Seed Freedom

A Global Citizens' Report

Co-ordinated by Navdanya

SEED FREEDOM

A GLOBAL CITIZENS' REPORT

Navdanya

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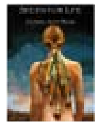

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FOREWORD

The need for a report for Seed Freedom grew out of the process of our collective writing on the state of GMOS in 2011: The GMO Emperor Has No Clothes. To create food and agriculture systems that are chemical free and GMO free, we need to begin with the seed.

At the local level, hundreds of communities, networks and organizations and millions of seed keepers and seed defenders are saving seeds, working to protect and keep seeds free and fighting laws that undermine our seed sovereignty. However, at the global level it is the corporate control that is shaping the future of the seed. We are determined to change this by joining forces through creating a Global Citizens Alliance for Seed Freedom and 'connect the dots' of the many voices around the globe to add strength to the movement to keep seed free. The report is a first step towards building this alliance.

The Seed Freedom campaign aims to alert people, communities, institutions and governments of the serious risk to the future of the world's seed and food security and what must be done to reverse it.

Our first objective is self empowerment of citizens who are aware that they have the power to liberate the seed and themselves.

Our second objective is to have empowered citizens put pressure on Governments and institutions to roll back Patents on Seeds and Seed Laws that rob us of Seed Freedom. These include the White House, EU, WTO and National Governments. Corporations like Monsanto through the government of the US is imposing laws for seed slavery and seed dictatorship worldwide.

Our third objective is to reclaim our democracy and through our democratic institutions and processes from the local to the global level, pass Laws for Seed freedom.

The report has been written through a participatory process by over a 100 individuals, communities, networks and organizations. It takes stock of the erosion of seed and seed sovereignty and the deepening seed emergency. It combines stories from seed savers with those from seed defenders. It captures both the history of past initiatives for liberating the seed as well as creative alternatives which are shaping a future beyond monocultures and monopolies towards diversity and the commons.

We realize that there are many individuals, grassroots organizations and networks engaged in the vital work of liberating the seed whom we do not yet know. We hope through the process of building our movement globally we will reach out to each other and strengthen our common work and be the change we want to see.

Dr. Vandana Shiva
Ruchi Shroff
Caroline Lockhart

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The Seed Keeper

Burn our land
burn our dreams
pour acid onto our songs
cover with saw dust
the blood of our massacred people
muffle with your technology
the screams of all that is free,
wild and indigenous.
Destroy.

Destroy
our grass and soil
raze to the ground
every farm and every village
our ancestors had built
every tree, every home
every book, every law
and all the equity and harmony.

Flatten with your bombs
every valley; erase with your edicts
our past
our literature; our metaphor
Denude the forests
and the earth
till no insect,
no bird
no word
can find a place to hide.
Do that and more.
I do not fear your tyranny
I do not despair ever
for I guard one seed
a little live seed
That I shall safeguard
and plant again.

(Palestinian poem)

INTRODUCTION

SEED FREEDOM - WHAT IS AT STAKE

Dr. Vandana Shiva

Seed is not just the source of life. It is the very foundation of our being. For millions of years, seed has evolved freely, to give us the diversity and richness of life on the planet. For thousands of years farmers, especially women, have evolved and bred seed freely in partnership with each other and with nature to further increase the diversity of that which nature gave us and adopt it to the needs of different cultures. Biodiversity and cultural diversity have mutually shaped one another.

Today, the freedom of nature and culture to evolve is under violent and direct threat.

The threat to seed freedom impacts the very fabric of human life and the life of the planet.

Seed keepers, farmers and citizens around the world have joined together as a Global Citizens Alliance for Seed Freedom to respond to this Seed Emergency and to strengthen the movement for the freedom of humanity. The Global Alliance for Seed Freedom is the start of a global campaign to alert citizens and governments around the world on how precarious our seed supply has become and, as a consequence, how precarious our food security has become.

Seeds are the first link in the food chain and the repository of life's future evolution.As such, it is our inherent duty and responsibility to protect them and to pass them on to future generations. The growing of seed and the free exchange of seed among farmers has been the basis to maintaining biodiversity and our food security.

Navdanya was started 25 years ago to protect our seed diversity and farmer's rights to save, breed, and exchange seed freely, in the context of the emerging threats of the TRIPS Agreement (Trade Related Intellectual Property Rights Agreement) of the World Trade Organization (WTO) which opened the door to the introduction of GMOS, patents on seed and the collection of royalties. A Monsanto representative later stated "In drafting these agreements we were the patient, diagnostician, physician all in one". Corporations defined a problem - and for them the problem was farmers saving seed. So they offered a solution, and the solution was the introduction of patents and intellectual property rights on seed, making it illegal for farmers to save their seed.

Seed as a common good became a commodity of private seed companies, traded on the open market.

Today, the threat is even greater. Consider the following:

- The last twenty years have seen a very rapid erosion of seed diversity and seed sovereignty, and the rapid concentration of control over seed by a very small number of giant corporations
- Acreage under GM corn, soya, canola, cotton has increased dramatically.
- Besides displacing and destroying diversity, patented GMO seeds are also undermining seed sovereignty, the rights of farmers to grow their own seeds and to save and exchange seed.
- In countries across the world, including in India, new seed laws are being introduced which enforce compulsory registration of seed, thus making it impossible for small farmers to grow their own diversity, and forcing them into dependency on giant seed corporations.
- genetic contamination is spreading - India has lost its cotton seeds because of contamination from Bt. Cotton, and Mexico, the historical cradle of corn, has lost eighty percent of its corn varieties, and these are but two instances of loss of local and national seed heritage.
- After contamination, Biotech Seed Corporations sue farmers with patent infringement cases. More than 80 groups came together recently in the US and filed a case to prevent Monsanto from suing farmers whose seed had been contaminated.

- As farmer's seed supply is eroded, and farmers become dependent on patented GMO seed, the result is indebtedness. Debt created by Bt. Cotton in India has pushed farmers to suicide.
- India has signed a U.S. /India knowledge Initiative in Agriculture, with a representative of Monsanto on the Board, and states are being pressurized to sign agreements with Monsanto. An example is the Monsanto Rajasthan memorandum of understanding (MOU) under which Monsanto would obtain Intellectual Property Rights on all genetic resources as well as research on seed carried out under the MOU.After a campaign led by Navdanya and a "Monsanto Quit India" Beeja Yatra (Seed Pilgrimage) with relentless protests by farmers forced the government of Rajasthan to cancel the MOU. Monsanto influence on the US Government and the joint pressure of both on governments across the world is a major threat to the future of seed and the future of food.
- Wikileaks exposed the US government's intentions to proliferate the use of GMOs in Africa and Pakistan. Pressure to use GMOs imposed by US government representatives is a direct effort to support giant biotech business and to expand their markets.
- For the ballot initiative on GMO labeling in the US, corporations led by Monsanto are pouring millions of dollars to prevent citizens from exercising their right to know and right to choose.

These trends demonstrate a total control over the seed supply and a destruction of the very foundation of agriculture. The disappearance of our biodiversity and of our seed sovereignty is creating a major crisis for agriculture and food security around the world.

We are witnessing a SEED EMERGENCY at a global level. Determined action is called for before it is too late.

The assault on Seed

A reductionist, mechanistic science and a legal framework for privatizing seed and knowledge of the seed reinforce each other to destroy diversity, deny farmers innovation and breeding, enclose the biological and intellectual commons, create seed monopolies.

Farmers varieties have been called land races, primitive cultivars. They have been reduced to a "genetic mine" to be stolen, extracted and patented. Not only is the negation of farmers' breeding unfair and unjust to farmers, it is unfair and unjust to society as a whole.

-Industrial breeding has been based on strategies to sell more chemicals, produce more commodities and make more profits.

The High Yielding Varieties (HYV) of the Green Revolution were in reality High Response Varieties, bred to respond to chemicals. Hybrids are designed to force the farmer to the market every season, since they do not breed true. "Yield", focusing on the weight of a single commodity is an inappropriate measure. Commodities do not feed people - they go to producing bio-fuel and animal feed. Quantity empty of quality, and weight empty of nutrition does not provide nourishment. Beginning with the false assumption that farmers' varieties are "empty", industrial corporate breeding gives us seeds and crops that are not only nutritionally empty, but loaded with toxins.

The rendering invisible of the diversity that seeds farmers have bred began with the so called 'Green Revolution' The Green Revolution narrowed the genetic base of agriculture, encouraging monocultures of rice, wheat and corn. Varieties bred for response to chemicals were declared Miracle Seeds and High Yielding Varieties (HYVs).

Industrial breeding has used different technological tools to consolidate control over the seed - from so called HYVs , to hybrids, genetically engineered seeds, "terminator seeds", and now synthetic biology. The tools might change, but the quest to control life and society does not.

What I have called the "Monoculture of the Mind" cuts across all generations of technologies to control the seed.

- While farmers breed for diversity, corporations breed for uniformity.
- While farmers breed for resilience, corporations breed vulnerability.
- While farmers breed for taste, quality and nutrition, industry breeds for industrial processing and long distance transport in a globalized food system.

Monoculture of industrial crops and monocultures of industrial junk food reinforce each other, wasting the land, wasting food, and wasting our health.

The privileging of uniformity over diversity, of the quantity over quality of nutrition, has degraded our diets and displaced the rich biodiversity of our food and crops. It is based on a false creation boundary which excludes both nature's and farmers' intelligence and creativity. It has created a legal boundary to disenfranchise farmers of their seed freedom and seed sovereignty, and impose unjust seed laws to establish corporate monopoly on seed.

Whether it be breeders rights imposed through UPOV 91, or Patents on Seed, or Seed Laws that require compulsory registration and licensing, an arsenal of legal instruments are being invented and imposed undemocratically to criminalize farmers seed breeding, seed saving and seed sharing.

Every seed is an embodiment of millennia of nature's evolution and centuries of farmers' breeding. It is the distilled expression of the intelligence of the earth and intelligence of farming communities. Farmers have bred seeds for diversity, resilience, taste, nutrition, health, and adaption to local ago-ecosystems. Industrial breeding treats nature's contributions and farmers' contributions as nothing.

Just as the jurisprudence of Terre Nullius defined the land as empty, and allowed the take over of territories by the European colonies, the jurisprudence of intellectual property rights related to life forms is in fact a jurisprudence of Bio Nullius - life empty of intelligence. The Earth is defined as dead matter, so it cannot create. And farmers have empty heads so cannot breed.

The TRIPS Agreement and the ethical dimension

The deeper level at which the Seed Emergency is undermining the very fabric of life is the ethical dimension of this issue. We are all members of the earth family, a steward in the web of life. Yet corporations who claim legal personhood, are now claiming the role of creator. They have declared seed to be their "invention", hence their patented property. A patent is an exclusive right granted for an "invention", which allows the patent holder to exclude everyone else from, making, selling, distributing and using the patented product. With patents on seed, this implies that the farmers' right to save and share seed is now in effect defined as "theft", an "intellectual property crime".

The door to patents on seed and patents on life was opened by genetic engineering. By adding one new gene to the cell of a plant, corporations claimed they had invented and created the seed, the plant, and all future seeds which have now become their property. In other words GMO meant God Move Over.

In defining seed as their creation and invention, corporations like Monsanto–shaped the Global Intellectual Property and Patent Laws so that they could prevent farmers from seed saving and sharing. This is how the Trade Related Intellectual Property Rights (TRIPs) Agreement of the World Trade Organization was born. Article 27.3(b) of the TRIPs Agreement states: "Parties may exclude from patentability plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and micro-biological processes. However, parties shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof." Again, this protection on plant varieties is precisely what prohibits the free exchange of seeds between farmers, threatening their subsistence and ability to save and exchange seeds amongst one another.

The TRIPS clause on patents on life was due for a mandatory review in 1999. India in its submission had stated "Clearly, there is a case for re-examining the need to grant patents on lifeforms anywhere in the world. Until such systems are in place, it may be advisable to:- (a) exclude patents on all lifeforms;"

The African group too stated "The African Group maintains its reservations about patenting any life forms as explained on previous occasions by the Group and several other delegations. In this regard, the Group proposes that Article 27.3(b) be revised to prohibit patents on plants, animals, micro-organisms, essentially biological processes for the production of plants or animals, and non-biological and microbiological processes for the production of plants or animals. For plant varieties to be protected under the TRIPS Agreement, the protection must clearly, and not just implicitly or by way of exception, strike a good balance with the interests of the community as a whole and protect farmers' rights and traditional knowledge, and ensure the preservation of biological diversity."

This mandatory review has been subverted by governments within the WTO: this long overdue review must be taken up to reverse Patents on life and Patents on Seed.

Life forms, plants and seeds are all evolving, self-organized, sovereign beings. They have intrinsic worth, value and standing. Owning life by claiming it to be a corporate invention is ethically and legally wrong. Patents on seeds are legally wrong because seeds are not an invention. Patents on seeds are ethically wrong because seeds are life forms, they are our kin members of our earth family.

The world view of Bio Nullius - empty life - unleashes violence and injustice to the earth, to farmers, and to all citizens. The violence of the Earth is rooted in both the denial of the creativity and the rights of the Earth as well as in the displacement of diversity.

Biopiracy

The violence to the farmers is three fold. First, their contribution to breeding is erased and what farmers have co-evolved with nature is patented as an innovation. We call this "biopiracy". Patents on life are ~~a~~ the hijacking of biodiversity and indigenous knowledge; they are instruments of monopoly control over life itself. Patents on living resources and indigenous knowledge are an enclosure of the biological and intellectual commons. Life forms have been redefined as"manufacture", and "machines", robbing life of its integrity and self-organization. Traditional knowledge is being pirated and patented unleashing this new epidemic of biopiracy. To end this new epidemic and to save the sovereignty and rights of our farmers it is required that our legal system recognizes the rights of communities, their collective and cumulative innovation in breeding diversity, and not merely the rights of corporations.

Secondly, patents lead to royalty collection which is simply extortion in the name of technology and improvement. If the first colonization based on Terre Nullius gave us land lords and "Zameendari" who pushed 2 million people to death during the Bengal Famine, the new bio imperialism based on Bio Nullius has given us life lords - the biotechnology/seed/chemical industry which have pushed 260,000 India farmers to suicide. In Brazil, farmers have been fighting against seed giant Monsanto, most recently filing a lawsuit hoping to sue the company for over 6 million euros on the grounds that the company has been unfairly collecting royalties from the farmers. The seeds Monsanto has been collecting royalties on, are from what are known as 'renewal' seed harvests, meaning that the seeds have been collected from the previous harvest, a practice used for centuries. But, because these seeds are from Monsanto's genetically modified plants, they are demanding that farmers pay. Not only are these royalties unfairly enforced, but they are pushing farmers deeper into debt that they cannot pay back, leaving them floundering in their fields of failed genetically-modified crops.

Thirdly, when the genetically engineered crops contaminate neighboring farmers' fields, the "polluter pay" principle is turned on its head and corporations use patents to establish the principle of "polluter gets paid". This is what happened in the case of Percy Schmeiser in Canada, and thousands of farmers in the U.S.

Owning and controlling life through patents and intellectual property rights was always the primary objective. Genetic engineering was the gateway to patents. Now, the corporations are taking patents on conventionally bred and farm-saved seeds.

During the first 'Green Revolution' (1950s/'60s), farmers breeding was neglected. During the second 'Green Revolution' (1990s) the biotech industries pushed for seed totalitarianism. Farmers' breeding is being criminalized. In 2004, an attempt was made to introduce a seed law in India which would require the compulsory registration of farmers' varieties. A Seed Satayagraha was started - the law has not yet passed… Satayagraha (Force of the Truth) was Gandhi's word for not cooperating with unjust laws. It means force of truth. Gandhi said "as long as the superstition exists that unjust law must be obeyed, so long will slavery exist."

We need to globalize noncooperation with unjust Seed Laws. This is at the core of the movement for Seed Freedom. The Stories of Seed Freedom are stories of courageous and creative individuals and organizations who are challenging unjust laws.

Patents on seed are unjust and unjustified. A patent or any intellectual property right is a monopoly granted by society in exchange for benefits. But, society has no benefit in toxic, non-renewable seeds. We are loosing biodiversity and cultural diversity, we are loosing nutrition, taste and quality in our food. Above all, we are loosing our fundamental freedom to decide what seeds we will sow, how we will grow our food and what we will eat. Seed as a common good has become a commodity of private seed companies, that unless protected and put back in the hands of our farmers', is at risk of being lost forever.

Resistance to unjust Seed Laws through the Seed satyagraha is one aspect of Seed Freedom. Saving and sharing Seeds is another aspect. That is why Navdanya has worked with local communities to reclaim seed diversity and seed as a commons by establishing more than 100 community seed banks. Across the world, communities are saving and exchanging seeds in diverse ways, appropriate to their context. They are creating and re-creating freedom-for the seed, for seed keepers, and for all life and all people.

When we save seed, we also reclaim and rejuvenate knowledge-the knowledge of breeding and conservation, the knowledge of food and farming. Uniformity as a pseudo scientific measure has been used to establish unjust IPR monopolies on Seed. And IPR monopolies reinforce monocultures. Once a company has patents on seeds, it pushes their patented crops on farmers in order to collect royalties. Humanity has been eating thousands upon thousands of (8500) plant species. Today we are being condemned to eat GM corn and soya in various forms. Four primary crops - corn, soya, canola and cotton have all been grown at the cost of other crops because they generate a royalty for every acre planted. For example, India had 1,500 different kinds of cotton, now 95% of the cotton planted is GMO Bt Cotton for which Monsanto collects royalties. Over 11 million hectares of land are used to cultivate cotton for which 9.5 million hectares of this land is used to grow Monsanto's genetically modified Bt variety. Corn is cultivated on over 7 million hectares of land, but of this area 2850,000 hectares are used for a 'High Yielding Variety' corn. Soya now covers an area of approximately 9.95 million hectares, and canola now comprises approximately 6.36 million hectares. This mass shift towards the cultivation of these crops not only threatens the diversity of other crops, but threatens the health and wellbeing of natural resources such as the soil, as this monoculture approach to farming drains the earth of its nutrients.

To break out of this viciousness of monocultures and monopolies, we need to create virtuous cycles of diversity and reclaim our biological and intellectual commons.

Participatory breeding of open source seeds, and participatory framing of open source rights are innovations that deepen seed freedom.

Seed Freedom has beIntroductioncome an ecological, political, economical and cultural imperative.

If we do not act, or have a fragmented and weak response, species will irreversibly disappear. Agriculture and the food and cultural spectrum dependent on biodiversity will disappear. Small farmers will disappear, healthy food diversity will disappear, seed sovereignty will disappear, and food sovereignty will disappear.

By speaking and acting strongly in one voice in defense of seed freedom as the Global Citizens Alliance, we can put the obscenity, violence, injustice and immorality of patents on seeds and life behind us. Similarly, in another period slavery was made a thing of the past. Just as today corporations find nothing wrong in owning life, slave owners found nothing wrong in owning other humans. Just as people back then questioned and challenged slavery, it is our ethical and ecological duty and our right to challenge patents on seeds. We have a duty to liberate the seed and our farmers. We have a duty to defend our freedom and protect open-source seeds as a commons.

This Global Citizen Report on Seed Freedom is a kernel/seed that we hope will multiply and reproduce until no seed, no farmer, no citizen is bonded, colonized or enslaved.

Photo Courtesy: Manlio Masucci

25 years of Alliances for Seed Freedom

Tewolde, Martin Khor, Mohd. Idris, Prof. Nunjundaswami Dr. Vandana Shiva 1993.

Dr. Regassa Feyissa of Ethiopia with Dr. Vandana Shiva discussing seed sovereignty and farmers rights at a Conference in Delhi 1996.

Michel Fanton, Dr. Vandana Shiva, Bernard and Vijaylakshmi at the Seed Gathering at Navdanya 1998.

Signatures being handed to the WTO at the HK ministerial 2005 Alejandro Iara (WTO Deputy Director General), Vandana Shiva (Navdanya/RFSTE), Susan Susan George (ATTAC France) and José Bové (Confederation Paysanne).

Planting a Neem Tree as a celebration of the Neem Biopiracy victory with Wangari Mathai in 2001.

Dr. Vandana Shiva, Blanche Magarinos-Rey, Fabian Pacheco, Dominique Guillet at the Kokopelli Pachamama festival in Peru, 2012.

SEED

I was born here, mother earth
I do not know my age, because it was so long ago.
I have many names, but you can call me seed.
I am immortal and my knowledge and spirit has existed through generations.
I am old and my protective shell represents the strength and power
to provide life and
Survive hardships and time.
Mankind is young, there are many a things I can teach them
But listening is, not their strength.
I am now living in the robot age, the human technology age
Where man believes that he can replace me with machines.
The robots are called, GMO and hybrid seeds like they have the right
to carry the name seed.
I cakle, I watch
Times are tough and are getting tougher, but I will survive
While the GMO robots fall like flies.
I have tried to tell mankind, I am unique, I am a survivor
But as I said their young and listening is not their strong point.

Barbara Hachipuka Banda
Natural Agriculture Development Program Zambia
Rio+20 - June 2012

SEED
The Embodiment of Cultural Diversity

Navdanya

Seed is the first link in the food chain. Seed is the ultimate symbol of food security. Free exchange of seed among farmers has been the basis of maintaining biodiversity as well as food security. This exchange is based on cooperation and reciprocity. A farmer who wants to exchange seed generally gives an equal quantity of seed from his field in return for the seed he gets.

Free exchange among farmers goes beyond mere exchange of seeds; it involves exchange of ideas and knowledge, of culture and heritage. It is an accumulation of tradition, of knowledge on how to work the seed. Farmers gather knowledge about the seeds they want to grow in the future by watching them grow in other farmers' fields. This knowledge is based on the cultural, religious, gastronomic, drought and disease resistance, pest resistance keeping and other values that the community accords to the seed and the plant it produces.

Paddy, for example, has religious significance in most parts of the country, and are an essential component of most religious festivals. The Akti festival in Chattisgarh, a centre of diversity of the Indica variety of rice, reinforces the many principles of biodiversity conservation. In the South, rice grain is considered auspicious or Akshata. The priest is given rice, often along with coconut, as an indication of religious regard.

Akti Ceremony Offering Seeds as commons

Other agricultural varieties whose seeds, leaves, or flower form an essential component of religious ceremonies include coconut, betel leaves, areca nut, wheat, finger and little millets, horsegram, blackgram, chickpea, pigeon pea, sesame, sugarcane, jackfruit seed, cardamom, ginger, bananas, gooseberry.

New seeds are first worshipped and then only they are planted. New crop is worshipped before being consumed. Both the festivals before sowing seeds as well as the harvest festival, which are celebrated in the fields, symbolize people's intimacy with nature. For the farmer, the field is the mother; worshipping the field is a sign of gratitude towards the earth, who as mother, feeds the millions of life forms who are her children.

Festivals like Ugadi, Ramanavami, Akshay Trateeya, Ekadashi, Aluyana Amavase, Naga Panchami, Navaratri, Deepavali, Rathasaptami, Tulsi Vivaha, Compasrsti and Bhoomi Puja cannot be celebrated without religious ceremonies around the seed. Seed festivals include those, which are related to identification of which seed to grow, its germination, and its other aspects. The seed is also considered and worshipped as Dhanalakshmi (or the goddess of wealth).

Seed is a gift of Srushtikarta(Brahma the creator), who created seeds in the primordial time. The Puranas refer to people getting *fala* by worshipping gods through religious sacrifices like yagya , or yagas. In the case of complete extinction of any one form of matter, the people performed samudra manthana(churning the ocean) to get it back.

All forms of nature are believed to interact and influence one another, be they of this earth, or of space. This interaction and influence is often reflected in the linking of cosmic influence is often reflected in the linking of cosmic influence of plants and stars to life forms on earth. The Navadhanyas (or the nine seeds) and their respective Navagrahas(nine cosmic influences) are:

1. Yava (barley) represents Aditya(sun)
2. Shamaka (little millet) represents the moon, and is responsible for the stimulation for the controlling of the nervous system.
3. Togari (pegion pea) represents Mangala (Mars), which is responsible for the controlling of the nervous system.
4. Magda (Mung) represents Budha(Mercury) and stimulates intelligence.
5. Kadale (chickpea) represents Brihaspati(Jupiter).
6. Tandula (rice) represents Shukra(Venus)
7. Til (sesame) represents Shani(Saturn) and is characterized by oil
8. Maasha (black gram) represents Rahu
9. Kulittha (horse gram) represents Ketu

Seed keeping was an intrinsic part of the life of agricultural communities everywhere. Sharing of seed exemplified a way of life, which viewed with reverence all life. In such a worldview, the farmer did not arrogate to himself/herself the right to own or manipulate another life forms, but saw his/her role as that of a custodian, of steward of the agricultural diversity abounding in nature.

In the present context, where new agricultural technologies have disrupted traditional lifestyles and destroyed numerous species and knowledge about them, and where control over seed is shifting from the community to the individual through the notion of seed ownership for private profit, seed keepers are a special people who have chosen to keep alive their culture, their tradition and their knowledge by conserving seed, the personification of their way of life.

Seed, for the Navdanya conservation initiative, represents the accumulation over centuries of people's knowledge and, by being a reflection of the options available to them, it represents their choice.

In today's context of biological and ecological destruction, seed conservers are the true gifters of seed. The gift or 'dana' of the Navadhanyas (nine seeds) is the ultimate gift-it is a gift of life, of heritage and continuity. Conserving seed is thus more than merely conserving germplasm. Conserving seed is conserving biodiversity, conserving knowledge of the seed and its utilization, conserving culture, conserving sustainability.

THE FORGOTTEN MESSAGE IN A SEED

Shumei International*

Today we are facing an agricultural crisis. We have lost understanding of our relationship with seeds and have come to regard them as commodities to be tampered with and changed at will, without considering the long-term impact. Just as we have lost the understanding of our place in the natural world, we as a society no longer recognize the sacredness of seeds. We have forgotten that nature instinctively balances the natural elements so that the seed and the soil can complement one another to stimulate growth without human interference.

The seed is the source of life, deemed a sacred gift by many traditions. It contains within itself all the necessary elements to grow into crops that provide the nutrients essential to sustain us. Unlike manipulated seeds, natural seeds carry within them a life force and purity that contribute to the vitality and health of the crops they produce and the food we eat. Likewise, indigenous seeds and local varieties of crops possess a natural ability to adapt to regional climates, soil and local environments, passing this knowledge onto the next generation of seeds. Imprinted by nature, the seed contain a blueprint for reproducing itself again and again over a great span of time and for millennia, humanity has respected and appreciated this gift.

Our current approach to industrialized agriculture carries with it a mindset that is contrary to nature. We are continuously trying to manipulate and control seeds and with it we are jeopardizing our food source and our planet. While we recognize the increasing food demands of a growing world population and the challenges of a changing climate, it is clear that agriculture has both the potential to damage or support our environment, affecting food security and life as we know it. There is probably no issue more critical than the health of our global agricultural system. For the survival of humanity, we must transition to more sustainable agricultural practices and leave behind those that contribute to the pollution of water and the soil through excessive use of fertilizers and chemicals, the loss of biodiversity, the predominance of monocultures and the reliance on fossil fuels, which exacerbates green house gas emissions.

Just as agriculture is intrinsically linked to the environment, agricultural productivity is linked to poverty reduction and development. We need a form of development in harmony with nature. We need a shift in our thinking about development. There are alternatives to depending on the new seed technologies and innovations used by the large agricultural corporations. Instead of putting all of our faith in genetically modified organisms (GMO), we can take a path toward sustainable development by empowering millions of small-scale farmers in developing and industrialized nations to be self-sufficient. We can encourage and revitalize a traditional farming culture that is more nature based – one that relies on an intuitive understanding of the natural elements and emerges from listening, respecting and responding to the workings of nature. We can encourage consumers to eat healthy, local and seasonal produce unmanipulated as nature intended. This way we can have a chance to change course and save this planet we call our common home.

The future lies with small-scale farmers and sustainable agriculture that provides true ‘sustainability’ through agro-ecological methods. Natural seeds play a critical role in the transition to more sustainable farming practices through natural seed collection and zero-input agriculture. Natural seed collection is a vital practice to safeguard traditional local varieties and crop diversity that have a superior immune system, a stronger root system and a natural resistance to infestation and climate fluctuations that cause floods and droughts. The crops from natural seeds will reproduce more resilient and better quality seeds each year, unlike ‘terminator’ seeds, which do not reproduce, or conventional seeds which decrease in quality over time. This approach spares the farmer the expense of having to rely on outside inputs, chemicals and fertilizers. It also reduces the farmer's dependence on store-bought 'miracle' seeds, which have been designed to require other additives in order to function.

The use of natural seeds and seed saving are core components of Natural Agriculture. Natural Agriculture recognizes that seeds are the central component of life and a starting point for understanding nature. The founder of Natural Agriculture, Mokichi Okada said, "Nature can teach us everything." In nature, seeds, soil, water, air and sun and the natural ecosystems of living organisms, micro-organisms and insects work together in harmony. The way we understand the seed is the way we must seek to understand the laws of nature and view nature as our partner, rather than seeking to manipulate or control it.

In Natural Agriculture there is an overriding respect for nature in all that we do. Therefore, Natural Agriculture is more than a method of food production that promotes zero-input techniques. It is a way of life that restores our relationships with the environment and enables both farmers and consumers to understand and care for nature, to be part of the growing process and all the elements involved. It both teaches and demonstrates the profound interconnectedness of humanity and nature. When we have this understanding, we realize that the purity and quality of the food we eat is intrinsically linked to the purity and quality of the seeds, soil, water, air and environment in which our food was grown.

The growing of food without chemicals and fertilizers takes patience and it means believing in the power of nature and the importance of the natural seed. Pure, unmanipulated seeds are essential to preserve the integrity of the environment and to preserve our own health. Cultivating respect and gratitude for nature begins with the seed and working in harmony with the natural world. It affects the way we as individuals produce, distribute and consume food, energy and natural resources. By doing so, we can create an environmentally sustainable system of food production and distribution. The message in the seed reminds us of our role in the web of life and that nature can teach us everything.

**Shumei International, promotes natural agriculture, a way of farming based on a deep respect and regard for nature that begins with the growing of crops. A philosophy and way of life that encompasses the way we eat, cook and think about food. www.shumeiinstitute.org/.*

Message from Venerable Prof. Samdong Rinpoche

Seed is universe and the universe is in the seed. This was the basic world-view of most of the various oriental spiritual and philosophical traditions. This view has been expressed in different idioms and methodologies. The basic principle of causality or the principle of the changing and continuity is based on such view.

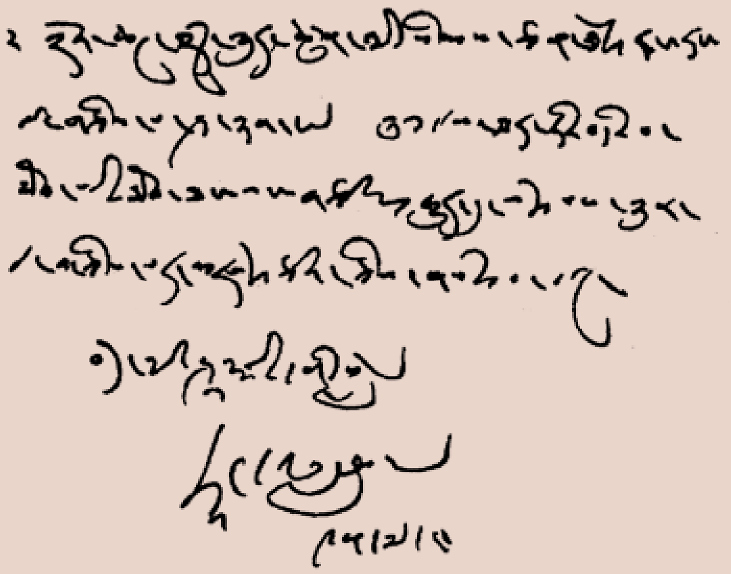
Seed is maturity. Seed is essence. Seed is potential. Seed is possibility. Thus, the seed is source of life and hope. Seed is the final judgment of right and wrong, positive or negative. In the world of material, the seed plays such an important role in creation, in sustainence, in changing and in continuum of all living things. Evolutionary processes or revolutionary processes equally need the seed without which nothing can happen.

Similarly, in the inner journey, the seed is the self. The bondage and freedom, the happiness and suffering are all governed by its seed. Therefore, to eradicate the impurity in the seed is the only path to achieve freedom and enlightenment in all religious traditions. Even in Mantrayana, the seed mantra (Beej mantra) is most important and foundational mantra of all the mantras.

It is thus, that I deeply appreciate all those who work in agriculture, who take care of the preservation and promotion of pure and uncontaminated seeds of all kinds, on which, the food and health security of future living beings are entirely depend upon. Through their efforts, the future of spirituality can also be insured in the unpolluted planet earth.

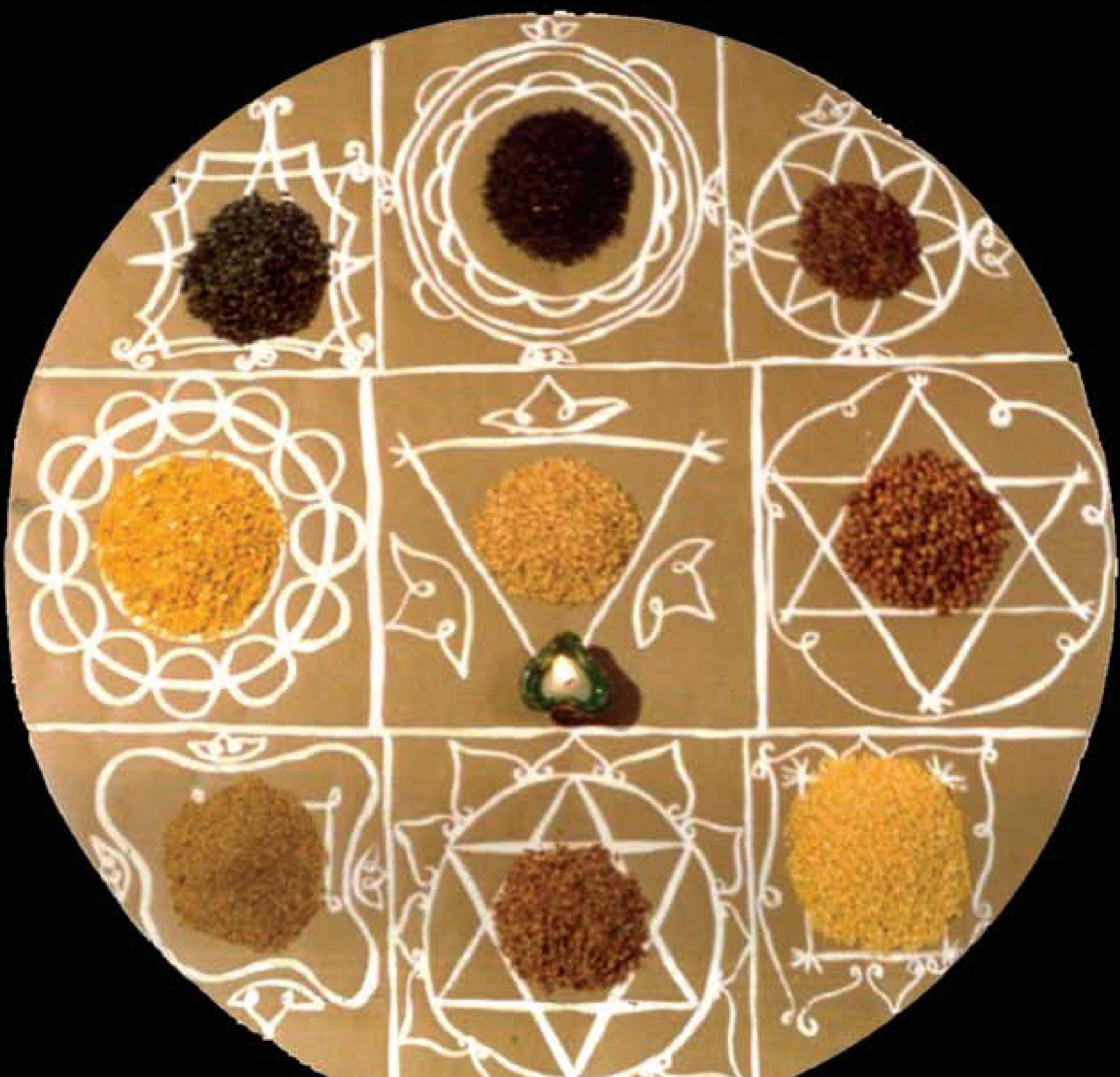
Prof. Samdhong Rinpoche
Former Prime Minister of the Tibetan Government in Exile

Message from His Holiness The Dalai Lama



All sentient beings, including the small insects, cherish themselves.
All have the right to overcome suffering and achieve happiness.
I therefore pray that we show love and compassion to all.

Message to Dr. Vandana Shiva by
His Holiness the Dalai Lama on the occasion of
His 60th birth anniversary, July 4th 1995



FROM MONOCULTURES TO DIVERSITY

FROM MONOPOLIES TO COMMONS

CENTER OF ORIGIN

The **center of origin** is a geographical area where a group of organisms, either domesticated or wild, first developed its distinctive properties.[1] Centers of origin are also considered centers of diversity.

Vavilov centers

Nikolai Ivanovich Vavilov (source wikipedia)

A **Vavilov Center** (aka **Vavilov Center of Diversity**) is a region of the world first indicated by Dr. Nikolai Ivanovich Vavilov to be an original center for the domestication of plants.[3] Vavilov developed a theory on the centers of origin of cultivated plants. He stated that plants were not domesticated somewhere in the world at random but there are regions where the domestication started. The center of origin is also considered the center of diversity. Until today Vavilov centers are regions where a high diversity of crop wild relatives can be found, representing the natural relatives of domesticated crop plants.

World centers of origin of Cultivated Plants[4][5]

Center	Plants
1) South Mexican and Central American Center	Includes southern sections of Mexico, Guatemala, Honduras and Costa Rica. **Grains and Legumes:** maize, common bean, lima bean, tepary bean, jack bean, grain amaranth **Melon Plants:** malabar gourd, winter pumpkin, chayote Fiber Plants: upland cotton, bourbon cotton, henequen (sisal) **Miscellaneous:** sweetpotato, arrowroot, pepper, papaya, guava, cashew, wild black cherry, chochenial, cherry tomato, cacao.
2) South American Center	62 plants listed; three subcenters ***2) Peruvian, Ecuadorean, Bolivian Center:*** **Root Tubers:** Andean potato, Other endemic cultivated potato species. Fourteen or more species with chromosome numbers varying from 24 to 60, Edible nasturtium **Grains and Legumes:** starchy maize, lima bean, common bean **Root Tubers:** edible canna, potato **Vegetable Crops:** pepino, tomato, ground cherry, pumpkin, pepper **Fiber Plants:** Egyptian cotton **Fruit and Miscellaneous:** cocoa, passion flower, guava, heilborn, quinine tree, tobacco, cherimoya
	2A) Chiloe Center (Island near the coast of southern Chile) Common potato (48 chromosomes), Chilean strawberry ***2B) Brazilian-Paraguayan Center*** manioc, peanut, rubber tree, pineapple, Brazil nut, cashew, Erva-mate, purple granadilla.
3) Mediterranean Center	Includes the borders of the Mediterranean Sea. 84 listed plants **Cereals and Legumes:** durum wheat, emmer, Polish wheat, spelt, Mediterranean oats, sand oats, canarygrass, grass pea, pea, lupine **Forage Plants:** Egyptian clover, white clover, crimson clover, serradella Oil and Fiber Plants: flax, rape, black mustard, olive **Vegetables:** garden beet, cabbage, turnip, lettuce, asparagus, celery, chicory, parsnip, rhubarb, Ethereal Oil and Spice Plants: caraway, anise, thyme, peppermint, sage, hop.

4) Middle East	Includes interior of Asia Minor, all of Transcaucasia, Iran, and the highlands of Turkmenistan. 83 species **Grains and Legumes:** einkorn wheat, durum wheat, poulard wheat, common wheat, oriental wheat, Persian wheat, two-row barley, rye, Mediterranean oats, common oats, lentil, lupine **Forage Plants:** alfalfa, Persian clover, fenugreek, vetch, hairy vetch **Fruits:** fig, pomegranate, apple, pear, quince, cherry, hawthorn.
5) Ethiopia	Includes Abyssinia, Eritrea, and part of Somaliland. 38 species listed; rich in wheat and barley. **Grains and Legumes:** Abyssinian hard wheat, poulard wheat, emmer, Polish wheat, barley, grain sorghum, pearl millet, African millet, cowpea, flax, teff **Miscellaneous:** sesame, castor bean, garden cress, coffee, okra, myrrh, indigo.
6) Central Asiatic Center	Includes Northwest India (Punjab, Northwest Frontier Provinces and Kashmir), Afghanistan, Tadjikistan, Uzbekistan, and western Tian-Shan. 43 plants **Grains and Legumes:** common wheat, club wheat, shot wheat, peas, lentil, horse bean, chickpea, mung bean, mustard, flax, sesame **Fiber Plants:** hemp, cotton **Vegetables:** onion, garlic, spinach, carrot **Fruits:** pistacio, pear, almond, grape, apple.
7) Indian Center	Two subcenters ***7) Indo-Burma:*** Main Center (Hindustan): Includes Assam and Burma, but not Northwest India, Punjab, nor Northwest Frontier Provinces, 117 plants **Cereals and Legumes:** rice, chickpea, pigeon pea, urd bean, mung bean, rice bean, cowpea, **Vegetables and Tubers:** eggplant, cucumber, radish, taro, yam **Fruits:** mango, orange, tangerine, citron, tamarind **Sugar, Oil, and Fiber Plants:** sugar cane, coconut palm, sesame, safflower, tree cotton, oriental cotton, jute, crotalaria, kenaf **Spices, Stimulants, Dyes, and Miscellaneous:** hemp, black pepper, gum arabic, sandalwood, indigo, cinnamon tree, croton, bamboo. ***7A) Siam-Malaya-Java:*** statt Indo-Malayan Center: Includes Indo-China and the Malay Archipelago, 55 plants **Cereals and Legumes:** Job's tears, velvet bean **Fruits:** pummelo, banana, breadfruit, mangosteen **Oil, Sugar, Spice, and Fiber Plants:** candlenut, coconut palm, sugarcane, clove, nutmeg, black pepper, manila hemp.
8) Chinese Center	A total of 136 endemic plants are listed in the largest independent center **Cereals and Legumes:** e.g. broomcorn millet, Italian millet, Japanese barnyard millet, Koaliang, buckwheat, hull-less barley, soybean, Adzuki bean, velvet bean **Roots, Tubers, and Vegetables:** e.g. Chinese yam, radish, Chinese cabbage, onion, cucumber F**ruits and Nuts:** e.g. pear, Chinese apple, peach, apricot, cherry, walnut, litchi, Sugar, Drug, and Fiber Plants: e.g.sugar cane, opium poppy, ginseng camphor, hemp.

Source: http://en.wikipedia.org/wiki/Center_of_origin

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THE LOSS OF CROP GENETIC DIVERSITY IN THE CHANGING WORLD

Tewolde Berhan Gebre Egziabher and Sue Edwards*

1. Introduction

Crop genetic diversity has not been evenly distributed throughout the cultivated parts of the world. Needless to say that it cannot exist in the non-cultivated parts except in the trivial sense of it having been taken there to be consumed or stored. Owing to inherent environmental diversity of particular areas of the world coupled with the history of agricultural development in relation to those areas, there have been hot spots of crop domestication and genetic diversification. These crop genetic diversity hot spots have come to be called Vavilov Centres to honour the Russian scientist who first identified 8 of them. Subsequent scientists have tended to think that, though such centres can indeed be identified, they are more than 8, and that, more importantly, crop domestication and diversification has been geographically more diffuse than initially thought to have been.[1,2] Many complex reasons are now causing a fast reduction in crop genetic diversity even in the Vavilov Centres.

2. Globalization and Crop Genetic Diversity

The accelerating increase in communication is mixing ideas, technologies, cultures and even people throughout the world. This process seems to be taking us towards one homogenous global culture. However complex this evolving global culture might turn out to be, it is inevitable that we will have lost much of the content of our erstwhile diversity in the process of achieving it. We have already witnessed a high level of attrition in our crop genetic diversity[3]. And yet, the very process of globalization is changing the world's environment, thereby increasing the need for crop genetic diversity to adapt agriculture to the changing farm conditions. If human survival into the indefinite future is to be assured, the globalizing humanity has to put all its efforts into the increase of crop genetic diversity, rather than fatalistically accept the accelerating decrease.

The southern parts of Europe constitute a part of the Mediterranean Vavilove Centre. This is now part of the industrialized world, also often referred to as the global North. The rest of the industrialized world is relatively unimportant as a source of crop genetic diversity. All the other important Vavilove Centres are in the developing world, also referred to as the global South. The problems of conserving crop genetic diversity are, therefore, geographically problems of the developing world though, of course, the erosion of crop genetic diversity concerns the whole of humanity. Because of these and related reasons, the difficulties in the actions that are required to maintain crop genetic diversity remain intimately linked to the problems of development that the South is facing in this era of globalization. The fact that globalization is led by the North while crop genetic diversity is mostly in the South marginalizes the causes of failure to protect this diversity and thus confounds the difficulties in the actions that need to be taken even when there is a global will to do so. Usually, in fact, there is insufficient national, let alone global, will to take all the needed action. And yet, the very process of globalization, which is exacerbating the erosion of crop genetic diversity, is also making that very diversity essential for the continuation of human wellbeing into the future. Though like all futures this particular one is uncertain, at least one facet is becoming clear?climate is changing[4], and a commensurate increase in crop genetic diversity is required for adapting to that change.

In the 2nd half of the 20th century, many scientists and scientific institutions realized that the world's future food supply was in danger because of crop genetic erosion and that something had to be done. The simplistic action was to store in gene banks the crop genetic diversity that would have disappeared otherwise. There are now globally many gene banks which are trying to save as much crop genetic diversity as they can.[5] But their problems are many,[6, 7] and their success has thus been limited.[8, 9] The most recent and most tantalizing quick fix arose in the form of genetic engineering that promised to synthesize any desired crop variety in the laboratory. But some of the thus newly synthesized varieties emerged with unforeseen problems.[10] The evidence for the complication of agricultural systems because transgenes from crops can get incorporated in the genomes of wild relatives through cross-pollination and thus, for example, make some weeds pernicious, is even more plentiful in scientific literature.[11,12] For these reasons genetically engineered crop varieties have now become highly controversial in many parts of the world.

In many parts of the developing world, for example in Ethiopia,[13] there are vibrant farming communities that are still increasing crop genetic diversity, both through breeding new farmers' varieties of existing crops, and through domesticating altogether new crop species. However, when the whole trend is considered, erosion is far greater than generation of crop genetic diversity even within the developing countries in Vavilov Centres, let alone globally.

3. Industrial Agriculture and Crop Genetic Diversity

The strategy used in industrial agriculture, also often referred to as the green revolution, is based on irrigation and chemical fertilizer to provide a homogenous environment [14] so that a crop variety selected for the purpose produces an evenly high yield throughout the cultivated land. In this way, crop varieties that had been adapted to the diversity of environmental conditions that had existed in an area prior to its coming under industrial agriculture are being eliminated. The resulting extensively grown monocultures become susceptible to disease and pest epidemics.[15] Soil erosion also increases[16], and much land is lost owing to salinization.[17, 18]

4. Intellectual Property Rights Regimes and Crop Genetic Diversity

Most of the crop varieties currently under cultivation are protected by intellectual property rights. Some of them are, in fact, patented. This makes for a one-way track of availability of crop varieties from the small holder farmers of developing countries to companies which are mostly in industrialized countries. This one-way flow is making access to crop genetic diversity from developing countries difficult especially to those very developing countries that gave rise to it in the first place. This is especially true of patenting.[19]

5. Changes in Food Habits and Crop Genetic Diversity

Globalization has induced a tendency towards uniformity in eating habits. A report prepared for the United Nations Environment Programme (UNEP) states that although about 7000 species of plants have in the past been used as human food, urbanization and marketing have now reduced them. Only 150 crops are now commercially important, and rice, wheat and maize alone now account for 60% of the world's food supply. The genetic diversity within each crop has also been eroding fast. For example, only 9 varieties account for 50% the wheat produced in the United States of America and the number of varieties of rice in Sri Lanka has dropped from 2, 000 to less than 100.[20]

Partly as a reaction to the erosion of crop genetic diversity and more because of a growing realization that industrial agriculture pollutes the environment and is, in the long run, unsustainable, the organic movement is now growing globally. This will help slow the erosion of crop genetic diversity. However, as far as the limited current experience tells us, the organic movement that is being generated by the globalizing world is not making sufficient linkages with the local community farming that has as yet not been swallowed up by the process of globalization. And yet these 2 sectors have commonalities and they could strengthen each other.

6. Genetic Engineering ' Not a Universally Accepted Source of Crop Genetic Diversity

Genetic engineering, often referred to as "biotechnology", started with an aggressive propaganda claiming that it will create new varieties that would solve all agricultural problems. The propaganda swayed even the United Nations Organization. In 2001, the United Nations Development Programme wrote, "Biotechnology offers the only or the best 'tool of choice' for marginal ecological zones.... home to more than half of the world's poorest people...."[21] . But, no varieties of significantly wide distribution that increase agricultural production compared to their non-genetically engineered counterparts have so far been produced through genetic engineering.[22] On the negative side, unexpected impacts that harm human and animal health, agriculture and the environment have been encountered in some genetically modified crop varieties.[23, 24, 25] But then, this was anticipated and that is why we now have the Cartagena Protocol on Biosafety to help avoid adventurism in the application of genetic engineering in agriculture and in other sectors. However, the major producers of genetically modified crops, e.g. U.S.A. and Canada, are not parties to the Protocol.

There are reports of biopharming with transgenic crops? planting crops genetically modified to produce pharmaceuticals or other chemicals ? in the U.S.A.[26] This means that we face a future when food crops are likely to be permanently contaminated with medicines or even other chemicals through cross-pollination with the varities planted for biopharming. It is conceivable that we could lose some crops totally because of mishaps that end up in extensive cross-pollination of this nature. The fact that the countries where biopharming is being developed are mostly not parties to the Cartagena Protocol on Biosafety complicates the problem.

7. Ethical Considerations

It is now clear, however, that globalization is eroding crop genetic diversity faster than ever. Climate change, a product of the very process of globalization, is also changing the environment faster than ever[27]. To continue feeding ourselves and to enable future generations to feed themselves, agriculture must keep adapting to the changes in environment as fast as they occur. To be sure that agriculture can keep changing as fast as it must, we need more crop genetic diversity than we ever had. If we stop atmospheric pollution immediately, the Earth's climate will still change though it would probably stabilize after some time. Even if we were to be able to stop polluting the atmosphere immediately, therefore, we would still need as big a crop genetic diversity as we can muster. This makes it necessary for us to conserve all the crop genetic diversity that we have as well as regain in full the capacity to generate crop genetic diversity that we have partly lost in the last 100 years. We must, therefore:

7.1. fund sufficiently existing gene banks and build new ones as needed for *ex - situ* crop genetic diversity conservation

- a) to keep all existing unique collections ensuring that they are all always viable and accessible for breeding;
- b) to regenerate all existing unique collections without genetic drift changing their unique identities;
- c) to make new unique collections before they disappear for good;

7.2. foster the growing organic movements to make their agricultural production systems crop genetic diverse so as to match the environmental diversity of the land that is under cultivation;

7.3. foster the establishment of mutually supportive linkages between the primarily subsistence farming communities in the South and the growing commercial organic farms which are primarily in the North for developing agricultural systems suited to the diversity of environments so as to maximize both production and crop genetic diversity.

7.4. consciously foster, including through subsidies when required, the *in-situ* conservation of crop genetic resources by organic farmers, both primarily subsistence and commercial, both in the North and in the South;

7.5. help organic farmers, both commercial, primarily in the North, and subsistence in the South, in research and development for maximizing both crop genetic diversity and yields in the diverse environmental conditions of the changing Earth ? this is needed also because agrochemicals are getting expensive with time owing to rises in petroleum prices, and industrial agriculture may soon become not affordable anywhere;

7.6. condemn as immoral the patenting of crop varieties because the process sucks in crop genetic diversity from primarily subsistence farming communities but restricts the resulting varieties into circulating only among the rich, especially when natural cross-pollination passes patented genes from genetically modified crop varieties to non-modified varieties;

7.7. declare Article 27.3 (b) of TRIPs as immoral;

7.8. make biopharming using food crops a criminal offence; and reduce biopharming with non-crop plants to the minimum to protect the environment, and even then, use it under strictly contained conditions to ensure environmental safety.

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www.isd.org.et

Footnotes

[1]Plenderleith, Kristina, 1999, "Traditional agriculture and soil management", in Posey, Darrell A., (ed), **Cultural and Spiritual Values of Biodiversity,** International Technology Publication: London for , and on behalf of, UNEP p. 317.

[2]Among many, Harlan, Jack R., J.M.J. De Wet and Ann Stemler, 1976, "Plant domestication and indigenous African Agriculture", in Jack R. Harlan, Jan M. J. De Wet and Ann B.L. Stemler (eds), **Origins of African Plant Domestication,** Mouton, Publisher: The Hague, p. 3-19, may be mentioned.

[3]Board on Agriculture of the National Research Council, 1993, **Managing Global Genetic Resources,** National Academy Press: Washington, D.C., p. 36 point out that this problem was already realized in the first half of the 20th. century.

[4]Meehl, G.A., T. F. Stocker, W. D. Collins, P. Friedingstein, A.T. Gaye, J. M. Gregory, A. Kitoh, R. Knutti, J. M. Murphy, A. Noda, S. C. B. Raper, 1. G. Watterson, A. J. Weaver & Z.-C. Zhao, 2007, "Global climate projections", In Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor & H. L. Miller (eds.) **Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,** Cambridge University Press: Cambridge, p. 747- 845.

[5]**Ibid.** , p. 85-116

[6]Tewolde Berhan Gebre Egziabher, 1993, "Modernization, science and technology, and perturbations of traditional conservation of biological diversity". Paper presented at the Biodiversity Convention Conference held Trondheim, Norway, 24-28 May 1993.

[7]Board on Agriculture of the National Research Council, 1993, **Op. Cit,** p.153-172.

[8]**Ibid**, p.27 & p. 322.

[9]Fowler, C, & P. Mooney, 1990, in their book **Shattering: Food, Politics and the Loss of Genetic Diversity,** The University of Arizona Press: Tucson, Arizona, have described in detail how much genetic erosion is occuring in gene banks.

[10]For example, **New Scientist,** 26 November 2005, has an editorial piece (p.3), and more detail under the title "Wheeze in a pod" (p.5), which report on the work of Australian scientists who developed a transgenic pea with genes from beans at the Common Wealth Scientific and Industrial Research Organization (CSIRO) over 10 years, and abandoned it because the transgenic pea became highly allergenic to mice and would presumably be allergenic also to humans.

[11]For example reference may be made to: Chévre, Anne Marie, Frederique Eber, Alain Baranger & Michel Renard, 1997, "Gene flow from transgenic crops", **Nature,** vol. 389, p. 924; and

[12]Mikkelsen, Thomas R., Bente Andersen & Rikke Bagger Jørgensen, 1996, "The risk of crop transgene spread", **Nature**, vol. 380, p. 31.

[13]For example**,** *Impatiens tinctoria*, a plant that used to be collected from the wilde for cosmetic purposes, is now being planted as a crop under small scale irrigation by many smallholder farmers in the mountain slopes of Southern Tigray because of the growing demand from urban women.

[14]Much has been written on this issue, e.g. Pretty, J.N., 1991, **Unwelcome Harvest,** Earthscan Publications Ltd.: London, p.17-369.

[15]Board on Agriculture of the National Research Council, 1993, **OP. Cit**., p. 36-37.

[16]World Resources Institute, United Nations Environment Programme and the World Bank, 1998, **1998-99 World Resources ? A Guide to Global Environment,** Oxford University Press: Oxford, p. 157, state that soil is now being eroded globally at a rate of 16 to 300 times more than the rate at which it is being formed. This is not to imply that stopping industrial agriculture would stop soil erosion. However, by making land that is losing both its soil structure and fertility keep producing food well because the crops are regularly given the high external fertilizer inputs that characterize industrial agriculture, awareness of the gravity of the problem is likely to be delayed until virtually all the soil has been eroded.

[17]Brown, L.R., and C. Flavin, 1997, **Vital Signs, 1997,** World Watch Institute: Washington D.C., p. 42 estimates this loss of land owing to salinization caused by irrigation to be 2 million hectares/year globally.

[18]Pretty, J. N., 1995, **Regenerating Agriculture,** Earthscan Publications Ltd.: London, p. 126-127 gives the lower estimate of 1.5 million hectares/ year being lost from salinization of irrigated land. In either case, the magnitude is frightening.

[19]Board on Agriculture of the National Research Council, **Op. Cit**, p. 23-25.

[20]Plenderleith, Kristina, 1999, **Op. Cit,** p. 287-323.

[21]United Nations Development Programme, 2001, **Human Development Report 2001,** Oxford University Press: New York, p. 35.

[22]Fernandez-Cornejo, J., & W.D. McBride, 2002, **Adoption of Bio-engineered Crops, ERS Agricultural Economic Report AER 810**, used data collected by USDA surveys to compare yields of genetically modified and non-modified crops and found that, in most cases, the yields from the genetically modified crops were lower. This is not to imply, however, that under industrial agriculture, the lower yielding modified crops are necessarily economically inferior. For example, a herbicide tolerant lower yielding genetically modified crop growing in a large farm could be economically superior since spraying the herbicide can be cheap compared to hand or even mechanical weeding. But industrial agriculture is unsustainable, see section 2.

[23]Freese, Bill, Policy Analyst of the Friends of the Earth, in 2002 distributed a 10-page report on this under the title, **Manufacturing Drugs and Chemicals in Crops.** He states that maize, soybean, tobacco and rice were being used in biopharming. He reports of biopharming field trials in Nebraska, Hawaii, Puerto Rico, Wisconsin, Iowa, Florida, Illinois, Texas, California, Marylan and Indiana.

HOW SEED LAWS CRIMINALIZE DIVERSITY & FARMERS' FREEDOMS

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The Official Catalogue : From Stopping Fraud to Criminalizing Diversity

Jean-Marie Hubac spent numerous weeks deciphering, analyzing and classifying all agricultural decrees passed since the beginning of the last century. The 1st part of this article, regarding the origin of the cultivated plants' catalogue, is partly extracted from a study done by Jean-Marie in 2000 about the confiscation of ancient/heirloom varieties under the pressure of some organisations which led to the closing of Terre de Semences (the World of Seeds). Jean Marie Hubac was one of the first to draw attention to the patent, self-proclamatory characteristic which defines the whole sphere of agricultural "legislation". Jean Piecre Berlan, research director at INRA, has stressed the very same self-proclamatory characteristic present in the sphere of the modern agricultural "technicity"/modern agriculture based on technological fixes.

Origin of the cultivated plants' catalogue decree of the 5th December 1922. (J.O. of the 8th December, 1922, p:11167)

Its objective was to establish a register of selected plants, supervised by a control committee. At that time, the register only dealt with "the patenting of a species or of a new variety" as well as with the conditions under which the depositor can claim "exclusive usage of the given denomination".

On the 26th March 1925, (J.O. of the 29th March, 1925, P: 3189-3191) a decree, instituting a selected plants' register and entitled to "Suppression of frauds in the commerce/trade of wheat seeds", is adopted. The preliminary report clarifies that this decree must be adopted because dishonest traders are duping buyers "by throwing in the seed market ordinary seeds which through a well brought out advertisement are fraudulently given the name and qualities of reputed varieties or which are falsely claimed to be newly selected varieties, having exceptional qualities." So, this is a plants' register which spells out, through its various articles, the conditions for registering and the steps to be taken in case a fraud is suspected. The idea to be noted here is that of falsification.

The decree of 16th November 1932 (J.O. of the 19th November 1932, p:12006-12067) proceeds "to institute a catalogue of plants' species and varieties and a register of large scale cultivation selected plants" and thus adds a new notion to the suppression of frauds, that of the protection of patents.

In fact, article 12 of this decree very clearly spells out the conditions for registration:

"Art: 12: the mention "species or variety", which is entered in the selected plants register is the exclusive property of the novelty claim obtainer. He can only establish it after the final registration. The trade of seeds, tubers, bulbs, grafts or cuttings of a registered plant is subject to the express authorization of the claimant."

All the notions above essentially talk about protecting plant patents.

To achieve this, it was necessary to put controlling institutions into place.

The GNIS (Groupement National Interprofessionnel des Semencas: National Interprofessional Seed Groupement) was created on the 11th October 1941 under the Law No.14194, which was completed by the Law No.383 on the 2nd August, 1943. On the GNIS site it is mentioned that the present form of this body dates 1962 whatever be the claim, GNIS was very much created by the Marshell Petian government, in 1941.

The CTPS (Permanent Technical Committee for Selection) was created by the decree No.594 of 24th February, 1942. It seems that in the beginning the powers of the CTPS were limited to the selection and control of wheat qualities.

It is interesting to note that the creation of these two institutions dates back to a disturbed, not to say dubious, period of French History; actually it coincides with the period when the Order of Doctors (Ordre des Medecins) and the Order of Pharmacists (Ordre des Pharmaciers) (with the subsequent suppression of medical degrees for homeopaths and herbalists) were created. And the SPU, Department of Plant Protection (Service de Protection des Vigitaux) turns these two bodies (1st mentioned) into a police force against plants'. Can these be coincidences?

What is certain today is that the same multinationals (of living sciences) control at the same time pharmaceuticals, agro-toxics, seeds and Genetic Modification (transgenics).

In 1961, professionals create UPOV (Union pour la Protection des Obtentions Variétales: Union for the protection of Variety Patents).

1981 sees the adoption of Decree 81-605 of 18th May 1981, enforcing the law of the 1st August 1905, regarding frauds and falsifications with regards to products and services in the case of trade of seeds ad plants (J.O. of 20th May, 1981). Article 5 of this decree stipulates that "the Minister of Agriculture holds a catalogue which comprises the closed list of varieties or varietal types the seeds plants of which "can be marketed" in the national territory. The registration in the catalogue requires three conditions: that the variety should be distinct, stable and sufficiently homogenous."

Let us not forget that this decree "has been adopted for the enforcement of the law of the 1st August 1905, regarding frauds and falsifications in the matter of products and services, in the case of trade of seeds and plants."

Are we here facing a strategic break?

Actually, the direct link between an officially closed catalogue of varieties and the crime of fraud or falsification regarding patents/obtentions is not very clear. In fact we are here in front of an inevitable and deceitful deviation. The State started legislating in order to protect "plant patents" and ended up putting into place catalogues banning the trade and therefore the agricultural usage of non-registered varieties; and the registration of varieties that cannot be registered) because they did not conform to the norms of "distinction, homogeneity and stability" (DHS).

All these *reeks* of déjà vu. Infallible dogmas are proclaimed (homogeneity, stability, heterosis, genetic determination, monogenetic resistance, outdated heirloom/ancient varieties, out of fashion former seeds, ecological agriculture incapable to feed the world etc.); decrees are adopted; inquisitions are set up with full powers; and the indomitable are accessed.

1. The Official Catalogue: a barometer of genetic erosion

During the symposium on Farmers' Seeds of Auzeville, the General Director of GNIS, Philippe Gracien, considered it as necessary to release a press memorandum which tells us that: "The results of these researches (those of the seed industry) are remarkable: in France itself, while from 1950 to 1975 only 91 new varieties were offered to farmers and therefore to consumers, from 1975 to 2000, 3244 new varieties were created, in other words 35 lines more."

For more details, we refer the reader to the precise analysis of the genetic erosion in the official catalogue, which we have done for each major food species.

The figure of 3244 new varieties is just a Big Fat Bluff!

1. These new "varieties" are but clones of each other. All responsible agronomists from France, USA and Canada agree in saying that "the genetical basis of all modern "varieties" is extremely restricted.
2. These new "varieties", (these clones) are only new for a few years and then they are put aside. In other words, the majority of varieties present in 2004 will no longer exist in 10 years.
   - Of the 320 wheat "varieties", registered in 2004, 82% are less than 10 years old.
   - Of the 400 tomato "varieties", registered in 2004, 75% are less than 10 years old.
   - Of the 1527 "varieties" of maize corn, registered in 2004, 88% are less than 10 years old.
   - Of the 400 "varieties" of lettuce, registered in 2004, 72% are less than 10 years old.

   We can see that only for these five species, the total of "varieties" (clones for the majority) registered in the 2004 catalogue is 2965!
3. Even though the internal logic of the DHS dogma is of scant interest to us, we can ask ourselves how this famous distinction is to be established in a field which would contain 1527 so called different clones of corn. The distinction must be allocated in the label!

   In the same memorandum, M. Gracien refers to the concentration of law in within the seed industry. We do not seek to share the same notions of concentration.

   - As of today, 5 seed companies control 75% of vegetable seeds worldwide.
   - o On the 106 heterozygote's clones (hybrids) of zucchini registered in the 2004 catalogue, 88 (i.e. 83%) are *de facto* the property of just 3 multinationals: Limagrain (62 clones), Monsanto (17 clones), and Syngenta (9 clones)

Undoubtedly, this signifies a concentrate of zucchini clones.

Let us now refer to the declarations of M. Wohrer, in a memorandum presented on the GNIS site, according to which the creation of modern varieties is a source of biodiversity. "The protection of biodiversity cultivated species is but a part emerged from biodiversity. In agriculture, biodiversity is not limited to a few ancient/heirloom varieties; for example there exist more than 3,500 potato varieties, both wild and cultivated, in the world. Genetic resources have been preserved since a very long time within the seeds network by selectors and specialized networks, which source from them interesting traits for varietal creation. This conservation requires colossal work from multidisciplinary scientists, diverse modes of conservation, accurate descriptions, and a rigorous follow up so that these genetic resources can be maintained and reproduced. The conservation of genetic resources requires technical skills that go beyond the work of a farmer. Finally, the permanent creation of new varieties out of these resources by enterprises, whose work this is selecting, contributes to enrich biodiversity."

We strongly oppose all these affirmations.

1. Cultivated species are not emerged part of biodiversity. Moreover, in the Western paradigm, the concept of cultivated species is very *limited*. Indeed, genetic erosion *is* happens not only at the *varietal level of varieties, it is also specific*. World Food Security depends only on twenty species which provide 95% of food calories whereas there are thousands of edible species on this planet.

2. Who has claimed that biodiversity is limited to a few *ancient/heirloom* varieties? The 3,500 varieties of potatoes referred to are also ancient varieties.

3. *Agricultural* biodiversity has, strictly speaking, no need of all the paraphernalia mentioned (colossal work, multidisciplinary scientists etc…). *Agricultural* biodiversity has been conserved in a lively way in farmers' fields since millennia.

   After having confiscated all these varieties and after having put them in deep freezers, it is absurd and too easy to pretend now that without modern technology one could not have been able to protect them.

4. It is totally wrong to assert that the farmer has no technical skill to conserve edible biodiversity. Once more, it is too easy to marginalize the farmer in his role of producer by confiscating his task of seeds' reproduction and then to claim that he does not know how to breed seeds. Agricultural biodiversity is a heritage of thousands of years of farmers' labour. The techniques and knowledge related to the reproduction of this biodiversity are also a heritage emanating from this labour. However, one cannot deny that the farmer does not have the capacity to manage the computerized creation of genetic chimera.

   In any way, the days of this type of killer agriculture are counted and it is a blessing that the farmers have stayed away from the development of this necro-technology. So, at least, they do not bear the direct responsibility for this.

5. There is eventually no permanent creation of new varieties which contributes to enrich biodiversity. This is a total hoax.

   - Modern varieties are only clones (and are not varieties!!)
   - Only a very small part of agricultural biodiversity is used to create these clones!

- Here is an example for maize. In Western Europe, especially in France, most of the hybrids have a toothed American parent, the other is a horned European. The inventory of horned, early fruitions European varieties can be done very quickly, as it is restricted mostly to the Laccanse population of the Tarn and the Garonne[1]; it is from them that Andre Canderson and Lascols, selectors of Inra sourced the two lines F7 & F2 in the early fifties. They are present in most of the early fruiting varieties of maize in Northern Europe, singly or together. In 1981, Hallaquer brought out the fact that out of the 129 races of maize that are described, each regrouping several tens of populations, three are used, i.e. about 2%.
- The explosion of maize cultivation, subsequent to the discovery of hybrids, has undoubtedly improved production but has created new problems: genetic uniformity, absence of variability and loss of material. This gradual loss is usually called genetic erosion but the term proposed by Harlan, in 1972, this is of genetic erasure, seems more appropriate…" (p:223-224 of the book Fabuleux of J.P. Gang).
- Here is another example, concerning soya. In July 2000 in Illinois, an agricultural station of the USDA, the Ministry of Agriculture of the USA (in partnership with the University of Illinois) introduced new varieties of soya. Rondell Nelson, the Unit-in-Charge spoke as follows: "We have introduced this genetic matter to broaden the genetic base of soya cultivated in USA which is very narrow. The selectors have used less than 1% of the genetic resources available for soya to develop the varieties currently available."

- Here is another example concerning wheat. In Canada, according to agronomists, all cultivated wheat is said to originate from Red Fife. This legendary wheat, introduced in 1842, was sent from Ukraine, and in Ontario David Fife got 5 ears of which got eaten by a cow. This was the reproduction wheat used to develop the Macquins and Thatele varieties, which dominated the market during the first half of the 20th Century. Two ears of wheat are thus the genetic ancestors of a majority of wheat cultivated in North America.
- Here is one more example concerning cucumber. The Dutch selectors went very far in the process of genetic erosion. They created non-bitter varieties from a genetic base which, to say the least, was narrow: in fact during a cribblege of 15,000 plants, they discovered a plant of the English "Long green improved" variety, with non-bitter fruits. All modern varieties without bitterness originate from this single plant.
- Here is another example regarding potato. First of all, we need to clarify that the CIP of Line has identified more than 5,000 varieties of potatoes from nine different species of Solanum. In Latin America, there are also 226 species of non-cultivated potatoes. The case of the potato regarding the aspect of a very restricted genetic base is exemplary:

a) In the State of Idaho, which is the main potato producing State of USA, the Russet Burbank variety (developed by Luther Burbank in 1871) covered 74% of the surface under autumn potato cultivation.

b) In Belgium, in the State of Flanders, in 2000, the Binjte variety covered 77% of the surface under potato cultivation. Let us remind, the Binjte variety was developed in 1905.

In the 2000 catalogue, 190 varieties of potatoes are listed. The Luther Burbank variety gives us a good example of an ancient variety which, though used in mono-culture, has held its way!

Another hoax which we must now reveal is the assertion that the official catalogue is not a source of genetic erosion because there are still ancient varieties.

Let us see the situation for some species. Here too, we once more refer the reader to the section of the genetic erosion of each species.

- Tomatoes: In 1995: 87% of heterozygotous clones and 2% of ancient varieties (grec). In 2004: 96% of heterozygotous clones and 1% of ancient varieties.
- Cucumbers: In 1995: 83% of heterozygotous clones and 10% of ancient varieties (grec). In 2004: 92% of heterozygotous clones and 5% of ancient varieties.
- Zucchini: In 1995: 84% of heterozygotous clones and 13% of ancient varieties (grec). In 2004: 92% of heterozygotous clones and 6% of ancient varieties.
- Cauliflower: In 1995: 41% of heterozygotous clones (green). In 2004: 78% of heterozygotous clones.
- Milan cauliflower: In 1995: 61% of heterozygotous clones (green). In 2004: 83% of heterozygotous clones.
- Cabus cauliflower: In 1995: 64% of heterozygotous clones (green). In 2004: 82% of heterozygotous clones.

At this rate, within 10 years all the ancient varieties would have disappeared from the catalogue and there would be only heterozygotous clones.

2. The Official Catalogue: a means of locking up

Jean-Pierre Berlon helps us to understand the two main routes which allowed multinationals to monopolize seeds and life forms at the global level. The technological route sterilizes life forms to stop them to reproduce in farmers' fields (heterozygotous clone, genetic chimera such as Terminator). The legal route puts a system into place which confiscates life forms through patents and other plant patenting certificates. There is yet a third way which is that of regulations. France is surely the country were seed is the most strictly controlled.

This regulatory locking-up is re-perpetrated in many ways: mandatory registration to the catalogue, certifications (standard seeds…), packing according to very strict specifications etc. Administrative harassment can take very variable forms and this must definitely be creating jobs!

The creation of an annex to the register "for heirloom varieties for amateur gardeners" (in December 1997) could have led us to believe that his system was becoming more flexible so as to allow the survival of ancient vegetable varieties. However, we were very rapidly disillusioned, given the extremely unreasonable conditions laid out for registration. According to them one had:

→ to pay the fee for a "half-right" (which was 1450 Euros then) **for each variety to the registered one**;

→ to prove the DHS (Distinction, Homogeneity, Stability);

→ to have them permanently in the experimentation field so that the state's controllers could exercise their prerogative of control; and

→ to use these seeds exclusively for amateur purposes.

The term "amateur" is not used in its etymological sense, that of loving (in latin). It refers to gardener. This clause, thus, stops every non-amateur vegetable grower to market heirloom-variety vegetables which are registered on the amateur list. Some years ago, there was even a tolerance for vegetable growers who were marketing "amateur" heirloom-variety plants. We still have not understood where they were supposed to find their seeds to produce the respective plants!

We must also clarify that this annex to the register was created on the request of the National Federation of Vegetable and Flower Seeds Professionals. This Federation had, through a letter dated 16th October 1998, invited Terre de Semences to regularize the "situation of ancient varieties which were not registered in the French Catalogue or the community's one."

It is this very same federation which saved Koko-Pelli association in 2004.

On the 23rd September 1999, M. Jean Wohre who was then in charge of the Section on vegetable plants, sent Terre de Semeces a letter on the letter head of GNIS:

"The mechanism which was developed in collaboration with the concerned producers and distributors now allows one to describe in an adequately precise manner these ancient varieties famously known for more than fifteen years and to allow the marketing of their seeds. We will thus participate in the conservation of a real bio-diversity while protecting seed buyers against false denominations.

In the absence of an immediate measure taken on your part, you will be liable to the saved according to the rules, post the controls undertaken by the Department of Concurrence and Repression of Frauds.

The mechanism referred to by M. Wohrer is in fact the 22 points form, set by UPOV for the distinction of varieties. As far as the heirloom varieties are concerned, this form is more like a gigantic force. For example, let us look at tomato, when it reaches maturity this fruit can be either red, yellow, orange or pink. What happens to varieties which are white, green, violet, black or multicolored? Regarding the size of tomatoes, it can be very small, small, medium, big, very big. What does very big mean? Under what do we classify tomatoes which are 500 gms, 900 gms or 1kg 400 gms?

If one was to follow the letter regarding the stipulations of his annex to the register, the ancient/heirloom varieties cannot be fitted in because it is impossible to talk of DHS in their case. Actually, what do homogeneity and stability mean in the case of ancient varieties?

In fact, Jean Pierre Belon rightly pointed out that even UPOV gave up an attempt to really define a variety. As far as the fact of proving that the varieties are notably known since more than 15 years, this work would require years of historical research in the case of very ancient varieties, considered more as "terror" varieties (belonging to a place) or family varieties, never proposed in a commercial catalogue.

Moreover, we do not understand what Mr. Wohrer means by "the conservation/preservation of a real biodiversity" and it is difficult to see how the non-registration of an ancient variety renders its preservation unreal?

Invoking the protection of buyers against false denominations is the justification of these regulations! Some also stated that this annex to be register would help to sanitize marketing. To what kind of sanitizing is here referred?

How can anyone dare to invoke the consumer's protection issue when modern agriculture, which is highly toxic, is destroying all ecosystems and is producing carcinogenic poision-food? Let us not even mention files that are too easily relegated to be sunk into oblivion: beet with hormones, mad cow disease, pigs fed with sewer water, drinking water which is unfit to be consumed, sewage mud used as manure. The list of agricultural nuisance is an endless one.

3. The Official Register: Serving whose interest?

If agro-technology is to continue to point out its delirious pursuits, the seed market will eventually be all clones and all patents. There will then be no need for ex-regulatory official register since all technical and legal locking up will be complete. In fact, this is exactly what one day an agent of the Fraud Suppression department confided to us, saying that his department was condemned to eventually pack up as self-control processes would have been setup for Industry and thus also for agro-industry.

Indeed, this is already an existing fact, since within the CTPS there are seed traders, including some very powerful multinationals, not to mention the GNIS (a gathering of interdisciplinary professionals!) whose employees are civil servants and of whom some are also agents of Oan of the Repression des Fraudes (Fraud Suppession body).

We are told, *ad nauseum*, again and again about the virtues of free exchange, liberalism (in all its hues) end even sometimes we are told of the virtues of a "free and undistorted competition."

So why a regulatory catalogue?

Why is there in France this determination to catalogue ancient varieties of vegetables (or cereals) and to eliminate them if they are not catalogued?

Why is the official catalogue maintained and applied in a very lax or whimsical way (not to say that it is not applied and maintained at all) in other countries of the European Community?

Is the nature of the French consumer such that she/he has to be protected from dangers (such as fraud, falsification, false denomination…), which cannot assail consumers of the other European Community countries?

Moreover, why is there no regulatory catalogue whatsoever, which is applied in North America, that is to say Canada and United States?

The situation (2004) in these two countries is as follows:

→ There are 274 seed companies, and thus 274 seed catalogues, which offer non hybrid varieties.

→ Those non-hybrid varieties number upto 8494 (Eight thousand Four Hundred and Ninety Four!)

In the USA and in Canada, there are no registers or no state bodies which can regulate the marketing of these non-hybrid varieties of which a sizable proportion is of ancient varieties (non-cloned ones)!

It is not my purpose here to laud an American agriculture, which besides this is the most undesirably toxic agriculture of the planet. We are indeed very aware that this agricultural liberalism - regarding ancient/heirloom varieties – is in contrast with the imposition of diktats that erase biodiversity and destroy traditional agriculture in Third World Countries. We just want to under-score the total freedom which seed producers in USA and Canada enjoy to promote and market ancient/heirloom varieties.

Why is our gentle France so different from other nations of the Northern hemisphere that such a hostile and regulatory climate exists with respect to ancient varieties of vegetables and cereals/grains? In fact we are inclined to think that for the past ten years, the consumer has exercised a vigilance which has enabled France not to sink totally into genetic modification. Civil Society has done a wonderful work in awareness creation so that France is not invaded by genetically modified cereals/grains, oleaginous plants and vegetables.

Activists (René Riesel, José Bové…) have gone to prison for having moved a few transgenic/genetically modified plants while the people (80% of them) do not want commercial plants which are genetically modified on their plate all the while agro-chemical multinationals are punitively poisoning the planet for decades now.

It is as if one was trying to exercise a ruthless genetic erosion with the help of ritual incantations; such as biodiversity, enhancement of heritage, conservation of vegetable species, management modes of genetic resources, etc..

Let us go back into history to shed light on some of the changes, twists and turns of the years from 1978 to 1980.

The Director of INRA, Jacques Poly, bets on biotechnology while in 1980 INRA goes under the co-administration of the Research Ministry. In 1982, this industry lauders a substantive program on biotechnology in which INRA plays a major role. The seventies are a period of deep crisis for INRA and some of its leaders start to question the productivist model.

Max Rivers, the Director of the Department of GAP (Genetics and Improvement of Plants), puts forward several criticisms against genetic engineering (and its sorcerer's apprentices as he calls head) and he underscores the limitations of the work on monogenic characteristics, such as their low agronomic interest and the bypassing of resistances. In this, his thought is in sync with the work of the Canadian agronomist Mcoul Robinson (author of the book Return to Resistance), who through his life time was dedicated to the selection of food plants through horizontal resistance, and who proved that the dogma regarding the supremacy of monogenics was a big hoax, one more.

However, it was the biotechnology steam that takes the upper hand in INRA leading to lesser and lesser agronomists in favour of molecular-biologists.

At the same time, in the early 1980s, several actors on the field start to roll back their sleeves to save the situation. These are small seed producers: Sylvia Schmidt of Bian Germe, Philippe Resbrosses of Sainte Marthe Farm, Philippe Banmoux who has an enormous catalogue at Nancy. These collector gardeners are too numerous to be all mentioned: Victor Renand, Jean and Coletted Achord, Nicole and Jean Bcphiste Prades, Gerad Brossette, Perre Bosgens, Angre' Halesse, Jean Grillause Daniel Andre, etc and then castles, Sundies St. Jean de Beanegard of Mrs de Cuel, Started opening their doors; exhibitions and fairs started to happen, such as the famous fair of cucurbitaceous plants in Tranzault under the influence of Jean Gubarg; all this had the perspective of putting the treasures of genetic resources into gardeners' hands.

The first symposium is organized at Angers in October 1985 on the following topic: "The diversity of vegetable plants: yesterday, today and tomorrow". During this symposium Mr. Andre Canderon, then Director of the Bureau of

Genetic Resources, said the following regarding adaptation of regulations: "…Regulations must not further aggravate the tendency to genetic erosion, nor must they be suspected of aggravating it."

Mr. Andre Canderon, then goes on to talk about the division of the diversity in the field, which he divides into four groups of plant material: 1) the varieties having a great economic impact; 2) the variation with a limited spread/diffusion! 3) the varieties which are of interest because of their ability to be parents; 4) Re material represented by wild forms.

He elaborates on two points in these terms: "Varieties of limited spread/diffusion: local agricultural role, super specialization niches; types suitable for the production of fruits, vegetables or flowers by amateurs, varieties having historical, folklorique etc. meaning.

The "secondary" varieties contribute to maintain a minimum of genetic, food and cultural diversity, which is desirable. However, each has a limited economic weightage: it would be too costly to impose upon them the same constraints as those upon big varieties. It would also be superfluous: when diffusion/spread is restricted, a simplified regulatory systems, custom mode, sometimes having a contractual element can be sufficient; the partners know each other well and guarantees need not be so high. Let us note that here amateurs and the whole community sector should play a big role."

This was in 1985. In December 1998, that is one year after the Ministry of Agriculture set the decree to open an annex to the registry for amateur varieties, the European Commission put out a directive 198/95 EC allowing member states to fix the special conditions/clauses regarding the marketing of seeds of varieties known as "conservation varieties", the varieties meant for organic agriculture and of mixtures of varieties.

The big advantage of this directive seems to be that it will provide a lot of flexibility concerning the DHS aspects, in fact to the extent that it may no longer be taken into account."

At the end of 2004, Mr. Londe, Member of Parliament of Eure, and former Minister drew the attention of the Minister of Agriculture on the case against the Kokopelli Association and on the implementation of the 98/95/EC directive. Part of the response of the Minister, (Published in the J.O. of the 21st December 2004) is hereby reproduced: "The 98/95/EC directive, which has been made national law in 2002, seeks to complete this general regulatory framework by putting into place steps specific to the marketing of seeds in the case of in situ conservation and sustainable usage of genetic plant resources. These steps are being currently discussed internally within the Commission…"

The Minister, then, goes on to talk about the annex to the register of 1997 which is "a real process of preservation of genetic resources available from vegetable plants." In short, we have more beautiful speeches while everybody throws the ball into each other's court and the management of this dossier/file is entrusted to CTPS, which is not known to work on behalf of a biodiversity managed by farmers, small organic seed producers and amateur associations.

In December 2003, spurred by juvenile madness, Kokopelli Association even proposed to the Ministry of Agriculture to register part of its "conservation "varieties in the catalogue", referring to the 98/95/EC directive. This could have been under the influence of a spell of blues. However, the agents of the Repression of Frauds department have always been extremely friendly, just as much as the police inspector for that matter. So, this letter was sent to GNIS and CTPS, to the Department of plant selection and to the Minister. Messrs Wohrer and Boulineau (on behalf of GNIS and CTPS) very obligingly responded to us by mail, inviting us to be in line with the annex to the register.

At the same time, Kokopelli Association was just awarded one of the four national prizes given by the National Young Chamber of Commerce, for economic innovation and humanitarian work done in the Third World. Kokopelli Association was thus one of the four national awardees, what an honour! It was, however, to be a virtual honour: a few days before the prize giving, to be held in Besancon, the prize was withdrawn, under some pressure… Isn't our democracy great?

Apparently discourses are completely contradictory. Thus, on the site of BRC (Bureau des Ressources Genetiques: Bureau of Genetic Resources), one can find an appeal, going back to 1998, directed to collectors to find ancient varieties of chicory and a notion that "this collection is available, exchangeable and liable to development"; on the other hand in 2004 an official in GNIS hold us in a very clear and peremptory manner, that the fact that gardeners exchange or give seeds was just a matter of "tolerance" on behalf of the authorities.

Does this clearly mean that it is not allowed to exchange or give seeds of vegetable varieties which are not registered in the official catalogue?

It even seems that some people don't even try to pretend that it would be important to give once more access to ancient varieties to gardeners. One of the BRG officials told us in no uncertain terms a few years ago that the production of "biodiversity was the job of the BRG and the gardeners could very well be content with a dozen/about ten varieties of tomatoes." (sic). In the same vein, we can find in one of the first chapters of the work History of Vegetables, (Edited by INRA) a few remarks which seem to us to be out of place regarding diversification theories, the cuisine of chefs, snobbery etc. We sometimes have the impression that for some people all these seems to be the whim of the rich and ordinary folks could just as well be content with what is put on their plate and in fact why not GMOs!

It would also seem that rich smoke screens are being set up to hide the reality of genetic erosion and the reality of the insidious introduction of GMOs in agriculture for human consumption's as well as for animal consumption. In January 2003, GNIS organized a symposium entitled "Seeds and biodiversity: from myths to reality", which was in fact an exercise in favour of GMOs.

The internet site of GNIS, in its pedagogical space, is a perfect example of the mixing of genres: pages on biodiversity and pages on GMOs, all coexist in perfect conviviality! It is a question of ducking the issue of transgenic. The AFCEU organized a second symposium on the theme of vegetable diversity in September-2005. One more, good speeches, great speeches, mystification but in reality a biodiversity which is shrinking away.

The June 2004 FAO treaty, co-signed by 48 countries, regarding the protection of food biodiversity is also a magnificent symphony to draw out all the cacophonous sounds such as huge in the world, loss of food biodiversity, invasion of GMOs in poor countries, destruction of traditional agricultures. It is indeed a very moving treaty! Biodiversity in the service of food security.

The official catalogue of GNIS or FAO

"FAO seems that around three quarters of agricultural genetic diversity has disappeared during the last century, and of the 6,300 animal species, 1,350 are threatened of extinction or are already extincted. Global efforts to conserve plants and animals in gene banks, botanical and zoological gardens are vital. However, it is essential that biodiversity is conserved on farms and in nature where it adapts to the evolving conditions or to the completion of other species. As custodians of biodiversity on the planet, farmers can improve and conserve local plants and trees and reproduce indigenous animals, ensuring thus their survival."

"Worldwide farmers possess an inestimable capital of local knowledge, refined to the point that they know perfectly how to match a variety or a race to a given agricultural ecosystem. These past years, the genetic resources of poor countries have been used for plant and animal selection, often without any benefits accruing to these countries."

"More than 40% of the emerged areas of earth are used for agricultural purposes, and this confers upon farmers a great part of the responsibility for the protection of biodiversity. Thanks to techniques such as agriculture without ploughing, a reduced usage of pesticides, the practice of organic agriculture and crop rotation, famers maintain the very fragile balance of their farms and the surrounding ecosystems."

All these declarations of the FAO seem to be totally contrary to the ones made by institutions such as GNIS. According to the FAO, biodiversity has disappeared! Farmers are the guarantors of the conservation of genetic resources; famers possess much knowledge enabling them to work for the adaption of varieties.

Let us continue our fight against the forces of inertia! If the nature of ancient vegetable and cereal varieties is such that they cannot be integrated into the present regulation (for lack of DHS), we could just as well suggest a change in regulations or the withdrawal of regulations. We would be even more inclined to eradicate the regulations instead of the ancient seed varieties.

Let us dare to dream about a human community sharing tomatoes without false denomination, lettuces without nitrates, maize without antibiotic, butter coming from the milk of cows feeding on good green grass, wheat without allergic gluten, carrots which would not have been irradiated, soya without glufosate.

Let us dare to dream about a community of gardeners and farmers sharing non-certified seeds, non-registered seeds, non-conforming seeds, non-treated seeds, non-irradiated seeds, non-catalogued seeds; in brief seeds full of the vigour of life and love in the likeness of seeds sown by farmers for thousands of people.

Let us dare to dream of a DHS stamped with humanity:

Diversity Humus Seeds.

Let us liberate Seeds and Humus!

We need to preserve some oases of seeds of life for the day which will see the agricultural titanic sink into the ocean of its varieties.

Dominique Guillet's contribution is translated from Semences de Kokopelli.

We thank Ms. Maya Goburdhun for the translation.

**Dominique Guillet. chairman-founder of the Association Kokopelli in Europe, created for the protection of food biodiversity and the production of seeds of Life. Its live collection of more than 2200 varieties of organic heirloom seeds is the most extensive in the world (not in the freezers but in the gardens and in the fields!) www.kokopelli-seeds.com*

Footnotes

[1]Gcc: to Andre Canderson, the Laccanse population, from where the F2 & F7 lines of the Inra originate, is actually made up of 2 maize plants in all)

SEEDS AND RIGHTS –
THE GRAMMAR OF FREEDOM

Carlo Petrini, Slow Food*

The debate on seeds, though periodically brought up in some news item, such as the recent judgement of the European Court on the marketing of traditional seeds not listed in the register, isn't widely circulated in Italy or elsewhere. It seems that public opinion, which is generally not very interested in anything related to agriculture but instead very interested in everything related to food, does not consider the two issues as being connected. It does not see the tight connection between seed and everything concerned with it, not just food but also the environment, the identity of territories, the rights of the community. And just as there is no debate, there is no literature, either scientific or for public distribution.

When in 2008 we published in the book series Terra Madre, the book "Seeds and Rights – The grammar of freedom "(Slow Food Editore) our authors became aware of how poor the bibliographical panorama at their disposal was. Slow Food began some 15 years ago, two major projects: the Ark of Taste, a catalog of products at risk of extinction, and the 'Presidia' initiative, the restoration and development of some of the products of the Ark. Both of these activities have an important link with the seed. And if the more theoretical aspect, that of description, cannot but contemplate the problem of the actual recovery of traditional seeds, the productive aspect immediately had to deal with the need to have access not only to the residual seeds of these products, but also to the skills - increasingly rare in industrialized countries - to reproduce them, store them, disseminate them. Today we can say that every Presidium, and across the world there are hundreds, is - in fact or potentially - a tiny germplasm bank: including Presidia that focus on products of animal origin and that with difficult can do without traditional fodder, or still need some kind of support (herbs for flavor, certain transformed ingredients).

To speak of seeds as a common good is important because seeds are information, skills, and culture. Discourse on the commons, and how the market should relate to them, is still too closed within specialist fields and this weakens its power and effectiveness. It is easier to raise attention, even in the media, when it comes to GMOs, in the same way it is easier to get attention when it comes to war than when it comes to how to build the conditions for maintaining peace. GMOs are designed for the market and therefore do not put it in crisis, do not force it to rethink itself, but on the contrary: regulations on GMOs, and more generally the regulations relating to the patenting of seeds, impose basically a foreign element to the market (a seed, a life, a common good) into the theoretical and procedural boxes created for other purposes, such as industrial goods or real property. In this climate of considerable disinterest by institutions and consumers for the element upon which our very survival depends, abuses and acts of blatant misconduct are possible, such as the planting of unauthorized GM maize Friuli (and for which Slow Food Italy has taken legal actions) and the misinformation that is continually conveyed through the general indifference.

We thus welcome the call to arms by Navdanya, the historical protagonist of the debate and the activities for the conservation of traditional seeds. Most welcome is this further step in strengthening a network which certainly exists, but that needs constant support, food and energy, to ensure that the seed is increasingly in the spotlight of those who deal with culture, health, law and economics.

We live in a world that cannot leave aside the market and its mechanisms, but the challenge is this: to create the conditions so that, instead of forcing every area of our existence into the narrow logic of a single and rigid market, ways are found to distinguish and protect, within the law and the market, elements that, because of their being essential for life, cannot be subordinated to the logic of profit.

**Carlo Petrini, founder of the International Slow Food Movement. www.slowfood.com*

CONCENTRATION OF THE SEED INDUSTRY

Pat Mooney, ETC Group*

The ETC Group has grown out of RAFI which wrote the first report on the law of the Seed to show the commercialization of the seed industry. ETC which stands for Erosion, Technology, Control has been monitoring the seed and chemical industry over the last 3 decades. The chemical industry started to take control over the seed industry with the emergence of the new biotechnologies. There is now a deeper and broader convergence across sectors to control all living resources on the planet.

The quest to secure biomass (and the technology platforms that can transform it) is driving corporate alliances and creating new constellations of corporate power. Major players include: Big Energy (Exxon, BP, Chevron, Shell, Total); Big Pharma (Roche, Merck); Big Food & Ag (Unilever, Cargill, DuPont, Monsanto, Bunge, Procter & Gamble); Big Chemical (Dow, DuPont, BASF); and the Mightiest Military (the US military).

The greatest storehouse of terrestrial and aquatic biomass are located across the global South, and they are safeguarded primarily by the peasant farmers, livestock-keepers, fisher people and forest dwellers whose livelihoods depend on them. In this context, it is necessary to strengthen the national laws to provide autonomous protection to the above mentioned sectors.

Seeds and Pesticides

Key Facts

- The global commercial seed market in 2009 is estimated at $27,400 million.
  The top 10 companies account for 73% of the global market (up from 67% in 2007).
- Just 3 companies control more than half (53%) of the global commercial market for seed.
- Monsanto, the world's largest seed company and fourth largest pesticide company, now controls more than one-quarter (27%) of the commercial seed market.
- Dow Agrosciences – the world's fifth largest pesticide company – made a dramatic re-entry on the top 10 seed company list in 2009 following a seed company-buying spree that included Hyland Seeds (Canada), MTI (Austria), Pfister Seeds (USA) and Triumph Seed (USA), among others.

The commercial seed sector is inextricably linked to the agrochemical market. Five of the top 6 agrochemical companies also appear on the list of the world's biggest seed companies, and the one that doesn't – BASF – has significant partnerships with the biggest players in seeds.BASF's longterm collaborations involve every major crop and include a project with Bayer CropScience to develop high-yielding hybrid rice varieties and a $2.5 billion R&D deal with Monsanto on stress-tolerance and yield in maize, cotton, canola, soybeans and wheat.

Technology Providers

Industry analyst Industry analyst Context Network describes the seed sector as having evolved "from a production/ niche product marketplace to a technology distribution marketplace."77 In other words, seeds are now like our cell phones and laptops – containers that deliver proprietary technologies. Up till now, those technologies have been variations on just two types of genetically engineered traits: one that tolerates the application of an herbicide (for weed control) and another trait that resists certain pests.

For the Gene Giants, climate change and the push to develop energy crops/feedstocks to fuel the bio-based economy offer irresistible market opportunities. Biotech's newest generation of proprietary seed traits focus on so-called climate-ready genes and GM traits that aim to maximize plant biomass.

Climate changing business plans

In 2008 ETC Group released its first report on Big Ag's efforts to monopolize genetically engineered, "climate ready" traits intended to withstand environmental (i.e., abiotic) stresses associated with climate change, such as drought, heat, cold, floods, saline soils, etc. Between June 2008 and June 2010, the Gene Giants and their biotech partners submitted at least 261 "inventions" related to climate-ready crops to patent offices around the world seeking monopoly protection.78 Just six corporations (DuPont, BASF, Monsanto, Syngenta, Bayer and Dow) and their biotech partners control 77% of the 261 patent families (both issued patents and applications).

In January 2011, Agrow World Crop Protection News published a review of recent patenting activity at the US Patent & Trademark Office (USPTO) related to plant biotechnology (March–December 2010).79 Their findings support ETC Group's conclusions: environmental stress tolerance and feedstock/bioenergy traits are the priority focus for biotech R&D (see chart below).

The most active patenting area, by far, is abiotic stress tolerance. Just 15 applications related to herbicide tolerance were submitted, for example, compared to 132 applications related to abiotic stress tolerance in plants. Just 4 Gene Giants and their biotech partners account for at least two-thirds (66%) of the patent applications related to climate ready crops. Energy crops or biomass/feedstock traits (i.e., altered lignin content and altered oil or fatty acid content) came in second with 68 applications.

Consolidation and Emerging Markets

The seed industry consolidation trend continues, with emerging markets – especially Africa – the most recent target. In 2010, Pioneer (DuPont) announced it intended to make its largest acquisition ever by buying South Africa's biggest seed company, Pannar Seed. Pioneer's purchase would have doubled its seed sales in Africa, giving it access to local germplasm as well as a foothold in 18 other countries on the continent where Pannar does business.80 Under pressure from activists – led by the African Centre for Biosafety and Biowatch – South Africa's Competition Tribunal nixed the deal in December 2010. Pioneer is appealing, contending that the Tribunal's decision is based on unfounded prejudices against GMOs and multinationals.81 The Tribunal will hear Pioneer's appeal in September/October 2011. The African Centre for Biosafety has pledged to keep fighting the deal and has launched an investigation into all seed holdings and licensing/cross-licensing deals in South Africa of DuPont's biggest rival, Monsanto.(Monsanto is South Africa's second biggest seed player;82 its engineered traits are present in an estimated 75% of all GM maize planted in South Africa.

Battle of Bullies

Meanwhile, back at HQ (USA), Monsanto and DuPont are slugging it out in court. Monsanto filed a lawsuit against DuPont in May 2009, alleging patent infringement for field-testing corn and soybeans with "stacked" traits (two or more engineered traits) involving Monsanto's herbicide-tolerant trait (which DuPont has been licensing from Monsanto since 2002) combined with its own herbicide-tolerant trait. DuPont fought back, suing Monsanto one month later for violating antitrust laws. The battle continues amid a US Department of Justice (DOJ) investigation into anti-competitive practices in agriculture. It remains to be seen whether the DOJ's investigation will result in any legal action to rein in the Gene Giant's oligopoly. Judging from the high-ranking biotech boosters in the Obama administration (see box), it's not easy to be hopeful on the anti-trust front.

Under fire at home and abroad, Monsanto is now downplaying its dominance in the world seed market. Brad Mitchell, Monsanto's Director of Public Affairs, told Organic Lifestyle Magazine in late 2009, "Monsanto's share of the total worldwide seed market is very small. Of the global seed market, it is estimated that greater than 80 percent is 'open source farmers seeds saved.

So, the commercial seed market is less than 20 percent and Monsanto's is a fraction of that 20 percent."84 Never mind that Monsanto and its top-ranking rivals spent the last 15 years attempting to wipe-out competition from seed-saving farmers – via lawsuits, monopoly patents and the development of genetic seed sterilization technologies (a.k.a. Terminator). For Monsanto and seed industry giants, the target markets are precisely those areas of the global South where farming communities are self-provisioning in seeds and where the largest remaining stocks of biomass are found. Meanwhile, DuPont – the world's 2nd largest seed firm – paints a very different picture of Monsanto's market dominance in seeds. In comments submitted to US antitrust investigators, DuPont points to Monsanto's monopoly in GM trait markets for herbicide-tolerant soybean (98 percent) and corn (79 percent). DuPont also notes that Monsanto, as "a single gatekeeper," has the power to raise seed prices and exclude competition.85 DuPont sees a clear need for at least one more corporate gate keeper!

The world market for agricultural chemicals in 2009 is estimated at $44,000 million.

- In 2009, the global market share of the Top 10 pesticide companies topped 90% for the first time.
- The top 6 companies, all of them sellers of proprietary (i.e.,patented) pesticides, account for over 72% of the agrochemical market. Those very same companies also play starring roles in the World's Top 10 Seed Companies.
- The off-patent pesticide companies (nos. 7-10) are shaking up the bottom half of the league table. Nufarm nudged ahead of Makhteshim-Agan in 2009; however, in June 2010 Makhteshim-Agan announced it would acquire Albaugh, the largest off-patent pesticide firm in the Americas (with close to one billion dollars in sales in 2009).

Monsanto Scientists Collaborate with Company Patent Attorneys to Develop Perfect Timing?

Monsanto's patent on the herbicide glyphosate (Roundup) expired in 2000, the same year the first known Roundup-resistant weed cropped up – a species of horseweed growing in a Delaware, USA field of Roundup Ready soybeans.86 A decade later, more than 130 types of "herbicide tolerant" weeds are growing in an estimated 11 million acres in the United States – the motherland of Roundup Ready soy. The Roundup Ready weeds are taking root worldwide,87 but according to Dave Mortensen, professor of weed and applied plant ecology at Penn State University, "Most of the public doesn't know because the industry is calling the shots on how this should be spun."

Much has been made of Monsanto's recent "concession" – amid a US Department of Justice investigation into anticompetitive practices in agriculture – to allow farmers to save Roundup Ready soybeans from harvest once the patent on the engineered trait expires in 2014.89. Monsanto's magnanimity is disingenuous because the company won't have a legal right to enforce the patent, and, besides, Roundup Ready ain't what it used to be. Monsanto, of course, blames farmers for the emergence of superweeds – for failing to rotate crops and for applying. Roundup exclusively ("It comes down to basic farm management," according to the company's head of global weed resistance management).90 Monsanto and the other Gene Giants are scrambling to develop second-generation GM crops that are tolerant to two or more herbicides including more toxic and environmentally hazardous ones – such as 2,4-D, a component of the Vietnam War defoliant, Agent Orange, and dicamba, which is chemically-related to 2,4-D.91 Monsanto plans to "stack" its glyphosate-tolerant gene with a dicamba-tolerant gene in soybeans, and in 2010 began the US regulatory approval process. So just when herbicide resistant weeds render Monsanto's Roundup completely useless for weed control – around the same time the company's Roundup Ready trait goes off-patent – Monsanto plans to have its next proprietary techno fix for weed control waiting in the wings.

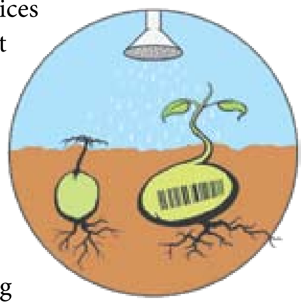
Chemically Challenged

When the sales numbers came in for 2008, pesticide execs popped open the bubbly. The next year's tally had them popping mood elevators: global pesticide sales declined by 6.5% in 2009 from 2008.92 Though the sector's slide seems to be staunched for now, sales in 2010 were still below 2008 levels. Industry analysts point to artificially high prices for herbicides in 2008 and overcapacity production of glyphosate (generic Roundup) as the main culprits in the sector's sudden downturn. Depressed currencies didn't help. And, finally, analysts suggest, increased adoption of herbicide-tolerant GM crops contributed to lower pesticide use. Recent studies, 93 however, show the opposite is true: planting genetically engineered, herbicide-tolerant crops increases herbicide use due to the emergence of herbicide-resistant weeds (requiring more frequent applications, higher doses and/or additional active ingredients). While global sales of pesticides were down in 2009 and 2010, the good news (for companies) / bad news (for the environment and human health) is that pesticide use in the developing world is rising dramatically. Bangladesh, for example, increased its use of pesticides by an astonishing 328% over the last 10 years.94 Between 2004 and 2009, Africa and the Mideast, as a region, posted the biggest increase in pesticide use. Central and South America are expected to experience the biggest increase in pesticide use to 2014, when the world market for pesticides may reach $52 billion, according to The Freedonia Group.95 Production of agrochemicals in China – mostly production of those formulas that have already gone off-patent – reached more than 2 million tonnes at the end of November 2009, more than double 2005 production.

Weed Killing Greenwash

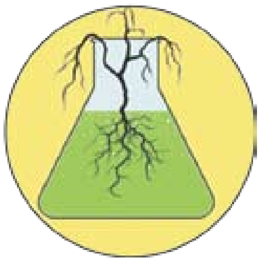
Monsanto has long touted the benefits of its GM herbicide tolerant crops, not just for weed control, but also as a climate-friendly technology that reduces greenhouse gas emissions.97 Roundup Ready crops promote chemical-intensive weed control and thus minimal plowing of land – a practice known as chemical "no-till," or "conservation tillage." According to Monsanto, "no-till practices in 2005 reduced carbon dioxide releases from agriculture by an amount equal to the emissions from about four million cars."98 In the United States, farmers who practice chemical no-till briefly benefited from carbon credit trading schemes through the Chicago Climate Exchange – a voluntary carbon reduction and offset trading platform. (The Exchange was closed in November 2010 due to lack of political support for carbon trading in USA).

If Monsanto and other Gene Giants get their way, chemical no-till farming practices will become eligible for carbon offsets under the UN climate treaty's Clean Development Mechanism – a convenient way to boost the company's bottom line.99 But recent scientific studies reject the view that no-till farming results in significant accumulations of carbon in the soil.100 An extensive review of the literature by USDA and Minnesota soil scientists in 2006 concluded that evidence of no-till's promotion of carbon sequestration "is not compelling."101 More recent studies confirm that no-till practices sequester no more carbon than plowed fields.102 There's no question that farmers have enormous capacity to sequester carbon by managing and building soil organic content using biological practices in integrated farming systems. But chemical not ill is a false solution to climate change. Monsanto's hardsell on no-till rides on the coattails of traditional conservation tillage practices and hijacks the concept developed by many farming communities worldwide.



World's Top Ten Seed Corporations

	Company	2009 seed sales US $ millions	% of market share
1	Monsanto(US)	7,297	27
2	DuPont(US)	4,641	17
3	Syngenta(Switzerland)	2,564	9
4	Group Limagrain(France)	1,252	5
5	Land O' Lakes/Winfield Solutions (US)	1,100	4
6	KWS AG (Germany)	997	4
7	Bayer Crop Science (Germany)	700	3
8	Dow AgroScience	635	2
9	Sakata(Japan)	491	2
10	DLF-Trifolium A/S (Denmark)	385	1
	Total Top 10	$20,062	64%



World's Top Ten Agrochemical Companies

	Company	2009 Agrochemical sales US $ millions	% of Market Share
1	Syngenta(Switzerland)	8,491	19
2	Bayer Crop Science(Germany)	7,544	17
3	BASF(Germany)	5,007	11
4	Monsanto (USA)	4,425	10
5	Dow AgroScience(USA)	3,902	9
6	DuPont(USA)	2,403	5
7	Sumitomo Chemical (Japan)	2,374	5
8	Nufarm(Australia)	2,082	5
9	Makhteshim- Agan Industries(Israel)	2,042	5
10	Arysta LifeScience(Japan)	1,196	3
	Top 10 Total	$39,468	89%

Greener (GM) Pastures? The United States Government and Biotech's Revolving Door

	Name	Current US Government Job	Old Job
1	Roger N Beachy	Former Director (as of May 2011) National Institute of Food and Agriculture, largest public funder of ag research awards. Appropriated $ 1.2 billion in funding in 2009	Former president of the non-profit Danforth Plant Science Center, founded with $50 million gift from Monsanto
2	Rajiv Shah	Director, US Agency for International Development	Former agricultural program director, the Bill & Melinda Gates Foundation; board member, Alliance for Green Revolution in Africa(AGRA)
3	Islam A Siddiqui	Chief Agriculture Negotiator, Office of US Trade Representative	Former vice-president, CropLife America, pesticide/biotech lobby group
4	Ramona Romero	General Counsel of the United States Department of Agriculture(USDA)	Corporate Counsel at DuPont

(Source: Who will control the green economy, http://www.etcgroup.org

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www.etcgroup.org

TWENTY YEARS OF FIGHTING FOR SEEDS AND FOOD SOVEREIGNTY

Henk Hobbelink, GRAIN*

When we set up GRAIN back in 1990, we were keen to influence the international fora that were drawing up agreements around seeds and biodiversity. We often found ourselves at the FAO in Rome, where governments were negotiating an agreement on the rules of the game for conserving and exchanging seeds and benefiting from seed diversity. Those were also the days when the Convention on Biological Diversity (CBD) was taking shape, which was eventually signed into existence in 1992 at the Rio Earth Summit. Just before that, we were deeply involved in the campaign against the patenting of life forms, and organised a major conference at the European parliament to denounce the plans of the European Commission to create a piece of legislation that would permit this. At the same time, we participated in a three-year "multi-stakeholder" dialogue, organised by the Keystone Foundation, which got us to sit at the table with other NGOs, government officials and people from the seed and biotechnology industries and from agricultural research institutes, trying to find some consensus on how to save and use the world's agricultural biodiversity. What was driving us then? We were concerned about the increasing concentration in the global seed industry, which was then being taken over by transnational agrochemical and pharmaceutical corporations, leading to an ever stronger push for monocultures and uniform seeds all over the world.

We were worried about emerging new technologies, such as genetic engineering, that would push diversity further towards extinction and tighten the corporate grip on farmers and the global food system. We were alarmed by legislation being proposed in a number of industrialised countries that would allow for the patenting of life forms and the privatization of the very building blocks of life. And we noticed that the institutional response to the rapid decline of agricultural biodiversity was limited to collecting seeds from farmers' fields and storing them away in gene banks. The panorama around us was bleak and the fight fierce, but we thought we could achieve something by lobbying governments and delegates to stop these developments and to support instead the contribution and role of small farmers. Judging from the growing debate around genetic engineering, the massive participation of civil society in the 1992 Earth Summit, and the subsequent meetings of the CBD and other environmental fora, this optimism was shared by many. But, as the 1990s evolved, a cruder reality became apparent. Increasingly, the shaping of agriculture and food production, and the role of transnational corporations in it, were defined elsewhere: in corporate boardrooms and in trade ministries. The 1990s were also the decade of the establishment and rise of the World Trade

Organization (WTO), where, shielded from the critical eyes of civil society organizations, a ruthless neoliberal trade

Food sovereignty

"Food sovereignty is the right of peoples, countries, and state unions to define their agricultural and food policy without the dumping of agricultural commodities into foreign countries. Food sovereignty organizes food production and consumption according to the needs of local communities, giving priority to production for local consumption. Food sovereignty includes the right to protect and regulate national agricultural and livestock production and to shield the domestic market from the dumping of agricultural surpluses and low-price imports from other countries. Landless people, peasants, and small farmers must get access to land, water, and seed, as well as productive resources and adequate public services. Food sovereignty and sustainability are a higher priority than trade policies." (Via Campesina, The International Peasant's Voice: www.viacampesina.org) agenda was being forced upon the world, especially on "developing" countries that still had some level of market protection. More economic growth and international trade at any cost had become the central dogma of all policies. And no treaty or agreement related to environmental or agricultural issues was allowed to interfere with this vital concern.

Then came Seattle in 1999. The confrontation between governments trying to push the world further down the neoliberal route with a new WTO agreement, and social movements taking to the streets to stop them, had a powerful impact on both the WTO and on the people and organizations fighting for a better world. The WTO never fully recovered from the blow, and the industrialised countries, in response, started signing bilateral or regional trade agreements instead, to secure their interests. To the social movements and NGOs involved in fighting the neoliberal corporate agenda came the realization that we could actually win by having a clear, radical and coherent line of analysis and action.

GRAIN's founding staff, Henk Hobbelink and Renée Vellvé, in 1987

Another world is possible

Often hidden from view, and unexposed at international fora, were the organizations and movements that were quietly resisting and building at the local level. The importance of these experiences became forcefully clear to GRAIN when we got ourselves involved in the "Growing Diversity"project.1 During a three-year period (2000–2003), this project worked with hundreds of organizations around the world to discuss, analyze and document the experiences of groups working at the local level to build local food and agricultural systems based on biodiversity. A massive amount of evidence came out of this project that an agriculture different from the one being promoted by the industrial powers and corporations was not only possible, but also more productive, more sustainable, and better for the farmers and communities involved. It became clear to us that the work at local level of organizations and communities resisting the neoliberal onslaught while developing strong alternatives was the backbone of any struggle to bring this other world into being. There was another development in the first decade of the present century that started strongly influencing agendas around agriculture and food systems. This was the emergence of the call for food sovereignty and the growing presence and maturity of small-farmer organizations such as Via Campesina. Via Campesina was created in 1993, and erupted on the international stage at the global civil society forum held parallel to the 1996 world food summit in Rome, where it launched food sovereignty as the alternative framework for a global world food system. Food sovereignty articulates the prioritization of food policies oriented towards the needs of local communities and local markets, and based on local knowledge and ago-ecological production systems (*see* Box: "Food Sovereignty"). For the first time, the global movement for a different food system had a concept and an action agenda that connected all the dots, brought together local and international struggles, and formed a basis for building alliances between different social movements and NGOs. In the decade that followed, many more groups and movements started to use food sovereignty as their framework for action, and this framework was articulated and further elaborated in numerous international and regional fora. The movement received a tremendous boost at the global food sovereignty forum held in Nyeleni, Mali, in 2007, at which organizations representing small farmers, fisherfolk, pastoralists, indigenous peoples, women and youth joined with NGOs and groups from the environmental movement to further articulate a common action agenda for the future.

In the late 1990s, GRAIN embarked on an ambitious and radical decentralization process that would bring us much closer to regional and local realities and struggles, and transform us into a truly international collective (*see* Box: "A brief history of GRAIN"). This process transformed GRAIN's agenda as well. The increased exposure to local struggles and social movements made us realize that we could not limit our work to the issue-oriented agenda of agricultural biodiversity, and we gradually broadened our focus to deal with the wider food system. As a result, we were able to produce new analysis and fresh thinking on issues such as agrofuels, hybrid rice, bird flu, swine fever, the food crisis, climate change and land grabbing, and connect them with the struggles for food sovereignty. At the same time, we strengthened and deepened our relationship with – and support role to – groups in Africa, Asia and Latin America. "Think globally, act locally" became GRAIN's very way of working.

A brief history of GRAIN

GRAIN's work goes back to the early 1980s, when a number of activists around the world started drawing attention to the dramatic erosion of genetic diversity – the very cornerstone of agriculture. Our work began as research, advocacy and lobbying under the umbrella of a coalition of mostly European development organizations. The work soon expanded into a larger programme and network that eventually needed its own independent base. In 1990 Genetic Resources Action International, or GRAIN for short, was legally established as an independent nonprofit foundation. In the second part of the 1990s, GRAIN reached an important turning point. We realized that we needed to connect more with the real alternatives being developed on the ground in the South. Around the world, and at the local level, many groups had begun to rescue local seeds and traditional knowledge, and to build and defend sustainable, biodiversity-based food systems under the control of local communities, while turning their back on the laboratory-developed "solutions" that had only got farmers deeper into trouble. In a radical organizational shift, GRAIN embarked on a decentralization process that brought us into closer contact with realities on the ground in the South and in direct collaboration with partners working at that level. At the same time, we brought a number of those partners into our governing body and started regionalising our staff pool. By the turn of the century, GRAIN had transformed itself from a mostly Europe-based information and lobbying group into a dynamic, truly international collective – functioning as one coherent organization – that was linking and connecting with local realities in the South as well as with developments at the global level. In that process, GRAIN's agenda shifted markedly, away from lobbying and advocacy, and towards directly supporting and collaborating with social movements, while retaining our key strength in independent research and analysis.

Lessons learnt and challenges ahead

The past 20 years have witnessed a tremendous increase in the dominance and control that huge transnational corporations exercise over the global food system. In essence, the entire neoliberal globalization process has been an exercise in handing over that control to them, and it has created tremendous inequity, human suffering and environmental damage in the process. As a result, we are now faced with well over one billion people going hungry every day, massive environmental destruction, and a climate crisis that we won't be able to stop unless profound changes are implemented. The challenges we face today are enormous. As the ever worsening and interconnected financial, food and climate crises are clearly showing us, the current neoliberal development model is beyond repair. At the same time, never before in history have we been faced with such powerful interests that want us to continue on the current destructive path. The matter lies beyond the question of what kind of economic development model to follow, or which seeds to use and which pesticides to avoid. It has become a matter of survival, for all of us. Below we highlight a number of reflections on issues that, from our perspective, we have to deal with, if we are to be successful.

Surviving in a hostile world

There is no point in denying that, despite the growing struggles of social movements, the world for most people has become a worse place to live in than it was 20 years ago. We would argue that the same is true for most other species as well. Several decades of the ruthless imposition of a neoliberal corporate agenda have left us with an aggressive policy environment, with a tremendous loss of democratic spaces at all levels: locally, nationally and internationally. While 20 years ago many of us were involved in all kinds of dialogues and roundtables, today it sometimes feels as if there is no one left to talk to up there. Many states have largely become instruments to implement a full-blown corporate privatization agenda, and many public institutions have turned into mere servants of that same agenda. When we entered the 21st century, we were promised by world leaders that this would be the century of democratization, of human rights, of the environment, of ending hunger – but already it has become perfectly clear that we are heading in exactly the opposite direction. This often leaves us in a very hostile environment, with increased repression against those that speak out, the criminalization of those who mobilize, and the silencing of those who denounce.

Following or setting the international agenda?

In the past 20 years, the most interesting, promising and mobilizing concepts and advances have emerged when social movements have decided to look at things from their own perspectives rather than within frameworks set

by the powerful. We can recite a long list of negotiations that we enthusiastically got involved in because we felt that we could achieve some positive results, but in which we got trapped in endless debates, where we saw our proposals being stripped of their essential meaning and corrupted into empty promises. At the FAO we argued for "Farmers' Rights" to challenge the privatization of seeds and genes, and to promote the notion that rural communities are the starting point for seed saving and crop improvement. We ended up with a Treaty that allows the patenting of genes, is mostly focused on managing gene banks, and – as lip service – might financially support a few projects that involve on-farm management of plant genetic resources. At the Biodiversity Convention we challenged "biopiracy", and urged the recognition of local communities in the management of biodiversity. We got "benefit-sharing regimes" that do nothing about the monopoly control that corporations obtain on the biodiversity collected from the forests and are essentially about regulating who gets paid for what when genetic resources change hands. They do little to protect local communities from the continuous undermining of their territorial integrity and the biodiversity that they manage, and indeed justify the "business as usual" approach. In the words of Erna Bennett, commenting on the role of NGOs in intergovernmental negotiations, in an article in *Seedling* in 2002: "playing the game by the enemy's rules has achieved nothing but to show us how we got to where we are. But it has not shown us how to get out." In contrast, we at GRAIN have learned by experience that, when movements clearly define their own perspectives, strategies and time-lines, much more interesting things tend to happen. We have already referred to the growing movement against the WTO, which maintained a clear and radical stand against the neoliberal development model. We have also mentioned the food sovereignty initiative, which allowed people to see the fuller picture of the kind of food system that has to be built. It helped to dissolve apparent conflicts of interest – between farmers in the North and in the South, between producers and consumers, between farmers and pastoralists, and so on – by clearly pointing out where the real source of the problem lies. It helped to build alliances between different social movements, and had a strong mobilizing effect. It showed that another food system is possible. All these processes are increasingly difficult for those in power to ignore, or to manipulate.

Source Seedling 2010

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LIVING SEED – BREEDING AS CO-EVOLUTION

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Three of the global issues most frequently debated today are biodiversity in general and agro biodiversity in particular, climate change and hunger: the three problems are interconnected and should be dealt with as such. As we will see later, seed production and seed sovereignty are central to the three problems.

It is now unequivocal that the climate is warming, as is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. It is also very likely that in several areas the frequency and the intensity of drought as well as the variability of the climate would continue to increase to alarming levels. Some of the most profound and direct impacts of climate change over the next few decades will be on agricultural and food systems (Brown and Funk, 2008).

In the context of climate change agro biodiversity is key to food security and today we witness a contradiction between the scientific literature emphasizing almost daily the importance of agro biodiversity on one side, and the continuous erosion of biodiversity on the other.

The industrialization of agriculture has caused an erosion of the diversity of crop varieties. Farms specialize in livestock or crops, reducing the number of species; fields are enlarged, reducing the extent of field margins and hedgerows; soil amendments enhance the uniformity of soils; and monocultures of genetically uniform individuals tend to dominate (Frison et al., 2011).

Plant breeding has contributed greatly to the decrease of agricultural biodiversity which can be quantified by the fact that barely more than 150 species are now cultivated; most of mankind now lives of no more than 12 plant species, with the four biggest staple crops (wheat, rice, maize and potato) taking the lion's share (Esquinas-Alcázar, 2010). Other examples from the World Conservation Monitoring Centre (1992) include:

- 74% of rice varieties in Indonesia descend from a common stock;
- 50% of the wheat crop in USA represented by 9 varieties;
- 75% of potato in USA represented by 4 varieties;
- 50% of soybeans in USA crops represented by 6 varieties;
- the number of rice varieties in Sri Lanka decreased from 2,000 in 1959 to less than 100 today of which 75% descend from a common stock;
- 62% and 74% of the rice varieties in Bangladesh and Indonesia, respectively, descend from a common stock.

Furthermore, the differences between collecting missions in Albania (1941 and 1993) and in south Italy (1950 and the late 1980s) showed high losses in genetic variability with levels of genetic erosion of 72.4 and 72.8%, respectively (Hammer et al, 1996). In India, rice varieties have declined from an estimated 400,000 before colonialism to 30,000 in the mid-19th century with several thousand more lost after the green revolution in the 1960s; also Greece is estimated to have lost 95% of its broad genetic stock of traditional wheat varieties after being encouraged to replace local seeds with modern varieties developed by CIMMYT (Lopez, 1994). (Lopez, quoted by Heal et al. (2004) also quotes a boast by Stalin to Churchill: "We have improved beyond measure the quality of our wheat. We used to sow all varieties, but now we only cultivate the Soviet prototype. Any other cultivation than that is prohibited nation-wide.")

The evolution of plant breeding helps explain the process of genetic erosion and how the changes in who is controlling seed production and seed supply occurred.

For millennia plant breeding was done (not necessarily in the way we define it today) by farmers. Selection started at the same time as domestication when the Neolithic man and women started intentional sowing, which applies strong, unconscious selection pressure (Zohary 2004). Alleles for non-shattering, lack of dormancy, reproductive determinacy and increased fertility of formerly sterile florets are all favored by the sowing-harvesting-sowing cycle (Harlan et al. 1973). After domestication, farmers have continued to modify crops for millennia and have been largely responsible for the spreading of crops across the planet (Gepts 2002). As they migrated across continents, they brought with them their seeds and their animals, which both needed to adapt to the new environments, the new soil types and possibly to new uses. This was possible because the seed they were taking along was far from being uniform and was therefore capable of adapting to new climates and soils.

In the plant breeding done by farmers there was an emphasis on specific adaptation not only to the environment (climate and soil) but also to the uses, so that it was obvious that the same farmer will select more than one variety of the same crop and that different farmers will select different varieties. An important aspect of farmers' breeding was that the selection environment and the target environment was the same, a situation that avoids the negative consequences of Genotype x Location interaction on response to selection (Falconer 1981). Over thousands of years this process (farmers' breeding) led to the formation of landraces. As they were the result of a lot of hard work, farmers had a strong interest in saving seed and conserving the landraces.

Saving or conserving seed?

Farmers always conserved seed from harvesting to the next planting but saving implies doing something more, i.e., avoiding its loss. Conserving seed has also a "saving" component in the sense that if the farmer always plants and harvests the seed of the same landrace without falling into the temptation of buying "commercial seed of new varieties", he also conserves the landrace. Nevertheless, if he sows ALL the seed he has, then there is a danger that in the case of adversities all is lost, both the seed and the landrace. Therefore saving has a connotation of preserving from disappearance not only the seed but also all the knowledge associated with it.

Such landraces are still the backbone of a number of important food and feed crops in West Asia and North Africa, and particularly of those crops which have been domesticated in the Fertile Crescent such as wheat, barley, lentil and chickpea and many horticultural crops which are important in the traditional Arab cuisine.

Farmers in this area have developed special techniques to store the seed from harvesting to planting in conditions that usually favor insects and rodents: a Syrian farmer discovered that a powder, commercially available for the treatment of intestinal parasites in sheep, when sprayed over the jute bags containing the barley seed kept the seed free of insects and was repellent for the rodents.

The maintenance of the landraces requires special skills and farmers still remember that their fathers used to collect spikes (of wheat or barley) before harvesting, applying a sort of mass selection. The ability of some farmers to produce seed of good quality is well recognized, and when farmers in West Asia feel that their landrace needs to be "refreshed" – farmers say often that after few years the seed becomes "tired" – they always go to another farmer, always the same, to get the new seed (of the same landrace).

There are stories, difficult to document such as the one of a drought in Tunisia, which left the farmers with no seed of a particular landrace. Eventually it was found that the wives had stored some seed in jars underground and even though in small quantity, it was sufficient to avoid the loss of the landraces.

Therefore, long before Mendel and long before plant breeding as we know it today, farmers planted, harvested, stored and exchanged seeds, and fed themselves and others, and in doing all this they built a considerable amount of knowledge about crops, their characteristics and possible uses, and their interactions with the surrounding environment.

With the re-discovery of Mendel's work, two major changes took place. Firstly, plant breeding was moved from farmers' fields to research stations and from farmers to scientists. What was done by very many farmers in very many different places started to be done by relatively few scientists in a relatively few places (the research stations) which with time became more and more similar to each other. Secondly, breeding for specific adaptation that was implicit in farmers' breeding, was gradually replaced by breeding for wide adaptation.

The best example of this change has been the development of the same high-yield varieties of common food crops in many countries, as a part of the green revolution. (Porceddu et al., 1988). The term Green Revolution was coined in March 1968 by William S. Gaud, the director of the U.S. Agency for International Development (USAID) to indicate the outcome of a development strategy based on a) new crop cultivars, b) irrigation, c) fertilizers, d) pesticides and e) mechanization. Within that strategy, the new varieties were obtained by selecting for wide adaptation. Not only was this exactly the opposite of what farmers had done for millennia, but the term wide adaptation was somewhat misleading because it indicates wide "geographical" adaptation rather than wide "environmental" adaptation (Ceccarelli, 1989).

In fact the agricultural environments in which these "widely adapted" varieties were successful were actually very similar (high rainfall, good soil fertility, and chemical control of pests and diseases) or were made similar by adding irrigation water and fertilizers when farmers could afford them. This caused four major problems. Firstly, the heavy use of chemicals soon began impacting the environment. Secondly, the poorest farmers and particularly those living in marginal environments were bypassed because they could not afford to purchase the chemicals needed to create the right environments for the new varieties – not all scientists agree on this, but most of the poor farmers do. The father of the Green Revolution, Norman Borlaug, pointed out a few years ago that "despite the successes of the Green Revolution, about two billion people still lack reliable access to safe, nutritious food, and 800 million of them are chronically malnourished" (Reynolds and Borlaug, 2006). Thirdly, there was a dramatic decline in agricultural biodiversity because on the one hand hundreds of genetically diverse local varieties selected by farmers over millennia for specific adaptation to their own environment and uses were displaced, and on the other hand the new varieties (despite having different names) were all very similar in their genetic constitution. Fourthly, seed production, which up to that point was in the hands of the farmers, became more and more centralized.

In these changes, there is no evidence that any use was made of, or any attention was paid to, the local knowledge accumulated by the farmers communities over thousands of years.

Eventually, and towards the end of the 19th century, plant breeding gradually went from being predominantly public to being predominantly private. The first consequence was that not all crops were treated equally, and some became 'orphan crops', neglected by science. These include some important food crops such as banana, cassava and yam. The second consequence was the need to protect the seed produced by private companies, and a seed legislation started to be developed that made illegal what the farmers had done for millennia: most of the laws which limi the exchange of seed do not have any biological justification. In fact, at least in most of North Africa and West Asia, farmers are still the major seed suppliers (Table XX) of major crops producing between 70% (in the case of cereals) and nearly 100 % (in the case of forage crops) of the seed required. The figure of cereals in higher due mostly to wheat because in the case of barley, even though with variation from country to country they produce 90% of seed. In individual countries the farmer's seed covers from 95% or more as in the case of Yemen, to about 70% in the case of Tajikstan and Syria.

Table XX Farmers as mail seed suppliers of major crops in selected countries of North Africa and West Asia

	Cereals		Legumes		Oilseed		Forages		Industrial crops				
Country	PSD	ASS	PSD	ASS	PSD	ASS	PSD	ASS	PSD	ASS	PSD Total	ASS total	% Formal
Algeria	102348	18076									323109	93135	29
Egypt	78655	27932	14071	1112	7432	93	22781	80	7244	11728	313759	81279	26
Ethiopia	291122	5985	214152	988	16450	55			98923		848753	22514	3
Iran	1148671	359060	0	0.0	9327.6	9312.4	2815	264	566957	23404	2876442	751100	26
Pakistan	88232	28145	64740	1126	66346	1886	60454	9943	404945	25776	1778553	314497	18
Tajikstan	13857	395	812				776		93912	23421	173385	52514	30
Syria	24402	4007	34021	802	1118		1429		112641	50176	532360	176068	33
Turkey*	393211	34525	96454	769	4751	9314	67971	2950	462405	70885	2663678	320593	12
Yemen	14353	51	1796		404		3155		50208	3142	87165	4220	5
Total	4296600	1017356	1144283	83797	1683247	317520	159380	13236	4421730	296872	19368988	3375600	17
% Formal		30		2.5		9		0.4		9		100	

PSD = Potential Seed Demand
ASS = Actual Seed Supply

While the actual figures may vary from year to year, from country to country and from crops to crops, what these figures mean is that first farmers are good at producing good quality seed because there is no documented cases of farmers' produced seed which has been the cause for the spreading of diseases, and second that, as mentioned earlier, limiting or considering illegal farmers' seed production can only be justified in terms of protecting a monopoly.

While saving seed and even exchanging seed with other farmers for biodiversity purposes has been a traditional practice, these practices have become illegal as the many plant varieties are patented or otherwise owned by some entity (often a corporation).[1] Under Article 28 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (the TRIPS Agreement), "planting, harvesting, saving, re-planting, and exchanging seeds of patented plants, or of plants containing patented cells and genes, constitutes use" and is prohibited by the intellectual property laws of signatory states.

Following the privatization of breeding, another factor contributing to the loss of agro biodiversity was the consolidation of the seed grain industry globally, leading to a more limited choice of seed varieties (Heal et al., 2004): as of 2008 49% of the global seed market was controlled by four companies which also control 53% of the global pesticide market (Agrow News, 2008). A recent report (Fuglie et al, 2011) indicates that the consolidation of the grain industry is increasing.

Many international organizations, recognizing the value of agro biodiversity for the future of humankind, are promoting the conservation of local varieties and wild relatives of crops. The most frequent type of conservation is the *ex situ* conservation in gene banks currently there are about 1500 gene banks which hold more than seven million seed samples (Fowler and Hodgkin, 2004). Ten of the largest are hosted by the CGIAR Centers with very large collections (for example 108,925 rice samples from 124 countries; 150,000 unique samples of wheat and its wild relatives from more than 100 countries; 2,000 wild and 5,000 cultivated potato types, 6,000 sweet potato and more than 1,000 of other Andean root and tuber crops; 35,682 samples of beans, 6.499 of cassava and 23,140 of tropical forages)

While these gene banks are essential as a last resort in rescuing seed in case of natural disasters, they do not store everything and they freeze not only seeds but also their evolution at the time of collection. A proof of this is the comparison between wild relatives of wheat and barley collected in Israel over a period of 28 years (1980 and 2008) which shows that the samples collected in 2008 are all significantly earlier than those collected in 1980 and held in the gene bank (Nevo et al. 2012).

Another problem is that the material available in the gene banks is not easily accessible by farmers and therefore there has been a worldwide interest by farmers' communities to establish their own gene banks as a way to have direct control on the genetic resources they consider important to them. Farmers gene bank may be considered not to be the best place where to save seed because they often lack the equipment that guarantees the best storage conditions. Also the "official" can be in danger when these happen to be in war zones. Three of the most recent examples are Iraq's gene bank in the town of Abu Ghraib, which was ransacked by looters in 2003. Fortunately, there was a safety duplicate in the form of a black box at ICARDA, a CGIAR center in Syria. Mrs Sanaa Abdul Wahab Al-Sheikh, who worked at the Abu Ghraib gene bank, saved about a thousand accessions by hiding them underground and in her fridge. She now works at the new, rebuilt Iraqi national gene bank at Abu Ghraib and the accessions she saved from the old collection have been joined by hundreds of others that she's been collecting from farmers' fields since 2004. Typhoon Xangsane seriously damaged the gene bank of the Philippines national rice gene bank in 2006. The ICARDA gene bank in Syria has an uncertain future given the current political situation, and although part of the germplasm has been safely duplicated, the physical safety of the bank is far from being secured.

In North Africa and West Asia, the only known example of farmers' gene bank is in Iran. Farmers in Garmsar, Iran, started doing Participatory Plant Breeding (see later) in 2006. Their exchanges with professional breeders led to discussions about one of their main problems: drought. They remembered that their old landraces were more resilient to drought than modern varieties. When an international breeder asked them if they would be interested in reviving their landraces they said yes. This led to a small project where 160 landraces of wheat and 160 landraces of barley (all from Iran) were secured from the Gene Bank of an International Center (ICARDA) and planted in farmers' fields and evaluated by them. Older farmers identified several of the landraces and their characteristics were recorded. Having these landraces in their hands, and knowing how difficult it can be to access the seeds of national and international gene banks (especially without the help of collaborating breeders) led the farmers to decide to keep all of these landraces in their own hands for the future. They wanted to keep every single one just in case it might be useful in the future. This led to the establishment of the Garmsar Farmers' Seed Bank, the first of its kind in Iran in June 2011.

Inauguration of the Farmers' Gene Bank in Garmsar (left) and some of the labeled seed samples ready for storing

Projects similar to the one described in Iran were also conducted in Yemen and Jordan, two countries that have their own National gene bank and where farmers have a strong interest in conserving their landraces particularly in view of their possible role to cope with climate changes.

However, no matter who and how saves and conserves the seed, the seed in a jar, or in a plastic bottle, or in an aluminum foil, at low or ambient temperature , on the one hand it is absolutely necessary and on the other it is absolutely insufficient to cope with future challenges.

Therefore, in several countries of North Africa and West Asia, while reaffirming the importance for farmers to conserve (save) the seeds of their varieties, the concept of letting the seed evolve has been introduced because we do not know whether the genes they posses will be able to cope with the challenges of the future climate. The two concepts (conservation and evolution) are not in conflict.- and the concept of 'how to conserve evolution' will be discussed later.

In a recent document (Foresight. The Future of Food and Farming, 2011) three important points are made:

- Innovation in how to involve producers in improving yields sustainably is as important as innovation in research – there is still a need for far greater participation of producers in defining and monitoring success;
- With much technology development taking place at greater distances from the farmer's plot, stronger mechanisms are needed to ensure that representatives of poor farmers and groups experiencing chronic hunger are included in local and national fora;
- Smallholder farming has been long neglected. It is not a single solution, but an important component in both hunger and poverty reduction.

The document reassess in different words what is written in Article 6 of, the International Treaty on Plant Genetic Resources for Food and Agriculture (FAO, 2009) " The sustainable use of plant genetic resources for food and agriculture may include such measures as: promoting, as appropriate, plant breeding efforts which, with the participation of farmers, particularly in developing countries, strengthen the capacity to develop varieties particularly adapted to social, economic and ecological conditions, including in marginal areas". And one of the recommendations of the report of the United Nations (De Schutter, 2009) "donors and international institutions, including the Consultative Group on International Agricultural Research and FAO, should put farmers at the centre of research through participatory research schemes such as participatory plant breeding".

This widespread interest in participation has been recognized since the early 80's by scientists (social scientists first and later biological scientists) and in the case of plant breeding has been implemented as participatory plant breeding (PPB), a process by which farmers are routinely involved in a plant breeding program with opportunities to make decisions throughout (Halewood et al., 2007).

The model of participatory plant breeding we have implemented (Ceccarelli et al., 2000; Ceccarelli and Grando, 2007), initially in Syria and then gradually in Tunisia, Morocco, Jordan, Egypt, Eritrea, Algeria, Yemen, Iran and Ethiopia in crops such as wheat, barley, lentil, chickpea and faba bean, combines modern science with the "local knowledge", brings plant breeding back into farmers' hands – and not farmers back into breeding as a recent publication suggests (Almekinders and Hardon, 2006), and also encourages a return to diversity.

The main feature of PPB is that farmers (or in general, users) are involved in designing and developing technologies – not just in testing the final products of scientific research as done in conventional (non-participatory)research. Specifically, there are several differences between conventional and participatory plant breeding: in conventional plant breeding – and only with few exceptions - new varieties are selected on research stations by breeders and the final products are tested on farm. Adoption occurs at the end of the breeding process. In PPB new varieties are selected in farmers' fields jointly by breeders and farmers and adoption occurs during the breeding process. In order to be fully participatory the program needs to be inclusive with specific regard to women because particularly in low-income countries they play a critical role in agriculture, and agriculture plays a critical role in their livelihoods. Purposively empowering women and focusing on their unique challenges will bring much wider gains in terms of poverty and productivity (Foresight. The Future of Food and Farming, 2011).

Scientifically, conventional plant breeding and PPB are the same process but PPB differs in three key organizational aspects:

- Trials are conducted in farmers' fields and managed by farmers;
- Farmers participate as equal partners in the selection process;
- The process can be duplicated independently in a large number of locations and countries, with different methodologies and germplasm depending on the crop and the country.

PPB can impact positively on biodiversity because, being a highly decentralized process, it produces varieties which are different from country to country, from village to village within a country, and even within the same village depending, among other factors, on the age, wealth and gender of the farmers. In addition to increasing biodiversity in space PPB increases biodiversity in time because the process is cyclic and there is a rapid turnover of varieties thus creating a system which makes it difficult for pathogens to spread. Another dimension of the biodiversity generated by PPB is that the varieties selected by farmers are often not homogenous, i.e. they are still genetically variable – like the landraces – in contrast to the majority of varieties produced by conventional breeding in which all the plants are genetically identical (pure lines, hybrids, clones).

Even though PPB has been practiced for only 20 years, there are already indications of impacts at various levels:

- Adoption: many new varieties have already been adopted by farmers even though the program is relatively new; in Syria more than 80 lines and/or populations have been named and adopted by farmers from the PPB trials since 2000, compared with seven varieties released by the conventional breeding program in nearly 25 years. In some areas of Syria the adoption of the PPB varieties has reached 80% of the barley area. In Jordan and Algeria, the first PPB varieties (one in each country) are under multiplication to be submitted to the variety release committee; in Eritrea three food barley, ten bread wheat and two durum wheat varieties have been selected by farmers, in Yemen two varieties of barley and two of lentil have been adopted, in Egypt three barley varieties have been selected by farmers in the project area (the North-West coast). In Iran, at the end of the first PPB cycle, farmers selected four varieties and are currently testing various types of mixtures between them. Two aspects of the participatory selection process are 1) the yield advantages, as high as 50-70% that are possible to achieve in low rainfall, drought stresses areas only by changing the variety – in these areas conventional plan breeding was never able to introduce any new variety; and 2) in most cases these yield advantages have been obtained using landraces for which farmers have consistently expressed a strong preference particularly in dry areas (Figure 15.4).

Other types of impact include:

- Institutional: in several countries, policy makers and scientists are showing much more interest in PPB as it is expected to generate more relevant results more quickly and at a lower cost;
- Farmers' skills and empowerment: the interactive nature of the PPB programs has considerably improved farmers' knowledge, their ability to negotiate, and their dignity. It is because of their skills and their increased self-confidence that farmers in a number of countries started exploiting the additional advantages of evolutionary plant breeding as described in the next section;
- Biodiversity: different varieties have been selected in different areas in each country, in response to different environmental constraints and users' needs. Interest in landraces has increased as indicated by the request of farmers in Syria, Jordan, Algeria, and Iran to have access and to evaluate their landraces kept in the gene banks.

From the point of view of the global issues mentioned earlier, one of the advantages of PPB is that by matching one of the key recommendations of the interim report of the Special Rapporteur to the United Nations on the right to food ("Put farmers at the centre of research through participatory research schemes such as participatory plant breeding", pg 22) provides an increase of agricultural production directly in the farmers' fields making therefore those increases available and accessible.

Participatory plant breeding also has the ability of addressing the specific needs of family farms and to make them more productive thus alleviating poverty and meeting local and global food demand. This will shift the focus from large-scale industrial farming addressing the research themes for smallholdings, which are very different from those of large-scale farming because they involve, for example, concepts such as crop rotation, complements of animals and plants, and the use of animal waste as fertilizer (Godfray, 2010).

We mentioned earlier that gene banks are are essential as a last resort for rescuing seed in the case of natural disasters but they freeze not only seeds but also their evolution at the time of collection. This suggests that landraces and wild relatives should also be conserved *in situ*, i.e. in their own native environment. Based on the evidence that evolutionary adaptation has occurred in a number of species in response to climate change both in the long term and in the short term, and on the recent demonstration (using experimental evolution) that while out-crossing populations are able to adapt rapidly to environmental changes, also a small amount of natural crossing (such as in self-fertilizing crops) allows adaptation to stress environments to develop (Morran et al., 2009), we have attempted to make the process of *in situ* conservation more dynamic by combining participation and evolution in participatory- evolutionary breeding programs (Phillips and Wolfe, 2005; Murphy et al., 2005; Ceccarelli et al., 2010). These programs could represent a dynamic and inexpensive strategy which will quickly enhance the adaptation of crops to climate change and that will combine better adapted varieties with the mitigation effects of eco-efficient management systems.

This idea was first proposed by Suneson (1956) as follows: "the core features (of the evolutionary breeding method) are a broadly diversified germplasm and a prolonged subjection of the mass of the progeny to competitive natural selection in the area of contemplated use".

We have implemented the first participatory- evolutionary breeding programs in 2008 by constituting a mixture of nearly 1600 barley F_2 representing the entire ICARDA's barley crossing program of that year and hence including a wide range of germplasm from the wild progenitor, *Hordeum spontaneum*, to landraces from several countries and to modern breeding materials. The barley population was planted in 19 locations in Syria, Jordan, Algeria, Eritrea and Iran. This has been followed in 2009 by a population of durum wheat consisting of a mixture of slightly more than 700 crosses which was planted in four locations, and in 2010 by a population of nearly 2000 segregating populations of bread wheat which was planted in two locations (one of which for seed multiplication). These populations will be left evolving in a multitude of environments, chosen by the farmers and characterized by single abiotic or biotic stresses or combinations of stresses and under different types of agronomic management (Figure 1) with the expectation that the frequency of genotypes with adaptation to the conditions (climate, soil, agronomic practices and biotic stresses) of the locations, where each year the population is grown, will gradually increase. The simplest and cheapest way of implementing evolutionary breeding is for the farmers to plant and harvest in the same location. It is also possible and actually desirable, to plant samples in other locations affected by different stresses or different combinations of stresses by sharing the population with other farmers. For example, in Iran the barley population which was planted by five farmers in two provinces in 2008, spread to 50 farmers in four provinces in the cropping season 2010-2011 and is currently grown on more than 300 ha.

However, the best way of exploiting the progressive better adaptation of the evolutionary populations is to consider it as an evolving source of new cultivars progressively better adapted to the evolving agronomic and climatic conditions: to do this farmers, by themselves or jointly with scientists, can use these evolving populations to select the most desirable plants, spikes, panicles, roots, tubers etc. – depending on the crops and use them in participatory breeding programs as described earlier.

While the population is evolving, the lines or sub-populations can be tested as pure lines (in the case of self-pollinated), clones (in the case of vegetatively propagated) or populations (in the case of cross pollinated) in the participatory breeding programs, or can be used as multi lines, or a subsample of the population can be directly used for cultivation exploiting the advantages of genetic diversity described earlier. The key aspect of the method is that, while the lines are continuously extracted, evaluated and exploited, the population is left evolving for an indefinite amount of time, thus becoming a unique source of continuously better-adapted genetic material directly in the hands of the farmers – a sort of evolving gene bank.

In Iran, the interest generated by the barley population has suggested the Iranian breeders to make their own bread wheat and durum wheat populations. The evolutionary bread wheat population, created by mixing Iranian breeding material was distributed and planted in different regions of Kermanshah province and showed resistance to lodging and rust and out-yielded the most widely grown cultivar Sardari (Hagparast, personal communication).

Eventually farmers communities holding collections of landraces can develop their own evolutionary populations. While keeping the original collection, they can use a little amount of seed from each landraces, mix it, plant the mixture and leave it to evolve.. With the skill they already have or those they have acquired through participatory plant breeding, they can eventually accelerate the process of evolution by applying artificial selection. As the population evolves, they may conserve year after year some seed of the evolving population, thus **conserving evolution.**

Combining seed saving with evolution and bringing back the control of seed production in the hands of farmers, can produce better varieties and more diversified that can contribute to help millions of farmers to reduce the dependence external inputs and vulnerability to disease, insects and climate change, and ultimately contribute to food security for all.

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OCCUPYING THE SEED

Applying Open Source Biology in Service of Seed Sovereignty

Jack Kloppenburg*

Please send your ideas, your hopes, your dreams so we can build a strong movement to 'Occupy the Seed'.
(Shiva 2012)

In her letter of invitation, Vandana Shiva admonishes contributors to this report to consider how they might "occupy the seed." That phrase draws on a contemporary trope with substantial popular resonance. The verb "occupy" has come to be used in reference to widespread efforts by civil society to step into corporate space (e.g., Wall Street) to impede the activities being carried out there, or to populate still-free public spaces in order to prevent their private appropriation. Certainly, proponents of "seed sovereignty" have worked hard in these areas, organizing actions both to impede the proliferation of patented seed and to prevent biopiracy.

But the achievement of seed sovereignty will ultimately depend on more than just slowing the progress of the corporate privatization/globalization project. Though absolutely necessary, a defensive stance alone is not sufficient to realize the goals of agroecological sustainability. "Occupying the seed" must come to mean not simply moving into social and political and geographic and biological spaces to prevent the use of plant genetic resources in destructive and unjust ways, but also the proactive creation of new, commons-like spaces which can be occupied for the establishment and elaboration of more just and sustainable forms of social production.

For several years now, I have been intrigued by the possibility of applying the principles and mechanisms associated with open source software to the seed sector (Kloppenburg 2009, 2010a, 2010b, 2011). Specifically, I have been trying to envision how the General Public License that is the legal and operational foundation of the free and open source software movement might serve as a template for the development and deployment of an analogous General Public License for Plant Germplasm (GPLPG). Could a GPLPG catalyze the creation of a protected commons of farmers and plant breeders whose materials would be freely available and widely exchanged but would be effectively protected from appropriation by those who would monopolize them? In what follows, I explore this possibility.

The Erosion of Seed Sovereignty

Until the 1930s, farmers in both the North and South enjoyed nearly complete sovereignty over their seeds. That is, they decided what seeds to plant, what seeds to save, and who else might receive or be allocated their seed as either food or planting material. Such decisions were made within the overarching norms established by the cultures and communities of which they were members. While these customary arrangements often recognized some degrees of exclusivity in access to genetic resources, they were largely open systems that operated on the bases of reciprocity and gift exchange rather than the market. Indeed, these customary arrangements usually functioned to stimulate and facilitate – rather than restrict – the wide dissemination of seed (Zimmerer 1996; Salazar et al. 2007). The sharing of seed resulted in the continuous recombination of genetic material, which in turn produced the agronomic resilience that is characteristic of farmer-developed crop varieties and landraces. This historic creation and recreation of crop diversity not only fed particular communities and peoples but collectively constitutes the rich repository of genetic resources on which future world food production will depend.

Since the 1930s, farmers' sovereignty over seeds has been continuously and progressively eroded while the sovereignty of what is now a "life sciences industry" has been correspondingly enlarged. The development of inbreeding/hybridization in maize first separated the farmer from the effective reproduction of planting material and created the opening needed for private capital to profit from the seed sector (Kloppenburg 2004). Hybrids were subsequently developed in all crops that were amenable to this biological convention. Most recently, genetic engineering has been used to develop "Genetic Use Restriction Technologies" that prevent a seed from germinating unless proprietary chemicals are applied. Dubbed "Terminator Technologies" by activist groups (ETC Group 2002), their development has no agronomic function but is intended to solve industry's plant-back problem in crops where hybridization has proven elusive (wheat, soybeans) and in nations in which intellectual property rights are nonexistent or their enforcement is ineffectual.

A second route to the expropriation of farmers' access to the reproducibility of seed has been the progressive development of ever more restrictive intellectual property rights legislation. The 1961 creation of the Union for the Protection of New Varieties of Plants by six European nations stimulated passage of the 1970 Plant Variety Protection Act in the United States. Though the specific legal and policy mechanisms have been somewhat different between Europe and North America (Bocci 2009), all have fostered a regulatory environment that has resulted in continuous contraction of the spaces and modalities available to informal seed exchange and growing restrictions on the "farmers' privilege" (as opposed to the "breeders' rights") to save and replant seed of protected varieties. Over the last two decades, standard utility patents have increasingly been applied to crop genetics in both North America and Europe. The absence of farmers' privilege/exclusion clauses in patent law has rendered plant-back unambiguously illegal in Canada and the U.S., and companies such as Monsanto and Syngenta have initiated a brutal propaganda and legal assault against farmers found to be violating their property rights (Center for Food Safety 2004).

Both national and transnational structures of governance are being used to promulgate and extend this legal framework at a global scale. The World Trade Organization now requires all member-states to offer some form of intellectual property rights for plants. Such a provision was imposed on Iraq by the U.S. occupation administration, and similar – if less transparently coercive – pressures are being applied by the advanced capitalist nations in trade negotiations with partners in the Global South. As a result, many countries have established laws that attenuate farmers' rights to save and replant seed (GRAIN 2003). Not only are these regulations effectively an enclosure of farmers' practices as well as their genetic resources, but as incentives for private investment they become a platform and justification for the debilitation of public breeding programs.

Farmers are not the only ones to find choices about how to perform their work – or if they can even undertake it – constrained by the growth of intellectual property rights. Public plant scientists especially find their "freedom to operate" being circumscribed by proliferating "patent thickets" (Graf et al. 2003). The ongoing emasculation of public research institutions (e.g., universities, government facilities, the CGIAR system), and the subordination of their work to corporate objectives has resulted in an overwhelming focus on the private sector development of genetically modified (GM) varieties (Gepts 2004). The failure of public science to provide an alternative to corporate seeds has permitted the global dissemination of crop varieties that do not meet the needs of most farmers, that often cannot be legally saved, that reinforce the expansion of unsustainable monocultures, and that too often contaminate other varieties with proprietary transgenes (Rosset 2006).

On Beyond Farmers' Rights?

An encouraging feature of the past decade has been the emergence of a robust, globally distributed resistance to the ways in which capital has chosen to shape global agricultural markets, develop biotechnology, and construct intellectual property rights (IPRs) (Schurman and Kelso 2003). Widespread popular aversion to patents on life-forms and to such pernicious applications as "Terminator Technology" has been joined to concerns in the scientific community about growing limits on their own "freedom to operate" amongst the proliferating corporate "patent thickets." Farmers, indigenous peoples, and civil society advocacy groups have been working in the context of a diffuse but powerful social movement that has had success at slowing – though certainly not stopping – what has come to be broadly understood as the project of corporate "globalization" in agriculture.

But if resistance activities have shown increasing numbers of people that "another world" is necessary, it becomes even more important to show them that another world is actually *possible*. In this arena, farmers and indigenous peoples and advocacy groups have not been as successful in working toward seed sovereignty as might be hoped. The three principal avenues for this effort have been establishment of "farmers' rights" at the international level, proposals for various *sui generis* arrangements in national contexts, and the promulgation of a wide range of bilateral agreements between bioprospectors and target communities themselves.

Much of the affirmative action that has been pursued on genetic resources over the last twenty-five years has been undertaken under the rubric of the construct called "farmers' rights." Alas, farmers' rights as they have appeared in international fora have been little more than a rhetorical sleight of hand, a means of diverting activist energies into prolonged discussions with the corporate/bureaucratic masters of passive-aggressive negotiation. A second line of action has involved efforts to exploit the sui generis opening in the WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). In practice, many nations – often under pressure from the USA and other advanced capitalist nations – simply adopt a plant breeders' rights framework rather than develop an alternative approach. With international and national-level institutions insufficiently attentive to their needs and rights, communities of farmers and indigenous peoples have in many cases turned to a third mechanism – direct bilateral arrangements – in an effort to establish rights over crop biodiversity, manage bioprospecting, and derive a flow of benefit from genetic materials. The evidence produced by a number of assessments of these arrangements shows that not only have they failed to deliver any significant benefits, they have also frequently caused considerable social disruption and have too often actually been actively damaging to the contracting communities (Hayden 2003, Greene 2004).

It should not be surprising that these three modalities have been only sporadically effective. The existing IPR regime is a juridical construct shaped to serve particular interests. IPRs are actually a means of circumventing and obscuring the reality of *social* production and subsuming the products of social production under private ownership for the purposes of *excluding* others from use. How can they be anything but antagonistic toward social relations founded on cooperative, collective, multigenerational forms of knowledge production? If another world is going to be possible, might its development not be facilitated more by the expansion of opportunities for humans to enact the principle of *sharing* than on the extension of the reach of the principle of *exclusion*?

That last statement sounds both idealistic and naive. But need it be? The regime of "common heritage" was characterized by widespread benefits from the free exchange of crop genetic materials worldwide. The legitimacy of this arrangement was called into question at the FAO in 1979 because, as it expanded globally, the seed industry had begun using IPRs to exclude others from access to their varieties for multiplication and breeding purposes. The problem was not that seed companies were obtaining and using crop genetic resources, or even that they were selling seed, but that they were restricting access to and preventing the use of materials that, as a matter of reciprocity, ought to have been shared. It is this failure of reciprocity and – with patenting, the elimination of the right to replant and to use for research, the loss of the *derivative right to use* – that is regarded as asymmetrical and therefore unjust. The inequitable nature of this practice has been compounded as corporations have used IPRs over genetic materials not just to accrue monopoly rents, but to actively undermine the independence of farmers and the integrity and capacity of public plant science.

Significantly, the initial strategic response at the FAO in 1979 was not to make companies pay for genetic resources but to declare that what they claimed as proprietary lines were in fact part of common heritage. This position was deemed impractical by many and the debate was soon transformed from how to enlarge the commons to how make industry pay for its raw materials. I was one of those who in the 1980s argued for what I now regard as a marketized and therefore misconceived and inadequate response (Kloppenburg and Kleinman 1987). The logical outcomes of that strategy are the flawed, compensationist modalities described above. Those modalities have neither protected farmers and indigenous peoples from biopiracy nor brought them much benefit, but have functioned mostly to legitimate and institutionalize their continued expropriation.

The really radical route to reestablishing symmetry in flows of crop germplasm was not to arrange payment for access to genetic resources in addition to IPR lines, but to work for reconstitution of the commons for both types of germplasm. But I *was* correct, back in 1987, in my judgment that pulling the companies' breeding lines into the status of common heritage was not a workable approach, and that continuing to maintain peasant land races as a freely accessed mine for genetic resources was unjust.

Is there a way out of this conundrum? Perhaps the really radical route to establishing a just regime for managing flows of crop germplasm is not to arrange payment for access to genetic resources in addition to IPR lines, but to create a mechanism for germplasm exchange that allows sharing among those who will reciprocally share, but excludes those who will not. What is needed is not recreation of the inadequate *open-access commons*, but creation of a "*protected commons*." This is what biological open source may offer. While it is no panacea, it represents a plausible mechanism for engaging in both resistance and creativity and for moving in concrete ways toward realization of seed sovereignty.

Open Source Informatics

Issues of commodification, ownership and exclusion of use are not unique to farming and plant breeding. Nowhere have these problematics been more clearly addressed than in the field of software development. While creative capacity in software development is globally distributed among individuals, universities, and variously sized firms, a few companies have attained a dominant market position from which they have used IPRs to reinforce their own hegemony by restricting the use of their proprietary software, especially of operating system code. Frustrated by expanding constraints on their ability to add to and to modify and to share as freely as seemed personally and socially desirable, software developers sought ways to create space in which they could develop content and code that can be liberally exchanged and built upon by others (Raymond 1999, Lessig 2004, Boyle 2008).

The resultant "free and open source software" (FOSS) movement is quite diverse, encompassing a considerable range of organizations and methods (e.g., Creative Commons, FOSSBazaar, Free Software Foundation, Open Source Initiative). What unifies these initiatives is a commitment to allowing software users to access and modify code and – critically – to implementation of an enforceable legal framework that preserves access to the original source code and to any subsequent modifications and derivatives. The Free Software Foundation (2008) specifically intends to preserve four kinds of freedom:

- The freedom to run the program, for any purpose.
- The freedom to study how the program works, and adapt it to your needs.
- The freedom to redistribute copies so you can help your neighbor.
- The freedom to improve the program, and released improvements to the public, so that the whole community benefits.

The FOSS movement has enjoyed considerable success. Thousands of open source programs are now available, the best known among them being the operating system Linux.

The practical utility of the shared innovation that characterizes open source software development and improvement is captured in what is known as Linus' Law: "Given enough eyeballs, all bugs are shallow." That is, the mobilization of large numbers of people working freely together in "decentralized/distributed peer review" generates what Eric Raymond (1999) calls a "bazaar" – as opposed to a "cathedral-builder" – approach to innovation. Users are transformed from customers into co-developers and the capacity for creative, rapid, site-specific problem-solving is greatly multiplied. Furthermore the social utility of such a collective enterprise is that, as a result of the open source licensing arrangements under which work proceeds, the results of social labor remain largely socialized and cannot be monopolized.

The critical feature of open source software is that it is copyrighted and made available through a license – the General Public License (GPL) or one of its many iterations – that permits modification and distribution as long as the modified software is distributed under the same license through which the source code was originally obtained. That is, source code and any modifications must be freely accessible to others (hence "open source") as long as they in turn agree to the provisions of the open source license. Note that the "viral" effect of such "copyleft" arrangements enforces continued sharing as the program is disseminated. Just as importantly, this form of licensing also prevents appropriation by companies that would make modifications for proprietary purposes since any software building on the licensed code is required to be openly accessible. Thus, software developed under open source arrangements is released not into an open access commons, but into a "protected commons" populated by those who agree to share.

From Software to Seeds

Agriculture offers great potential for elaboration of what Ravi Srinivas (2002) has called a "BioLinux" approach to biological open source innovation, and what Richard Jefferson (2006) has pioneered as the "BiOS Initiative." Millions of farmers the world over are engaged in the recombination of plant genetic material and are constantly selecting for improvements. Like programmers, farmers have found their traditions of creativity and free exchange being challenged by the IPRs of the hegemonic "ownership culture" and have begun looking for ways not just to protect themselves from piracy or enclosure, but also to reassert their own norms of reciprocity and innovation.

Moreover, farmers have potential allies who are themselves capable of bringing useful knowledge and significant material resources to bear. Although its capacity is being rapidly eroded, public plant breeding yet offers an institutional platform for developing the technical kernels needed to galvanize recruitment to the protected commons. And in the practice of "participatory plant breeding" there is an institutional vehicle for articulating the complementary capacities of farmers and scientists in the North as well as the South. Could copyleft arrangements establish a space within which these elements might coalesce and unfold into something resembling seed sovereignty? How would BioLinux arrangements find concrete expression?

In 1999, University of Minnesota bean breeder Tom Michaels outlined how this might occur. He proposed a "General Public License for Plant Germplasm" (GPLPG) modeled explicitly on the General Public License developed by the FOSS movement for software Michaels 1999). Plant scientists would supply germplasm to other parties accompanied by a Materials Transfer Agreement (MTA) spelling out the provisions of the GPLPG. Those conditions would include copyleft provisions permitting further development and recombination and improvement of the germplasm, but requiring that any lines or cultivars derived in whole or in part from GPLPG plant germplasm likewise be made available to others under the GPLPG and without further restriction for use in subsequent breeding programs.

This mechanism is simple, elegant, and effective. No new law is required; like the "shrink-wrap" license already common to software and commercial seed sales, the GPLPG is based on existing contract law. No patenting or PBR protection is necessary; again, the GPLPG is based on existing contract law, not on IPR statutes. The GPLPG is enforceable in existing law. And just as with the "shrink-wrap" license already common to software and commercial seed sales (Technology Use Agreements), there are statutory legal consequences for those who violate the license provisions. The GPLPG is compatible with commercial seed sales; seed of GPLPG lines maybe reproduced and sold, but the vendor has no claim on subsequent uses or distributions. GPLPG seed will not be attractive for appropriation and incorporation into proprietary breeding programs; the "viral" nature of the license requires that any derivative lines developed using GPLPG germplasm must also be distributed under the GPLPG, thus eliminating the possibility of capturing monopoly profits from downstream patenting of derivative applications and uses.

In sum, the GPLPG is sufficiently simple to be used by many different actors (individual farmers, communities, indigenous peoples, plant scientists, universities, non-governmental organizations, government agencies, and private companies) in many places and diverse circumstances. Properly deployed, it could be an effective mechanism for creating a "protected commons" for those who are willing to freely share continuous access to a pool of plant germplasm for the purposes of bazaar-style, distributed peer production.

How might use of the GPLPG (or some variant) by farmers, indigenous peoples or public agencies and scientists contribute to the achievement of seed sovereignty)? The GPLPG has useful application to *resistance* activities. It could:

- *Prevent or impede the patenting of plant genetic material*. The GPLPG mandates sharing and free use for breeding and research of the subsequent generations and derivatives of the designated germplasm. In effect, this prevents patenting since there can be no income flow from the restricted access to subsequent generations and derivative lines that it is the function of a patent to generate. While the GPLPG does not prohibit patenting, it renders it pointless. Further, the "viral" nature of the GPLPG means that as germplasm is made available under its provisions and used in recombination, there is a steadily enlarging the pool of material that is effectively insulated from patenting.
- *Prevent or impede bioprospecting/biopiracy*. Faced with a request to collect germplasm, any individual, community or people could simply require use of a MTA incorporating the GPLPG provisions. Few commercially oriented bioprospectors will be willing to collect under those open source conditions.
- *Prevent or impede the use of farmer derived genetic resources in proprietary breeding programs*. Because neither the germplasm received under a GPLPG nor any lines subsequently derived from it can be use-restricted for breeding and research, such materials are of little utility to breeding programs oriented to developing proprietary cultivars. Any mixing of GPLPG germplasm with these IPR-protected lines potentially compromises their proprietary integrity.
- *Prevent or impede further development and deployment of GMOs*. The development of transgenic cultivars almost universally involves multiple layers of patented and patent-licensed germplasm. Moreover, many of the critical enabling technologies employed in genetic engineering are patented and their use restricted by licenses. Given the large investments that have been made and accompanying expectations of high financial returns, GMOS will not be developed if they cannot be IPR-protected. Any mixing of GPLPG germplasm with these IPR-protected materials and tools compromises their patentability. Use of the GPLPG cannot itself stop the further development of GMOs, but it can impede it by preventing additional genetic resources from being drawn into the web of proprietary and IPR-protected materials.

In addition to its capacity for reinforcing *resistance*, the GPLPG may have even more potential for *occupation*, for the creation of effective, autonomous space for the elaboration of transformative alternatives. Use of the GPLPG would help to:

- *Develop a legal/institutional framework that recognizes farmers' collective sovereignty over seeds*. A major advantage of the GPLPG is that it does not require the extensive development of new legal statutes and institutions for its implementation. It relies on an elegantly simple vehicle (the MTA) that is already established and enforceable in conventional practice and existing law. It uses the extant legal regime to establish rights over germplasm, but then uses those rights to assign sovereignty over seed to an open-ended collectivity whose membership is defined by the commitment to share the germplasm they now have and the germplasm they will develop. Those who do not agree to share are self-selected for exclusion from that protected commons. It is important to note that this approach really assigns sovereignty over seed to a collectivity of "seed users" rather than farmers *per se*, although that collectivity is effectively composed largely of farmers.

- *Develop a legal/institutional framework that allows farmers to freely exchange, save, improve, and sell seeds.* For farmers, the feature that is of principal importance is the freedom to plant, save, replant, adapt, improve, exchange, distribute and sell seeds. To paraphrase the "four freedoms" specified by the Free Software Foundation, the GPLPG establishes a legal framework within which farmers can maintain:

  The freedom to grow the seed, for any purpose.
  The freedom to study how the seed works, and adapt it to their needs.
  The freedom to redistribute the seed so they can help their neighbors.

The freedom to improve the seed, and release improvements to the public, so that the whole community benefits.

- *Develop an institutional framework in which farmers cooperate with plant scientists in the development of new plant varieties that contribute to a sustainable food system.* The protected commons that could be engendered by the GPLPG can, and must, also encompass scientific plant breeders whose skills are different from but complementary to those of farmers. Participatory plant breeding offers a modality through which the labor power of millions of farmers can be synergistically combined with the skills of a much smaller set of plant breeders. The GPLPG offers plant scientists in public institutions a means of recovering the freedoms that they – no less than farmers – have lost to corporate penetration of their workplaces.
- *Develop a framework for marketing of seed that is not patented.* The GPLPG is antagonistic not to the market, but to the use of IPRs to extract excess profits and to constrain creativity through restrictions on derivative uses. Under the GPLPG, seed may be reproduced for sale and sold on commercial markets. By carving out a space from which companies focusing on patented lines are effectively excluded, the GPLPG creates a market niche that can be filled by a decentralized network of small scale, farmer-owned, and cooperative seed companies that do not require large margins and that serve the interests of seed users rather than investors.

In the face of increasing restrictions on their degrees of freedom to access and use seed, we should explore how copylefting offers a means for farmers and plant scientists to create a semi-autonomous, legally secured, "protected commons" in which they can once again work collectively to express the inventiveness that has historically so enriched the agronomic gene pool.

Conclusion: Toward Occupying the Seed

We should sit down with the legal people who drew up the Creative Commons licenses and see whether farmers could use a similar approach with seeds.

José Bové (2005: 11)

If seed sovereignty is to be pursued as part of a larger conception of food sovereignty, what is to be done? José Bové is clear about what path should be taken. If germplasm had been made available by farmers and indigenous peoples under the GPLPG since 1950, I believe that world agriculture would look very different today. At a minimum, the public agricultural research system would be far more robust than it is now, most seeds in most genebanks would be freely available to any breeders willing to share the results of their work, and it would be Monsanto – not farmers – that would be finding the international plant genetic resources regime to be unduly restrictive. With such potency, might a Biolinux approach be useful today?

A wide variety of analysts have grappled with what to do about the asymmetric and unjust character of plant germplasm use and exchange. Their counsel can be separated into three types. The first is to do nothing. Some are so overwhelmed by practical complexities and moral ambiguities that they simply don't know what to do and fail to provide any effective guidance at all (e.g., Gepts 2004, Eyzaguirre and Dennis 2006). Others bemoan the problematics of existing arrangements, but accept their inevitability (e.g., Wright 1998). Brush (2007: 1511), dusting off an old seed industry apologia, concludes that existing mechanisms of development assistance and technology transfer represent sufficient means of ensuring "reciprocity" and "benefit sharing." Fowler (2003:3, 11) flatly declares that "for better or worse, the debate concerning whether the international community will sanction the existence and use of IPRs in relation to germplasm...is over" and that "Anyone who is not happy will remain unhappy." Well, many farmers are still not happy and they are not willing to simply accept unhappiness as their allotted portion.

The second and much larger group agrees that *something* needs to be done about the injustices, but that the realities of corporate power and a dominant capitalism require a "situational pragmatism" (Brown 1998: 205) that involves cutting the best deal you can. So Mgbeoji (2006: 170) recommends that indigenous peoples consider a "more astute and pragmatic response" to patenting of sacred plants. Salazar et al. (2007) advise trying out the new and trendy "declaration of origin" as a means of preventing appropriation. This is the well worn terrain of all the bioprospecting contracts and the discoverer's rights and the geographic indications and the biopartnerships and the recognition funds and the royalty agreements and the exploration fees and the all the other arrangements that have been proposed and tried.

I have no objection to trying them out and am in no position to tell any peasant communities or indigenous peoples what they should or should not do. I *will* point out that none of these arrangements have yet worked. Darryl Posey observed that, as far as he was concerned, these deals were holding actions that would not enfranchise anyone but that would "at least buy some time" (cited in Hayden 2003: 38). But, buy time for what? Hurtado (1999:7-8) warns of the dangers in the pressures to be pragmatic and to accept what he calls the "intermediate" solutions where "...we must not go to extremes, but rather negotiate and arrive at a mid-point. And in this the INTERMEDIATES are the special or *sui generis* regimes, which seek to sit indigenous people at the negotiating tables, in order to talk us into submission. Because it is there where the banana skins are placed, it is there where we start to skid."

The third option is to take Hurtado's advice, to avoid the banana skins, to refuse to accept the unhappiness or the deals and to go for broke, to go for it all, to go for real transformation, to go for occupying the seed! Occupying the seed sovereignty will not be easy. What is required is simultaneous and linked development of concepts and applications among farmers, plant scientists, seed vendors, public institutions and civil society advocacy groups in the face of corporate and state opposition. Open source biology is no panacea. But, as I have hoped to show, it is a plausible vehicle for enacting occupation. Would the movement consider taking on that task?

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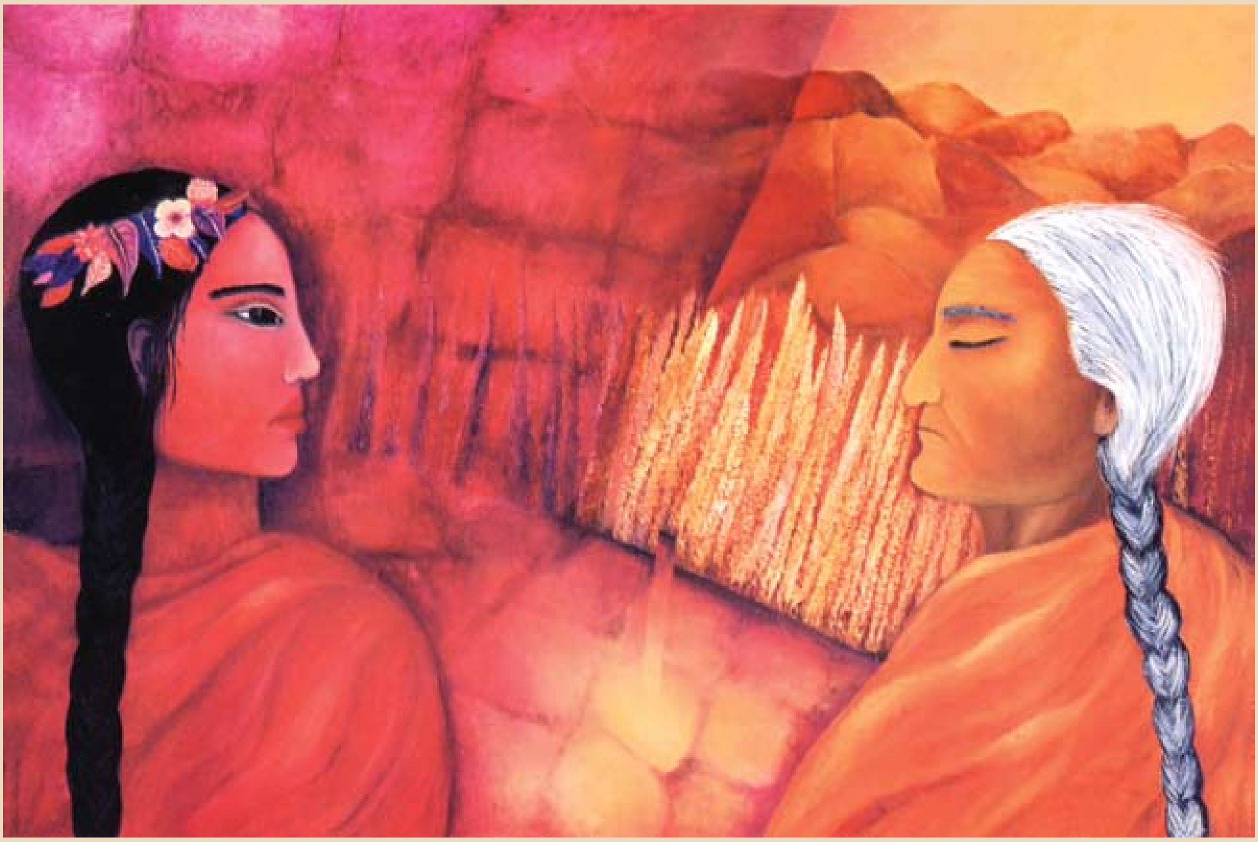


Mamala Kiwicha (Amaranth)

So very old is this Mamala, she has been forgotten.
The appreciative ones are the women that
still sing during seedtime, receiving from
her the initiation onto new paths and the
sustenance for body and soul.

THE SEED

ASIA PACIFIC

INDIA

25 years of Bija Swaraj (Seed Freedom)

Navdanya

Patents on life and the new biotechnologies are today's tools of imperialism, and they are a core part of the global "constitution" called the WTO (World Trade Organisation) rules of free trade in the form of Trade Related Intellectual Property Rights (TRIPs). The phrase "Trade Related" had to be forcefully linked to intellectual property precisely because intellectual property has no place in a trade treaty and patents should not have been extended to cover life forms as they were under Act 27.3(b) of TRIPS which forces countries to patent life forms, in particular micro-organisms and genetically engineered plants and animals. These rules and laws were made by and for corporations. As a Monsanto spokesperson stated about the drafting of TRIPs "we were the patient, the diagnostician, the physician".

Patents of life are a total control system. They allow corporations to claim ownership over life forms – micro-organisms, plants, animals. They allow corporations to define the acts of saving and sharing seeds as "intellectual property crimes". And they allow the crime of biopiracy – the theft of traditional knowledge and biopiracy to be treated as a right.

A patent is an exclusive right to own, make, sell, produce, use a patented product.

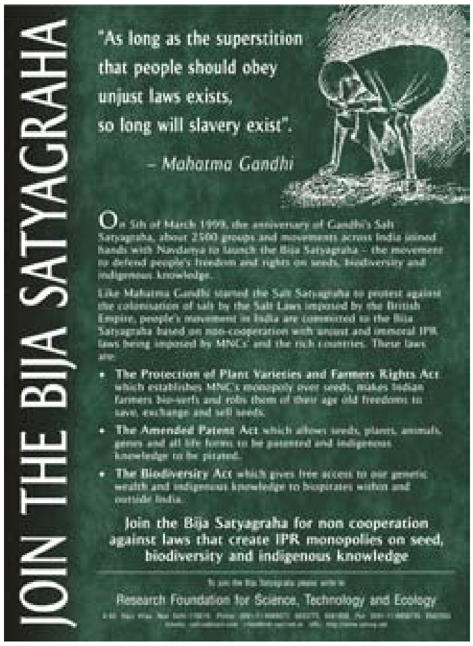
A patent on seed implies that a farmer saving seed is an "intellectual property thief". But it means more. A system in which seed has become a corporate monopoly, a system in which a few companies control the seed supply is in effect a system of slavery for farmers. Where the freedom of seed disappears, the freedom of farmers disappears. This is why, in 1987, we started Navdanya means nine seeds which symbolises the richness of biodiversity. It also means the new gift which for us is the gift of seed as a commons and a source of life.

The Green Revolution was an exemplar of the deliberate destruction of diversity. The new biotechnologies, are repeating and deepening these tendencies, rather than reversing them. Further, the new technologies in combination with patent monopolies being pushed through intellectual property rights regimes in GATT/WTO and other trade platforms are threatening to transform the diversity of life forms into mere raw material for industrial production, and limitless profits. They are simultaneously threatening the regenerative freedom of diverse species, and the free and sustainable economy of small peasants and producers which is based on nature's diversity and its utilization.

The seed, for example, reproduces itself and multiples. Farmers use seed both as grain as well as for the next year's crop. Seed is free, both in the ecological sense of reproducing itself, as well as in the economic sense of reproducing the farmers livelihood.

This seed freedom is however a major obstacle for seed corporations. If the market for seed has to be created, the seed has to be transformed materially, so that reproducibility is blocked and its status has to be changed legally, so that instead of being the common property of farming communities, it becomes the patented private property of Seed Corporation. Over the last 25 years Navdanya has both protected and conserved seeds and biodiversity as part of Bija Swaraj. (seed freedom). We have also resisted laws that threaten our seed freedom.

Bija Satyagraha-Defending Farmers Seed Freedom



Since 1991, when the Dunkel Draft Text of the WTO agreement were leaked Navdanya organised awareness campaigns and rallies to alert farmers across the country about the emerging seed monopoly through patents. Navdanya spearheaded the movement to protect the farmers rights to biodiversity, rights of seed saving and seed exchange. We have been organizing several seminars, yatras, signature campaigns to create awareness amongst the farmers and also to sensitize the policy makers and politicians of the country to defend seed freedom.

We started organizing farmers through the Bija Satyagraha Movement to keep seed in farmer's hands and refused to cooperate with unjust IPR and seed laws that make seed a corporate monopoly and seed saving and seed sharing a crime. In 1993, half a million farmers participated in a historic Bija Satyagraha rally at Bangalore's Cuban's Park. This was the first international protest against WTO

Bija Satyagraha is

- a grass-roots campaign on patent issues,
- an assertion to people's rights to biodiversity and
- a determination not to co-operate with IPR systems that make seed saving and seed exchange a crime.

In February 1992, Navdanya organized a National Conference on GATT and Agriculture with the Karnataka Rajya Ryota Sangha (KRRS) followed by a massive farmers rally in Hospet organized by Navdanya in association with the KRRS in October 1992. The Seed Satyagraha was launched following Gandhi's Swaraj as a fight for truth based on non-cooperation with unjust regimes. In March 1993, we held a national rally in Delhi at the historic Red Fort under the leadership of the national farmers' organizations, the Bharatiya Kisan Union. Independence Day 15th August 1993 was celebrated with farmers asserting their Collective Intellectual Property Rights' (Samuhik Gyan Sanad) On 2nd October, 1993, one year of the seed Satyagraha was celebrated in Bangalore with a gathering of 500,000 farmers where farmers from other Third World countries as well as scientists who work on farmers' rights and sustainable agriculture participated in an expression of solidarity.

On 5th March 1999, Navdanya reasserted the Bija Satyagraha Movement against the immoral and illegitimate laws with over 2500 groups to defend farmers' rights and seed freedom in the face of biopiracy and seed monopolies. The movement was part of the Campaign for Bija Swaraj – Seed/Biodiversity Sovereignty. The Bija Satyagraha was launched to defend biodiversity and people's rights to biodiversity, a new freedom movement against the new colonization of our life, livelihood and living resources. The internationalization of the Seed Satyagraha within one year has given the word "globalization" a new meaning. From representing global markets as in the parlance of free trade proponents, it has come to mean from us the globalization of people rights and seed freedom through resistance to centralized control over all aspects of their life.

Navdanya with its network Diverse Women for Diversity and its partner International Forum on Globalisation was active at the WTO protest in Seattle which stopped the WTO and have not allowed it to come out of intensive care since then.

In September 2000, over 400 farmers from all over the world came together at the unique Bija Panchayat (People's Seed Tribunal) to give evidence of the crisis of seed and agriculture in the wake of globalization, which is pushing small farmers to suicide. Today the Bija Satyagraha has spread through large number of communities and groups across the country.

Responding to the deepening crisis, RFSTE and Navdanya took the initiative to organize a Bija Yatra in India in the year 2000 with the focus on Seed Rights, Seed Conservation and Sustainable Agriculture. Navdanya's Seed Tribunal and Bija Yatras (Seed March) have created awareness through seed fairs, seed exchange programs and initiation of new community seed banks.

We have been organizing Bija Panchayats, in different parts of the country against the existing IPRs laws, i.e. Patent Act, Seed Act, the PVP Act and Biodiversity Act, to articulate the peoples collective voice so that the entire discussion and policy on the seed is not determined by the corporate sector and interests driven by profit motives. Navdanya, RFSTE and West Bengal Institute of Juridical Sciences drafted an alternative IPR law, which provides sovereign rights to the nation over its genetic resources and give recognitions to the local community over its biodiversity.

To counter the globalized IPR system to be implemented at the national level, Navdanya conceptualized the idea of Common Property Rights in Knowledge as early as in 1993 to counter the private IPRs system and to prevent biopiracy. RFSTE/ Navdanya drafted model laws. Which ware then used and further developed by the Third World Network and the Organization of African Unity for creating *sui generis* options based on community rights to TRIPs.

Farmers' biodiverse indigenous varieties are the basis of our ecological and food security. Coastal farmers have evolved salt resistant varieties. Bihar and Bengal farmers have evolved flood resistant varieties, farmers of Rajasthan and the semi-arid Deccan have evolved drought resistant varieties, and Himalayan farmers have evolved frost resistant varieties. Pulses, millets, oilseeds, rice, wheat, vegetables provide the diverse basis of our health and nutrition security. This is the sector being targeted by the Seed Act. These seeds are indigenous farmers varieties of diverse crops, indigenous varieties of thousands of rice, hundreds of wheat, oilseeds such as linseed, sesame, groundnut, coconut, pulses including gehat, navrangi, rajma, urad, moong, masur, tuar, vegetables and fruits.

The Seed Act is designed to enclose the free economy of farmers and the free economy of seed varieties. Once farmers' seed supply is destroyed through compulsory registration by making it illegal to plant unlicensed varieties, farmers are pushed into dependency on corporate monopoly of patented seeds. The Seed Act is therefore the handmaiden of the Patent Amendments Acts which have introduced patents on seed.

New IPR laws are creating monopolies over seeds and plant genetic resources. Seed Saving and seed exchange, basic freedoms of farmers, are being redefined. There are many examples of how Seed Acts in various countries and the introduction of IPRs prevent farmers from engaging in their own seed.

The 2004 Seed Act has nothing positive to offer to farmers of India but a promise of a monopoly for private seed industries which have already pushed thousands of our farmers to suicide through dependency and debt caused by unreliable, high dependency and non-renewable seeds.

Dr Vandana Shiva handing over 100,000 Seed Satyagraha petitions to the Prime Minister to stop the Seed Act 2004

It is the MNC seed industry that needs regulations and not the small farmers of our country without whose seed freedom the country will have no food sovereignty and food security.

From January to March 2005, Navdanya with its partners undertook Bija Satyagraha campaigns to declare non-cooperation with the new Patent Laws, which allows patent on life and the proposed Seed Act, which would criminalize farmers. In the spirit of Gandhi's salt satyagraha, more than 100,000 people committed themselves to partcipate in a seed satyagraha if a seed act was brought into force. The declarations were handed over to the Prime Minister. The Seed Act has not yet been passed.

After the introduction of Bt cotton in India, it was witnessed that across the country, farmers are taking the desperate step of ending their life because of the new pressures building upon them as a result of globalization and corporate hijack of seed supply. More Than 20,000 farmers have committed suicide in Andhra Pradesh alone. The lure of huge profits linked with clever advertising strategies evolved by the seeds and chemical industries and easy credit for purchase of costly inputs such as pesticides is forcing farmers in to a chemical treadmill and a debt trap.

In response to the passage of Seed Act and growing farmers suicide, Navdanya undertook Seed Pilgrimages (Bija Yatras) to stop farmers suicides and create an agriculture of hope using heritage seeds and farmers ago ecological knowledge. Hence, the Bija Yatra 2006-2007 was launched on 9th of May to mark 150 years of our struggle for freedom by building a movement to stop the genocide of our farmers and reclaim our food sovereignty. The Yatra started from sevagram, District Wardha in Maharashtra. The Yatra was concluded on 26th May in Banglore, Karnataka. The yatra covered Amravati, Yavatmal, Nagpur and vidarbha region of Maharashtra, Adilabad, Warangal, Karimnagar and Hyderabad in Andhra Pradesh, and Bidar , Gulbarga, Raichur, Hosepet, Chitradurg and Bangalore in Karnataka. These are the regions where farmers have become locked into dependence on corporate seeds supply for growing cash crops integrated to world markets, which is leading to a collapse in farm prices due to 400 billon dollars subsidies in rich countries.

1993 Seed Satyagraha with half million farmers in Banglore burning the effigy of Dunkel the Director General of GATT.

1994 Seed Satyagraha Rally at the Red Fort.

1994 protest organised by Navdanya with farmers groups at Red Fort to prevent the Government from signing the GATT/WTO agreement.

1993 - Burning the TRIPS agreement draft at the half million rally farmers.

Diverse Women for Diversity at the WTO protest in Seattle 1999 - Maria Zunega from Nicaragua

Diverse Women for Diversity at the WTO protest in Seattle 1999 - Jean Grossholtz

The Yatra was jointly organized by Vidharbha Organic Farmers Association, Maharashtra Organic framers Association, Andhra Pradesh Ryotu Sangham, MAR, All India Kisan Sabha, Karnataka Ryota Rajya Sangh, Bharat Krishak Samaj, Navdanya and other activists and organizations.

Navdanya spearheaded the movement in the three suicide belts of the country, namely, Maharashtra, Andhra Pradesh and Karnataka by burning the Bt. seeds in Amravati to reiterate its pledge to protect the farmer's rights of seed saving and seed sharing. The yatra, which was flagged off on May 9, 2006 from Sevagram in Vidarbha, Maharashtra focused on the seed rights, seed conservation and sustainable agriculture. Awareness was also created through the medium of music and street play to convey the message of organic agriculture, resistance to corporate monopoly of seeds, and the harms of mono-cropping and benefits of multi cropping systems.

Navdanya also organized a public hearing on the issue of farmers' suicide in Bhatinda, Punjab. The DiwanHall of Gurudwara Haaji Rattan was over flowing with the sea of widows and family members of suicide victims.

Apart from providing guidance and help to the farmers for the revival of agriculture, Navdanya, under the "Asha ke Beej" (Seeds of Hope) program, distributed the indigenous variety of seeds to the farmers and encouraged them to shift to organic and sustainable agriculture. More than 6000 farmers were distributed indigenous seeds. Various posters conveying messages on Bt. cotton failure, farmers' suicides, and sustainable agriculture were distributed among the farmer communities.

As a part of the yatra, over 250 village communities were covered and more than 5000 farmers have affirmed their rights to biodiversity by taking a pledge to conserve rejuvenate and protect their biodiversity. The awareness campaign reached areas of farmer's suicide and distributed indigenous seeds by covering around 75 villages in Maharashtra, 85 villages in Andhra Pradesh and 90 villages were covered in Karnataka. The College of Agriculture in Bijapur, Karnataka gave its full support to our endeavour in promoting awareness on the native seeds and it organized an interactive session between the Navdanya team and the professors and students of the college. The students promised to support the cause by sensitizing people.

More than 10,000 people were reached through the yatra and more than 10 million populations were covered in Karnataka alone through electronic media.

The Bija Yatra created awareness among farmers on GMO's, corporate farming and seed monopolies. The yatris had burnt Bt. Cotton throughout the journey of hope to encourage farmers to boycott Bt. Cotton, give up seeds of suicides and seeds of slavery, and adopt seeds of life and seeds of freedom and hope. A truck full of seeds traveled with the Bija Yatra and there was a hunger for seeds among farmers whose seed supply has been destroyed by the seed monopolies of Monsanto and its Indian subsidiary/licensees.

Navdanya also organized a Bija Rally in the regions of Uttar Pradesh October 2006 with a reach of more than 10,000 farmers. In each village, farmers signed the copy of the memorandum for cancellation of seed Act 2004 and discussed drawbacks of the seed act, patent laws and privatization of water. During the yatra 200kg of wheat variety 308 was distributed to farmers.

BIOPIRACY

Over the past decade, through new property rights and new technologies, corporations have hijacked the diversity of life on earth, and people's indigenous innovation.

Intellectual property rights regimes globalised through the TRIPs agreement of WTO and have been expanded to cover life forms thus creating monopoly control over biodiversity. The TRIPs agreement of GATT is not the result of democratic negotiations between the larger public and commercial interests or between industrialized countries and the Third World. It is the imposition of values and interests by Western transnational corporations on the diverse societies and cultures of the world.

Patents on life are a hijack of biodiversity and indigenous knowledge; they are instruments of monopoly control over life itself. Patents on living resources and indigenous knowledge are an enclosure of the biological and intellectual commons. Life forms have been redefined as "manufacture", and "machines", robbing life of its integrity and self-organization. Traditional knowledge is being pirated and patented unleashing a new epidemic of "bio piracy".

To end this new epidemic and to save the sovereignty rights of our farmers it is required that our legal system recognizes the rights of communities, their collective and cumulative innovation in breeding diversity, and not merely the rights of corporations. It is the need of the hour to evolve categories of community intellectual rights (CIRs) related to biodiversity to balance and set limits along with boundary conditions for protection. The Intellectual Property Rights as evolved are in effect, a denial of the collective innovation of our people and the seed sovereignty or seed rights of our farmers.

Illustration 2: Protest at the European Patent Office during the Neem Biopiracy hearings in 1994

Patenting of Neem

The patenting of the fungicidal properties of Neem was a blatant example of biopiracy and indigenous knowledge. But on 10th May, the European Patent Office (EPO) revoked the patent (0436257 B1) granted to the United States Department of Agriculture and the multinational corporation W. R. Grace for a method of controlling fungi on plants by the aid of an extract of seeds from the Neem tree. TThe challenge to the patent ofNeem was made at the Munich Office of the EPO by 3 groups : The European Parliament's Green Party, Dr. Vandana Shiva of RFSTE, and the International Federation ofOrganic Agriculture and challenged it on the grounds of "lack of novelty and inventive step". They demanded the invalidation of the patent among others on the ground that the fungicide qualities of the Neem and its use has been known in India for over 2000 years, and for use to make insect repellents, soaps, cosmetics and contraceptives and the neem patent was finally revoked.

The Basmati Robbery

On 8th July 1994, Rice Tec Inc, a Texas based company, filed a generic patent(Patent No. 5663484) on basmati rice lines and grains in the United States Patent and Trademark Office (USPTO) with 20 broad claims designed to create a complete rice monopoly patent which included planting, harvesting collecting and even cooking. Though Rice Tec claimed to have "invented" the Basmati rice, yet they accepted the fact that it has been derived from several rice accessions from India. Rice Tec had claimed a patent for inventing novel Basmati lines and grains.

After protests the U.S. Patent and Trademark Office struck down large sections of the Basmati patent. No new patents have been given to Rice Tec, and no new right has been given to market their varieties as equivalent to or superior to Basmati.

Syngenta's Attempt at Biopiracy of India's rice diversity

Syngenta, the biotech giant, tried to grab the precious collections of 22,972 varieties of paddy, India's rice diversity, from Chattisgarh in India. It had signed a MoU with the Indira Gandhi Agricultural University (IGAU) for access to Dr. Richharia's priceless collection of rice diversity which he had looked after as if the rice varieties were his own children. The mass agitation by the peoples' organization, farmers' unions and civil liberty groups, women's groups, students' groups and biodiversity conservation movements against Syngenta and IGAU bore result and Syngenta called off the deal.

Monsanto's Biopiracy of Indian Wheat

The next major victory against biopiracy for Navdanya came in 2004 when the European Patent Office in Munich revoked Monsanto's patent on the Indian wheat variety, Nap Hal. Monsanto, the biggest seed corporation was assigned the patent (No. EP 0445929 B1) on wheat on May 21st, 2003 by the EPO under the simple title, "plants". On January 27th, 2004 The Research Foundation for Science, Technology and Ecology along with Greenpeace and Bharat Krishak Samaha filed a petition at the EPO challenging the patent rights given to Monsanto, leading to the patent being revoked.

ConAgra's Biopiracy claim on Atta (Wheat flour)

Atta, a staple food and ingredient within India, is currently under threat from the corporation ConAgra who filed a "novel" patent (patent no 6,098,905) claiming the rights to an atta processing method, and was granted the patent on August 8th, 2000. The method that ConAgra is claiming to be novel has been used throughout South Asia by thousands of atta chakkis, and so cannot justly be claimed as a novel patent.

Monsanto's Biopiracy of Indian Melons

In May 2011, the US company Monsanto was awarded a European patent on conventionally bred melons (EP 1 962 578). These melons which originally stem from India have a natural resistance to certain plant viruses. Using conventional breeding methods, this type of resistance was introduced to other melons and is now patented as a Monsanto "invention". The actual plant disease, Cucurbit yellow stunting disorder virus (CYSDV), has been spreading through North America, Europe and North Africa for several years. The Indian melon, which confers resistance to this virus, is registered in international seed banks as PI 313970. With the new patent, Monsanto can

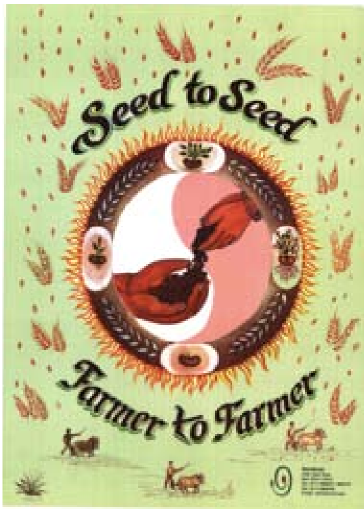

NO PATENTS ON SEED
NO PATENTS ON LIFE
Patents for genetically engineered crops :
• threaten the environment through increased use of chemicals, monocultures
• increase the farmers' dependence on the seed industry
• threaten food security by creating monopolies


NO PATENTS ON
NEEM PRODUCTS
NO PATENTS ON LIFE
Patents on neem products are based on a bias against non-Western knowledge systems which are treated as 'obvious' and 'natural'.
Such patents will lead to monopoly production and undermine the natural resource and market base for the small scale sector.
The neem patents are a blatant case of intellectual piracy.


NO PATENTS ON SEED AND FOOD
NO PATENTS ON RICE
Rice cannot be allowed to become a Corporate Monopoly.
Stop Rice Biopiracy.
Join the Movement
Against Patents on Seed and Food.
RFSTE / Navdanya


I AM NOT AN INVENTION


HANDS OFF OUR SEEDS
BIJA SWARAJ
SEED SOVEREIGNTY
BIJA SATYAGRAHA
NO PATENTS ON SEEDS


Seed to Seed
Farmer to Farmer


Save our sovereignty.
Save our seeds.
Save our salt.
Boycott Cargill and other TNCs

now block access to all breeding material inheriting the resistance derived from the Indian melon. The patent might discourage future breeding efforts and the development of new melon varieties. Melon breeders and farmers could be severely restricted by the patent. At the same time, it is already known that further breeding will be necessary to produce melons that are actually protected against the plant virus. DeRuiter, a well known seed company in the Netherlands, originally developed the melons. DeRuiter used plants designated PI 313970 – a non-sweet melon from India. Monsanto acquired DeRuiter in 2008, and now owns the patent. The patent was opposed by several organisations in 2012.[1]

Monsanto's Bt Cotton

The gene giants taking patents on seeds and biodiversity are also pushing genetically engineered seeds such as Monsanto's Bt. cotton. Genetically engineered crops are contaminating and polluting biodiversity, thus destroying the integrity of genetic resources. e.g. The corn in Mexico's centre of genetic diversity has been found to be contaminated by Bt. corn. New IPR laws are creating monopolies over seeds and plant genetic resources. Under pressure from World Bank, the Seed Policy of 1998 started to dismantle our robust public sector seed supply system.

Monsanto has pushed its Bt. cotton into Indian agriculture through corruption and fraud at every step. Bt cotton was commercialized in India during April 2002 with Monsanto being the major technology provider operating through 60 regional biotech companies holding Bt licenses. Under international agreement, Monsanto/Mahyco can charge a royalty of 20% for 3 years and 5% for another 3 years. Even though Monsanto does not have a patent on Bt cotton in India, it collects royalties as fees for trait value. The increase in the net profit of Monsanto India (about 162 per cent increase in profit from 2000 to 2003) indicates the huge success of Bt cotton seeds. At present, 95 percent of the cotton seed sold in India is Bt cotton owned and controlled by Monsanto.

During 2004, the farmer had to pay Rs 1,600 for a single 450 gm packet of Bt cotton seeds which included a technology fee component of Rs 725. The intervention of state governments forced the company to slash the seed price. However, Monsanto still makes about Rs 34 billion per year from Indian farmers[2]

A comparison of organic and Bt cotton seed price during the last two decades will be relevant in this context. During the 1990s, the local seed cost was around Rs 9 per Kg. By 2004, the cost skyrocketed to Rs 1,650 to Rs 1,800 for less than half Kg (450gm). At present the seed cost is Rs 650 to Rs 920 for 450 gm. However, the current price still exhibits a disproportional increase when compared to the cost of seed (Rs 9) before the introduction of Bt.[3]

Other inputs like fertilizers, pesticides, utilities like water and electricity also saw a big rise in costs from the mid to late 1990s. The rising input costs have forced the farmer into a debt trap.

The states under the cotton belt have the highest number of farmers' suicide due to agricultural indebtedness. Between 2001 and 2010, a total of 94,975 farmers committed suicide in the states of Maharashtra(37646), Karnataka(21828), Andhra Pradesh(21809) and Madhya Pradesh(13692).[4]

Maharashtra remains the worst single State for farm suicides for over a decade now. The total number of farmers who have taken their own lives in Maharashtra since 1995 is closing in on 54,000. There is a remarkable increase in the average number of suicides in Maharashtra after the introduction of Bt cotton in 2002. (P Sainath, Farm suicides rise in Maharashtra, State still leads the list,The Hindu)

To address this crisis, Navdanya has established 3 seed banks in Vidarbha to save and distribute local varieties of seeds to farmers and work towards a living economy. (See Box Fibres of Freedom)

The Great Seed Robbery: Public Private Partnerships

India has signed a US India Knowledge Iniative in Agriculture, with Monsanto on the Board. Individual states are also being pressured to sign agreements with Monsanto. One example is the Monsanto-Rajasthan Memorandum of Understanding, under which Monsanto would get intellectual property rights to all genetic resources, and to carry out research on indigenous seeds.

Under pressure of the Prime Minister's office, Indian states are signing MOUs with seed corporations to privatize our rich and diverse genetic heritage.

For instance, Project Sunshine, Monsanto's hybrid maize expansion program seeking to bring about a "Yellow Revolution" in tribal areas of India. The project is implemented in tribal districts of Vadodara, Banaskantha, Dahod and Panchmahal of Gujrat and is extended to Jhabua, Dhar, Seoni, Chhundwara, Ratlam, Khargone and Alirajpur districts of neighboring Madhya Pradesh state. They have similar projects in Orissa (Project Goldendays), Gujarat (Project Sunshine) and Rajasthan (Project Golden Rays).[5]

Project Sunshine included seed distribution, chemical fertilizer distribution, soil testing, micro-credit and banking services, rain fall insurance, farm mechanization, extension and marketing support. Each farmer is supposed to get 8 Kilos of hybrid maize seed from these companies, in addition to 50 Kilos each of Urea, DAP and MoP. The state government began purchasing and distributing Monsanto maize seeds under the brand name of Prbal since the inception of Project Sunshine under the Vanbandhu Kalyan Yojana in 2008. Under the scheme, over 5 lakh tribal farmers were being provided Prabal seeds for free. Non – tribal farmers were given subsidies ranging from 33 per cent to 50 per cent, depending on their financial status. It is estimated that the state government has procured seeds for Rs 54.94 crores from Monsanto from the last four years.

However, the project met severe criticism from all corners. The reasons behind are:

1. The Dekalb hybrid corn being used in the project matured 23 days later than the local varieties. This means land being engaged for 23 days more than the local cultivation which makes it difficult for the rain fed farmers to adopt inter cropping. It also encourage monoculture practice which undermine the food security of the farmer.
2. The hybrid yielded grain 81.17% higher than the local cultivars on an average. However, the hybrid was cultivated under protected soil moisture, recommended high chemical fertilizer dose and plant protection measures. The long term practice of chemical farming can adversely impact the fragile eco systems in the tribal villages.
3. The increase in cost of seed was phenomenal during the project period. The price of seed has increased from Rs 156 per acre in 2007 to Rs 1,145 in 2009.
4. The local community preferred indigenous maize varieties for their food requirements.

The seeds that will be used for essentially derived varieites by corporations like Monsanto are originally farmer's varieties, and there is a law to protect farmers' rights - The Farmers Rights and Plant Genetic Resources Act. Nothing in the MOU acknowledges, protects or guarantees farmers' rights and is violative of the Farmers Rights Act. While public resources will be given away freely to Monsanto at a subsidy, Monsanto's IPR monopolies will be protected. This is an MOU for Monsanto takes all and the public system gives all.

After a campaign by Navdanya, a "Monsanto Quit India" Bija Yatra (Seed Pilgrimage) and relentless protests by farmers, the Rajasthan governement was forced to cancel the MOU.

On 25 April 2012, the Gujarat government decided to withdraw Monsanto's proprietary seeds from various ongoing government projects including Project Sunshine.

The hijack of the seed supply by corporations like Monsanto threatens the very survival of our peasants and our biodiversity. The costly experiment of Bt. cotton and hybrid corn that Monsanto has undertaken is increasing the economic and ecological vulnerability of farmers without bringing them new benefits.[6]

The future of the seed, the future of the farmers and the future of food lies in the conservation of biodiversity of our seeds. Seed Sovereignty is the foundation of food sovereignty.

The Great Seed Robbery threatens both and it must be stopped.

Biopiracy of Brinjal

The development of Bt brinjal by Monsanto and its Indian partner Mahyco is another classic example for biopiracy. The company has accessed nine Indian varieties of brinjal to develop their genetically modified vegetable without prior permission from the NBA or the relevant State and local boards. This is a violation of the Biological Diversity Act 2002, according to the Environmental Support Group (ESG) which lodged the formal complaint with the Karnataka Biodiversity Board on February 15, 2010, soon after the Government put a moratorium on Bt brinjal on health and safety grounds.*(Priscila Jebaraj, 'Development of Bt brinjal a case of bio-piracy', The Hindu,August 10, 2011)*

Bio Piracy of Climate Resilient Crops

For millennia farmers have innovated and evolved varieties with unique properties. Farmers' innovation has stressed on breeding for climate resilience and for conservation of biodiversity. Giant corporations which have destroyed biodiversity by promoting mono cultures and uniformity are now claiming farmers' collective, cumulative innovation as their invention through bio piracy patents. The latest in this bio piracy is the patenting of climate resilient traits. Petitioner has been conserving farmers' varieties since 1987. We have created community seed banks of climatic resilient crops which have distributed seeds after cyclones, the tsunami, and after draught.

The corporations are pirating the collective innovation of farmers in breeding crops that are resilient to droughts, floods and salinity. The Bio technology industry is spreading the misconception that without genetic engineering we will not be able to evolve crops with climate resilience. As a recent Monsanto advertisement states:

9 billion people to feed. A changing climate. Now what?

(And of course offers its GM seeds as the answer.)

ETC Group's report reveals that the world's largest seed corporations are secretly amassing hundreds of monopoly patents on genes the company will market as "Climate Resilient" genes. As the report reveals, these proprietary approaches to combating the effects of climate change will not solve the problem but in fact exacerbate it.

The report also includes a table listing of the 1,500 patent applications and patents on the so-called climate resilient genes. India's national Action Plan on Climatic Change has a mission dedicated to sustainable agriculture. However its focus is not on sustainable farming and organic agriculture but on the "Use of Biotechnology". As the Action Plan states "Biotechnology applications in agriculture related to several themes, including drought proofing, taking advantage of elevated CO_2 concentrations, increased yields and increased resistance to disease and pests"

Farmers' innovations and participatory breeding options do not find any reference in the corporate/official response to climate change. This report on the Bio piracy of Climatic Resilient crops shows that farmers have bred crop varieties that can tolerate climate extremes such as droughts, floods and cyclones (which bring salty sea water to land). As lists from our community seed bank and community biodiversity registers show that these traits already exist in farmers' varieties. Gene giants are appropriating climate resilience as their "innovation" through patents. India's rice varieties possess a wide diversity in their morphological and physiological characters. These varieties were and are the gifts of nature's intelligence and farmers' innovation over millennia from the temperate high hills of the Himalayas to the tropical lowland deep water and salt water marshes of the sea coasts. Global biotechnology corporations like Monsanto, BASF Bayer, Dupont and Syngenta make broad- based IPR claims on genetically engineered varieties. However, the genes introduced by them are not created by them, but have been created through farmers' careful selection and breeding process in conjunction with nature.

However, genetic engineering is a laggard technology, limping far behind the advanced technologies of farming communities of yesteryears. It merely tries to recreate artificially and often irrationally, usually with hazardous or ludicrous consequences, what nature and farmers have already most aptly created in partnership of over thousands of years.

Further, abiotic stresses rarely occur alone; there are usually two stresses in a site, and often as many as six, including micronutrient deficiencies in soil. Thus the long-term adaptability of a variety depends on its level of tolerance for all the stresses that occur in its growing environment. Sometimes, no stress occurs at all, i.e. aluminum-toxicity will not occur if the soil is kept saturated through adequate rainfall. However, rainfall will not affect phosphorus deficiency. The severity of some stresses like salinity is affected through factors like time and space, due to high solubility and mobility of salts. Salinity is also affected by the quantity of water available, either as rainfall, or groundwater. These variations form a major constraint to commercial breeding, particularly genetic engineering.

Farmers' varieties have high grain yields, and high straw yields, which help to further increase soil fertility as well as its capacity for retaining moisture, either as green manure, or as fodder for cattle, which in turn produce manure for the soil.In addition, farmers' varieties have been selected for their long-term ability to withstand several stresses and yet produce consistent yields. Thus farmers' varieties are ecologically sound varieties as well as food security sound varieties.

The resilience and wide adaptability of farmers' varieties is clear from the fact that while commercial and public sector varieties of salinity resistant rice failed to rehabilitate agriculture in Ersama, Orissa in the aftermath of the super cyclone and floods of 1999, a farmers' variety from the Navdanya Project in West Bengal proved extremely successful, and is today in high demand. Farmers have developed and have been using these varieties for over hundreds of years; genetic engineers like Monsanto are just waking up to their potential.

Bio Piracy of India's Gene Bank

Blessed with one of the world's most diverse seed gene banks, India's premier state-run agriculture research institute, the Indian Council of Agriculture Research is offering its massive seed /gene bank to multi-national seed giants. The claim is that this is in exchange for expertise and a share of the profits and is seeking to collaborate with multinational seed corporations to develop high-yielding, durable seeds to improve the nation's poor crop yields. However, corporations are creating non renewable seeds which farmers cannot buy every year. Costly non renewable seeds are trapping farmers in debt- 250,000 indebted farmers have committed suicide in the last 15 years.

As one of the oldest and largest agricultural societies, India has an impressive diversity of at least 166 species of crop plants and 320 species of wild relatives of cultivated crops. Forests, which contain much though by no means all of India's biodiversity, now comprises about 64 million hectares, or about 19% of land area of India, according to satellite imagery. Roughly 33% probably represents primary forest. About 10 million hectares are managed as "Protection forests" for ecological stability, 15 million for production of timber and 25 million as social forest to meet the demand for the fuel wood and fodder. About 14 million hectares lie within national parks and wildlife sanctuaries.

Most of the people in our country derive their livelihood and meet their survival needs from the diversity of living resources. In this context, therefore, conservation of biodiversity is intimately linked to indigenous knowledge system on the one hand and people's rights to protect their knowledge and resources on the other hand. Whenever biodiversity is threatened and eroded, people's rights and people's knowledge is also eroded.

Seeds produced and sold by farmer account for over 70 per cent of the total seed supply in the country. The sharing and exchange of biological resources and knowledge of its properties and use has been the norm in all indigenous societies, and it continues to be the norm in most communities, including the modern community. But sharing and exchange get converted to "Piracy" when individuals, organizations or corporations who receive biodiversity and knowledge from indigenous communities freely and convert this gift into private property through intellectual property claims. This piracy of genetic wealth is called "bio piracy".

Under this bio piracy regime biodiversity-based traditional knowledge system of the forest dwellers, farmers and healers are fast becoming the private property of the MNCs. The MNCs are usurping these systems from the domain of common knowledge through property rights which in essence promote resource piracy and intellectual piracy, since the system provided under the TRIPs recognizes and provides protection only to the formal innovators, not to the informal indigenous innovators. The traditional knowledge of informal innovators is being pirated by the formal innovators who make minor modifications or advances and then seeks patents, thereby claiming the knowledge as their 'private property'.

Navdanya's Community Biodiversity Register (CBR)

A Community Biodiversity Register is the documentation of the resources and knowledge of local communities at the local, regional and national levels by the people themselves for the purpose of rejuvenating the ecological basis of agriculture and the economic status of the farmers.

The CBR recognizes both the differing needs of farmers and consumers as well as their contribution towards meeting these needs. Navdanya has formed more than 5000 CBRs over the years. The CBR serves the needs of the local agricultural communities and not the needs of non-local commercial interests who need biodiversity for raw material. The documentation therefore has to develop from local community registers which are ecosystem specific and culture specific and which are the primary level of utilization for community rejuvenation. Documenting farmers' varieties of seed is a vital countervailing force to the predatory nature of the IPR regime because it refutes the terms "landraces" and "germplasm" (both of which contribute to the concept that farmers varieties are gifts of nature and thus can be appropriated freely for corporate benefits) and invalidates corporate claims to originality and innovation by placing it beyond doubt with the farming community. The CBR, by making farmers varieties are gifts varieties freely accessible to other farmers across the country, rejuvenates agricultural biodiversity, people's knowledge and sustainable agriculture.

Access to traditional varieties revitalizes the role of the farmer as a plant breeder, and strengthens his resistance to seed monopolies. Seed exchanges between farmers thus shrink the market for corporate seeds. Such exchanges thus help farmers and farming communities' retain agricultural freedom and economic control over agriculture.

At Navdanya, we have been compiling such a community agricultural biodiversity register based on our work over the years. Navdanya's community biodiversity register acts as a document of indigenous resources and indigenous knowledge, as a platform for assertion of Common Intellectual Rights and as a seed catalogue for interested individuals and groups to get access to organic seed, the first link in the organic food chain.

Navdanya believes that conservation of agricultural biodiversity is impossible without the participation of the communities who have evolved and protected the plants and animals that form the basis of sustainable agriculture. In agriculture, in situ conservation strategies are impossible to separate from sustainable utilization and production methods.

Why has documentation of community knowledge become necessary?

Documentation of community knowledge is becoming imperative because of

1. Erosion of resources: Non-sustainable production and consumption patterns in agriculture have led to the erosion of land, water and agricultural biodiversity in farmers' fields. For example, the 'miracle seeds' of the green revolution replaced indigenous varieties of rice, many of which are like the amaranth, which are in the process of being replaced by the crops like rice and wheat, are also threatened by extinction.
2. Erosion of knowledge: Communities which are identified and innovated have traditionally had free exchange of knowledge of their resources within the community and outside it. When such resources are eroded and lack common use, common knowledge is eroded over time.

3. Disappearance of sustainable utilization alternatives: When both the resource and knowledge about it disappear from the commons, the space for utilization of alternatives in a sustainable manner, or rather, the space for a return to sustainable agricultural production and consumption shrinks.
4. Intellectual piracy: The removal of knowledge from the commons leaves it vulnerable to being claimed as the private intellectual property of someone else. This is particularly true when the common knowledge has no recorded originator or innovator but has been treated as community knowledge traditionally. The IPR regimes ensure that the pirates of such knowledge become the new owners of the knowledge and share it only for profits.
5. Biopiracy: Intimately linked with intellectual piracy is biopiracy. The removal of resources from the commons leaves it vulnerable to piracy both directly by the IPR regimes and by collections made by organizations (nationally and internationally, government or private)
6. IPRs and monopolies: Together, intellectual piracy and biopiracy mean that the resource is now in the monopoly control of corporations. In agriculture, this reduces all innovation to innovation by the corporations for profits, and agricultural production and consumption become conditional to corporate interests.

Jaiv Panchayat (Living Democracy)

Ecological agriculture is not possible unless biodiversity is in the commons, and is free from the threat of extinction posed by technologies like genetic engineering. Hence, on 5th June 1999, on the World Environment Day, Navdanya launched Jaiv Panchayat - the Living Democracy Movement- to fight against the biopiracy and IPR monopolies on life forms.

The "Jaiv Panchayat" is the Biodiversity Panchayat. It is living democracy – both in being the democracy of all life, and democracy in everyday life. It consists of the entire gram sabha (gram ke sab log) women, children and minority communities and not merely those who are on the electoral rolls of the village. This form of the Panchayat renders the community the decision-maker on all matters pertaining to biodiversity and its conservation. In doing so, the

Jaiv Panchayat lays down the parameters within which the elected Panchayat body can take action vis-à-vis biodiversity. The community ownership it asserts is not aimed at putting different communities in conflict with each other over the use and control over biodiversity. It is actually rejuvenating the traditional systems of common property resource management, which was based on equitable sharing of scare resources for the common good of all the communities, as an alternative to the privatization and monopolization propagated by the Corporates.

Such alternatives are also envisioned in the Convention on Biological Diversity (CBD) and Agenda 21. The Jaiv Panchayat movement is in the spirit of the CBD and is our local Agenda 21. The obligations to implement the commitments under CBD are part of the government's mandate, broader and deeper than that of the trade commitments.

Local grassroots initiatives like the Jaiv Panchayat are crucial in this context and they do not have to be limited to structures of the formal elected Panchayat. Such local decentralized democratic bodies are in fact in the spirit of the Panchayati Raj Amendment 1992 and the Panchayat Act 1996. Genuine commitment to the process of democracy implies that even the processes of globalization and free trade have to be based on recognition of primary ownership of village communities to their natural resources and their decision making power to determine the utilization of these resources.

The first Jaiv Panchayat was brought to life by a gathering of about 1000 villagers of Agastyamuni village in district Rudraprayag, Garhwal, Uttaranchal on 5th June, 1999- the World Environment Day. The Jaiv Panchayat campaign launched by Navdanya is a part of the much broader movement called Bija Satyagraha. As a part of the movement over 6000 village communities have affirmed their rights to their biodiversity and have taken a pledge to conserve, rejuvenate and protect their biodiversity. There are more than 200 Jaiv Panchayats in Garhwal alone, where people have asserted their inalienable and common rights to their natural resources. In many of the Jaiv Panchayats, the elected leaders are also the leaders of the Movement. Many of them have declared their villages GM-free zones as well.

Jaiv Panchayat records the biodiversity of the village in their own Community Biodiversity Register (CBR) to protect and reclaim the biological and intellectual commons. It has rejuvenated indigenous knowledge and promoted its propagation from grandmother to grandchildren.

Mandakini Milan Declaration

5th June 1999 Agastyamuni, Distt. Rudraprayag, Garhwal, Uttaranchal

Today, on 5th June 1999, on the auspicious occasion of World Environment Day, we the people of Agastyamuni, take the solemn pledge that we will continue to protect our plants, trees, animals, cattle, and our entire diverse biological wealth, as a revered gift and our ancestral heritage.

This pledge assumes more significance as it is being taken in Agastyamuni, the sacred land of Rishi Agastya, who through his dedication and research stabilized the mighty Himalayan Mountain (therefore the name Agastya - the stabilizing force). Both humanity and nature have greatly benefited from the diligent research of Maharishi Agastya, Maharishi Jagdamni, Rishi Atri, Mata Anusuiya and other saints. Their work has contributed to the conservation and sustainable use of all kinds of medicinal plants and floral wealth and other precious biodiversity of these mountains. The research has been further enriched by Maharishi Charak and other saints and health practitioners who compiled the volumes of Samhita and Nighantu detailing the uses and properties of our biological resources. These volumes were bestowed to the community for well- being and continue to live through the Ayurveda.

From our forefathers we have inherited the right to protect the biodiversity of our Himalayan region and also the corresponding duty to utilize these biological resources for the good of all people. Therefore we pledge, by way of this Declaration, that we shall not let any destructive elements unjustly exploit and monopolies these precious resources through illegal means. So that in our communities and countries we can truly establish a living people's democracy wherein each and every individual can associate herself/himself with the conservation, sustainable and just use of these biological resources in her/his everyday practical living. This tradition of sharing shall be kept alive through the *Jaiv Panchayat* - the living democracy. The Jaiv Panchayat will decide on all matters pertaining to biodiversity. Through such decentralized democratic decision-making we will make real the democracy for life.

Cows, buffaloes, goats, sheep, lions, tigers, and in fact all animals, birds, plants, trees, precious medicinal plants and manure, water, soil, seeds are our biological resources and we shall not let any outsider exercise any control over them through patents or destroy it through genetic engineering.

As a community, we shall together be the guardians of our biological heritage.

The basic purposes of the Jaiv Panchayat are to:

- Strengthen people's rights over biodiversity to defend local economies
- Heal the diseased and decaying system of political democracy, and
- Counter and resist the WTO rules for free trade in agriculture, patents on seeds, and medicines which are threatening the environment, livelihood and domestic rights of the common citizens.

The launch of the Jaiv Panchayat marks the commencement of a movement towards relocating control and decision making over knowledge and biodiversity from global to the local, from the MNCs to the people. The Jaiv Panchayat is living democracy because through it, people live economic and political democracy in their daily lives, the democratic structure society is vibrant and alive; and the family of species, our earth family of diverse life forms is included in the democracy of life.

The democratic functions of a Jaiv Panchayat are to:

- Protect cultural diversity and cultural activities
- Rejuvenate indigenous knowledge of biodiversity
- Create mechanisms to conserve it
- Create mechanisms to regulate it and use it sustainably
- Document the biological wealth past and present
- Conserve medicinal plants and encourage traditional health practices
- Defend the livelihoods based on biodiversity
- Promote sustainable agriculture
- Facilitate setting up of community seed banks
- Regulate the trade of biodiversity
- Shape the laws for ownership and control over biodiversity and its knowledge
- Make decisions on IPRs and knowledge conflicts
- Make decisions on activities that would have adverse impact on biodiversity and people's lives, e.g. introduction of genetically modified organisms, toxic and hazardous chemicals and polluting industry
- To make the Community Biodiversity Registers

Keepers of The Seed

Seed Keepers of the Ganga Valley

Seed Keepers of the Yamuna Valley

The Navdanya philosophy of conservation of agricultural biodiversity is through a network of community seed banks in different ecozones of the country. Such conservation through a network of community seed banks, as envisaged by us, facilitates four rejuvenations:

1. Rejuvenation of agricultural biodiversity as a common property resource;
2. Rejuvenation of farmers' self reliance in seed locally and nationally;
3. Rejuvenation of sustainable agriculture as the foundation for food security, both locally and nationally;
4. Rejuvenation of farmers' rights as common intellectual rights of agricultural communities.

In situ strategies of agricultural biodiversity conservations need the participation of four kinds of farmers.

1. Farmers who continue to use and conserve diverse varieties. In general these are small peasants in marginal or remote areas, which were left out of the green revolution because of not having the necessary resources to shift into resource-capital- and chemical-intensive agriculture. Marginal farmers in marginal regions are therefore the source of rejuvenation in biodiversity in agriclutre. They are the seed savers or beej rakshaks.
2. Farmers whose agricultural biodiversity has been eroded but who feel the ecological, economic and political imperative to reintroduce diverser species and crop varieties for ecological and food security. They can become beej rakshaks by introducing diversity from farmers who have conserved seed through community seed banks and exchange networks.
3. With industrialization of agriculture, many farmers have stopped producing seed for their own requirements. If biodiversity has to be rejuvenated in agriculture and farmers' seed supply has to be strengthened, some farmers need to become seed producers for farming communities. Such farmers who multiply and produce more sed than they require in order to meet the needs of other farmers are seed producers or beej utpadaks. Seed multiplication can also be undertaken by farmers' organizations and NGOs involved in seed conservation activities.
4. Given the rapid erosion of biodiversity and the acceleration of forces of destruction through the spread of monoclutures and export oriented agriculture, some initiatives will also be needed to conserve biodiversity that is disappearing and cannot be conserved through immediate introduction in production systems. Farmers who grow species and varieties that have lost their utilization value due to marker forces need to be encouraged to grow diversity for *in situ* conservation for future use and ecological security.

No matter what the level of conservation activity, free exchange of agricultural biodiversity and knowledge of its utilization among farming communities is essential for both conservation and sustainable production. There is no static or deep division between the four kinds of *in-situ* activity. Different farmers will function in different roles according to the socio – economic context, their own capacities and the larger support system.

Free exchange between farming cummunities becomes vital in the light of the present erosion of agricultural biodiversity and future erosion in farmers' rights due to IPRs in biodiversity. The community seed bank network facilitates farmers' seed exchange and supply systems.

Bringing the Lab to the Field

In Navdanya's *living seed banks* the contributions of farmers to identifying, studying, modifying and cultivating varieties to suit their ecological, economic and other needs are recognized. Farmers are the experts, situated at the centre of conservation activity. Conservation starts and ends in the fields—it is carried on within the environment where the diversity grows. While corporate agriculture does not acknowledge farmers' skill in agriculture and contributions to breeding, and therefore awards breeders' rights only to the seed industry and researchers, Navdanya' partnership model of conservation recognizes that farmers and scientists are equals. This partnership model is committed to creative solutions that fall far from the mainstream and question the dominant model of food production and distribution.

Dr Vandana Shiva and late Dr Nikhil Chakravarti honouring late Dr R H Richharia

The work of Dr. R.H. Richharia, eminent Indian rice scientist and pioneer in the area of conservation of diverse varieties through farmers' participation, served as an inspiration and guide. Daniel Querol, an expert in genetic resources who helped set up conservation programs in Mexico, Peru, and Nicaragua, came to Navdanya in 1987 to help design the program. Dr. Oscar Zamorra of the Agricultural University in Los Banos, Philippines, who along with a group of Filipino farmers established a farmer-run seed conservation program, visited the Navdanya program and held training workshops with local farmers. The Keeper of the National Herbarium of Ethiopia, Dr. Tewolde Berhan G. Egziabher, provided valuable technical information. In addition, for several years Navdanya staff interacted with and received training from experts at the Plant Genetic Resources Centre of Ethiopia. This gathering of farmers and scientists as equal partners has been a key to the great strength of the Navdanya program.

In February 2010 **Dr. Salvatore Ceccarelli** of the International Center for Agricultural Research in Dry Areas, Syria (ICARDA) flew to the Indian subcontinent to meet with the Navdanya Seed Keepers Network and share his findings from his work with farmers in North Africa and the Middle East. Ceccarelli, a former scientist for a major seed distributor in Europe, began his talk by stating that hybrid seeds are failing farmers and describing the principles of **participatory breeding** to the assembled group. Participatory breeding refers to the method whereby small farmers work in conjunction with scientists to breed plants that meet the specific needs of the farmers—not the financial needs of global seed corporations. Using this collaborative method farmers actively participate in and direct the ongoing process of crossbreeding plants possessing exactly the kind of desirable traits they require—such as drought and disease resistance, yield, or taste. But, stressed Ceccarelli, while this work may be done in cooperation with scientists, farmers can just as effectively do this work themselves.

Navdanya's Community Seed banks

Dr. Vinod Bhatt

Navdanya has set up 111 community seed banks in 17 states of India in the last 25 years. Many seed banks are now running independent. Since the first seed banks were created in the Garhwal Himalayas of Uttar Pradesh, the Deccan in Karnataka, and the Western Ghats, also in Karnataka, Navdanya has started new seed banks in Ladakh, Jharkhand, Bihar, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. Navdanya's partners in this work include Bija Bachao Andolan in Northern Uttar Pradesh now Uttarakhand; Green Foundation, Navdarshanam, and Centre for Tropical Ecosystems, in Karnataka; Rishi Valley in Andhra Pradesh; Centre for Indian Knowledge Systems in Tamil Nadu; Vrihi in West Bengal; Vidharbha Organic Farming Association, and Vidharbha, Prakruti Paramparika Bihana Sangarakhna Abhijan in Orissa; Kisan Samvardhan Kendra in Madhya Pradesh; Kisan Vigyan Kendra in Uttar Pradesh; Manvi, Indian National Trust for Art and Cultural Heritage in Kerala; Hazaribagh, in Jharkhand; and the Women's Alliance and Ladakh Ecology Group in Jammu and Kashmir.

Matsunobou Fukuoka with Dr Vandana Shiva at Navdanya's seedbank

Navdanya has also established conservation and training centers at village Ramgarh / Sheeshambara in Doon Valley, in Bulandshahar in west U.P. and Balasore in Orissa. More than 3800 rice varieties have been collected, saved and conserved. Hundreds of varieties of crops such as millets, pseudo-cereals and pulses have been conserved and promoted which were pushed out by the green revolution and growing monocultures.

Navdanya's Biodiversity Farm in the Doon Valley was started on land that had been desertified with more than two decades of eucalyptus plantation and is now home to a rich variety of crops. Presently it is spread over 45 acres of land. Navdanya conserves more than 1600 different species of crops and multipurpose plants, which include 600 paddy varieties, 15 pulses, 159 varieties of wheat, 11 varieties of Barley, 10 varieties of Oats, 7 varieties of mustard and several millets, vegetables, green manure, pulses, spices, vegetables and medicinal plant varieties. The farm's register serves as a record of these local indigenous varieties and of indigenous knowledge. It also serves as a document for assertion of common intellectual rights and as a seed catalogue from which interested individuals and groups can get access to organic seeds.

Some of our community seed banks are described below:

Sor/Sankri

Seed Bank at Sor/Sankri

Sor/Sankri village of district Uttarkashi, in the famous Har Ki Doon valley is situated at about 2000m amsl. The village in the valley represents subtropical to alpine climate. The villages are situated in between the range of altitude varying from 1500m to 2800 m amsl. The region is now a part of the Govind Ballbh Pant Wild Life Sanctuary since 1952. It is also declared a National park for Musk deer. About 80 % of the land in the area is covered with the forest.

Due to the fact that the village is situated inside the wild life sanctuary and national park, farmers are deprived of the rights of not only collecting the minor forest produce (MFP), but also from rearing their cattle in the forest. As a consequence population of sheep's and goats has come done to 20 % in last 10 years. People have entirely shifted from animal rearing to Agriculture, which is now the main source of livelihoods in the region. Farmers grow kidney beans, amaranth, potatoes, buckwheat and chenopodium.

In recent years people have also started planting apple orchards as an alternative to the sheep's and goats in tune of the neighbouring state of Himachal Pradesh. But still the plants are very small, which will take atleast few more years to get income from the orchard.

Cultivation of medicinal plants and Hippopy (Seabuckthorn) is also gaining popularity after people were banned from collecting MFPs from the reserve forest. Navdanya also played a vital role in popularizing the cultivation of medicinal plants and Hippopy as a health drink for people of different ages.

Other than this, inaccessibility is another hampering factor for the development of this region. Majority of villages in the region are still more than 20 kms away from the road head. However, in the monsoon season, because of excessive rains area remains cut-off from the other part of the country.

The community seed bank in the region not only provides farmers with the different varieties of quality seeds of different crops within their area, but also, access to different options like cultivation of medicinal plants which are of immense importance, and can not be grown elsewhere in other climatic conditions.

About 5329 people of 18 villages in the region are benefitting directly from this seed bank. Of these about half are women farmers. The people in the region belong to the local tribe, popularly known as *Pahari*.

Chandipur, Orissa

Dr Ashok Panigrahi and Kusam Misra

Odisha, a predominantly rice growing state is considered to be the home of the tall indica rice diversty. It is speculated that at one point of time in the remote past there were some ten to fifteen thousand of tall indica rice diversity being widely cultivated in varied eco-climatic conditions existing the state. These were strongly photoperiodic and many of them were really high yielders. Dr.R.H. Richaria, an Internationally renowned Indian rice scientist was known to have documented some such high yielding natives, selected and improved through local peasants which could outmatch and outweigh the best yielding rice HYVs. This was done by Dr. Richaria at least 15 years before the launch of the Green Revolution. Richaria's highest yield was 54 quintals per acre or 13.6 tons per hectare achieved in Salem and the lowest yield was 24 quintals per acre or 6 tons per hectare achieved in West Bengal from his indigenous improved rice varieties. The presenter himself achieved 28 quintals per acre organically in the fields of a peasant at Mayurbhanj in kharif of 2004-05, using internal inputs only. Some of them had the lodging character in them, but their straw was used as roofing material and cattle feed. Some of them were known to be climate adapted and others met varied food specific necessities of the rice cultivators and consumers. A few of them were therapeutic as well having the tissue rejuvenating potentialities as required in the traditional Indian medication. The aromatic rice diversity carried diverse aroma in them; some smelling like fried green gram and others like cumin seed. Both the consumer and the producer had ample scope to pick and chose the variety of rice of choice. The contribution of the 1st.green revolution is elimination of this natural rice diversity. The widely cultivated HYV rice, now limited to just a few, fail to sustain extreme eco-climatic conditions like saline inundations, flood and drought and meet the consumers food preferences. Aromatic rices have vanished from the local markets. Existence of therapeutic rice is now believed to be a myth in Odisha.

Photo courtsy: Dr. Ashok Panigrahi

Seed Bank in Orissa

The trend was perceivable more than a decade ago. Navdanya decided to save these vanishing rice diversities of Odisha through a system of germ-plasm-conservation employing both in situ and ex situ methods and at the same time carry out experiments on their sustainability in varied eco-climatic conditions in view of rapid climate change and yield potentials under various soil amendments. Their behaviours and responses are being recorded. This came handy while selecting the seeds of specific rice diversities for empowering the local communities in rehabilitating agriculture in disaster areas like Erasama in Odisha after the Orissa super cyclone in 2000, Nagapattinam in Tamilnadu after the boxing day tsunami in 2005 and Nandigram in Bengal in 2007. Navdanya Odisha as of now maintains 4 seed banks, 3 village level and 1 central level, where seeds of diverse rice varieties are conserved and renewed every year. Climate resilience factor is given importance in the village level seed banks when all available rice land races are conserved in the central seed bank. Navdanya also encourages individual cultivators to save, exchange and increase diversities in his/ her own fields. The village level seed banks are located in different and varied eco-climatic zones, like salt prone, flood prone and drought prone areas. The central seed bank has 700 rice varieties in its accession out of which 119 varieties are climate resilient. 33 of these are salt and flood tolerant including 1 aromatic variety, 47 are flood tolerant and 39 are drought tolerant including 3 aromatic and 2 therapeutic rice varieties. The rest 581 varieties belong to the general category. There are 56 aromatic rice varieties of which 2 have unique and diverse aroma, 1 smelling like fried green gram and the other, like cumin seed not available anywhere in the world. The therapeutic rices are used in old age tissue rejuvenation.

Diversity, seed exchange and yield potentials

Seed exchange has been the back bone of paddy cultivation until the green revolution. Native paddy plants have diverse basal sheath colours, with about 9 shades of 5 colours, ranging from green, yellow, purple, violet to black. Reappearance of wild variety is an inherent character of paddy cultivation. Cultivators, hence, replace the variety with a different basal sheath colour next season just to be able to distinguish the weeds which are then manually removed. All the green revolution varieties have the same basal sheath colour, making it difficult to distinguish the wild weed which is never removed. A particular variety cultivated in a given field for more than 3 years lose yield, hence, is replaced. This replacement used to be procured through seed exchange, a part of the barter system that was in place till a few decades ago. Thus the cultivators used to gain twice, a new variety and an ensured more yield as the new variety always yielded more. The green revolution proponents do not contribute to this gospel truth. It has been further found out that seeds exchanged over a long distance for growing in the same type of micro-climate not only yielded much more but often even changed its potentials. Two examples will suffice to put all doubts at rest.

1. Udasiali, an indigenous photosensitive kharif paddy variety transported over 500 kilometers from Balasore to Erasama in Jagatsingpur as part of post 1999 super cyclone disaster agricultural rehabilitation yielded at par in rabi.
2. Three select Odisha salt tolerant paddy varieties transported over a distance of over 1500 kilometers from Balasore to Nagapattinam in Tamilnadu under the 'seeds of hope' programme following 2004 tsunami yielded three times more and far better than any known high yielders. The same varieties behaved even better when cultivated in Indonesia, another 1000 or more kilometers away, in 2006 by Professor Friedhelm Goltenboth of Hohenheim University, Germany.

Paddy cultivated under green revolution may have better yield potentials, but it never benefit the cultivators. More grains come to the market but only after making a hole in the cultivator's pocket. Several dozen field experiments conducted to find out the cost-benefit ratios of modern subsidized farming compared to organic farming in order to show a path to the distressed paddy cultivators, yielded a truth that the said ratio can never go beyond 1.5 for the former (msf)and never less than 2 for the later(of). In few instances the B:C ratio achieved under organic farming exceeded 4.5 which is unthinkable in green revolution farming. When all subsidies are withdrawn from the farming sector, the current type of agriculture for sure will cease to operate.

Rice Diversity at Navdanya Seed Bank, Orissa

S.N.	Name of the Variety	S.N.	Name of the Variety	S.N.	Name of the Variety	S.N.	Name of the Variety	S.N.	Name of the Variety
1.	Abhimanyu	59.	Baraf	117.	Chakadubi	175.	Dhalakalama	233.	Gobindabhog
2.	Acharmoti	60.	Barapanka	118.	Chakramala	176.	Dhalakhuda	234.	Gola
3.	Agnijhal	61.	Baripada	119.	Champa	177.	Dhalamutura	235.	Gopalabhog
4.	Agnisal	62.	Barsa	120.	Champasola	178.	Dhalapatini	236.	Gaurisankar
5.	Agnisara	63.	Barshadhan	121.	Champeisali	179.	Dhalapuntia	237.	Gautam
6.	Ahirman	64.	Basa chandrakanti	122.	Chandrakanti	180.	Dhalaraigadi	238.	Gouri
7.	Ahiramohan	65.	Basanapusa	123.	Chandrama	181.	Dhalasree	239.	Gudamathia
8.	Andhrapatini	66.	Basuabhog	124.	Chauli	182.	Dhalasola	240.	Hadagada
9.	Andhraswarna	67.	Basumati	125.	Chhancha	183.	Dhalasungi	241.	Hadiasanra
10.	Anjali	68.	Basumati D	126.	Chhatakitara	184.	Dhalaswarna	242.	Haduakaya
11.	Annada	69.	Basumati J	127.	Chhatisha	185.	Dhalatulasi	243.	Hajirmal
12.	Annapurna	70.	Basumati M	128.	Chhotachampa	186.	Dhanaphula	244.	Haladigundi
13.	Aparajita	71.	Baula	129.	Chhotara	187.	Dhaniaphali	245.	Haladirangi
14.	Asubhajana	72.	Baulapentha	130.	Chilaladihari	188.	Dhanraj	246.	Haradjhati
15.	Asibam	73.	Baunsagaja	131.	Chinamali	189.	Dhansiri	247.	Harimalli
16.	Asina	74.	Baunsamuli	132.	Chingudibhusa	190.	Dhinkia	248.	Harisankar
17.	Askani	75.	Baya	133.	Chinikamini	191.	Dhirendra	249.	Harkoli
18.	Asmipisi	76.	Bayabhanda	134.	Chinisankar	192.	Dhosarasungi	250.	Hatipanjar
19.	Assamchudi	77.	Bayamundi	135.	Chinnor	193.	Dhosora	251.	Henna
20.	Asu	78.	Bedamalata	136.	Chitramani	194.	Dhosrakhuda	252.	Hichrangi
21.	Asudhan	79.	Bedaswarna	137.	Chitra	195.	Dhubakarttika	253.	Hirakani
22.	Asukakharua	80.	Belamanji	138.	Charu	196.	Dhubaasina	254.	Hiramoti
23.	Athagadia	81.	Belamanjia	139.	Chirag	197.	Dhubachhotara	255.	Hiranya
24.	Atia	82.	Benachera	140.	Champati	198.	Dimiriphula	256.	Hirapatini
25.	Atisaru	83.	Benumberi	141.	Chhanda	199.	Dubiraj	257.	Himani
26.	Bedi	84.	Benasali	142.	Chandrika	200.	Dubraj	258.	Hybrid
27.	Baijayanti	85.	Bengaldhan	143.	Chitanya	201.	Dubraj S	259.	Indrabati
28.	Babaganesh	86.	Benibhog	144.	Champabati	202.	Dudhasali	260.	Inkiri
29.	Baba rakshyakar	87.	Betana	145.	Chhapana	203.	Dudhasara	261.	Irabanjhi
30.	Baberphuli	88.	Betanasi	146.	Chanhala	204.	Dudheswar	262.	Jagabalia
31.	Badadhan	89.	Bhajana	147.	Chaitali	205.	Dula	263.	Jagannath
32.	Badakalamula	90.	Bhajanadhan	148.	Chhanaka	206.	Dumabakuri	264.	Jagannath S
33.	Badalatachaunri	91.	Bhaliki	149.	Charulata	207.	Durga	265.	Jaiphula
34.	Badiluchei	92.	Bhartsendha	150.	Chandan	208.	Ekchori	266.	Jaladhan
35.	Badshabhog	93.	Bhasamani	151.	Chandralekha	209.	Eksuan	267.	Jaladubi
36.	Badsahbhog K	94.	Bhojana	152.	Chakori	210.	Farakka	268.	Jalachingar
37.	Bagada	95.	Bhuguniukhuda	153.	Chaintamani	211.	Gaguadulei	269.	Jaldi
38.	Baghamanda	96.	Bhundi	154.	Chhabi	212.	Gahiradhulia	270.	Jamainadu
39.	Baiganmanji	97.	Bhuskunda	155.	Culture	213.	Gajapati	271.	Janani
40.	Baikani	98.	Bhuta	156.	Culture K	214.	Gamri	272.	Jangalijata
41.	Baikoili	99.	Bhutamundi	157.	Dagarkaya	215.	Gangabali	273.	Jatia
42.	Baisnabi	100.	Bhutia	158.	Dahiasu	216.	Ganjamgiri	274.	Jiban
43.	Balabhadrapakhia	101.	Bibhuti	159.	Dahikera	217.	Gargada	275.	Jhalakseni
44.	Balaji	102.	Bikram	160.	Dahikeshari	218.	Garubhuta	276.	Jhatakalei
45.	Bali	103.	Bilandi	161.	Dasarageti	219.	Garumoti	277.	Jhulamkaya
46.	Baliadadha	104.	Bilualanja	162.	Daya	220.	Gayabhog	278.	Jhuli
47.	Balianisa	105.	Binodpateli	163.	Debadutta	221.	Gayatri	279.	Jhulpalli
48.	Balibhuta	106.	Birendra	164.	Debasis	222.	Ganga	280.	Jhumurijata
49.	Balidan	107.	Bimala	165.	Dengaswarna	223.	Gedaswarna	281.	Jirasankar
50.	Banalata	108.	Bobailachha	166.	Desibasumati	224.	Gedikalama	282.	Jamuna
51.	Bandana	109.	Bridol	167.	Desimasura	225.	Gedimalata	283.	Kaberi
52.	Bangalipatini	110.	Brundabana	168.	Desiminiget	226.	Gelhei K	284.	Kabutakanta
53.	Bangalya	111.	Brundabati	169.	Desiswarnachampa	227.	Gelhei M	285.	Kadalipheni
54.	Bangaraasina	112.	Budhikakudi	170.	Dhabaleswar	228.	Gelheigeti	286.	Kaincha
55.	Bangaramadhei	113.	Bunde	171.	Dhalabakuri	229.	Ghanteswari	287.	Kajalkanthi
56.	Banki	114.	Bungi	172.	Dhalabhuta	230.	Gitalahari	288.	Kakharua
57.	Banshadhara	115.	Buxijagabandhu	173.	Dhalajhingasal	231.	Gitanjali	289.	Kakudibichha
58.	Bankichula	116.	Chakaakhi	174.	Dhalakakiri	232.	Gitanjali basumati	290.	Kakudimanji

S.N.	Name of the Variety	S.N.	Name of the Variety	S.N.	Name of the Variety	S.N.	Name of the Variety	S.N.	Name of the Variety
291.	Kalamali	361.	Kathia	431.	Mahupheni	501.	Nalinadiya	571.	Puriasina
292.	Kala akhi	362.	Kathinandan	432.	Makara	502.	Nalipakhia	572.	Purichampa
293.	Kalabagada	363.	Katkal	433.	Malabati	503.	Nalipatini B	573.	Purnima
294.	Kalabakuri 1	364.	Kaya	434.	Malata	504.	Naliatini M	574.	Puspa
295.	Kalabakuri 2	365.	Kedargouri	435.	Malati	505.	Nalirasi	575.	Rabana
296.	Kalabasa	366.	Kerali	436.	Mangala	506.	Nalipatti	576.	Raibhog
297.	Kalabasumati	367.	Kesundera	437.	Mangalpuria	507.	Nalisitabhog	577.	Raigadi
298.	Kalabetanasi	368.	Katakijowa	438.	Montosh	508.	Nalisola	578.	Raigarh
299.	Kalabhuta	369.	Khadiasola	439.	Mardaraj	509.	Nalisunakhadi	579.	Rajendra
300.	Kalabhigina	370.	Khajuria	440.	Masala	510.	Nalisungi	580.	Rajeswari
301.	Kala brahmanbai	371.	Khandagiri	441.	Masura	511.	Namalkathi	581.	Raktabijuli
302.	Kalachampa	372.	Khandarangi	442.	Mathabeni	512.	Nandi	582.	Ramjata
303.	Kalajira	373.	Kharabela	443.	Mathura	513.	Nandini	583.	Ramsai
304.	Kalajira (K)	374.	Khatia	444.	Matia	514.	Nandiparbatkalia	584.	Rangaballav
305.	Kalajiri	375.	Khejurkandhi	445.	Matiasalei	515.	Nanu	585.	Rangabanjhi
306.	Kalakaincha	376.	Khirasara	446.	Matiasungi	516.	Narda	586.	Rangalata
307.	Kalakakiri	377.	Khosakani	447.	Mayurakantha	517.	Natakalama	587.	Ranganisungi
308	Kalakalama	378.	Krishna	448.	Medi	518.	Nausal	588.	Rangasiuli
309.	Kalakanthi	379.	Koilibai	449.	Meghadambaru	519.	Nenka	589.	Rangi
310.	Kalakataki	380.	Konark	450.	Meghamala	520.	Nilagiri	590.	Rani
311.	Kalakaya	381.	Kranti	451.	Meghisal	521.	Nimain	591.	Ranidhan-2
312.	Kalaketaki	382.	Krushnakesi	452.	Meher	522.	Niranjan	592.	Ranidhan-3
313.	Kalama	383.	Kubera	453.	Methimahipal	523.	Nitai	593.	Ranisev
314.	Kalamara	384.	Kujidhulia	454.	Mitikabhajana	524.	Nitaigour	594.	Ranjeikhuda
315.	Kalambank	385.	Kujipatini	455.	Mohanbhog	525.	Nuhachur	595.	Ranjitpatini
316.	Kalameghi	386.	Kukuda akhi	456.	Motmachhakanta	526.	Omkar	596.	Raspanjar
317.	Kalamkathi	387.	Kulari	457.	Motamakarkanda	527.	Padarua	597.	Rastrapati
318.	Kalamulia	388.	Kumbhakarna	458.	Motasamili	528.	Padasendha	598.	Ratamalli
319.	Kalamutura	389.	Kumbharasala	459.	Motaswarna	529.	Padhuatanka	599.	Ratna
320.	Kalansu	390.	Kundabhuski	460.	Moti	530.	Padmabati	601.	Ratnachudi
321.	Kalapahada	391.	Kundabhusundi	461.	Motichur	531.	Padmajira	602.	Rupam (mota)
322.	Kalapatini	392.	Kurguri	462.	Madhaba	532.	Padmakeshari	603.	Rupam (saru)
323.	Kaklapuntia	393.	Kusumakunda	463.	Mugajai	533.	Padmarai	604.	Sabita
324.	Kalasree	394.	Kusumamanji	464.	Mugei	534.	Padmini	605.	Sabitapatini
325.	Kalasungi	395.	Ladu	465.	Mugeisal	535.	Pahadabhangi	606.	Safari
326.	Kalasura	396.	Lagubhutia	466.	Mugraphul	536.	Pahadiaminiget	607.	Sagadiabangi
327.	Kalatulasi	397.	Lajakulibadan	467.	Mugudhi	537.	Palaya	608.	Sagdiabhangi
328.	Kalaukhuda	398.	Lakshyahira	468.	Muktakiari	538.	Pandursuan	609.	Sagiri
329.	Kaliaansu	399.	Lalata	469.	Mundakathi	539.	Panibighina	610.	Saharchampa
330.	Kaliabhajana	400.	Lalboric	470.	Mundakaya	540.	Panichakiri	611.	Saharchampa S
331.	Kaliajhinga	401.	Lal basumati-1	471.	Mundidhan (dhala)	541.	Panidubi	612.	Saini
332.	Kalikati	402.	Lalbasumati-2	472.	Mundidhan (nail)	542.	Paniduliki	613.	Shaktiman
333.	Kalikhadsi	403.	Lal Dhan	473.	Musakani	543.	Panirohi	614.	Salajhati
334.	Kalikuji	404.	Lalu	474.	Nabasali	544.	Panisanla	615.	Shalaphula
335.	Kalinga 2	405.	Langalamunda	475.	Nabina	545.	Panisanra	616.	Sambalpuri
336.	Kalsi	406.	Lat	476.	Nadanchhatia	546.	Panisendha	617.	Sambhu
337.	Kamaleswar	407.	Latachaunri	477.	Nadiaphula	547.	Pankaj	618.	Samudra
338.	Kamini	408.	Latasal	478.	Nadiya	548.	Pankhei	619.	Samuka
339.	Kanchan	409.	Laxmidhan	479.	Nagara	549.	Pandaba	620.	Sanakalamula
340.	Kankadabichha	410.	Laxmikajal	480.	Nagarjun	550.	Paraja	621.	Sanalatachaunri
341.	Kankadamali	411.	Laxmikanta	481.	Nagupateli	551.	Parbani	622.	Sankar
342.	Kankidia	412.	Laxmiswang	482.	Najaka	552.	Parijat	623.	Sankarchin
343.	Kansiri	413.	Lilabati	483.	Nala	553.	Parirupa	624.	Sankargouri
344.	Kantha asina	414.	Luna	484.	Nalibakuri 1	554.	Pasakathi	625.	Sankari
345.	Kanthakakiri	415.	Lunabakada	485.	Nalibakuri 2	555.	Patakhuda	626.	Sankarsiali
346.	Kanthakarpura	416.	Lunifaram	486.	Nalibasa	556.	Patalagi	627.	Sankhamahuri
347.	Kanthakathia	417.	Lunisree	487.	Nalibetanasi	557.	Pauli	628.	Sanra
348.	Kanthanarda	418.	Machhakanta	488.	Nalibhuin	558.	Pimpudibasa B	629.	Sanrapateli
349.	Kantra	419.	Madhia	489.	Nalibrahmanbai	559.	Pimpudibasa M	630.	Sapuri
350.	Karandikatha	420.	Madhupuri	490.	Nalichaunri	560.	Pinhagali	631.	Saragchhinda
351.	Kirti	421.	Magura	491.	Nalichina	561.	Pitambari	632.	Sarala
352.	Karnasal	422.	Mahadi(mota)	492.	Nalidhulia	562.	Prakruti	633.	Saraswati
353.	Karni	423.	Mahadi (saru)	493.	Nalihajari	563.	Parasara	634.	Sargiphula
354.	Karpurakeli	424.	Mahalabeli	494.	Nalijhingasal	564.	Panchali	635.	Sarita
355.	Kartikanali	425.	Mahalaxmi	495.	Nalikakiri	565.	Phalguni	636.	Sarubhajana
356.	Kartikapatini	426.	Mahanadi	496.	Nalikalama	566.	Pasani	637.	Saruchina
357.	Kasbai	427.	Maharaja	497.	Nalikalambank	567.	Pratikshya	638.	Sarukhandagiri
358.	Kashiphula	428.	Mahipal	498.	Nalikhuda	568.	Puja	639.	Sarumadhi
359.	Kasturi	429.	Mahuchampa	499.	Nalimakarkand	569.	Pujaphula	640.	Sarumakarkanda
360.	Kasturi basumati	430.	Mahulakasi	500.	Nalimandu	570.	Puncture	641.	Sarusamili

S.N.	Name of the Variety
642.	Sashi
643.	Sathia
644.	Sautuni
645.	Sebati
646.	Sefali
647.	Setka
648.	Seulapuni
649.	Shalimar
650.	Sharbati
651.	Shree
652.	Simbamanjia
653.	Singpura
654.	Sisabir
655.	Sitabhog
656.	Sitasal

S.N.	Name of the Variety
657.	Sitasali
658.	Society
659.	Soda
660.	Solo
661.	Sankhi
662.	Sreeram
663.	Subasini
664.	Sugandhi
665.	Sujata
666.	Sunasalita
667.	Sundarbhajana
668.	Sundarsali
669.	Surendra670. Suryakanti
671.	Suryamukhi
672.	Swarnachampa

S.N.	Name of the Variety
673.	Swarnadhan
674.	Swarnatikili
675.	Tulika
676.	Tambala
677.	Trupti
678.	Tofan
679.	Triveni
680.	Triranga
681.	Talachera
682.	Tambrasungi
683.	Tamdisal
684.	Tamkudai
685.	Tapaswini
686.	Telosing
687.	Tentulimanji

S.N.	Name of the Variety
688.	Thakurabhog
689.	Thakurasuna
690.	Thengu
691.	Thunka
692.	Tikapatini
693.	Tinka
694.	Tipaharisankar
695.	Tulasi
697.	Tulasibasa
698.	Udasiali
699.	Udayagiri
700.	Ujawla asha
701.	Upahar
702.	Utkalprava

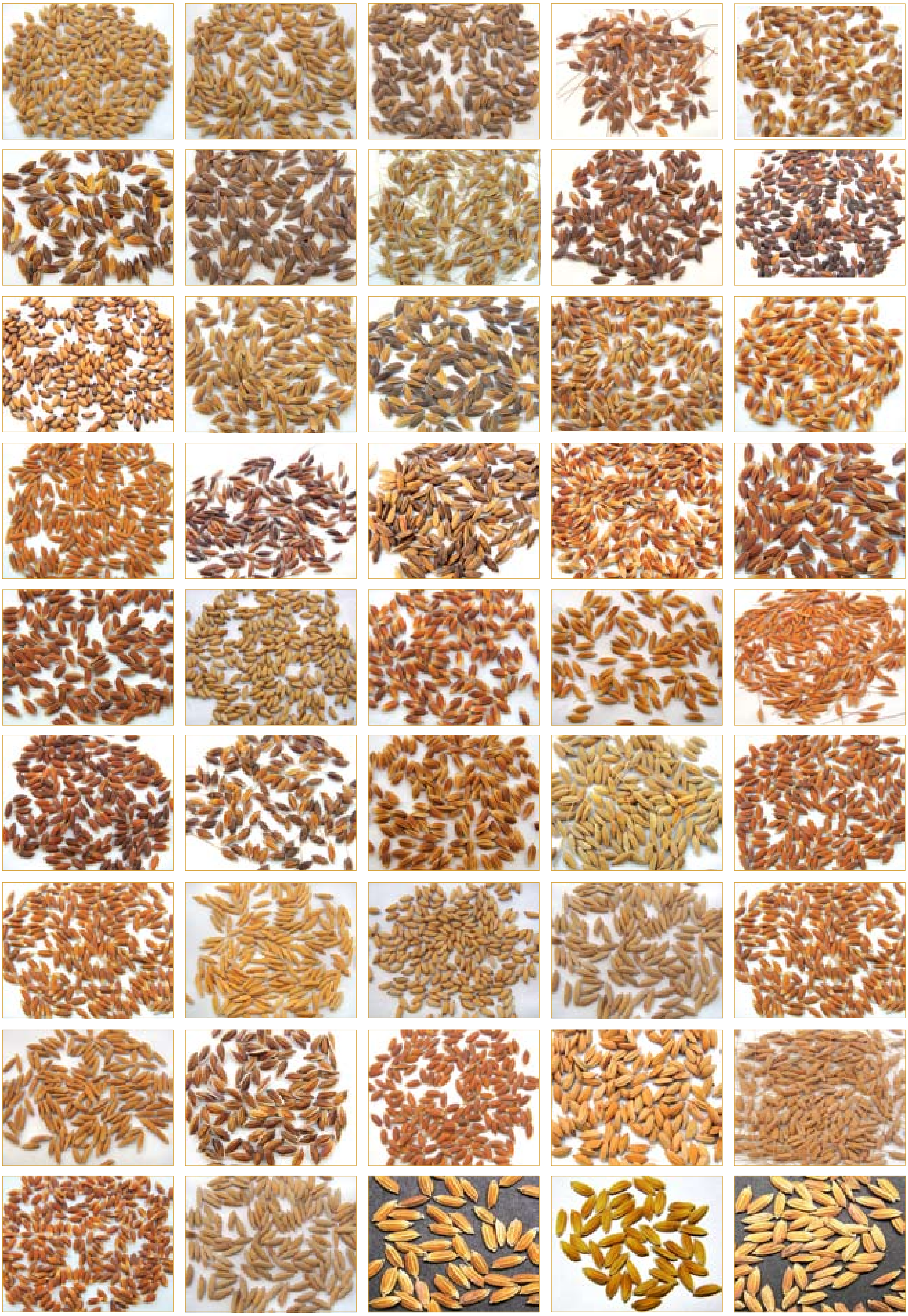
Vegetable Diversity at Navdanya Seed Bank, Orissa

S.N.	Name of Winter vegetables	Variety Name & Type
1.	Bitter gourd (Thusi)	Small size
2.	Bitter gourd (Nakhara)	Big size
3.	Bottle gourd	Round shape
4.	Bottle gourd	long
5.	Sweet gourd (Baidabati)	Big size
6.	---do--- (Guamala)	Small
7.	Cucumber	Medium size
8.	Brinjal	White long (bunchy)
9.	---do---	White round
10.	---do---	Red (Hazari)
11.	---do---	Black long
12.	---do---	Black round(Blue star)
13.	---do---	Green Long
14.	Tomato	Pusa Rabi
15.	---do---	Punjab Keshari
16.	---do---	Panjab Suanra
17.	Ribbed gourd	Medium
18.	Cauliflower	Early (45 days)
19.	Ladys'finger	Native
20.	Radish	White Chetaki
21.	---do---	Red Chetaki
22.	---do---	Rebini (Native Large)
23.	---do---	White small
24.	Indian spinach	--------
25.	Amaranth	(seasonal leafy veg.)
26.	Country bean	Plant type
27.	Cow pea	creeper
28.	---do---	erect plants
29.	Guanra	erect plant
30.	Green chili	Yellow erect
31.	---do---	white/green
32.	Cabbage	Early (45 Days)
33.	Water bind weed	Land variety
34.	Coriander	Native herb
35.	Spinach (Palak)	(seasonal leafy veg.)
36.	Knol-khol	45 days variety

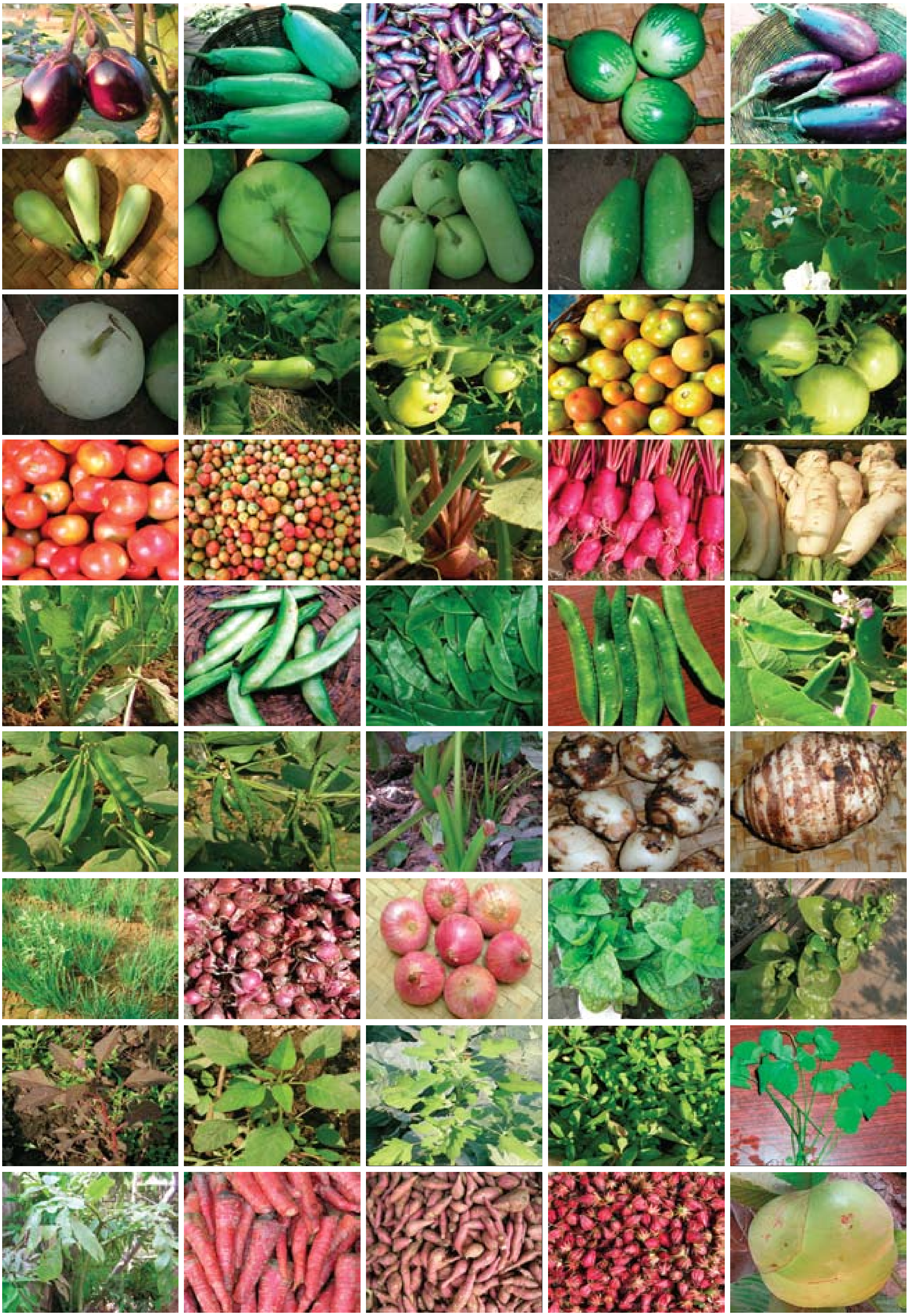
S.N.	Name of Summer vegetables	Variety Name & Type
1.	Cow pea	Plant Type
2.	Cow pea	Creeper Type
3.	Sweet gourd	Large size
4.	Sweet gourd(Guamala)	Small size
5.	Bottle gourd	Long type
6.	Bitter gourd	Big Type
7.	Bitter gourd	Small type
8.	Brinjal	white long
9.	Brinjal	Black bunchy
10.	Brinjal	Bl;ack round
11.	Brinjal	white bunchy
12.	Brinjal	Black long
13.	Cucumber	Big type
14.	Cucumber	Chaitali
15.	Lady's finger	Medium size
16.	Ribbed gourd	Long type
17.	Ribbed gourd	Medium size
18.	Country bean	Plant Type
19.	Indian spinach	Leafy/stem veg.
20.	Amaranth	White stem veg.
21.	Amaranth	Red stem veg
22.	Amaranth	Leafy veg.
23.	Musk melon	Fruit

S.N.	Name of Rainy vegetables	Variety Name & Type
1.	Bitter gourd (Thusi)	Small size
2.	Bitter gourd (Nakhara)	Big size
3.	Bottle gourd	Round shape
4.	Bottle gourd	long
5.	Sweet gourd (Baidabati)	Big size
6.	---do-- (Guamala)	Small
7.	Sweet gourd (Bhudeii)	Small
8.	Cucumber(Lahari)	Small
9.	Cucumber(Mancha)	Big
10.	Cucumber (Barpata)	Medium
11.	Cucumber (Sohalpata)	Medium
12.	Brinjal	White long (bunchy)
13.	---do---	White round
14.	---do---	Red (Hazari)
15.	---do---	Black long
16.	---do---	Black round(Blue star)
17.	---do---	Green Long
18.	Tomato	Pusa Rabi
19.	---do---	Punjab Keshari
20.	---do---	Panjab Suanra
21.	Tomato	Chepti
22.	Ribbed gourd	Medium
23.	Cauliflowr	Early (45 days)
24.	Ladys'finger	Native
25.	Radish	White Chetaki
26.	---do---	Red Chetaki
27.	---do---	Rebini (Native Large)
28.	---do---	White small
29.	Indian spinach	--------
30.	Amaranth	(seasonal leafy veg.)
31.	Country bean	Plant type
32.	Cow pea	creeper
33.	---do---	erect plants
34.	Guanra	erect plant
35.	Green chili	Yellow erect
36.	---do---	white/green
37.	Cabbage	Early (45 Days)
38.	Water bind weed	Land variety
39.	Coriander	Native herb
40.	Spinach (Palak)	(seasonal leafy veg.)
41.	Knol-khol	45 days variety

RICE DIVERSITY



VEGETABLE DIVERSITY



Vrihi seed bank in West Bengal

Vrihi, in partnership with NAVDANYA, the national movement for agro biodiversity conservation started a seed bank in West Bengal under the stewardship of Debal Deb. Some of the varieties conserved in the seed bank are listed below. This has been taken from the SEEDS *OF TRADITION, SEEDS OF FUTURE published by Navdanya and written by Debal Deb,* which elucidates the Folk rice varieties of eastern India.

S.No	Name
1	AAsh
2	Ag Niba N
3	Ag N I-Sa L
4	A Jirm A N
5	Akshay Rani
6	A M Ar-Sa L
7	Annapurna
8	Asa N I. Eya
9	Ash Ph Al
10	Ash U
11	Ash Win Dhu Lea
12	Ashw1n Jharia
13	Asi-Iwin Jharia
14	A Sit K A Lm A
15	Ausha Bonk Ata
16	Ba Bu Ila Ta
17	Bad A Bona
18	Bag H Jh A Pta
19	Ba Id Dh Usu Ri
20	Said Dulah
21	Said K A La M K Athi
22	Ba Id R As
23	Baja L
24	Ba K Ul Phool
25	Ba La Ram -Sal
26	Ba Li Bha A
27	Bank ChR (Big)
28	Ba Nk A Ta
29	Bank Ui
30	Ba Nsh Cajal
31	B.A Nsh Kanta
32	Bansh Ka Thi
33	Sa Nshm Oti
34	Ba Nsh Mugur
35	Bansh Pate
36	Bansh Tara
37	Banya-Sal
38	Bardhaman Nagra
39	Bardhaman Panloi
40	Ba S M Alt
41	Basta R
42	Begana Manjia
43	Ben A Jhu Ri
44	Benaphool
45	Begun Bechi
46	Bh A Lk I
47	Bha Samanik
48	Bhim -Sal
49	Bhu Ri
50	Bhu Ri-Sal
51	Bhu Rishu La H
52	Bhut1a
53	Bhut Moor!
54	Bira La
55	Biro I
56	B Ir Pa Na
57	Bis H Mon1
58	Bochi
59	Bochi Con Dri
60	Bodr Es H
61	Bok R A
62	Bombaimugi
63	Born
64	Bou Bhog
65	Bou Dulali
66	Budbud•Sa L
67	Bullet
68	Cha Itanya
69	Chakramala
70	Chamarmani
71	Champa
72	Chandrak Anta
73	Chapa Khusi
74	Cheena Ka Mini
75	Cheena Pa Kr!
76	Dakshina Laghu
77	Danaguri
78	Danger Bar.Uah
79	Dangri Patna!
80	Da Rk A-Sa L
81	Da R-Sal
82	Da Ya L M A Dina
83	Dehra Dun
84	Dehra Dun Bas
85	Dehra Dun
86	Gan Hes A
87	Cheng A
88	Cheng-Sal
89	Cherk I Jhuloor
90	Cherk I Raj Chhoto
91	Nuniya Chila Patna,
92	Chiniatap
93	Chitra Kanhai
94	Dahar Nagra
95	Churno Kath
96	Deputy-Sal
97	Deshi Masuri
98	Deshi Patna'
99	Deula Bhog
100	Dhaka!
101	Kalam
102	Dhanashree
103	Dhula
104	Dhusuri
105	Dhula-Sal
106	Dhusuri
107	Dora Ngi
108	Dudh Ka Lma
109	Dudhe Mator
110	Dudheswar
111	Dudh-Sa Ri
112	Dukhi Darba R
113	Dumur Kano!
114	Dumur-Sal
115	Durga-Sal
116	Fr-13a
117	Cada Ba
118	Gandha Malati
119	Ga Ndhes Wa Ri
120	Ga Nc A Ja Li
121	Ganga-Sal
122	Garam Masala
123	Ga Ria
124	Ga Rib-Sal
125	G A Yasu R
126	Geti-Sal
127	Getoi
128	Gheos
129	Ghora –Sal
130	Gita
131	Ita N Ja L
132	Gitashree
133	Gobinda Bhog
134	Gochari Patnai
135	Gorah
136	Go R -N Ita I
137	Gun Ri Bhog
138	Gu Ru Ji
139	Ha (Jam
140	Halud Gathi
141	Hamai
S.No	Names
142	Ha Nsguji
143	Hanuman Jata
144	Ha Rir Jhinga
145	Hatichampa
146	Hatipanjar
147	He Era
148	Heera Moti
149	Hinche Sa Roo
150	Ichhamati
151	Indra-Sal
152	Ja G A Nnath Bhog
153	Jal Kamin1
154	Jamainadl
155	Jamai-Sal
156	Ja Shu A
157	Ja Ta
158	Jata Kalm A
159	Ja Ta Leta –Sal
160	Jhanti-Sal
161	A Nt!
162	Jh In Ga
163	Jhin Ga-Sal
164	Jh It1 Piti
165	Jh U Li
166	Jhu Loor -16
167	Jira•Sal
168	Jirk U Di
169	Jiten Dr A
170	Ju Ga I
171	Ju Ng Li
172	Ja Ta K A Biraj-SaL
173	Ka Dalika
174	Kajal Dheki
175	Kajal Kathi
176	Kajal Sundari
177	Jata Kalm A
178	Ja Ta Leta –Sal
179	Jhanti-Sal
180	A Nt!
181	Jh In Ga
182	Jhin Ga-Sal
183	Jh It1 Piti
184	Jh U Li
185	Jhu Loor
186	Jhu Loor -16
187	Jira•Sal
188	Jirk U Di
189	Jiten Dr A
190	Ju Ga I
191	Ju Ng Li
192	Ja Ta K A Biraj-SaL
193	Ka Dalika
194	Kajal Dheki
195	Kajal Kathi
196	Ketaki
197	Has Dhan
198	Iichaskani
199	Ic Hat1a T1ka
200	Khater-Sal
201	Kaialgourd
202	Khejur Chhari
203	Khira-Sal
204	Khira Bichi
205	Kholam Kuchi
206	Khudi Kha Sa
207	K Ina Ri
208	Komal
209	K Ubja
210	Kum Rogorh
211	Kuro Bagar
212	Kusumgenda
213	Lakshman-Sal
214	La Kshmichura
215	Lakkhi Dighal
216	La K Shmi Ja Ta
217	Lal Aush
218	Lal Badshabhog
219	La L DhePa
220	Ma Had!
221	Mahamaya
222	Ma Ji-Ii Jhuloor
223	Mala
224	Ma La Ba Ti
225	Ora Meteh
226	Ma Lgudia Kalam
227	Ma Llika
228	Ma Llik-Sa L
229	Ma Lsiraj
230	Manik Kalma
231	Manik-Sal
232	La L Pesha Ri
233	Ma Rich Muk Hi
234	Marich Mukul
235	Ma Rich-Sa L
236	Mayurkantha
237	Medi
238	Meghnad-Sal
239	Meg1
240	Najirma
241	Nalpai
242	Narahasoi
243	Na Rasingha Ja Ta
244	Narkel Chhari
245	Nata
246	Niroja
247	Sateen
248	S Ek A Ra
249	Shal Keleh
250	Shati
251	Shatia
252	Shatia Bha Doi
253	Shim Ul K Uri
254	Shisha Phal
255	Shiuli
256	Shiyal Bhomra
257	Shiyal Raj
258	Sholeh
259	Shotput
260	Shu Kalma
261	Silot
262	Sindur-Sal
263	Sindurmukhi
264	Sitabhog
265	Sita-Sal
266	Sona Dhusuri
267	Sona Jhuli
268	Sonam
269	Sona Puri
270	Srabani
271	Srabanti-Sal
272	Sriram
273	Subasita
274	Sumitra
275	Sundari
276	Sundar Mukhi
277	Swarna Kanti
278	Talmugur
279	Tangra Patnai
280	Tetke
281	Thakur-Sal
282	Thupi-Sal
283	Tikar Nadi
284	Tulai Panji
285	Tulsa
286	Tulsibhog
287	Tulsi Manjari
288	Tulsi Mukul
289	Utkal Prabha
290	Velchi
291	Zeeni

Tamil Nadu seed bank

Navdanya initiated a seed bank in Tamil Nadu with The Center for Indian Knowledge Systems. The list below is taken from the book on indigenous rice varieties.

S.N.	Name	S.N.	Name	S.N.	Name
1.	Thanga Samba	12.	Muttakar	23.	Kallimadiyan
2.	Neelan Samba	13.	Kullakar	24.	Pisini
3.	Kappa Samba	14.	Kappakar	25.	Koomvalai
4.	Vadan Samba	15.	Perungar	26.	Kudaivazhai
5.	Kudiraival Samba	16.	Sigappu Kuruvikar	27.	Pitchavari
6.	Kaliyan Samba	17.	Vaigunda	28.	Chengalapttu Sirumani
7.	Kurangu Samba	18.	Jiljil Vaigunda	29.	Kadaikazhuthan
8.	Seeraga Samba	19.	Thooyamallee	30.	Arubatham Kodai
9.	Samba	20.	G.E.B.24	31.	Kattu kuthalam
10.	Samba Mosanam	21.	Sempalai	32.	Periyavari
11.	Kitchili Samba	22.	Kuzhiyadichan	33.	Sadakar

Chota Udaipur, Rajasthan

Rajasthan is known for its desert as well as hot and dry climate throughout the world. Navdanya started a seed bank for such an agro-climate in the village Chota Udaipur in district Ajmer of Rajasthan. Due to the increasing use of hybrid and high yielding seeds of millets, vegetables and other crops, indigenous seeds are disappearing very fast. This seed bank in Rajasthan will help conserve the traditional seeds of millets, oil seeds, spices, vegetables and pulses in the state. About 500 farmer families are being benefitted directly from the present seed bank. Over the next 5 years, we hope to cover a population of 15000 farmers across 10 villages.

Inauguration of the seed bank in Rajasthan in 2009

Kotari Seed Bank, Jharkhand

Jharkhand is another newly formed state of India, which was carved out of Bihar. The community seed bank in the village Kotari of Ranchi district benefits 500 families across 10 villages.

Seed Bank in Jharkhand

Seed banks in the National Capital Region

A seed bank was established in a village near Meerut in western Uttar Pradesh. After receiving proper training, farmers kept and multiplied these seeds. Now farmers have 52 varieties of vegetable seeds, 6 varieties of fruits and 8 varieties of other grains in their seed bank. Group is very proud of seed bank now.

After farmers were empowered through training and they started getting better yields, farmers were linked to the market through procuring their vegetables from their doorsteps and distributing it to the Navdanya network. Navdanya's women vegetable growers group in the year 2009 - 2010 grew and sold vegetables for Rs. 2 lac approximately. In 2010-11 the group was able to sell vegetables worth Rs. 5,20,389, whereas in 2011-12, their sales went upto Rs. 11,29,226. In just three years the sales of the women group went up by almost about 6 times.

Vegetable seeds were also sold by the group in addition to the vegetables. In the year 2009-2010 they could sell the seeds for Rs. 3000 and in the financial year of 2010, 2011 for Rs, 42,000 and in 2011-2012 for Rs. 60,000. These seeds were also distributed to the widows of farmers who have committed suicides in Punjab as 'Seeds of Hope'.

In Punjab about 3500 seed packets were distributed, whereas about 3000 seed packets were also distributed by Navdanya in Uttarakhand and Ladakh as well.

Navdanya in the year 2011 started vegetable production and a living seed bank in Bulandshahar, in NCR. Navdanya also created a seed bank at New Delhi office. From this seed bank seeds are being distributed to the students in different schools working on the project

Seed Bank in National Capital Region

Rejuvenating Lost Gardens of Khajurahoo

Navdanya started rejuvenating Lost Gardens of Khajuraho in association with the INTACH Belgium in the year 2008. The endeavor was started with the "Pateria Ka Bag", 1.5 acres, situated on Rajnagar road towards the north. Plants of Mango, Guava, Amla, Jack Fruit and other local fruits were planted in the garden after restoring the old monuments in the gardens. Plant nursery was developed and vegetable and tree plans were given to the farmers around free of cost to help local farmers to improve the diversity and also to conserve the crops and fruit trees grown in the region for centuries.

A seed bank was started in the year 2011. The seed bank was started with conserving the vegetable seeds. The seed bank is conserving about 45 vegetable seeds of the region.

Moroever, at the "Rani ka baug" a vegetable nursery is being developed along with fruit trees plantations.

Progress of the Navdanya intervention was witnessed by the participants of the conference on Sustainable Development of Khajuraho, organized by INTACH, India in association with INTACH Belgium and M.P. Government on from 16th -18th November 2010.

Seed Bank in Khajurahoo

Seeds of Hope, Seeds of Freedom

The Seeds of Hope (Asha Ke Bija) program aims at providing an emergency supply of indigenous varieties of seeds in those regions, which are worse effected, either by the natural calamities likes super cyclone in Orissa, Tsunami in Tamil Nadu or as result of the policies e.g. Punjab and Andhra Pradesh.

The saline resistant seeds conserved by Navdanya in Orissa have helped the victims of the super cyclone that hit Orissa in October 1999 to re-establish sustainable agriculture.

Navdanya has also given hope to the victims of tsunami. The tsunami waves affected the agricultural lands of the farmers due to intrusion of seawater and deposition of sea land. More than 5203.73 hectare of agricultural land in Nagapattinam was affected by the tsunami. The Navdanya team conducted a study in the affected villages to facilitate the agriculture recovery. The team, distributed 3 saline resistant varieties of paddy, which included Bhundi, Kalambank and Lunabakada, to the farmers of the worse affected areas. These varieties of native saline resistant kharif paddy seeds were collected from Navdanya farmers in Orissa amounting to a total of 100 quintals.

Navdanya through its Seeds of Hope program also provided farmers of Kashmir valley with seeds for next crop, which they lost during the 2005 earthquakes. The biodiverstiy program has started in Pulwama district in Jammu and Kashmir. The district was carved out of Anantnag district. Initially the biodiversity has started in five villages of Pulwana district, which are Sambura, Pampar, Batherhama, Zawoora and Hadu. In the long run, the biodiversity conservation program of Navdanya aims to cover whole of Kashmir and Ladakh.

Navdanya launched Project Climate Change in August 2006 and established seed banks in Jaisalmer (drought resistant crops), Orissa (saline resistant corps) to help with various dimensions of preparedness in the face of extreme climate changes like the foods in Barmer (Rajasthan). Navdanya is now multiplying and distributing varieties of resistant seeds of rice, millet, bajra (pearl millet) and wheat. GMO- free seed banks have been started to rescue farmers from the seeds of suicide.

Under the Seeds of Hope program, Navdanya continues its efforts to supply seeds to those who are in the need of it and have lost their local varieties due to Green Revolution policy of the government.

Apart from providing guidance and help to the farmers for the revival of agriculture, Navdanya, under the Asha Ke Beej program, distributed the indigenous variety of seeds to farmers in the Bija Yatra in Uttar Pradesh, Maharashtra, Karnataka and Andhra Pradesh and encouraged them to shift to organic and sustainable agriculture. More than 7000 farmers were distributed indigenous seeds. The farmers were so thrilled to receive the traditional seed varieties and Navdanya assured them to provide full support to them to convert to organic agriculture. It would be interesting to note that the seed bags contained nine seed varieties such as split red gram, paddy, spinach, mustard etc. Various posters conveying messages on Bt. Cotton failure, farmers' suicides, and sustainable agriculture were distributed among the farmer communities.

Vandana Shiva distributing seeds to families of suicide victims in Vidarbha

Late Mr Tambake, vice president of KRRS and Darwan Singh Negi of Navdanya distributing seeds during Beej Yatra.

Fibres of Freedom in Vidarbha

Photo©Manlio Masucci

Farmers in the Vidarbha region of central India are trapped in a vicious cycle of debt caused by increased use of monoculture farming practices, a dependence on costly non-renewable seed supplies by monopolies, and increasing chemical inputs. This situation has caused a serious social and agrarian crisis with epidemic suicide rates among indebted farmers leaving behind broken families and communities as well as environmentally damaged lands. Navdanya has been working with farmers for over two decades to build alternatives to the suicidal economy of patented / genetically engineered / hybrid seeds controlled by corporations.

Responding to the deepening crisis, in Vidarbha and across the country and reclaim our seed and food sovereignty, Navdanya launched Bija Yatras in 2000 as well as seed tribunals to address the root causes of this tragedy. In 2007, Navdanya started the **Seeds of Hope Program**, which provides immediate support directly to indebted farmers and specially the widows of farmers, farmers themselves, who have committed suicide to give them an economically and ecologically viable and sustainable alternative and moreover, addresses the root cause of the crisis. Navdanya distributes indigenous variety of seeds to the farmers and encourages them to shift to organic and sustainable agriculture. More than 6000 farmers have been distributed indigenous seeds. The Fibres of Freedom program aims at providing immediate support directly to indebted farmers and specially the widows of farmers, farmers themselves, who have committed suicide to give them an economically and ecologically viable and sustainable alternative.

Fibres of Freedom supports farmers to grow chemically free organic natural fibres as well as promotes our indigenous skills and knowledge.

Our program provides participating farmers with the training, infrastructure, knowledge, and leadership to help lead, through positive example, an increasing number of farmers into this and similar projects. These suicides have had a devastating impact on the social fabric of these families and their farming communities. Therefore, in particular, this project aims to support widows of farmers who have committed suicide and provide them and their families with a livelihood and security. The incomes that the Project will bring to these farming families will enable their children to go to school and get an education. The despair and dispossession experienced by these families and their communities will be transformed into hope and economic empowerment in a stable way.

VOICES OF THE SEED

Bija Devi: Navdanya Seed Keeper of 16 years at the Biodiversity Conservation Farm in Dehradun, Uttarakhand.

"Without seed there is no food. Without food there is no life. Saving seeds is saving life in all its diversity."

Kusum Misra: Navdanya's Seed Keeper of 13 years in Balasore District, Orissa.

"For me, seeds are my children. I protect them with the same love and the same care. The salt-tolerant rices we have saved have helped farmers recover after the 1998 Orissa Super Cyclone, the 2004 Tsunami, and the 2008"

Rukamani Rawat: Navdanya Coordinator from Tehri District, Uttarakhand

"I was involved as an activist in a women's association in Tehri. An old man asked me if I knew anything about seed since I was (in his words) such a strong activist. I was very embarrassed because I didn't know anything about seed. It was my desire to learn that brought me to Navdanya. I wanted to learn about seed, water and land. Then I started to attend all government meetings that distribute hybrids and chemicals at fairs. Now when I challenge them they say, 'How do you know all this?' We come from a strong region. I am confident to take on anyone."

Chandra Shekhar Bhatt: Navdanya Coordinator from the Rudraprayag District, Uttarakhand

Self-organization is the way to freedom. The seed is Brahma, the Creator. If it is living seed and fertile seed then we will have fertile life.

Darwan Singh Negi: Senior Navdanya Coordinator from Pauri District, Uttarakhand

"The saving of seeds and organicagriculture is the most important work of our time."

Ramesh Sakharkhar: Organic Farmer and Seed Saver from Amravati district, Maharashtra

The relationship between the farmer and seed is that between mother and son. These seeds that I am wearing talk to me all the time. They say, 'Though I am small put me in the soil and I will do great work!' Navdanya is not the movement to save seeds, but the seed of all movements.

Prem Singh: Navdanya coordinator from Banda District, Uttar Pradesh

"Seed banks are very important because the government does not provide drought-prone varieties. Except for the farmers who are using these seeds there is total crop failure. The government is spreading seeds that require seven irrigations. In our area we don't even have water to drink!"

Vinod Chamoli: Navdanya Coordinator from Rudraprayag District, Uttarakhand (on the left)

"At this young age they call me 'the wise one.' When I began my role as coordinator I called a meeting with the Panchayat heads in twenty-eight villages. I asked them, 'Why are you eating poison? Why do you want to kill yourself?' They all agreed and have virtually stopped the use of urea chemical fertilizers."

Angoori Devi: Navdanya farmer; operates a vegetable seed bank in Meerut District, Uttar Pradesh. Angoori Devi was trained in a Navdanya women's food program in 2004.

The first fruit of any plant is the best seed, mark it with a ribbon and remember that it is the seed that should be saved. Keep the seed in the original home of the seed: if you have pumpkin then keep it in a pumpkin shell. Remember moisture will ruin your seed. Eating the seed that should be saved is the worst sin. In the past, even though people starved there was still seed in the seed bank.

Kishan Lal Deshma: Navdanya coordinator from Tonk District, Rajasthan

"When we talk about local seed we are also referring to trees. The kanga tree can survive seven to eight years of drought to give fodder and fuel. And when we think about the seed we must not only think about humans, but also about animals. When we wait three months for our harvest the cow gives us milk and dung everyday. Bring back our indigenous cows!"

Pushpa Devi, age 34, Bhoniyada village, Pratab Nagar, District Tehri

Pushpa Devi is the head of the village council and a member of the Navdanya network since 2007. "We learn from our parents and we also teach our children". She has also taken seed keeping very seriously. "We keep our own seeds and store wherever there is a space, under the cot, in the window on the roof". She is now confident that if her crops fail she will be able to get seeds from the Navdanya.

Ganeshi Devi, 84 year old women from village Bhatwari in Mandakini Valley of Rudraprayag District, Uttarakhand is the farmers who did farming throughout her life and still loves farming.

"We cannot see God, but this (earth and seeds) we can see, everything is earth, our mother." When I go to the temple people ask: "What will you give us?" She responds, "I will give you seeds." She became member of Navdanya way back in 1998. "They are doing marvellous job of saving seeds and making the soil and environment poison free".

Pavitra Devi, age 76, of Village Bharwari, District Rudraprayag, Uttarakhand

Pavitra Devi, of village Bhatwari, District Rudraprayag, Uttarakhand, a 76 year old women is a very hardworking farmer. "We plough, we work, we do everything. We sow, then we work again, then we do harvesting. The person who will sow, who will do hard work, he will get more." As a matter of course she collects seeds and exchanges with others. "If someone needs, I will give. If they don't have, then they get".

Bachni Devi, 65, Kuran Village, Pratap Nagar, District Tehri Garhwal, Uttarakhand

Bachni is a seed keeper, saving "the good big ones (seeds)" and feeding the rest to the family. Her house also acts as the community seed bank. Seeds are stored in big white sacks filled with small bags and pots of seeds. The villagers have organized themselves, selecting farmers to contribute to the seed bank. The village has also created seed sharing links with other local villages with community seed banks.

Shivdei Devi, 63 years, Maniguha Village, Rudraprayag District, Uttarakhand

Shivdei Devi has never used chemicals on her land and wouldn't accept them even if they were given to her free. "They will burn the soil," she says. She is a seed keeper and happily exchanges seed with other people in the village. When asked what is important about farming Shivdei replies, "this is good work. If we want to work, we work. If you have a job somewhere, your boss will tell you what you are not doing and that you have to do this or that. But here, in agriculture, nobody is our boss, we are our boss."

Rajeswari Devi, age 50, Maniguha village, Rudraprayag District, Uttarakhand

At the bottom of Rajeswari Devi's sickle, two rings are attached so that rattles when she uses it. "It is to scare the snakes away" when she is cutting in the field. She continues in her explanation, "we are afraid of snakes, but the snake is also good, because the mice make holes in the field and the snake protects against that." Mice-eating snakes also have their acknowledged place in the farming system. Rajeswari distributes herbal medicines and is skilled in midwifery.

Narmada Devi, aged 68, Bhatwari village, District Rudraprayag, Uttarakhand

Narmada Devi, named after India's Narmada river, was 11 when she came to Bhatwari village. "In April/ May we sow paddy, at that time we do hard work," she says. "Lots of work we have to do." She explains that first ploughing is done, then compost is spread, the seeds are sown and finally the crop is harvested. She saves seeds as well. "Without seed there is nothing at all. We should save seed and only then we will sow," she says.

Asha Bhatt, age 38 , Nandpur, Bedubagar village and Chond village, Mandakini Valley, Rudraprayag District, Garhwal Himalaya

Asha Bhatt divides her life between the house and the farm belonging to her father-in-law. She brings food back from the farm for the family. Sometimes she exchanges a small amount of crops for salt, oil or pulses. "Money can be found anywhere, but the grain we can only find in the field, not in the bank."

Urmila Devi Bhatt, age 63, Chond/ Nandpur, Bedubagar, Mandakini valley, Rudraprayag District, Garhwal Himalaya

Urmila has a huge knowledge of seed keeping. She is member of Navdanya since 2000 "There are so many types of seed storage, some people put oil and cotton and burn inside the box, then they put clay, and that seed is very dry. We also store some seeds in sachets inside the fingermillet, so it will not go bad."

Sumedha Devi Bhatt, age 38, village Nandpur, Bedubagar, District Rudraprayag, Uttarakhand

Sumedha Devi cooking Prasad for the cows

Sumedha Devi is 38 years old and the wife of Navdanya Co-ordinator, Chandrashekhar Bhatt. Now a days she goes up to Bhatwari at sowing and harvesting times to work at the family farm. They enjoy singing together while they transplant the paddy. "Everything about farming is good", she says: "paddy sowing, growing finger millet, to sow everything you want". She is also a skilled in seed-saving and seed-keeping and has two seed stores.

Sarojini Devi, 38, Sauri village, Mandakini valley, Rudraprayag District, Uttarakhand

Sarojini is 38, and she came to Sauri when she was 18 years old. "They teach 'little little' and until I knew everything." Sarojini says that it took three to five years to gain experience in farming. "Now we grow everything. It takes hard work to be a farmer", says Sarojini.

Abbaldey, age 56, Souri village, Mandakini valley, Rudraprayag District, Garhwal Himalayas

Abbaldey learned farming from her parents and now teaches her family. She is also member of Navdanya and a Seedkeeper for more than 10 years. She also exchanges seeds and if she has better seeds she will give them to others, and if others have better seeds they will give some to her.

Rajni Devi Mehta, age 33, Sauri village, Mandakini valley, Rudraprayag District, Garhwal Himalayas

Rajni Mehta with newly harvested crops

Rajni learned to farm from her parents and in-laws and says the methods she uses are much the same now as then. Mostly she works on the land alone, but at busy times the community works together to spread compost, transplant and harvest. When asked whether she would stop farming if they had enough money to buy all their food at the market, she says, "no I would not stop, the fields would be destroyed."

Madani Devi, age 60, village Sauri, Mandakini valley, Rudraprayag District, Uttarakhand

Last year, a 60 year old Madani Devi a seed keeper and a farmer from village Sori was invited by Navdanya to speak with a group of young people in Delhi for sharing her knowledge of organic farming and life in the Mandakini Mountains. Madani saves all her seed, selecting the best of the crops for this purpose. "If we don't have good seed, then we don't have confidence [in the crops]."

Harshi Devi, age 42, Ginwalla village , Mandakini valley, Rudraprayag District, Garhwal Himalayas

Harshi Devi (left) with her mother-in-law

When asked about how to save seeds, Harshi says, "we know." She continues, "I taught myself," Harshi explains why it is important it is to know the difference between good and bad seed: "why waste bad seed in the soil when you can use them as food?"

Smt. Subodini Devi Bhatt, age 75, Dehradun, Uttarakhand

Subodini is now 75 and lives in the home of one of her sons in Dehradun. Sh takes seed keeping very seriously. "We kept the traditional seed for so many generations; seeds from so many villages. Even those people who had little food, they never touched their seeds. Even if they starved they never ate their seeds. Seeds were kept separately." The seeds were taken from the fields where they grew best before the harvest of grains was done.

Mrs Stanzin Chondol Parcha, village Gompa, Leh

Mrs Stanzin Chondol a 40 year old women lives in village Gompa. She grows about 38 vegetables in the only season she gets in a year. Her vegetables include radish red and white, turnip,carrot, mint and many more. She is not only saving her own seeds but also encourages others to do so. Being active member of the women group called Galdan Tsogspa Gompa she sets an example, how you could live happily even at the altitude of 12000 feet above msl coping with the adverse climatic conditions through hardworking.

"There will be no food if there is no seed"

Tsering Dolma Miktsek is a member of Women's Alliance of Ladakh / Navdanya and is one of the best organic farmers and seed keepers of the Leh valley. "I don't spend any money for inputs from outside the farm," Tsering says. "We are saving our seeds and we have also started saving our own traditional seeds. There will be no food if there is no seed."

WOMEN, SEED AND FOOD SOVEREIGNTY FROM CHHATTISGARH

Illina Sen*, Rupantar

Rupantar has had the good fortune of having worked with the indigenous communities of south Chhattisgarh for over two decades. The indigenous communities of Chhattisgarh have been food sovereign in ways not fully comprehended by the scientific community right upto the present time. To make an attempt to understand this reality, one has to understand the production and distribution systems in some detail. Chattisgarh has had an amazing variety of food production systems. It is one of the last places on the earth to have a remembered history of an enormous diversity of food resources. These food resources include many varieties of rice germ plasm, a wide range of millets and other dryland crops, pulses, oilseeds, fruits, edible flowers, tubers mushrooms and other gathered foods. Many of these are dependent upon access to and close proximity of the forests.

Chhattisgarh has traditionally been known as the rice bowl of India. The region is known to have grown a very amazing diversity of rice varieties in the not too distant past. These include indigeneous rice varieties capable of giving the equivalent of, or even higher yields than the green revolution varieties. These varieties are adapted to various micro ecological conditions, and give reasonable yields under normal conditions and with organic manuring. Individual varieties vary in maturity period ranging from 55 days to more than 180 days, drought resistance, and water tolerance capacity. There are low rain fall area varieties and deep water ones, short rices of a height of 50 cms,.to tall ones more than 150 cm. The grain size also varies from short fine to long fine, long bold to short bold and round, oval ones, beaked and awned ones, awned with various colours sizes and shapes. The kernel may be coloured white, dull white, red opaque and the grain can be of one of many possible colours.The grain may be scented or unscented. The world's longest rice"Dokra-Dokri" is found in Chhattisgarh.

Much of our current knowledge of the diversity of rice strains in Chhattisgarh is based upon the research of Dr R.H. Richaria, the famous rice scientist of the region whose pathbreaking work on indigenous rice varieties was put down by the proponents of high yielding monocultures.. His research demonstrated quite clearly that it was possible to obtain and maintain remarkably high yields of rice while using indigenous seeds, local resources and skills.

The farming communities in Chhattisgarh have held secure this amazing diversity of seed for many generations through their traditionl farm practices.Whatever we have been able to do has only been possible through learning from them. Rupantar's own collection and accession of seed varieties exceeds 2000 in number, and each is adapted to a different eco climatic regime, just as each has its own demand for production related protocol.This is because the diversity in crops is matched by the diversity in production techniques. There has been a range of technical and production practices that the farmers of Chhattisgarh have practiced. For example, the *Biyasi* system of rice cultivation, practiced both in the low lying plains as well as by the Marias in Abujhmar under the shifting system of cultivation, was based on a ploughing of standing crops, as a method of weeding.

There was also a variety of sowing practices known to the farmers. Apart from broadcasting, there was *Laichopi*, in which the seeds were germinated in a controlled environment and then sown. This was useful in areas/years where the rains came early, and the fields did not retain enough warmth for in situ seed germination. To cover cover seed shortage, the farmers knew the technique of *chaalna*, in which broken earheads were replanted in the soil using the technology of clonal propagation, that Dr Richharia tried to popularize among farmers who were power drunk with hybrid seeds and canal irrigation, and were quick to forget their traditional knowledge base. Again, the *Utera* system in which gram and oilseeds are sown in a planted rice field before it is due to ripen and left to grow with the residual moisture remaining in the rice fields.

It is not possible to have a discussion on the bio diversity in food resources without referring to the many kinds of uncultivated foods used in Chhattisgarh. These include many kinds of roots and tubers (*jimi kanda, keu kanda karu kanda, chind kanda* to name a few), many kinds of greens, and the many seasonal edible mushrooms. There is a large range of leaves ,from trees, creepers , bushes and shrubs, that are eaten here as *bhaji* s. Some of these like the *tinpania* and *chanori* bhajis grow naturally in the many rice fields after the rice harvest. As a matter of fact, the distinction between what is a *bhaji* and what is a weed is a product of the philosophy of agricultural monoculture that is in complete contradiction to the culture of bio diversity prevalent in Chhattisgarh. These foods lend richness to the diet and in times of drought and food scarcity it is these food resources that have sustained generations of the people of Chhattisgarh. It is this complex heritage that has kept the indigenous people of Chhattisgarh food sovereign to a large extent, and not the highly centralized and inefficient Public Distribution System (PDS)

This amazingly complex production system was accompanied by distribution system equally comprehensive. The *Charjaniha* (literally belonging to several people) is a community based grain bank that is found in several areas of the southern hills, and variants are seen among the different tribal groups of the area. Procurement is through voluntary contributions, and/ or preferential collection from the more affluent families, or those wishing in any given year to donate to a public fund. Community collections through the *Cherchera* rituals or through groups of women dancing the *Relo,* also go to build up the collection. The *Charjaniha* resources can be held in paddy, in the minor millets, and even in an NTFP product like *Mahua,* and are used for community functions, as well as for distribution to individual households in drought years.

Women's role in production and social life

The network of local traders or *kochiyas* were originally the link persons between the many local markets, and were the major agents in the local trade in primary food resources. It is interesting the the *kochiyas* operating in the food trade were mainly women, while those dealing in forest produce with commercial value or utility items were mostly men. Today, the system exists in a distorted form, with male *kochiyas* having become agents of a centralized trade system . However, the role of women belonging to the *Sonkar* (vegetable farmer) community in primary marketing survives upto the present day , and institutions like the *Turi Hatri* (women's market) of Raipur bear witness to the vibrancy of women centered local distribution networks.

The role that women have played in maintaining these systems is relatively little understood. In Chhattisgarh, women are the major agricultural workers. They work in each and every aspect of crop production, preservation and storage. In certain parts of the state like Abujhmar and Sihawa, women are also known to use the plough, a function that is tabooed and prohibited for them in almost all other parts of the country. Apart from crop weeding, maturing, harvesting, women are the leading players in all post harvest and storage operations. Women also play a major role in the collection and processing of the many kinds of uncultivated foods found in Chhattisgarh. Many of these foods are collections from the forest, and women use them for maintaining household food security and nutrition needs outside the market system.

Women are the primary gatherers of all uncultivated foods, and inheritors of an ancient knowledge system about food bio diversity. They are also the gardeners and herbalists with primary knowledge and responsibility for maintaining the home gardens ,the *baris and the bakhris.* Again it is the women who take the produce to the primary markets and barter or trade in the items related to primary food needs. Agricultural scientists would do well if they attempted to learn from women about their existing knowledge of seed technologies, varietal preferences, and even breeding experiences an procedures.

Women were also the keepers of the seeds. Thay were also traditionally responsible for all post harvest operations. An important aspect of these is the preservation of the seeds of bio diversity. In traditional Chhattisgarh, the crop to be harvested as seed is identified in the field of standing crop, and women always took special care while reaping these. A wide variety of seed storage structures were used in subsequent stages, and the exact storage structure used for seed depends on the length of time the seed was needed to be stored away, the moisture content, and other factors. Some seeds like rice are even today stored in bamboo *dholgi* (or *dhongi*)s, thatched and sealed with cow dung, and kept away. These can last for upto three years. Other seeds like the minor millet seeds or vegetable seeds are stored in Sal leaf containers, and often hung up in the kitchen above a wood fire, so that the smoke can act as a pesticide and preservative. The extremely complex knowledge of seed storage and preservation including its technical aspects has always been in the hands of the women.

Today this entire system, as well as the seed heritage of the people of Chhattisgarh is gasping for life. Misguided government effort aimed at so called maximization of production, the commercial pressure of the market, of banks and the seed corporations, the so called 'model' Public Distribution System of Chhattisgarh that procures paddy from farmers at a flat rate (ie regardless of quality or special characteristics) often leaves the farmer with no perceived reason to grow the traditional varieties. This is apart from the efforts at Bio piracy that the Seed corporations remain constantly engaged in. A major crisis in Chhattisgarh occured when Syngenta attempted to enter into into a 'collaborative reaearch project ' with the Indira Gandhi Agricultural Univesity at Raipur, where Dr Richharia's own academic work is housed.On that occassion, shortly after the new state of Chhattisgarh was created, it was civil society pressure that led to this nefarious plan being aborted.Today, civil society is fragmented on the issue of development options for the new state. Rupantar battles on with its programme of ex situ conservation of rice diversity and its attempts at in situ conservation, but unless there is a validation of the importance of seed diversity and an assured outlet for farmers growing diverse varieties in our system, the task seems really uphill.

Photo courtesy: Navdanya Archives

SAVING SEED...

Sarita Kumari, Ghanerao, Rajasthan

I must confess that never before did I give any thought to preserving seeds or in a larger context saving this environment or us.

I heard Dr. Vandana Shiva in a SWAN conference in Bangladesh on Green Economy in June 2011 and I was shaken up from my desultory state and had goose bumps for the time she spoke.

It hurt me; inadvertently I may have had a hand in slowly destroying the earth by my own ignorance.

Vandana's passionate speech galvanized me into introspection.

I went upto her during our lunch hour and inquired in detail about the endangered corn seed in Rajasthan.

The sweet yellow corn being produced in Rajasthan now in danger of being firmly and steadily wiped out by cabal of ignorant, greedy, self promoting people, with no loyalty towards their own earth, would they so effortlessly sell it for short material gain. I was left searching for answers

I followed it up again by visiting Vandana in her 'Navdanya' office in Delhi and coincidentally she was going to visit Jodhpur in August, 2011 I requested her to stop by in Ghanerao (the village where I reside).

I didn't want to waste anymore precious time, once back in Ghanerao, I started inquiring about seeds from villagers and the tribals who would always save seeds to be planted next season, a practice slowly being over taken by the new hi-breed seeds which are readily available in the local market.

With these thoughts a small seed bank came into being. Banki and Leela, two young 'Rabari' (tribal) girls who have been working with us found this venture close to their interest and enthusiastically helped me start it.

Infact they taught me how to save seeds in earthenware bowls. In which they are mixed with ashes to preserve them. This then is tied with muslin cloth for airing. How simple and effective.

Within days and weeks our little seed bank was taking shape.

We collected seeds of fruit, vegetable, grains, pulses and spices

It opened a whole new world to me.

Running a heritage castle for tourism and thinking I was doing my bit was nothing compared to the satisfaction I felt in preserving the real heritage, The Seed!

In August Vandana and two of her colleagues came to Ghanerao and in the morning we went to the tribal holdings.

The 'Garacias' (triblas) who have been tilling this land for 80 years, were relocated from Mt Abu on an initiative of the then ruler of Ghanerao.

Our initiative started with talking with Small groups of tribals, about holding and preserving their seeds, and to resist the short-term success and gain offered by the hi-breed corn.

A farmers meet was then held in Kumbalgarh, which was attended by four hundred farmers, and it was heartwarming to see half of them were women with their children.

The message put forward was simple, to gain better produce and high land yield was only through traditional practice and to preserve the seed.

Save seed, Save land, Save environment, Save earth!
Now is the time to start.

SEED QUEST

Vanaja Ramaprasad

Seed has been the lifeline and source of sustenance ever since organized agriculture came into existence. In recent times it has also drawn the attention of world community as a means of technological intervention in agriculture for commercial interest on one hand and on the other, the imminent need to conserve the diversity that is on the threat of extinction.

Technological revolution heralded the advent of miracle seed just after the Second World War. Green Revolution, as it is known largely benefitted the farmers in the irrigated areas, the fertilizer and seed industry and urban consumers while leaving a negative impact on small farmers in the dry lands. Above all, the impact has been an irreversible loss in the genetic diversity of Indian Agriculture that farmers had nurtured over the centuries. The heirloom seeds that farmers held in their position were the living links in an unbroken relationship to the land reaching back to antiquity. Farmers' centuries ago began domesticating crops with the simple acts of selecting seeds for resowing. Saving seeds thus became a part of the culture and tradition that made agriculture a way of life. Today industrialization of farming has taken rapid strides so much so that cultural diversity and biological diversity have become major issues of concern. During Earth Summit of 1992 the international community focused its attention to understand the catastrophe unfolding in the destruction of biological diversity. It was emphasized that the world community was losing genetic resources for food and agriculture at an unprecedented rate. It was described as a biological meltdown. Together with this was the concern on the erosion of culturally based knowledge represented by thousands of diverse cultural groups also on the endangered list.

It is hard to imagine biodiversity and agriculture without people. Earth's biotic history is the product of hundreds of millions of years of evolutionary history. The past and future of agricultural biodiversity is closely linked to millions of farmers, herbalists, indigenous healers, herders and fisher folk worldwide. It is widely acknowledged that their contribution to the sustainable use of flora and fauna is the basis of their livelihood. There is also the growing recognition worldwide that the innovation of farmers and indigenous peoples is of utmost importance in understanding, utilizing and concerning biological diversity of agriculture, human health and the environment.

The principle of farmers' right was established by the UN and FAO to recognize farmers' contribution followed by the Convention Biological Diversity which became the legally binding framework for conservation sustainable use of agricultural biodiversity. Such international efforts to recognize farmers' contribution have been jeopardized by conflicting trends set forth by monopolistic Intellectual Property Rights regime. Obviously the conflict of interest is between holders of indigenous knowledge and inventors of new technologies. Existing framework is inadequate to protect the rights of farmers and indigenous people. There is also an urgent need to debate on the rights of not just individual farmers but the whole community.

Taking into consideration the constellation of these factors GREEN Foundation has initiated the conservation agricultural diversity by farmers through a network seed banks across different eco-regions in Karnataka. According to our understanding a Community Seed Bank is not a store where seed is kept for distribution or marketing, or a sophisticated storage facility which has temperature and humidity control. It is a system in the process of community agriculture, which includes village level facilities, a garden or field where traditional varieties are safeguarded. Through this system farmers have played a key role in the creation, maintenance and promotion of crop genetic diversity. With the help of traditional skills which have developed over centuries they have been selecting crop varieties to meet specific needs such as quality, resistance to pest and pathogens, adaptation to soils, water and climate. Under this system local farmers have established their own seed networks to facilitate seed supply to their families and local markets. Community Seed Banks is therefore a system composed of all the above. It is among the major strategies for maintaining genetic diversity in crop/plant species.

It has been an exciting journey through the different landscapes of Karnataka to map the diversity that farmers hold in their custody and to revive the lost crops to meet the growing needs of food and fodder. The documents of earlier century break the long held myth that traditional cannot meet the needs of the farmers. It has been important to go back in time and space and that is what SEED Quest is all about.

Photo courtesy: Navdanya Archives

A GARDEN FOR EVERYONE

Seed Conservation & Sharing Initiative for Home Gardeners

Deepika and Bernard – Pebble Garden, Auroville

'A GARDEN FOR EVERYONE' is an integral part of PEBBLE GARDEN, started in 1994, for the total regeneration of 7 acres of severely eroded land in Auroville, Tamil Nadu, India.

Context / Larger Work

The land is severely eroded and forms part of nearly 8000 ha of land devastated by past human actions causing massive soil loss & extreme gully erosion.

After 18 years of regeneration work, this 8 acre plot of eroded land has grown into :

- A vibrant forest of 5.5 acres, with indigenous Forest Species & Returning Fauna
- A garden area of quarter acre with
- Soil built up with NO external Inputs – no soil or organic Matter brought from outside
- 11 life-nurturing water bodies
- A fledgling fruit tree area
- A seed conservation initiative called 'A Garden for Everyone'
- A charcoal/wood vinegar production plant & research on Terra Preta
- A place for learning

The work is done by Bernard and Deepika (members of Auroville) with no hired labour and with small donations from individuals.

Seed Conservation at Pebble Garden

Pebble garden has a Regenerated Garden Area of a quarter acre (1000 sq metres) devoted essentially to Seed Conservation. This garden was created by an intensive process of soil building, using select pioneer species to create biomass in-situ. It has been producing continuous healthy seed crops since 2001.

It supports a plant collection of more than 100 endangered traditional Vegetable Varieties from all over India: root crops, herbs, perennial and wild food /useful crops, medicinal plants and flowers. These varieties are ideal for home use and home gardens.

'A Garden for Everyone' is an outreach initiative to share these hardy plant varieties, which have performed well on this wasteland, with home gardeners and subsistence farmers throughout the country. They are shared within known organic farmers' collectives via organic fairs, seed melas and through personal contacts and references.

Qualities of the Collection

The varieties conserved at Pebble Garden are necessarily robust, determined by the conditions in which they are grown. They are easy to grow, vigorous, produce well with minimum water and other inputs, are able to tolerate drought, heat or excess rain and can resist pests and diseases. Most of them are endangered, rarely grown, not seen in markets, nor are their seeds easily available. They have certain qualities that home growers & users value, such as taste & flavour, nutritive value, cultural significance, diverse shapes, colours and sizes, staggered fruit production, keeping quality, long fruit bearing duration and they enrich or preserve our food culture.


Seed harvest in Pebble garden

Why Conserve these Varieties?

Commercial varieties, on the other hand, are bred/selected with commercial priorities such as yield over and above food value, uniform looks rather than taste, easy transportability, response to chemicals inputs, uniformity and single phase harvest. These are qualities which do not serve any of the basic needs of home growers and consumers. With breeding priorities of 'increased productivity' *at any cost*, modern plant varieties fail to produce safe, tasty, healthy and nutritious food.

In the name of feeding a growing a population on less and less land, given imminent climate change, the seed and agro-chemical industry is poised to take farming away from the hands of farmers, to deny people the freedom and right to be nourished with 'real' food. 'Food' that fails to nourish, is unsafe and ruins the environment beyond measure can hardly be called food anymore.

Solutions/The Way Forward

1. Start a Home Garden

A Home Garden is a simple, direct and powerful act, well within the capacity of many of us, to empower ourselves in the face of a dangerous and uneasy situation where food is no longer safe and often crosses continents before it reaches us. Growing food for the Home, is a direct answer to the challenge of food security. For those with access to land of any kind, minimum resources, balconies, terraces and backyards, the key is in our hands.

2. Conserve and Share Traditional Seeds

Home Gardeners need to have access to seeds of traditionally bred varieties. These are very hard to come by. With the commercialisation of farming and the growth of agri-business the immense seed wealth that was bred by farmers over millennia has disappeared from the hands that created it, now replaced by modern varieties. Our common plant heritage is seriously endangered because farmers who created and protected it in their farms and homes have now been reduced to mere consumers of commoditized seed. National seed banks which house massive seed collections cater to the needs of corporate breeders, claiming to address the food needs of a growing population.

The potential of traditional varieties to fulfil the same breeding objective of 'feeding a growing population' is immense. This is clear from the fact that the success of many commercial varieties is because they are essentially derived from traditional ones. A single gene modification is enough for a variety to stand the eligibility test of 'distinctness' for it to be a registered variety that is 'owned' and can be marketed exclusively. This is like riding someone else's horse, changing just the saddle and declaring it ones own. A whole state mechanism is in place to protect patents on plant varieties and monopoly marketing rights on seeds. All the laws pertaining to seed in India safeguard the interests of seed industry and trade. By these laws, farmers end up as common criminals if they freely exchange and sell seeds of varieties which they themselves, as a community, have developed in the first place !

As a positive action in this direction, every effort needs to be made to put back the farmer in his rightful place as a custodian and developer of this immense inherited plant wealth.

The onus is on farmers and common people to

- COLLECT traditional varieties, from wherever they survive in remote areas and backyards, yet untouched by commercial varieties
- CONSERVE them in farms and homes by growing, using and saving the seeds
- SHARE them widely within the farming community
- DEVELOP them by traditional methods like simple selection

A Home Based Seed Wealth Centre

In times when farming was for the growing of food, rather than money, every farm was a centre of seed wealth, every farming household was a seed bank.

To 'live' this idea, the seed conservation work at Pebble Garden has intentionally been kept 'Garden-Based' and 'Home-scale', largely done by one person with voluntary help and with a minimum budget.

The varieties being conserved at Pebble Garden are from all over India. They come from organic farms and home gardens. It is a dynamic collection with additions every season. Of the 100 varieties grown, most are of vegetables popularly used in India.

The collection includes different varieties of Brinjal/Eggplant, Lady's Finger, Bottle Gourds, Ridge Gourds, Snake Gourds, Bitter Gourds, Pumpkins, several species of beans, different varieties of each bean, Chillies, Tomatoes and Corn. Lesser known and forgotten crops feature prominently in this collection, such as perennial and wild leafy vegetables, root crops of Dioscorea family, other tuber crops, garden fruits like physalis and rosella, medicinal rhizomes. Most of these crops have a promising food potential, but as they do not feature in the market system, they are virtually forgotten and barely known except in remote or tribal areas.

As the collection includes multiple varieties of the same species, e.g. 15 varieties of brinjal / eggplant, 10 varieties of chillies etc., all grown in a small space, the chances of losing the unique characteristics of each variety by cross pollination is very high. Even though the conservation work is small in scale, there should be no compromise on standards. Maintaining Genetic Purity is the foremost challenge and we worked out a set of techniques which can easily be followed by home-level seed conservers. These methods are simple, low cost and easily replicable. By upgrading traditional seed saving skills, using these techniques, farmer saved varieties never need to face the accusation of being 'inferior' or of 'poor quality'. Part of the Seed Work at Pebble Garden involves teaching these simple methods to interested growers in an equally simple language.

Conclusion

It is undeniable that with an increasing population, there are more mouths to feed and less land available per person. It is also true that the climate is changing. In this context seed technologies like GM are being heavily marketed as the only solutions. However, any technology which pushes productivity beyond natural limits and comes with serious health and environmental hazards, some proven, some unpredictable, cannot be a solution.

Traditional crop varieties have evolved over millennia to adapt to a very wide range of climatic conditions. There are paddy varieties adapted to hilly areas, others which thrive in coastal plains and some even in salt water. Traditional crop varieties offer a range of all possible solutions for growing food in a changing climate. Crop migrations are known in history. As climates changed, farmers shifted to more suitable crops.

Increased productivity is achievable with simple selection, complemented by organic agricultural practices to express this full potential. The productive capacity of a variety rests partly in the seed and partly in its growing environment.

Half of the available land mass of India suffers from serious degradation due to massive deforestation and the effects of chemical agriculture. The challenge of food security for a growing population can only be suitably met by holistic solutions which address the serious problem of land degradation, prevent further land loss, enhance productivity of soils and at the same time improve crop varieties. Our land restoration experience at Pebble Garden has shown us that it is possible to regenerate a high eroded land with biomass based technologies, simple tools, traditional plant varieties and basic manual skills.

With technologies that work in harmony with nature, humanity can surely feed herself.

Footnotes

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SEED FREEDOM AND SEED SOVEREIGNTY

The Current Situation in Bangladesh

Farida Akhter*
UBINIG
(Policy Research for Development Alternative), Bangladesh

In Bangladesh, rice is not just a crop; it is the life and livelihood of farmers throughout the country. As compared to other Asian countries, the importance of rice may not be unique to Bangladesh, but it is the Bengali people who are known as "Bheto Bangalee" meaning 'rice-people". One can hardly separate a Bengali from the agro-ecology, lifestyles, cultures and the daily livelihood struggles determined by rice cultivation. The erosion of rice seeds poses a threat to seed sovereignty. Beyond the erosion, is the intervention of HYV, hybrid and genetically modified rice creating a situation which is no less than a War. It is indeed a situation of Emergency.

Broadcast, transplanted and deepwater Aman together form the main rice crop in Bangladesh. Boro, the second largest rice crop, is also grown all over the country but mainly in the Dhaka & Chittagong regions. The rabi season with bright sunlight and less moisture in the air, is well suited for the cultivation of crops, particularly where irrigation water is available. The rabi crops which are grown all over the country are wheat and potatoes, being grown in large quantities in the Rajshahi region. Millet and sesame are also found to be grown but in smaller quantities [Hossain, 1991].

The erosion of seed diversity and Disappearance of Open Pollinated Varieties

Most of the crops grown in Bangladesh, particularly those which are called 'local varieties" are open pollinated. The open pollinated varieties are traditional varieties which have been grown and selected for their desirable traits for millennia. They grow well without high inputs because they have been selected under organic conditions. These varieties have better flavor, are hardier and have more flexibility than hybrid varieties. These seeds are dynamic and adapt to the local ecosystems as opposed to the alternative hybrid varieties which are static. However, with the introduction of the so-called "improved varieties", which are nothing but laboratory seeds found in packets and sold in the market, the farmers' personal seed collection disappears. In the case of rice, the open pollinated seeds started disappearing with the introduction of the Green Revolution. The open pollinated seed system, known as the traditional system, can not be used by the modern agricultural system. Efforts from international donors and the governments were made to adopt the technologies and so-called modern agricultural inputs such as chemical fertilizers and irrigation. In the early 1960's fertilizer application was limited to tea gardens and government agricultural farms, and irrigation was practiced on only about 7% of land. The government then created the Bangladesh Water Development Board and Bangladesh Agricultural Development Cooperation (BADC) to procure modern agricultural equipment, chemical fertilizers, and improved seeds and distribute them to farmers at highly subsidized prices throughout the country (Hossain, 1988)[1]

Modern varieties (MVs) of rice seeds were made available to farmers in 1968 which could supposedly withstand the dry season (boro) and wet season (aman) tolerant crops were largely distributed in 1970. By 1984/85, the area irrigated under these seeds covered approximately 20% of the cultivated land which "facilitated the spread of modern-input-responsive MVs to cover one-fourth of cropped land and one-third of the sown area under cereal crops" (Hossain, 1988).

Ultimately, Green Revolution or chemical-based and mechanized agriculture led to the undoing of peoples' sustainable livelihoods. Rural areas were turned into semi-urban areas, and the monoculture of rice production led to the loss of genetic diversity throughout the country. Out of 15,000 traditional local varieties of rice, presently 30 varieties are promoted as HYV varieties. In the Bangladesh Rice Research Institute over 7000 varieties of rice are still found (UBINIG, 2003). Although the collections in the National Gene Banks are impressive, the National Gene Banks have absolutely no connection with the farmers. The seeds and germplasm are kept in cold storage without any effort to regenerate them.

Seed Diversity - Inherent in Traditional Farming Practices

Farmers, both past and present are maintaining the diversity of seeds for every crop they grow through the practice of traditional and ecological farming. Small scale farmers as well as the middle-class and wealthy farmers maintain seed diversity and treat it as their treasure. Small-scale farmers grew the crops for their subsistence needs and any surplus was exchanged for diversity. The wealthy farmers maintained diverse, local varieties so as to have special rice varieties for guests, special occasions, cultural and religious needs as well as to act as a safeguard against natural disasters. Seed varieties were also required for keeping livestock, poultry, and practicing horticulture. Farmers have never appreciated monoculture. More than 300 wild indigenous species of plants were identified which were relatives of the cultivated crops grown in Bangladesh. In Bangladesh, there were 12000 rice accessions (BRRI, 2005); 1090 landraces of white jute (Corchoruscapsularis) and 519 of tossa jute (C.olitorius) (Husain et al 1988); 700 tea accessions (BTRI, 2005) and 300 accession of sugarcane[2].

The Erosion of Seed Diversity

The switch to modern agriculture meant the introduction of few modern variety seeds through government agencies which would take up vast areas of land. Now, there are only 57 high yielding varieties (HYVs) and three hybrid rice varieties that have been released for commercial cultivation in the country up to the year 2012. In addition, 75 rice hybrids have been introduced into Bangladesh from China, India and Thailand. Thousands of local varieties of rice have been eroded due to the introduction and release of these selected hybrids and modern varieties of rice.

There was a time when Bangladesh was a rich treasure chest of biological diversity. It is on record that there were 15,000 varieties of rice during the early twentieth century. A survey in 1976 revealed that only 6000 varieties were available. Now the numbers can be counted in fingers; there are 57 varieties and 3 hybrids released from the Bangladesh Rice Research Institute (BRRI), 75 hybrids introduced from China, Thailand, Vietnam, India and a few local varieties escaping to specific niches like chamara in Tangail and kataribhog in Dinajpur.

The situation for other crops is even worse. Recent records reveal that there were 160 crops grown in Bangladesh in the past. The traditional practice of mixed cropping and crop rotation has been replaced with monoculture of selected varieties and hybrids. The first remarkable case of erosion, was that of the big-size water melon. But some of the worst cases of erosion are evident in the vegetable varieties of Bangladesh. Most of the local varieties of brinjal, cucurbits, amaranth, spinach etc. have been replaced with hybrids.

The process of replacing local varieties with new hybrid varieties which are promoted under Government patronization, collaboration with development partners and seed companies-both national and multinational and some Non-Governmental Organizations (NGOs) through their micro-credit programs. The farmers were attracted to these hybrid varieties by colorful publicity put forth by the seed companies. Consequently, seeds of the local crop varieties have been eroding fast in this wave of modernization and globalization. The Bangladesh Agriculture Research Institute (BARI) is now conducting research on Bt brinjal and the Bangladesh Rice Research Institute (BRRI) has been conducting trials with Golden Rice. These are serious threats to the genetic contamination of rice and brinjal and must be stopped.

The Threat to Seed Sovereignty: Patents, Seed Law and GMO Contamination

Since the Green Revolution, seed has become an important item of trade and has since been treated as an industry. The patrons of the Green Revolution are now appearing as the leaders of the seed business. Initially the seed business was initiated through the Government agencies but over time it has been taken over by large companies. The Bangladesh Agriculture Development Corporation was established in 1962 as an autonomous corporation of the Government to deal with the issue of seeds. The Seed Ordinance was enacted in 1977, and has since been amended twice, once in 1997 and again in 2005.

Seed supply for the farmers of Bangladesh has been increasingly controlled by seed companies, both national and International. The Seed Law was modified, enforcing compulsory registration of seeds making it impossible for farmers to produce their own seeds. Thus, the farmers were forced to rely on the market seed supply.

In Bangladesh, Government institutions have been involved in a number of biotechnological research projects. These include the University of Dhaka, Rajshahi University, Chittagong University, BAU Mymensingh, Bangladesh Forest Research Institute (BFRI), Bangladesh Institute of Nuclear Agriculture (BINA), Bangladesh Rice Research Institute (BRRI), Bangladesh Agriculture Research Institute (BARI) and Bango Bandhu Sheikh Mojibor Rahman Agriculture University (BSMRAU). In addition there are Non-Governmental Organizations (NGO) and private enterprises like BRAC, Proshika, Grameen Krishi Foundation, Bangladesh Seed Foundation, CARE Bangladesh, PROVA, Syngenta, World Vision Bangladesh, Agriculture Marketing Company Ltd. (AMCL), Alpha Agro Ltd. are also involved with biotechnological researches. The Department of Agricultural Extension, RDRS and BRDB have implemented the extension of genetically modified crops.

In late 2003, The International Rice Research Institute (IRRI) in collaboration with Bangladesh Rice Research Institute (BRRI) arranged the PETRRA fair (Poverty Elimination through Rice Research Assistance IRRI/PETRRA Project of Bangladesh) in Dhaka where details about the genetically engineered golden rice carrying vitamin-A related genes of the daffodil flower were discussed. PETRRA informed the public that such genes have been introduced with BR-29, the widely cultivated rice variety of Bangladesh so that vitamin-A would be produced in its seeds.

Bangladesh hosted the Convention on Biological Diversity (CBD) on 20 March 1994 in order to ensure the conservation and sustainable use of the country's rich biological diversity. Although Bangladesh is willing to benefit from the latest scientific revolution in modern biotechnology, the country is fully aware of the possible adverse impacts of genetically modified organisms (GMOs) on the environment, biodiversity and human health. Accordingly, Bangladesh ratified the Cartagena Protocol on Bio-safety on May 24th, 2000.

The National Bio-Safety Framework (NBF) was developed following an extensive assessment of biotechnology and bio-safety in Bangladesh. Surveys were conducted on the current use of modern biotechnology, existing relevant policies, laws and regulations, building activities and expertise within the country. The Framework provides the basis for the future regulation and management of GMOs in Bangladesh. The objective of the NBF is two fold. It gives an overview of the existing systems and identities future needs for an effective and transparent legislation and administrative system.

The National Biotechnology Policy 2006 is a prelude to creating a policy environment favorable to the promotion of the commercial transgenic crops, which is in fact a part and parcel of American foreign policy. This policy is not merely economic in nature for the benefit US biotech companies, but is alarmingly related to our security and survival.

At least 70% of the 150 million people in Bangladesh belong to farming communities who are presently producing food for the country and their success largely a result of their own ingenuity. They have been affected by the introduction of agricultural technologies such as mechanized and chemical-based HYV technology and the introduction of hybrid seeds. There are numerous literatures which argue that we need to distinguish the positive from the negative in terms of Green Revolution technologies and that the technological solution to food production has always been a bad proposition given the ecological and environmental destruction it has caused. The shift should be towards socially, ecologically and environmentally responsible science and technology. Biotechnology and Genetic Engineering does not fit this model.

National Biotechnology Policy would benefit this parasitic commercial class who are eager to import transgenic crops and biotech products from the USA and other industrial countries. A section of corporate appointed scientists, who are eager to turn our public education and research institutions to the service of corporate interests, will also benefit. But the farmers will be severely affected as has been witnessed in countries like Argentina, Brazil and Mexico.

It is a systematic strategy of polluting the biodiversity-rich countries like Bangladesh so that they become permanently dependent on the multinational biotech companies. Such an uncritical biotech policy will permanently transform the agricultural sector of Bangladesh into an industrial food production system, bringing the sector under the logic and global control of food chains and cripple the possibility of the agricultural sector to enter in the global market with ecological and organic product. Adoption of this policy will destroy the agriculture of Bangladesh. It will seriously compromise the country's ability to attain food sovereignty. This is a policy tuned to allow the import of transgenic agricultural crops and products.

Enabling policy and regulations which serve to protect the environment and the biological wealth of Bangladesh are imperative and we must encourage scientific and technological innovation that can invigorate farming communities and bio-diverse agriculture. The profound richness of our diversity can nurture a healthy nation and create a thriving robust agrarian sector. But current policy has been made to link Bangladesh with the USA and biotech companies to destroy our farming systems and expose our biological resources to the threat of Bio-piracy by multinational companies[3].

GM Maize

Maize is cultivated in many districts of Bangladesh. Farmers used to grow open pollinated high yielding varieties (HYVs) of maize released from the Bangladesh Agricultural Research Institute (BARI). However, during the nineties the cultivation of hybrid maize has increased. Extensions of maize hybrids were specially intensified among the farmers by the Department of Agricultural Extension (DAE) after the heavy flood in 1998.

BRAC and the Grameen Krishi Foundation (a subsidiary of Grameen Bank), two micro-credit NGOs, played a role in pioneering the introduction and extension of hybrid maize cultivation. They tied hybrid maize seeds with micro-credit and compelled farmers to grow the maize hybrids as poultry feed. The DAE also distributed hybrid maize seeds free of cost after the flood in 1998. The scarcity of seed was created at the farmers' level through the introduction of commercial seeds. At present, there is an increasing trend towards the extension of the poultry industry in Bangladesh. As a result, there is an expanding market for maize grain as feed. Based on this demand, NGOs which deal with micro-credit, alongside a number of seed companies are availing this opportunity to extend hybrid maize seeds for commercial gains. The DAE is also organizing demonstration plots, field days and other motivational programs for this extension and to bring more farmers on board. At present, there are 24 hybrid varieties of maize under production in Bangladesh.

Table 1. Commercial name of the maize varieties with source

Sl No.	Variety	Source
1	900-M	Auto Equipment Co. Ltd.
2	N K-40	Syngenta
3	Pacific – 984	BRAC seed Marketing , Bangladesh, Thailand
4	Pacific – 11	BRAC seed Marketing , Bangladesh, Thailand
5	Barnali	HYV BARI, Bangladesh
6	Shuvra	HYV BARI, Bangladesh
7	Meher	HYV BARI, Bangladesh
8	Khoi Bhutta	HYV BARI, Bangladesh
9	Swan-2	NA
10	PSC-3344	Agri Business Corporation, India
11	PSC-3322	Agri Business Corporation, India
12	PSC-105	Agri Business Corporation, India
13	PSC-HP-100	Agri Business Corporation, India
14	PSC-105	Agri Business Corporation, India
15	PSC-984	Agri Business Corporation, Thailand
16	Hybrid Mukta	India
17	Hybrid Madhu-1	India
18	Hybrid Madhu-2	India
19	Hybrid Madhu-3	India
20	Hybrid Madhu-4	India
21	Konok Bhutta	India
22	Hybrid Madhu- 19	India
23	Hybrid Madhu-21	India
24	Hybrid Madhu-28	India

Bt Cotton

Cotton has been grown in Bangladesh as a cash crop for generations. Experimental production of American cotton was initiated in the plain lands of the country during the 1970s, at which point cotton was grown on approximately 1215 hectares. Soon following this period, the Cotton Development Board (CDB) was constituted which resulted in the intensification of cotton cultivation across the country. Cotton production was extended to 34 districts in 10 zones after the constitution of the CDB and four cotton research centers were then established.

Before the establishment of the Cotton Development Board (CBD), two types of cotton were cultivated, one of which was Gosspium Hirsutum grown in the plain lands and other was Comilla which was grown in the hilly land of Bangladesh. Now, ten high yielding varieties (HYVs) of cotton have been released from the CDB. The HYVs of cotton include; (1) CB-1, (2) CB-2, (3) CB-3, (4) CB-4, (5) CB-5, (6) CB-6, (7) CB-7, (8) CB-1, (9) CB-9, (10) CB-10, (11) CB-11 (12) CB-12. There are two hybrid varieties in use, namely DM-1 & rupali-1. In addition there are 2 varieties of Comilla cotton which are (1) Pahari Tula-1 (2) Pahari Tula-2.

Many of the cottonseeds for cultivation in the plain lands are now imported from the USA, all of which are are HYVs. About 6-7% of the country's requirement of raw cotton is met from domestic production, while the rest is imported. Experimental production of 8 cotton hybrids, introduced from India was conducted in Jagodishpur Chawgacha, Jessore in 1990-91. Although due to the failed yield of these varieties, the seeds were rejected and cultivation was discontinued.

The Threat to Public Breeding

Crop breeding and variety selection have been continued since the dawn of civilization by the farmers, farming communities and lately by the public research institutions. Varietal improvement of crops is vital to farmers especially in the developing countries. These efforts are aimed to ensure food sovereignty, raise the farmers' income and meet the challenges of climate change and global warming. The farmers' and their crops must have the resilience to adapt to change in climate by adopting new crops, selecting the most appropriate genetic material or changing the time of sowing. Yet farmers were discouraged from pursuing their breeding efforts due to pressures from genetic improvement and maintenance of varieties. However, farmers in the less intensive cropping areas like the salinity prone coastal belt in the south and the drought prone north western region are still continuing their need-based breeding efforts. These include the breeding of salinity tolerant varieties of rice and other crops for the south coast and drought tolerant varieties for the northwest.

The toughest hurdles for farmers to overcome in their efforts for crop improvement includee:

1. Government policy and rule
2. Seed companies-national and multinational.

The Multinational Seed Companies include Syngenta Bangladesh Ltd, Bayer Crop Science Ltd. Bangladesh, A C I Limited. Global Agro Resources Incorporation, Macdonald Private Limited and Ganges Development Corporation. The National Seed Companies are in joint collaboration with East West Seed Ltd, Aftab Bahumukhee Farm Limited, Supreme Seed Co. Ltd, Pasha Pashi Seed Company, Ispahani Agro Ltd., National Agro-care Import and Export Ltd., LalTeer Seed Limited, Getco Agro vision Ltd., Ranks Agro Biotech Limited, Energypac Agro Ltd. Namedhari Malik Seeds (Pvt) Limited, just to name a few.

There are no existent government policies which approves farmers' seeds, all the government policies and legal instruments are in favor of the seed companies. These policies work against the small-scale farmers and threaten their ability to continue their varietal breeding.

A rich base of variability of crops is a foundation for present productivity and future source of improvement. The rapid loss of biodiversity due to the large scale extension of monoculture of modern varieties and hybrids is a threat to sustainability. It was proved long ago that without the maintenance of genetic variability, food supply would at risk of epidemics and infections.

Corporate Control over the Seed Supply

The Seed Industry in Bangladesh is comprised of both public and private sector initiatives. In the private sector there are more than 100 companies involved, with over 5000 registered seed dealers operating across the country. The past decade has been marked by a transition from open pollinated to Hybrid varieties. As a country which depends on agriculture, seed is the key to the survival of the nation. Seed is the life and livelihood, it is the dream of the farmers. In the 2011-2012 fiscal year, there was a total need of 10,57,172 metric tons of seed in Bangladesh. Out of these requirements, 14% were supplied by the Bangladesh Agriculture Development Corporation, the farmers themselves produced 40% and the remaining 46% were supplied by the seed companies (The Daily Shamokin, 9 July 2012). There are about 280 seed companies enlisted with the Bangladesh Seed Merchant Association (BSMA). About 30 enterprises have reasonably organized seed businesses involving the production and marketing of seed. 13 companies are considered as medium sized with annual sales of more than 40 metric tons to 1000 metric tons of seeds and the remaining 17 companies with annual sales of less than 40 metric tons of seeds. In addition to the newly emerging companies, NGOs are also playing an important role in seed supply in Bangladesh. At present there are more than 20 NGOs involved in the production and marketing of seed.

Royalties - Increasing the Cost of Seed

Imported hybrid seeds are more expensive than locally produced seeds, costing farmers approximately ten times more money. The price of one kilogram of hybrid rice seed ranges from BDT 250-300 as against BDT 20 to 30 for each kilogram of rice inbreeds. Small-scale farmers cannot afford to buy the costly seeds every planting season. Rather, they need to maintain their own seed collections, which can be kept in the hands of the farmers and used for future growing seasons. Moreover, the cost of production for the modern varieties and hybrids is much higher due to the high costs of inputs which were not required before such as fertilizer, pesticides. Because of these offsetting facts, the modern varieties and hybrids are not only cost prohibitive for small farmers but also unfriendly to environment.

The Influence of Corporations over Government Research, Breeding and Agricultural Policy

Agricultural research in Bangladesh has been coordinated by the Bangladesh Agricultural Research Council (BARC). The BARC, however, has no control over the allocation of the financial resources. According to the Bangladesh Agricultural Research Council Bill 2012, 12 research institutions are affiliated with the BARC. These institutes are commonly referred to as NARS institutes of Bangladesh. These include:

- Bangladesh Rice Research Institute (BRRI)
- Bangladesh Jute Research Institute (BJRI)
- Bangladesh Agricultural Research Institute (BARI)
- Bangladesh Institute of Nuclear Agriculture (BINA)
- Bangladesh Sugarcane Research Institute (BSRI)
- Bangladesh Livestock Research Institute (BLRI)
- Bangladesh Fisheries Research Institute (BFRI)
- Bangladesh Tea Research Institute (BTRI)
- Bangladesh Forest Research Institute (BFRI)
- Soil Research and Development Institute (SRDI)
- Bangladesh Sericulture Research and Training Institute (BSRTI)
- Bangladesh Cotton Development Board (BCDB)

The BARC and its 12 affiliated research institutes roughly account for three quarters of the country's agricultural research expenditure. Agricultural research has depended on donor financing, particularly in terms of World Bank loans, which facilitated considerable investments in infrastructure and equipment (http://www.asti.cgiar.org/pdf/bangladesh_cb34.pdf).

The private sector has minimal input into agricultural research and development in Bangladesh. There are a large number of nongovernment organizations (NGOs) involved in agriculture, but research activities, if any, are very limited. The Bangladesh Rural Advancement Committee (BRAC), RDRS, GrameenKrishi Foundation (GKF) among others have recently been conducting research on conventional agriculture. Research on ecological agriculture has been carried out by Proshika, UBINIG, BARCIK, Unnayon Anneshon, Action Aid, CARITAS, and CCDB.

**NGOs:

BRAC (Bangladesh Rural Advancement Committee)

BRAC is one of the largest NGOs in the world now working in all sectors of agriculture development in Bangladesh. BRAC's present activities on agriculture development include the establishment of two Agriculture Research and Development Centers at Joydevpur, Gazipur near the national research institute BARI and BRRI and at Sherpur, Bogra where applied agricultural research is done. BRAC is dealing with Plant Tissue Culture, Vegetable, Rice and Maize research including the development of hybrids which have high yielding potential and high profit. The research sector is also conducting studies regarding the adaptability trail of all exotic varieties. BRAC has already established 9 agricultural farms in different agro-ecological zones of the country on around 210 acres of land.

The BRAC agriculture program is coordinated with both national and international agricultural research organizations. It has signed a Memorandum of Understanding with Bangladesh Rice Research Institute (BRRI), Bangladesh Agriculture Research Institute (BARI), and Bangladesh Institute of Nuclear Agriculture (BINA). BRAC coordinates with international research organizations like International Rice Research Institute (IRRI, Philippines), International Wheat Research and Maize Research Center (CYMMIT), International Potato Center (CIP). Asian Vegetable Research and Development Center (AVRDC) and Yuan Long Ping High Tech Agriculture Co. Ltd. China. The BRAC agriculture program is also working with a number of multinational seed companies including Monsanto and ACI with agreements for sharing technology and the marketing of agro-products. At present, the partnership with the multinational seed companies include: Yuans Hi-Tech Seed Co. Ltd. China, Hi-Tech Seed Co. Ltd. Pacific Seed Company, Australia. Mahyco Seed Company, India, Druk Seed Company, Bhutan, and Seminis Vegetable Seed (India) Ltd. India**.**

RDRS (Rangpur Dinajpur Rural Service in Bangladesh)

RDRS Bangladesh (Rangpur Dinajpur Rural Service) is an NGO that has been working to empower the rural poor in northern Bangladesh since 1971. In 1997, RDRS became an autonomous organization as the Bangladesh field program of the Geneva-based Lutheran World Federation. RDRS retains close partnership links with LWF/DWS and the related agencies. RDRS's work expands over 10 different districts – Panchagarh, Thakurgaon, Dinajpur, Rangpur, Nilphamari, Lalmonirhat, Kurigram, Jamalpur, Moulvibazar and Habiganj. RDRS Bangladesh and Udyog Foundation have promoted flood tolerant paddy Swarna Sub1 developed by the International Rice Research Institute (IRRI) in the country's northern district. Bill and Melinda Gates Foundation (BMGF) provided financial assistance through IRRI to increase seed production and disseminate the technology under its Stress Tolerant Rice for Poor Farmers in Africa & South Asia (Strasa) programme[4]. RDRS is also involved in research on drought tolerant varieties.

GrameenKrishi Foundation

Grameen Krishi Foundation is a profit company like the Grameen Bank, and works with poor farmers. Unlike the Bank that deals only in cash, the Krishi Foundation lends and accepts repayments in cash as well as in agricultural input and produce. Under their current seed programme, GKF signs up mainly small-scale to medium farmers to produce seed. Lack of mechanisms to assess production targets and create local demand is one of the reasons of poor efficiency of the existing GKF seed system. Recently, GKF experimented with an innovative method by focusing on the poor not only as seed producers, but also as customers, and to help sell quality seed. Per union, ninety farmers that own less than 0.5 ha were selected in a way that ensured maximum geographical coverage. GKF trained them as seed producers, seasonally sold them foundation seed and collected the seed they harvested for drying, grading, storing and packaging as truthfully labeled seed. At the beginning of the next season, the poor seed producers were given priority over seed retailers to buy back their processed truthfully labeled seed. In this new Grameen seed system, incentives are ensured for farmers, retailers and GKF, making it a financially sustainable business. By inviting seed producers, sellers and retailers to the seed processing centre, system transparency is created and confidence built in the quality of the seed. As seed is grown and sold in the same area, all farmers in the system get better access to quality seed. This new seed innovation system works independently of the GKF credit system, but could be complemented by it. Involving other NGOs and local officials helps to further increase the customer base (www.agroinsight.com). Profit is put back into the Foundation through sinking tube-wells, building agricultural infrastructure, to undertake agricultural research as well as other future building activities.

People's Initiatives for Seed Conservation and Reclaiming Seed as Commons

The farmers in Bangladesh have been practicing agriculture using their traditional knowledge and wisdom specific to their particular context and have been maintaining the seeds at the family level for generations. In many cases, maintaining seed is a part of religious rituals. Slowly the authority of seed has been taken away by the seed companies. The farmers have been made dependent on the market supply of seeds. Under this circumstance, some non-governmental organizations especially the Nayakrishi movement has been endeavoring to empower the farmers and the farming community with the authority of seeds.

The Nayakrishi Andolon (New Agricultural Movement) - a biodiversity based farming system is a movement for ecological agriculture. It is based on simple principles which do not use pesticides and chemicals, focus on soil management rather than the external input of fertilizers and utilizes the practice of mixed cropping and crop rotation for pest management and risk reduction. Mixed cropping is also crucial to increase productivity through management and production of biodiversity, rather than quantitative yield of a single monoculture crop. The central approach of the initiative squarely lies in the conservation, management and use of local seed and genetic resources and adopting and improving production techniques suitable for farmers' seed. Hundreds of local varieties of rice, vegetables, fruit and timber crops, etc. have been reintroduced within a short period of time. For example, farmers in Nayakrishi area cultivate at least 3000 varieties of rice, and the number is increasing. The movement has been negotiating with the national gene bank to help them regenerate the collected germplasm and internalize the conservation of genetic resources as a built-in operation of the movement. At least 300,000 farmers in 19 districts of Bangladesh practice Nayakrishi. In all the farming households' women are the key persons who preserve seeds and therefore have taken up the lead in the movement. They have formed the Nayakrishi Seed Network in a systematic structure to involve women at different levels of their expertise.

The Nayakrishi Seed Network (NSN) is the active farmers' network within Nayakrishi Andolon with the specific responsibility of ensuring both in-situ conservation of biodiversity and genetic resources in the field and ex-situ conservation at the household and community level. It builds on the farming household, the focal point for in-situ and ex-situ conservation. Farmers maintain diversity in the field, but at the same time conserve seed in their homes to be replanted in the coming seasons. The next step for the Network is the formation of the Specialized Women Seed Network (SWSN) comprised of women farmers who have specialized knowledge and skills for seed preservation and genetic resource conservation.

Activities of Nayakrishi Andolon are constituted as a system of relations between farming households. The category of Nayakrishi households, as the basic unit of the movement, is very crucial to understanding the working methodology of Nayakrishi Andolon. The individual plans and decisions are made into collective decisions through meetings and the collective sharing of information. In these meetings decisions are taken to ensure that in every planting season all the available varieties at the farmer's households are replanted and the seeds have been collected and conserved for the next season.

The Network Structure:

Nayakrishi Seed Huts: From the individual farmers' seed collection at the household level, Nayakrishi Seed Huts are established by the independent initiative of one or two households in the village, belonging to Nayakrishi Andolon, who are willing to take responsibility to ensure that all common species and varieties are replanted, regenerated and conserved by the farmers. These households are known as Nayakrishi Seed Huts (NSH).

Specialized Women Seed Network: To enhance the capacity of the community the Specialized Women Seed Network (SWSN) has been formed. These are the women who are specialized in certain species or certain varieties. Their task is to collect local varieties from different parts of Bangladesh. They monitor and document the introduction of a variety in a village or locality. They keep the information up to date about the variability of species for which they are assigned. The SWSN often shares their findings at large meetings organized by the Nayakrishi Andolon.

Community Seed Wealth Centre: Community Seed Wealth (CSW) is the institutional set up in the village that articulates the relation between village and the National Gene bank. The CSW also maintains a well-developed nursery. The construction of CSWs is based on two principles: (a) they must be built from locally available construction materials and (b) the maintenance should mirror the household seed conservation practices. Any difficult scenarios the CSW encounters, reflects the problems that farmers are facing in their household conservation. Any members of the Nayakrishi Andolon can collect seed from CSW with the promise that they will deposit double the quantity they received after the harvest.

Nayakrishi and Biodiversity: As an agricultural practice Nayakrishi Andolon is based on 10 simple principles. In addition to poison and chemical free agricultural practice, the production of biodiversity is built into the method of Nayakrishi food production. As a fundamental principle of agricultural practice Nayakrishi farmers reject monoculture and ground their practice in mixed cropping and crop rotation. It has an immediate effect in overcoming the present narrow genetic base. It is a highly effective method for pest management and contributes to the nutritional health of the soil. With regard to the productivity, output from Nayakrishi practices is either at the same level or higher than that from conventional chemical agriculture. Apart from the ecological gains, the main reason for the acceptance of Nayakrishi is the economic return to the farmers. The local species and varieties are always preferred than those that are introduced from external sources. Hybrid varieties are avoided mainly because farmers cannot use the seed for the next season. Hybrid seeds dis-empower farmers, especially women, and make them dependent on seed companies. Nayakrishi farmers are not against the new varieties introduced by the formal system, but they do not accept the category "high-yielding" as an adjective to the laboratory seed. There is always a substantial gap in the claim and the actual performance of a HYV variety in the farmers' field. The calculation of yield by the Nayakrishi farmers is done firstly not on a single crop based on monoculture calculation; secondly, the energy used as input and the energy produced as an output are taken into account to bring the category of "sustainability" as the fundamental parameter to assess "productivity". Since the "high yielding" varieties require more inputs and energy to perform effectively, than what they reasonably can produce, the term "high yielding" is a misnomer. Thirdly, a biodiversity-based farming system responds to the diverse needs of the community that cannot be satisfied by increasing quantitative yield of a particular crop. However, the addition of a new variety from the formal system to the existing genetic resource base of the farming community is seen as a contribution and its integration into the Nayakrishi farming practices is based on totally different parameters than proposed by the conventional mainstream agriculture. Among the rice varieties from the Bangladesh Rice Research Institute (BRRI), a number of them have been doing quite well without pesticides, chemicals and pumped ground water.

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Footnotes

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SEED SOVEREIGNTY IN NEPAL

Kusum Hachhethu
Navdanya (Nepal)

Nepal is an agrarian but food-deficit country. Around 70% of the population is involved in agriculture, which contributes to 40% of the GDP. Yet, 3.5 million of Nepal's 26.6 million people are food insecure (WHO). Till 1980s, Nepal used to be a food exporter, but the country has become food deficient during the last one decade.

Hence, increasing agricultural productivity is vital to the overall growth of Nepalese economy and reduction of hunger and poverty. In order to boost agricultural productivity in Nepal, hybrid seeds were introduced and highly promoted – today, these seeds are extensively used in many regions of Nepal, including the remote areas. About 80% of the vegetables that are grown in Nepal are produced using hybrid seeds.

Commercial cultivation of maize became popular in Nepal when the government initiated "Maize Mission Program". The program provided hybrid seeds and fertilizers to the farmers as an incentive for growing maize. However, in the recent years, there has been a constant failure of maize in various maize growing regions of Nepal- many have attributed hybrid seed to be responsible for the failure.

On September 13, the USAID released a press release stating that Monsanto has teamed up with USAID of Ministry of Agriculture and Cooperatives (MoAC) in Nepal to promote the use of hybrid maize seeds and provide training to the farmers, as a part of pilot project in Nepal. The announcement created an outcry among experts, farmers and civil society members, who were critically aware of Monsanto's unethical history – as a result, "STOP Monsanto in Nepal" campaign came to life. Although Monsanto had already marked its presence in Nepal more than a decade ago, the announcement of large- scale entry of Monsanto opened the gateway for a bigger discourse on questions related to Nepal's agriculture future – including the use of hybrid and genetically modified seeds.

When a crop fails?

In late 2009 and early 2010, there was a massive "maize failure" in various maize-growing regions of Nepal –Chitwan, Nawalparasi, Rautahat, Sarlahi, Bara, Parsa and others. "The plant grew very well, but none of the cob had kernels" complains Krishna Prasad Kafle, one of the farmers from Giadakot Village, Nawalparasi, Chitwan who suffered from a massive failure of maize in 2009.

Recently, on June 7, 2012, maize farmers in Jhapa district conducted a mass rally in Chandragari headquarters to protest the loss incurred by non-yielding maize – similar problem has been seen in Garamani, Jalthal, Prithivinagar, Balubadi, Rajgadh, Haldibari and other more than 15 VDCs in the district. (Irate farmers stage protest, Govind Chhetri, The Himalayan Times, 06/07/2012).

Farmers from various corn-growing regions have been devastated by the failure– they have incurred a huge monetary loss of millions of rupees (Yadu Upreti, secretary of Farmers Welfare Protection Forum Jhapa). Yet, the catastrophe has been ignored and neglected by the government and media.

Seeds of Destruction

While some blame climate change and the unusual cold weather as the major culprit behind the failure, others suspect "bad quality foreign seeds" and arraign multi-national companies that supply such seeds. Farmers are incensed with local agrovets (seed distributors) and agents from multi-national companies who persuade them to buy hybrid seeds.

Failed Promises

In 2009, Laxmi Sapkota and family sowed maize seeds from two different companies at two different plots - one of them (Manisha 9497) failed, while the other gave normal output. If climate change and environmental factors were responsible for the failure, plants from both the plots should have failed. The failed one, "Manisha 9497", is a hybrid maize seed produced and marketed by Manisha Agri Biotech Pvt. Ltd, Hyderabad, India. ". Only after we threatened to approach the national media, the company provided us with minimal compensation, and they simply resolved the issue with us" said Laxmi. While Sapkota family was able to receive some compensation from the agrovet, there are many other innocent victims of the maize failure, who do not have the fortitude to fight back.

While local corn varieties are sold for 40-70 Nepali rupees (NRs) per kilo, hybrid counterparts are sold for around 200 NRs per kilo. "This year, in 2012, about 70 percent of maize cultivated in more than 32,000 hectares land in Jhapa was sown with hybrid maize, among which, 60 percent cobs did not bear corn." (Irate farmers stage protest, Govind Chhetri, The Himalayan Times, 6/7/2012).

Amid all this, Monsanto, an American based multinational agriculture biotechnology corporation, had been making an attempt to introduce (at a larger scale) its hybrid maize seed in Nepal, in the name of higher yield and better output. On contrary, evidences from various countries corroborate the failure of Monsanto's hybrid maize.

Grow more Maize…

Five years ago in 2007, "Maize Mission Program" was initiated with the objective of increasing maize production in Nepal and to substitute maize importation from India. Due to the increasing demand of maize for feed industry, the demand is greater than the supply. Hence, Nepal imports half of the estimated 270,000 tonnes of maize it uses a year from India, costing about 200 million Nepalese rupees.. The existing policies related to agriculture such as National Seed Policy, 1998, Agricultural Policy 2005, Science and Technology Policy, 2004 have also stressed on minimizing food insecurity and poverty through the promotion and development of hybrid seeds.

Monsanto already in Nepal

According to Chitra Kunwar, senior scientist at Nepal Maize Research Center at Rampur, 30 varieties of hybrid maize seeds from 12 different foreign companies have already been approved and registered in Nepal. Registered companies include Bioseed, Zuari Seed, Kanchanjunga, Pioneer, Bisco Bioscience, Charoean, Aishwarya and Monsanto (NARC).

Technically, Monsanto has already established itself in Nepal – Monsanto's products could be found in the market since 2004. In 2010, 100 metric tonnes of Monsanto's seed were imported in Nepal. In 2009, four of Monsanto's hybrid seeds (Allrounder, 900M, dkc 7074 and Pinnacle) were registered in Nepal, after the approval of Seed Quality Control Center.

Nevertheless, the fact that Monsanto is already in Nepal is not an excuse to allow large-scale entry of its seeds in Nepal. The goal of Monsanto's official pilot project in Nepal was to target 20,000 farmers, who would also be trained on hybrid maize production practices - allowing Monsanto to work with 20,000 farmers, when their seeds are constantly failing, is a total insanity. Past evidences suggest that entry of Monsanto's hybrid seeds in any country serves as a gateway to introduce Genetically Modified Organisms (GMOs). Monsanto's hybrid maize in Nepal will be rapidly followed by GM maize. (http"//www.naturalnews.com/032826_Monsanto_seed_supply.html.

In April 23rd 2004, Nepal became the member of World Trade Organization (WTO). As a member of WTO, Nepal was obliged to sign the "Trade- Related Aspects of Intellectual Property Rights (TRIPS) agreement, which is the most comprehensive multilateral agreement on intellectual property. In case of seed, patents on seed favors giant multinational companies such as Monsanto, by allowing them to claim the seed as their property and restricting others from buying, selling and distribution of the seed. In addition, in the name of patents, companies are able to collect royalties from the poor farmers and generate huge profit from it. Often multinational companies, who own the patent over seeds, criminalize farmers by accusing them of "Intellectual Property Theft"- even when the farmers themselves are the victim of genetic contamination by their genetically modified seeds (GM Watch http://gmwatch.org/latest-listing/1-news-items/13216-new-threats-by-monsanto-against-organic-farmers.

Patents and Intellectual Property Rights on Seed

Although, Nepal is a member of WTO, the country has not yet made adequate preparations to implement legislations and policies that fulfill the requirements of TRIPS of WTO. At present, IPR in seed and agriculture is not strictly followed in Nepal, however, a draft on the proper implementation of IPR has already been prepared and it is possible that it will be approved anytime by the government. The entry of Monsanto in Nepal, together with strict implementation of IPR on seeds, can prove to be a hard blow to the Nepali farmers. (for various reasons mentioned above)

Monsanto's Turndown

Various countries of the world are saying No to Monsanto. On 25th April 2012, government of Gujarat, India withdrew Monsanto's double-cross hybrid maize named "Prabal" , distributed to more than half a million tribal farmers of Gujrat via "Project Sunshine" in 2008. On June 4, 2012, Haitian peasant farmers burnt several bags of hybrid maize seeds, donated by Monsanto as a part of post-earthquake reconstruction program – the donated seeds have been treated with Maxim XO, a hazardous fungicide.

The Monsanto Debate

In Nepal, the debate over Monsanto sparkled after the USAID news release of September 13, 2011 that stated "**USAID teams with the Ministry of Agriculture and Cooperatives (MoACs) and Monsanto Company to promote the use of hybrid maize seeds in Nepal.**" (http://nepal.usaid.gov/in-the-spotlight-archive/478-usaid-teams-with-the-ministry-of-agriculture-and-cooperatives-and-the-monsanto-company-to-enhance-maize-production-in-nepal.html).

The announcement of the deal created an outcry among civil society members – including social activists, environmental activists, farmers, journalists, agricultural experts and students. As a response, an anti-Monsanto campaign named "Stop Monsanto in Nepal" was formed. Soon after, the campaign gained momentum in media as well as government level..

Monsanto debate in Nepal has instigated a bigger discourse on topics related to seed and agriculture, which has long been segregated from government's agenda as well as Nepali media. This discourse lays a foundation to analyze our existing policies on seed and agriculture, recognize the loopholes and to design\implement better policies on the topic. Farmers are also educating themselves and making informed choices.

Where is Nepal headed?

Instead of welcoming multinational such as Monsanto, investment in agriculture must be focused on long-term food security measures – such as irrigation, better land management, improved seeds and agricultural research. We must defend our seed sovereignty, which is the foundation of food sovereignty. The international Seed Campaign demands:

- the right to obtain seeds from our own harvest, to re-sow, distribute and sell them;
- the promotion of diversity in all regions by supporting conservers and breeders of varieties that can be re-sown;
- the prohibition of genetic modification technologies in agriculture;
- the prohibition, without exceptions, of patents on plants and animals, their traits and genes, as well as patents on breeding methods;
- a new agrarian policy, which, instead of supporting energy-intensive industrial production and monocultures, promotes biodiverse and ecological production.

The Interim Constitution of Nepal guarantees the right to a dignified life, to liberty and to live a sovereign life. We must take precaution to defend our food democracy from dictatorship by multi-national corporations. We must protect our seed sovereignty.

Control by seed

By Najma Sadeque

To the rest of the world, Abu Ghraib is associated with inhuman torture, incarceration without trial and arrogant US unilateralism. To the farmers of Iraq, Abu Ghraib was better known for the national seed gene bank, started in the early 70s. In fact, Iraq's most well-known wheat variety is known as 'Abu Ghraib'. The country precious heritage is now all but lost.

Facing the same unsolicited adversary, Syria is under a similar threat. The Centre for Agricultural Research in Dry Areas (ICARDA) is situated there and still holds remaining samples of Iraq's threatened seeds. It is worrying because the planned destruction of Iraq's agriculture is not widely known. Modern Iraq is part of the 'fertile crescent' of Mesopotamia where man first domesticated wheat between 8,000 and 13,000 years ago, and home to several thousand varieties of local wheat. As soon as the US took over Iraq, it became clear its interests were not limited to oil. In 2004, Paul Bremer, the then military head of the Provisional Authority imposed as many as a hundred laws which made short work of Iraq's sovereignty.

The most crippling for the people and the economy of Iraq was Order 81 which deals, among other things, with plant varieties and patents. The goal was brutally clear-cut and sweeping — to wipe out Iraq's traditional, sustainable agriculture and replace it with oil-chemical-genetically-modified-seed-based industrial agriculture.

There was no public or parliamentary debate for the conquered people who never sought war. The conquerors made unilateral changes in Iraq's 1970 patent law: henceforth, plant forms could be patented — which was never allowed before — while genetically-modified organisms were to be introduced. Farmers were strictly banned from saving their own seeds: this, in a country where, according to the Food and Agriculture Organisation, 97 per cent of Iraqi farmers planted only their own saved seeds.

With a single stroke of the pen, Iraq's agriculture was axed, while Order 81 facilitated the introduction and domination of imported, high-priced corporate seeds, mainly from the US — which neither reproduce, nor give yields without their prescribed chemical fertiliser and pesticide inputs. It meant that the majority of farmers who had never spent money on seed and inputs that came free from nature, would henceforth have to heavily invest in corporate inputs and equipment — or go into debt to obtain them, or accept lowered profits, or give up farming altogether.

The US has now completely revamped Iraq's agriculture, uninvited and against the will of local farmers. It's not for nothing international researchers have termed the deliberate annihilation of Iraqi agriculture the 'ultimate war crime'.

It was in the early seventies that Henry Kissinger devised the chilling plan to control countries by replacing their self-sufficiency with food and seed dependency. A cartel controlled by the leading financial families of Britain, US, Holland and Australia, began to buy up all the world's major sources of food and seed. The six leading grain companies — Cargill, Continental, Louis Dreyfus, Bunge and Born, Andre, and Archer Daniel Midlands/Topfer — completely dominate the world's grain and cereals supplies. They include wheat, corn, oats, barley, sorghum and rye; also a strong grip on meat and dairy, fruits and vegetables, edible oils and fats, spices and sugar.

It was something that agricultural countries already arm-twisted by World Bank/IMF conditions, should have worried about. But most governments were ignorant or indifferent to ecology and biodiversity to realise how survival was being threatened. Alarmed by the inexorable onslaught of the agro-chemical multinationals, Indian activist Vandana Shiva began creating indigenous seed banks in 1987 and challenging seed patents, monopolies and genetically-modified seeds — so far she has created 60 such seed banks in India. So have many other groups in India.

Similarly, Nayakrishi in Bangladesh is rediscovering food plants that were thought lost forever. In the fore is Via Campesina, the global, million-strong peasant movement for land, seed and food sovereignty, particularly in the Latin American countries. Only a few small, scattered efforts exist in Pakistan. And even though farmers have demonstrated over and over again that biodiverse ecological agriculture produces more and healthier food per acre than monocultures, tens of times more cheaply, concentrated wealth and power continues to move the food and seed system out of the hands of peasants and villages and into the hands of a few corporations.

Monoculture — the planting of a single crop variety over thousands or millions of acres — has been systematically eliminating biodiversity all over the world, without many plants ever being documented. Despite the assault on them, there are still over 200,000 varieties of wheat left in the world today, thanks only to the world's unheralded small farmers and movements. But it's hard to tell for how long, since these and other plants varieties are being constantly wiped out by industrial agriculture. Mexico, the historical cradle of corn, has already had its maize varieties decimated during the development and implementation of the dubious 'Green Revolution' by US interests. Eighty per cent of Mexico's corn varieties have been lost since the early 20th century.

Almost throughout Pakistan's history, uninformed or indifferent governments coupled with feudal domination of farmlands have maintained the newly-entrenched system of dependant agriculture. But the final threat to our indigenous seeds came a decade ago, in the form of a globally-discredited chemical-turned-seed corporation that was given virtually open house to take over Pakistan's agriculture, even sitting in as unofficial adviser in ministry meetings.

The Punjab provincial government's recent rejection of Monsanto was not for ecological reasons and the dangers that genetically-engineered seeds posed for human health, livelihoods and agriculture at large, but because the terms were too steep — which still gives Monsanto a chance to renegotiate itself back into the fold.

The blind adoption of unproven or failing agricultural technologies on the unproven grounds that American scientists can always improve on nature, could leave Pakistan as devastated as Iraq without even needing an Order 81.

Source: http://tribune.com.pk/story/342986/control-by-seed/

MOHAMMAD AHMADI*


Mohammad (left) and his son (right)

Mohammad was born in Iran and he lives in a small village in Kermanshah province. Five years ago, he went to Salas and found a special wheat variety in a farmer's field that attracted his attention.

At first, he thought that this variety was irrigated; he asked the farmer how many times he irrigated his field. The farmer told him that this were a rainfed landraces of wheat and his ancestors were planting this variety since a long time.

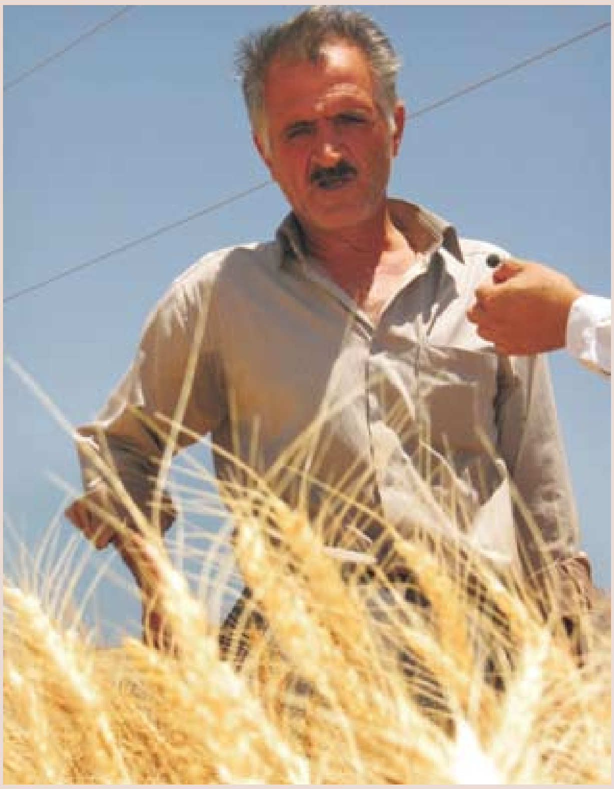
It was then that he became interested in planting this variety on his farm. He went to the farmer's field and selected the best spikes. This resulted in about 36 kg of seed, which was then planted on his farm.

During the years he tested this variety under different conditions such as planting on light clay soil, on heavy clay soil and on rocky ground. After 5 years, he was able to plant this variety in more than 8ha of his land. He thinks that the yield of this wheat in every condition is better than other officialy released varieties such as Sardari and Azar 2.

He decided that the next experiment will be planting this variety with supplemental irrigation because he believes that this farmer's variety is much better that the irrigated varieties that today farmers use in their farms.

Mohammad said that Iran is a dry country and water is very important in Iran, so in economical terms 6 tons of rainfed wheat is more beneficial than 7 tons of wheat obtained with severe irrigation. Also there is no use of pesticides and fertilizers on this variety; he likes this farmer's variety so much that he wants to call it "Hameh"

Mohammad believes that in the past, the weather in Kermanshah was very cold and there was also freezing even in mid-spring and therefore, this kind of landrace of wheat was not good. However, nowadays this wheat is in harmony with the prevailing weather conditions and therefore the growth and the yield of this farmer's variety in the new weather is very good.



SHAHRIAR MAHMOUDI*

Shahria in his evolutionary barley field in cropping season 2011-2012, with terminal drought stress yielded 2000 kg./ha

This is the story of a young farmer, Mr. Shahriar Mahmoudi who has born in Telesm village in 25 February 1977, Dalahoo region, west Iran and lives, where climatic conditions are suitable to grow rainfed wheat, barley, chick pea and lentil. He is one of the most famous seed savers in the region before and has been practicising participatory and evolutionary plant breeding since 2005-2006. For a long time ago his father supplied local barely seed to nomads. He is talented in public relationship and has had a great impact on rainfed farming in the region after he made a good relationship with breeders at the Dryland agricultural sub-institute (DARSI) based in Kermanshah province since 2003-2004. In 2008-2009 after two years of initiation of participatory plant breeding in Iran by CENESTA, ICARDA and DARSI; I (Reza Haghparast) asked him to plant 8 kg of evolutionary barley seed (mixture of 1600 F2 generation) received from Dr. Salvatore Ceccarelli (ICARDA barley breeder). The seeds reached very late at late November 2008. Shahriar told that Dalahoo is a cold region and it is too late to plant barley in this freezed soil!! I explained him the story behind Participatory Evolutionary plant breeding in harsh environment and the act of natural selection to keep the adapted seeds. He planted the seed pessimistically in that frozen soil and after harvesting the crop in late June 2009, he was amazed by 103 kg seed he harvested from the mixed seed in cropping season when the amount of rainfall was lesser than long term average. He planted 60 Kg in 4000 m2 in 2009-2010 cropping season with good amount of rainfall with proper distribution. He harvested 2.1 ton barley seed (4.2 kg/ha) and because of good performance of "evolutionary barley seed" specially in low fertile field conditions, each year he devotes a part of its land to this seed and sells a part of it to other farmers. Other farmers are satisfied with its performance. In cropping season 2011-12 with terminal drought stress, he distributed 2600 kg seed of evolutionary barley. In this cropping season, average yield of local barley was 2160 kg/ha, while evolutionary barley yielded 2400 kg/ha. Average grain yield of Sararood-1, an improved check in fertile field was 2800 kg/ha. But farmers who prefer local barley, adopted evolutionary barley and substitute it with local barley in field with low fertility. Shahriar is well known to farmers in that region and people say that he acts like an agricultural researcher center, a seed company, and agricultural extension by himself. He still takes the advice of his experienced old father who is known for his indigenous knowledge and had a good memory of rich diversity of the local bread wheat cultivars a long back they had in his field.

Farmers visiting Shahria Mahmoudi's evolutionary barley field (2nd year) in a wet cropping season 2009-2010 yielded 4200 kg/ha. In this photo Shahriar in green hat.

Shahriar and his father and his son (July 2010)

ABU HAZEM*

Al Shoubak is located just off the King's Highway 190 km south of Amman and less than an hour north of Petra. It is situated around 1.359m above sea level at a latitude of 35° 25° north. The average annual rainfall is about 280mm. Recorded temperature maxima have reached +36°c, and minima -18°c. Winter snows are common, the spring is cool and frosts can occur in late May.

Call "Gadam" Harvested field and using animal to carry

Farmer with manual tool using in collection and clean harvested wheat

Gdmat Shoubak (another line from Safra Maan) is one of the good Jordan wheat landraces. Alshoubak fields lie on a very complicated structure with deep slopes and many rangelands split the fields. Under this situation Abu Hazem bred this landraces since 1954. Abu Hazem started his long journey of Gdmat Alshoubak as a response to nature. Every year he selects his multiplication seed in the field known as Altahseen in Arabic which means a selected part in the field that has been roughened from any off type for preparing healthy and pure seeds for the coming year. Under complicated geography he improved plowing techniques. Abu Hazem improved upon his tools to make them long (0.5 m) for manual cultivation using animals in order to catch most of the rainfall which would otherwise be lost trhrough the mountain slopes.If you ask Abu Hazem why he breeds this strain all this time, he will start by described it; this strain yellow like gold in the field with four sides which doesnot shatter like other wheat varieties and has the ability to respond to rainfall at height without lodging. Overall the seed is hardier than other varieties so it is very good for storage and shipping. He cooks it in different ways.

Farmer Village

Stone Mill which women in the village use to prepare wheat dishes

ADNAN ALSMADI

NAKED BARLEY LANDRACE "ALNABOU":*

Adnan Alsmadi or Abu Mohammed is another story of a farmer living in a mountainous region of Jerash, a complicated geographical area with overlapping forests. Twelve years ago his father found a small amount of "Alnabou", a naked barley landrace, in a cave in the region which he then planted in his small field. The Alnabou seeds multiplied in this mountain area where Quercus trees grow, and where there is a rainfall of around 350ml, shallow soil and steep slopes where animals are used for plowing.

The farmer describes this landrace as not easy to recognize from wheat after the threshing process but it can multiply 18 times more. Abu Mohammed uses Alnabou for feed and food. When it was fed directly to the animals for the first time they were affected by diarrhea, which the farmer said meant that the animals would have a clean stomach after which all will be well. The farmer breeds and prepares Alnabou grains manually and makes a bread paste to which he adds wheat flour to bind it. The gluten content of the barley is zero and many dishes can be made such as Gsmat and Fariekh which are very tasty in comparison to the wheat paste that is prepared using a small stone mill to make Borgall and Bekalh.

Farmer field

First step for preparing Borgall

Abu Mohammed in his house

The manual cultivated tool using animal

*Profiles facilitated by Dr. Salvatore Ceccarelli

PHILIPPINE FARMERS RECLAIMING THEIR OWN SEEDS

Charito P. Medina Masipag*

Seeds are the embodiment of survival and food security of all humanity. But these seeds which had been developed, selected, shared and maintained by farmers since the dawn of agriculture had been under constant threat since the Green Revolution (GR) was introduced some 50 years ago. Farmers' varieties had been displaced and replaced by several waves of 'modern' varieties—from high yielding varieties (HYVs) to hybrid seeds and genetically modified crops (GMOs).

Farmers' organization members transplanting rice in seed bank

Modern varieties and technologies have directly or indirectly caused genetic erosion of farmers' varieties and associated diversity. In rice, at least 85 percent of the fields in Burma, Indonesia, Philippines and Thailand are now occupied by HYVs. In addition, some 375,000 ha or nine percent of total rice lands in the Philippines was planted to hybrid rice in 2011. The hectarage is bound to increase as the government targets 500,000 to 700,000 ha for 2013.

Likewise the first genetically modified crop in the Philippines was approved for commercialization in 2002. Ten years after, eight Bt corn varieties have been approved for commercialization but limited to two traits—pest resistance (Bt crops) and herbicide resistance, or a combination of the two (stacked trait). And these are owned by three companies: Monsanto, Syngenta and Pioneer. The area planted to genetically modified corn for 2011 was 685,619 ha (ISAAA data) comprising 27% of the total corn area of 2.49M ha in the Philippines.

Biotech corporations had been using all tactics to promote GMOs. First, Syngenta had been very aggressive in promoting vitamin A rice masquerading as a technology to feed malnourished children. This public relations GM crop is currently field tested in the Philippines and the proponents plan to commercialize next year. Second, climate change is used as an opportunity to advocate GMOs hyped as climate smart seeds in the form of drought tolerant and 'submarine' rice. These new seeds promoted as 'climate ready' seeds are expected to be a 'medicine worse than the illness' because these crop varieties have narrow genetic make-up, high response to chemical fertilizers, and displace many farmers' varieties. At the landscape and ecosystem level, it replaces the mosaic of varieties into monocrop of single traits.

On another dimension, it has to be emphasized that farmers knowledge, sometimes called associated knowledge is also important because it embodies the 'software' of the seeds, i.e. every variety's ecological adaptability, tolerance to climatic stress, resistance or susceptibility to pests and diseases, even gastronomic qualities. Having the seeds without the associated knowledge of farmers is like having a library without a catalogue. But all of these are lost with the proliferation of modern seeds developed in research institutions or corporate laboratories to the exclusion of the farmers.

Government policy and programs have its role in the disappearance of traditional and farmers' varieties. Under the Philippine Hybrid Rice Commercialization Program (HRCP), production of hybrid rice seeds is promoted through

(1) procurement of seeds at a guaranteed price, (2) distribution of the procured seeds to participating farmers at half the procurement price, and (3) payment of additional money to participating farmers to help defray fertilizer input costs. This way, the spread of hybrid seeds was facilitated, displacing local varieties, and enhancing the use of chemical fertilizers and pesticides.

Threats to farmer seed sovereignty

All seed laws and plant varietal protection (PVP) laws in Asia are redefining seeds as private property or commodity and the economic rights of breeders as paramount. As a consequence, the age old farmers' rights of seed growing, saving, exchanging, improving and marketing are restricted or at least become a privilege only. Thus, the sustainable practice of a cycle of seed production and reproduction is curtailed to the effect of reducing farmers as mere seed users. As a result, farmers need to buy the seeds every time they plant. Through this system, the seed companies profit every time while farmers became impoverished,

The Philippines enacted its plant varietal protection law in 2002 (RA9168). This law essentially institutionalized plant breeders' rights and farmers' rights are marginalized. Inherent to the current seed and PVP laws is the requirement for uniformity with a consequential effect of narrow genetic base. This has been documented to be one of the reasons for greater incidence of pest and disease outbreaks.

The provision in article 27.3b of the Trade Related aspects of Intellectual Property Rights (TRIPS) requiring *sui generis* protection of the biological resources of a country is not beneficial to developing countries. This requirement is advantageous to rich countries and big corporations only because they have the capital to invest in research to generate the often voluminous data requirements. Proof to this is that even if there is very rich biodiversity in the Philippines, and with Filipino discoveries of their uniqueness and uses, 98 to 99 percent of all intellectual property rights (IPR) granted in the country are owned by foreign entities. Under this disproportionate ownership of patents, it is obvious that benefits would accrue more to the patents multinational corporations.

Being one of the mega-diverse country in the world, the Philippines is prone to bioprospecting that often result to biopiracy. A number of Philippine biological and genetic resources have been lost to foreign patenting without corresponding benefit-sharing, for example *ilang-ilang, saluyot*, and *ampalaya* to name a few.

There is no Philippine law recognizing farmers' varieties and farmers' rights.

Corporate seed control, increasing cost, and declining farmers' income >gmo data, hybrid rice; gmo poliecon

Seeds and knowledge as commons had been shifting to privatization and corporate control. Multinational seed companies became very active in hybrid rice because being the first filial generation (F1) in the crossing of two varieties, it can not be replanted because it starts to segregate in the succeeding generation (F2). This ensures control of the seed by the corporations.

There are 11 seed companies active in hybrid rice in the Philippines and these are presented in table 1. In addition, Monsanto, Syngenta and Pioneer are active in developing and commercializing genetically modified crops in the country. The setting up of multi-million dollar seed production plants in the Philippines by Syngenta and Pioneer is an indication of the lucrative seed business.

Table 1: Seed companies active in Hybrid rice in the Philippines.

Seed Company	Base Country
Advanta	India
Bayer	Germany
Bioseed Research	Philippines
Devgen	Netherlands
Heilongjiang Beidahuang Seed Group	China
Hyrice Seed Tech	Philippines
Monsanto / Cargill	USA
Shiram Bioseed Genetics (DSCL)	India
SL Agritech	Philippines
Syngenta	Switzerland
Yuan Longping High-Tech Agriculture (LPHT)	China

Royalty fees and monopoly control has rendered more expensive seeds with little option for farmers. For example, the price of a 20kg (to plant one hectare) Round-up ready corn is 8,200 Pesos while the same amount of hybrid non-GM corn is 2,300 Pesos. Thus, the biotech seed companies are earning a profit of 5,900 Pesos on a per hectare basis. The high capitalization had been taken advantage by local usurers charging 2 to 8 percent interest per month.

A recent study of Masipag on the political economy of GM corn shows that a farmer needs a capital of 30,000 to 38,000 Pesos per hectare, while the net income could be as high as 20,000 Pesos or negative income at times. This has been driving farmers into indebtedness and ultimately landlessness when the money lenders confiscate the farmers' farms due to their inability to pay their debts.

Influence of corporations over public research and government policy

Biotech corporations have a very strong lobby and influence to research institutions and government policies in the Philippines, through the International Service for the Acquisition of Agri-biotech Applications (ISAAA).

Researchers from the University of the Philippines Los Banos (a government institution) were the ones who field tested Monsanto's Bt corn, the first GM crop in the Philippines. It was the same researchers who defended the corporate GM technology in so many fora, debates and public hearings until the said product was approved for commercialization. Currently, these are the same researchers, paid by taxpayers money, who are field testing Bt-Brinjal and golden rice.

Government policy and the GMO approval process are also skewed not into biosafety but bio-entry. The Bureau of Plant Industry under the Department of Agriculture has approved 68 GMO transformation events for importation for direct use as food or feed. Not a single application was turned down so far. Risk assessments lack rigour because these are reduced into simplified procedure of checking of positive or negative effects, and conducted by a single person in contrast to the usual practice of a risk assessment multidisciplinary team. Field testing for efficacy tests are advocated as safety tests. The science and technical review panel of the approving government body are all pro-GMO.

Rice panicle selection to maintain good quality seeds in seed bank

The Philippines is host to the International Rice Research Institute (IRRI), the architect institution of the green revolution in rice. Their seeds and technologies were developed to the total exclusion of farmers to the effect that local knowledge and the capacity to improve such were made irrelevant with the imposition of such 'modern' varieties. This technological centralization was responsible for the erosion of farmers' seeds as well as farmers knowledge.

Agricultural policy was also crafted in promoting these modern seeds and technologies. Government programs supported distribution of the modern seeds through its extension program. It also provided subsidies and agricultural credits to users of the modern seeds, chemical fertilizers and pesticides. Modern chemical farming was the only recognized method covered by crop insurance, often to insure that the loans were paid but no coverage provision for supporting food of farmers when crops are damaged. Farmers insisting on using their varieties were ridiculed as backward and irrational.

IRRI's influence had profound impact on national research initiative because the diverse approaches were coopted to the paradigm, framework and priorities of the former. For example IRRI had been regarded to have the best rice scientist in the world and that they provide advice that permeates into local policies and priorities. Also, many rice scientists were trained in IRRI and they consequently espouse the same paradigm. Some local scientists who worked in IRRI later transferred to the Philippine Rice Research Institute.

Packaged technology became the norm even in highly heterogeneous environment, objectives and culture. Peasant-oriented approach to increasing production were totally ignored or considered as backward. This homogenizing effect transcended across seeds, technology, growers' objectives.

The intrusion of corporations into seed business at a time of declining public funding, IRRI is now increasingly dependent on corporate funding. IRRI is increasingly doing research focused on those with potential patentability. Researches 'commissioned' by seed companies are increasing whose results are obviously for the corporations that provide the funds. This mutual relationship makes IRRI conduct research that directly or indirectly legitimizes or endorses technologies of biotech and seed corporations. For example, golden rice is being promoted through IRRI by the Golden Rice Humanitarian Board. This research and business board is pushing for the commercialization of vitamin A rice which is a public relations stunt of the biotech industries at a time when GMOs are suffering from consumers' acceptability.

Vegetative stage of Masipag rice seed bank

Many consortia and networks are coordinated and based at IRRI to propagate a homogeneous framework in agricultural technology, to legitimize and promote corporate technology, or to coopt other approaches. The Hybrid Rice Development Consortium at IRRI is pushing for hybrid rice. A Consortium for Unfavourable Rice Environments based in IRRI is a regional platform for partnerships among national research and extension systems (NARES) seem to appear relevant in addressing climate change but then again it promotes a technocentric approach and espousing genetic uniformity of so-called 'climate ready' varieties.

IPR is affecting research and the kinds of varieties and technologies that are being developed. Research priorities and directions of public and international institutions are shifting to patentable and profitable technologies at the expense of practical and safe technologies. Proponents of IPR claim that this stimulates research but what is actually happening is the contrary. There is greater restriction of research on patented varieties because they can't be used for breeding materials without the patent owner's consent. Also, seeds with patented genes are difficult to access by independent scientists who would like to do research on health impacts.

People's initiatives in seed conservation and reclaiming seeds as commons

In the Philippines, there are a handful of non-government organizations and peoples' organizations that are active in reclaiming seeds and doing seed conservation. The Southeast Asia Regional Initiatives for Community Empowerment (SEARICE) has a project called Community Biodiversity Development and Conservation and Biodiversity Use and Conservation in Asia Programme (CBDC-BUCAP). This program aims to strengthen the capacity of farmers to manage plant genetic resources (PGR) and to secure their local seed systems through conservation, crop improvement and sustainable utilization. This is implemented in five rice-growing countries namely, Bhutan, Lao PDR, the Philippines, Thailand and Vietnam. As a countermeasure against biopiracy, the CBDC project in Bohol, Philippines has designed a community seed registry.

MASIPAG (Farmer-Scientist Partnership for Development), has the longest experience among the initiatives on seed conservation in the Philippines. It started in 1986. Today, the organization is a network of more than 600 farmers'/people's organizations (PO), 60 non-government organizations (NGO) and 15 scientists, operating in 49 of the 79 provinces of the whole country.

Over its 26 years of asserting farmers' rights and reclaiming seeds, it has collected 1,090 traditional rice varieties (TRV) from remote rural villages less disturbed by the green revolution (GR). This rice seed collection is roughly 25 percent of the estimated TRV in the Philippines before the GR displaced most of them. One unique character of the Masipag initiative is that it is farmer-led and that the seed collections are from farmers' own collection efforts and that no single variety was taken from the IRRI or from the government seed banks.

Throughout the Masipag network, 147 seed banks (also called Trial Farms) are maintained autonomously by farmers through their organizations. Each seed bank contains at least 50 rice varieties. These seed banks are more popularly known as trial farms because this is where they select locally adapted varieties. It is multi-functional because this is their seed bank, where they get their initial seed materials; it is a germplasm for farmers who wanted to look for breeding materials; it is for identifying characteristics of each variety including resistance to drought, flooding or to pest and diseases. In fact it is also a tool for creative organizing—i.e. farmers need to participate in the maintenance of the seed bank otherwise they may not have access to the seeds, thus making the farmers organization more active and solid.

There are eight provincial back-up seed banks, containing 100 to 600 varieties each, which are also maintained by the farmers' organization (Table 2). These serve as source of new batches of seeds given to the local seed banks/trial farms. Also, two regional back-up seed banks (maintaining 600 to 1,200 varieties) and a national back-up seed bank is maintained by Masipag where more than 2,500 rice varieties are maintained, characterized, and source of seeds to the provincial and local seed banks/trial farms.

As Network, seed security is ensured because of the seed support system. When extreme weather events like drought, flooding or cyclone occurs causing damage to a particular locality, the affected farmers can simply request seeds from other organizations with seed banks, or the back-up farms.

Table 2: Back-Up Farms of the MASIPAG network

Location	Year Started	Managed by	Varieties Maintained
Luzon BUF Rajal Centro, Sta. Rosa, N. Ecija	1986	MASIPAG National	2,600
Visayas Masipag BUF and Learning Center	2006	MASIPAG -Visayas	600
BUF Dao, Alimodian, Iloilo	2003	BALICDA, DASMPC, CARIKA	617
BUF Cauayan, Negros Occidental	2003	POMOLUYO Fed.	600
Mindanao BUF Happy Valley, Tambulig, ZDS	2005	PCB Zambo del Sur	500
BUF, Villa Castor, Buug, Zambo- Sibugay	2005	PCB Zamb- Sibugay	300
BNM/MRS, San Vicente, Sto. Niño, South Cotabato	2005	Perfecto Vicente	1,200
CSB Buenavista, Gingoog, Kitaotao, Agusan Norte	2003	Alterdev Services Foundation	300
CSB, Midsayap, North Cotabato	2004	Southern Christian College –CEREA	500
BUF, Bolinsong, Bonifacio, Mis. Occ.	2004	PCB Mis. Occ.	500
MBC Maluko, Manolo Fortich, Bukidnon	2005	MASMIN	900

Seed exchange is done by farmers during meetings and assemblies. It is not uncommon to have 100 different kinds of seeds, varieties and species and planting materials, including cuttings and seedlings, being exchanged during bigger meetings like regional assembly of Masipag. This contributes to enhancement and maintenance of biodiversity at the farm level.

Beyond seed conservation, Masipag is also improving its seed collection through participatory and farmer-led plant breeding. Over two decades, Masipag has developed 1,085 Masipag rice. Currently, 67 farmer-breeders are actively breeding rice independently in their own farms. In aggregate terms, these farmer-breeders have produced 506 rice cultivars.

Banking on the experience described above, Masipag is very active in the promotion of sustainable organic agriculture using local varieties. It continues to lead seed improvement, seed adaptation screening and in the development of organic farming technologies. It has generated data showing that the yield of organically grown Masipag rice is at least the same, sometimes higher, to that of conventional chemical farming. The net income is almost always higher in Masipag organic farmers compared to conventional farmers.

Masipag continue to promote recognition of farmers' rights and campaign against IPR on biological resources and against biopiracy. Together with other civil society organizations, a No2GMO coalition was organized and it is active against field testing and commercialization of GMOs. Fora are conducted in areas where there is field testing of GMOs, and lobbying is done both at the local government level and at the legislative branch in government. It has helped in the formulation of local ordinances for the banning of GMOs and in support of organic agriculture.

A network called RESIST Agrochemical Transnational Corporations is also very active in the campaign against multinational corporation control of seeds, food and agriculture. The network is very active in opposing aerial application of pesticides, hybrid rice, GMOs, biofuel plantations or destructive mining. Fora, mass actions, signature campaigns, legislative lobbying are also being done to educate and mobilize farmers, consumers, members of the academe and other sectors to fight TNC interest in seed privatization and control in agriculture.

Conclusion

In the face of adversity from TNCs and challenges of the changing climate, seed diversity has been an essential tool by farmers in order for them to cope and survive. These seeds, which have been kept and nurtured by farmers, hold the future to securing food for the billions of people. As more and more farmer groups are creating ways to conserve, develop and share seeds, they in turn are reclaiming their right to food sovereignty and a healthy future.

However, seed conservation and development are not enough. Defending seed freedom should also be embodied thru our efforts in exposing and opposing private control in our seeds. Practical methods of seed conservation should go hand-in-hand in pushing for a change in policies and agenda in agriculture.

**Charito Medina is an agriculturist and environmental scientist with a PhD degree in environmental biology. He is the national coordinator of MASIPAG (Farmer and Scientist Partnership for Development). www.masipag.org*

PEPITO BABASA

Rice seed bank caretaker and rice breeder

Pepito Babasa is 60 years old, married, with eight children. During his youthful years he was a truck driver. But in 1986, he went back to his hometown to do farming. He settled in San Miguel, Bato, Camarines Sur with one hectare rice field, half of it as his home lot planted to coconuts and vegetables. He later occupied five hectares of public land in the water rise area of Lake Bato where he plants rice during dry season when the lakewater draws down.

He is a rice farmer since 1986, practicing chemical farming during the peak of the green revolution. He bought seeds, chemical fertilizers and pesticides. The yield of his farm increased initially until the natural soil fertility was exhausted. Later, his net income was getting smaller because yield has stagnated and price of all his inputs were increasing.

He was introduced to MASIPAG through a sustainable agriculture orientation in 1998. He immediately embraced the sustainable agriculture alternative and formed his organization in his village. They had their first trial farm cum seed bank in the same year. In 2002, he attended a rice breeding training in MASIPAG. Since then, he has multiple roles as farmer-trainor, farmer-rice breeder, and caretaker of the regional back-up farm in Camarines Sur province.

The seed bank that Pepito maintains started from 50 rice varieties in 1998 to its current 250 cultivars: composed of 130 Traditional Rice Varieties (TRVs) and Masipag rice, 24 stable cultivars from his breeding work, and 96 selections from his breeding crosses. With a 2m x 3m plot size, he just need about 1,500 sq m for the total 250 rice varieties. The seed bank is important to the community because this is where they select the locally adapted varieties and the source of seeds for each farmer member of the organization or to other groups of farmers. This is also their 'school' because farmers observe the agronomic characters of each variety and out of school youth can have apprentice in the seed bank.

Pepito says he maintains the seed-bank-cum-trial farm because he was inspired by the initiative of other farmers that started MASIPAG in looking for alternatives to chemical farming and for bringing back the control of seeds to farmers. Otherwise, seeds and technology will be appropriated and controlled by multinational corporations. He believes that this work has to be continued as a gratitude to the help of MASIPAG in alleviating him from poverty, in helping other families of farmers towards food security and sovereignty.

For Pepito, the seed bank is important because this is where he observes the characteristics of varieties to be used in breeding, and that the varieties are immediately accessible to him. As an active rice breeder, he wants to develop varieties to suit his objectives of having varieties adapted to his farm, resistant to pests and diseases, and adapted to climate change. He adds, that he develops varieties based on his priorities and taste, including his family. After 10 years as farmer rice-breeder, he has done 25 crosses, with 24 stable cultivars that he developed and in the process of doing selection to 96 segregating populations of his crosses. Pepito says he wants to continue breeding as long as he do farming because he don't want to be subservient to seed companies, nor locked in hybrid rice and genetically modified rice. If he develops a variety and shared freely to other farmers, then other farmers will also share their seeds and technology to others. In this way, small scale farmers can develop an alternative system to the corporate farming that is sweeping the world today.

JAPAN

Conserving seeds for bio-cultural diversity

Japan Civil Network for CBD: Working Group of People and Seeds for the Future

The Working Group of People and Seeds for the Future is a network of people who care about the conservation of seeds. It is formed of organic cultivators, small and marginal farmers, home-gardeners, seed savers, environmental NGOs, NPOs and CSOs.

Introduction

Seed symbolize the mystery of life. It is nature's ultimate gift, woven into the very existence of people. However, the diversity of seed- this invaluable genetic material- is decreasing all over the globe. The deterioration is most notably among cultivated species. We have already lost about 90% of the genetic diversity of cultivated plants.

The importance of seeds

The diversity covered by CBD contains three kinds of variability: intra-specific level, inter-specific level and ecosystem level. For us, the closest demonstration of biodiversity in our daily lives occurs as a result of mutations of domesticated plants. In fact, it is important that the conservation of bio-cultural diversity should be discussed from the viewpoint of farmers who cultivate traditional varieties and understand biodiversity at the level of seed. It shouldn't be based on the global viewpoint based on the use and benefit sharing of these genetic resource.

Recommendations for the future of people and seeds

1. The United Nations should include a concrete statement of "all propagules including seeds" in the definition of CBD. Further, in view of the equal importance of all plants, CBD should not identify a particular plant variety as the only genetic resources to be conserved.
2. It is imperative that governments should regard conserving and supplying seeds as an important strategy for food security. Although CBD only refers to the conservation of the main domesticated varieties, it should also identify and conserve useful wild plants and land races adapted to the local environment.
3. Governments and agricultural organization should conserve seeds of domesticated plants mainly in the farm fields where natural and artificial selection has occurred in the continuous *in-situ* cultivation with the recognition that seed banks of *ex-situ* conservation are a mere backup.
4. Governments and agricultural organizations should respect long-established local knowledge and farming culture, and should ensure local people the sustainable use of wild plants and landraces.
5. The Japanese government, in cooperation with agricultural and civil organizations should ensure that farmers have free access to their own seeds. Furthermore, Japanese government should ratify the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR), which accounts for the role of farmers more than CBD.

The Japanese government should also set out a novel framework for protecting the rights of breeders of new cultivars and for ensuring fair seed supply, and enact legislation to oblige seed companies to show the details of breeding methods of their seed products .

6. Citizens worldwide should cooperate and establish local and international networks to create local citizen's seed banks for the future of the people and seeds.

The Global Situation

From a global perspective, the staple grains and cereals such as wheat, rice and corn have moved to monoculture production improved varieties or cultivars. In fact, the introduction of modern farming technology without any deliberation of cultural background, such as traditional land ownership system, widened the gap between rich and poor, broke up rural communities, and deteriorated their sustainability. The introduction of improved varieties or cultivars by means of modern farming technology not only brought about a genetic erosion and drove away the original cultivars, but also caused multi-sided problems such as monopoly of seeds and genetically modified crops. There are many international organizations, NGOs and citizens' groups that are re-evaluating the importance of these traditional systems. A better network formation is expected to play n active role in preventing international framework which emphasizes economic value of genetic resources from deteriorating people's lives.

The Situation in Japan

Majority of the forested areas were artificially created after World War II. The governmental plan was to increase the forested areas by plantation of selected varities, such as sugi (Japanese cedar), hinoki (Japanese cypress), akamatsu (Japanese red pine) and karamatsu (larch), creating a forestry monoculture.

Even in the plains, the amount of farming areas has remarkably declined, while metropolitan and industrial areas have increased. The advanced farming technology established a paddy growing system dependent on few selected cultivars and agro-chemicals. Reduction of the acreage under cultivation is being promoted for avoiding overproduction.

Before modern farming techniques were introduced, farmers all over Japan had cultivated many local varieties adapted to their unique environment. However, with structural reform of paddy farms, Japan's farming ecosystem is losing its rice diversity.

The country can be considered as a center for vegetable diversity. A number of horticultural species were developed during Edo period such as sakura (cherry tree), tsubaki (camellia), satsuki (azalea) and asagao (morning glory). Japan also have traditional varieties with remarkable mutation from the point of view of genetics and ethno-botany.

Diversity of traditional varieties has been deteriorated by productivity-oriented, rice-centered production policy, globalization of food market, and monoculture of crops. The deterioration in biodiversity has almost closed the possibility of future expansion of regional specific crop varieties.

Japan Civil Network for CBD:
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Permaculture Movement on Seed Freedom

The permaculture movement has always emphasized connectivity through design. Through conscious design, interactive diversity, stability and fertility can be created so the needs of humanity can be supplied in a way that is beneficial to the land and the people and facilitate the creation of true wealth. However, such a designed system requires functional productive biology - plants, trees and their seeds - for designing interactive stability. Therefore, the heritage seeds that have been carefully selected for generations and millennia by traditional peoples are invaluable. These heritage species, selected for their quality of nutrition, functional use and ease of production have all been selected for the specific bioregional needs of local people. The permaculture movement has always stood in support and extension of the gathering of new species assemblies for the advancement of productive, stable, sustainable human settlements. Saving our seeds and sharing them needs to become a standard, accepted, normal way of life. The ensuing networking of plant species and their seeds enables an extremely exciting combination of traditional and new global assemblies that can give us that possibility of a designed future abundance. The Global Citizens Alliance for Seed Freedom is an obvious partner that will always be a cause supported by the global permaculture movement.

Geoff Lawton, *Founder and Director of the Permaculture Research Institute of Australia*

Permaculture is a design methodology giving us a framework for redesigning our environment in the image of natural systems. It takes us back to a place that is regenerative, where all life is sacred and where we look after the whole; a diverse integrated, resilient world! In these Permaculture designed systems, which are based on the life ethic and an understanding of the laws of nature we, as humans, step back into the age old process of co-evolution; the process that all of our ancestors were immersed in over the many millennia since our time on earth began. Many of us stepped out of that process of co-evolution quite recently when we stopped gardening, when we stopped saving our seeds.

When in New Zealand, we eat processed food from China we take away the possibility of our body communicating with our own place on earth; that is, our soils and microbes, our food plants and animals and our co-evolving in that environment as we always did. Just as when we stop bees co-evolving with their environment when we choose to re-queen their hives rather than letting the bees make their own choices of what is best in relation to their changing world. When we stop saving our own seeds another link in the age old chain of co-evolution is broken….. Every broken link weakens the weave, the resilience, and the future for our grandchildren.

Our heritage seeds; our ancestral seeds are key threads for all of us in this web of life. All of us have co-evolved in our own environments; where ever that is on earth, with the food plants that also co-evolved in that place. We are all an expression of the energies of the environment our ancestors co-evolved in.

Food grown from our heritage seeds nourishes us better than food grown from seeds that either come from somewhere else on earth, or seeds that have been bred for reasons other than nourishing people. Our ancestral seeds are us! We cannot separate our bodies, our stories, our health, our resilience and our lives from these seeds. Our strength, our DNA, the future for our grandchildren, the continuance of the human race may well be dependent on us all coming back into the circle of co-evolution with our heritage; open pollinated seeds.

We are at a critical time in the story of our planet. Our health is deteriorating, the health of our environment is deteriorating and the web of life is disintegrating at an alarming rate. Diversity and integration are key elements in this design. Our open pollinated heritage seeds contain the genetic diversity needed to strengthen the web, to nourish our bodies, minds and souls so as to bring us back into relationship with mother earth… for healing and regeneration to happen. We must have access to our seeds……

Throughout the Permaculture movement world wide we have gardeners and seed savers who are growing, selecting, saving and passing around the seeds that our ancestors saved for us. Our bodies recognize these seeds that are able to produce food that is able to fully nourish us; food that will keep us strong!

As permaculturalists we commit to growing the seeds, saving the seeds and sharing the seeds.

It is our responsibility. It is our gift. It is what we are here to do!

We fully support and endorse the Global Citizens Alliance for Seed Freedom.

Kay Baxter, *Co-Founder and Director of the Koanga Institute, New Zealand*

THE AUSTRALIAN SEED SAVERS' NETWORK

Jude and Michel Fanton*

We founded the Seed Savers' Network Australia in 1986 to conserve the diversity of local useful species on farms and in gardens. 1985 was marked by the Australian Labor Government legislating plant patenting, aptly named Plant Breeders' Rights. Since then we have travelled far and wide, to prompt organisations and charismatic individuals into seed action in forty countries.

Our strategies have included:

- Writing and publishing three textbooks on seed saving, including a best selling seed saving handbook on how to propagate 117 vegetables and herbs
- Publishing 1200 pages of bi-annual newsletters over twenty-three years
- Mounting an interactive website, www.seedsavers.net
- Maintaining Facebook and Twitter accounts
- Producing a one hour documentary, "Our Seeds"
- Directing, filming, co-producing a one hour documentary "Nos Racines - Our Roots"
- Producing thirty hours of video clips and uploading them onto Youtube and Vimeo,
- Organising a national seed exchange through forty-five long newsletters,
- Running a short-term holding seed bank with 8,700 accessions over twenty-two years,
- Establishing and running a seed multiplication garden designed on Permaculture principles,
- Hosting open days and frequent tours in the gardens of our Seed Centre,
- Establishing a hundred Local Seed Networks around Australia,
- Organising twenty annual seed saving conferences in Australia,
- Speaking and giving presentations at conferences in the African, South American, Asian and Pacific regions,
- Giving two hundred workshops on practical seed saving along with IPR, GMO and conservation-of-biodiversity issues.

Our conservation work is community-based. We conserve seeds and other planting material through organising urban and rural gardeners and small-scale farmers to seek out local varieties, multiply and share them. We function on very limited resources, with absolutely minimal staff. Many hundreds of volunteers and interns have done much of the work in the seed garden, seed bank and ethno-botanical library.

Seed Savers is dependent on neither grants nor government funds. Most of our income comes from sales of books and DVDs, subscriptions and donations. Sales of "The Seed Savers Handbook" generate a third of our income. Although we support local initiatives to produce and market local seeds, we do not market seeds ourselves because we see a conflict of interest.

At this point, mid 2012, we have handed on many of our former activities to our local groups. From early 2008 we curtailed our hands-on administration, annual conference and production of newsletters, supplanting them with appealing to a wider audience through a greater web presence and film clips. We continue to work in our self-seeding garden, trialling local varieties, eating them and enjoying immensely the diversity and fruit of 900 perennials that we planted, largely from seed.

Here you will see retrospective of the range of Seed Savers' activities over twenty-six years in three broad strategies:- conservation, promotion and education.

Conserving Crop Varieties with Gardeners and Farmers

- Running a seed bank – we received 8 700 samples of non-commercially available seed at our seed bank in Byron Bay, the most easterly point of Australia, and redistributed freely 500 000 packets.
- Organising seed exchange in our newsletter
- From 2001 we encouraged the formation of Local Seed Networks around Australia to take on these tasks in their local spheres.

Promoting Seed Saving

We have worked continuously at promoting seed saving within Australia and beyond using several strategies:

- Mass production and distribution of pamphlets and posters,
- Running twenty annual conferences,
- Producing and screening a one-hour documentary, "Our Seeds".

We have influenced seed saving to become much more popular with Australian gardeners and farmers through our newsletters, our Seed Savers' Handbook, and through constant media presence.

Training in Seed Saving

- Writing, publishing and distributing a Handbook to 34 000 seed savers and translation into five languages,
- Running several practical training courses on seed saving
- Writing many how-to articles on seed saving.

Our Aims

To develop and promote:

- Educational programmes for the preservation of open-pollinated (non-hybrid) seeds and the genetic diversity of plant varieties
- Non-profit seed exchange programmes
- Agricultural and horticultural programmes with emphasis on the open-pollinated plant varieties
- Preservation gardens for open-pollinated varieties
- Seed banks for non-hybrid plant varieties
- Scientific research relating to the above matters

To provide:

- Educational assistance to community development projects
- Open-pollinated seed stock to individuals, groups and communities.

In 2000 we formed The Seed Savers Foundation Ltd.

Our Activities in Australia

Writing and publishing books on seed saving

We have written and published three books, "The Seed Savers' Handbook , "Local Seed Network Manual" and "Seed to Seed Food Gardens in Schools".

Receiving and redistributing seed samples

From 1986 to 2008, we received more than 8 700 seed samples of every size either by mail or at Seed Savers office. We recorded each sample in a complex database, allocated them an accession number, tested them for viability and multiplied them. Now that activity is undertaken by our Local Seed Networks around Australia.

Helping gardeners create local adaptations

Over 15,000 gardeners and farmers have been directly involved with Seed Savers' programmes. Several hundred of them collected, multiplied and offered seeds and other planting material in our Spring Newsletters from 1986 to

2008. On average there were 1200 varieties offered each year.

Trialling and multiplying seeds in biodiverse gardens

We established, and maintain, our Seed Centre gardens and food forest on Permaculture principles. Our main challenge for seed production is humidity. Fungal resistance therefore takes first priority in our selection criteria. Our commitment to biodiversity means vegetables must survive competition from other plants .

The food forest is multi-layered with legume pioneers of all sizes, vines and an understorey of spices and shrubs. It is self-fertilised with mulch of all sizes from twigs to trunks as we routinely lop it. There is a nexus between the wild and cultivated with semi-cultivated areas reserved for foraging.

In these ways our garden and seed saving methods emulate those of many in the Majority World.

Running courses in seed saving

Over our twenty-six years to 2012 we have taught a total of two hundred workshops on practical seed saving always with a perspective on IPR, GMO and conservation-of-biodiversity issues.

Holding twenty Seed Savers annual conferences

Every year from 1988 to 2008 we held a two to three-day conference, usually at the end of October. It was a roving experience with the conference held at our base in Nimbin, and later Byron Bay, every second year and elsewhere the alternate year.

Promoting food and seed gardens in schools

We have a strong programme of encouraging more food gardens in schools through the distribution of our book, “Seed to Seed Food Gardens in Schools”. It gives practical steps for planning, establishing, maintaining and utilising food gardens in schools.

Producing our documentary, “Our Seeds”

We produced a one-hour documentary “Our Seeds: Seeds Blong Yumi” in 2008, distributed 900 free copies and as of 2011, sold another 1200 online. It celebrates traditional food plants and the people that grow them. The film introduces those who stand at the source of humanity’s diverse food heritage. We filmed seed saving practices, seed guardians’ lives, and interviews on the international seed situation. Shot in eleven Asian, European and Pacific countries, the film features Pacific islanders who face great challenges to their way of life, their culture and their traditional cultivation methodologies.

Producing 800 film clips and youtubing them

We have made short film clips in Japan, India, Malaysia, Indonesia, Portugal, Spain, France, Bosnia, Serbia, Austria, New Zealand and Australia and instantly uploaded them to Seedsavers Youtube Channel

Our Global Reach

Our strategies to encourage community initiatives for seed conservation have been to travel on invitation, usually by small NGOs, to work with farmers and gardeners. We help establish, or assist existing, seed saving groups.Since 1992 we have worked on seed saving projects in several countries including Afghanistan, Cambodia, East Timor, Ecuador, India, Japan, Vanuatu, Solomon Islands, and Papua New Guinea.

In summary we have:

- Worked on, documented and researched seed saving in thirty-eight countries
- Trained sixty-nine interns from fifteen of those countries
- Placed twenty-five interns on seed saving projects in nine of those countries
- Allocated small grants to thirty-five food biodiversity projects around the globe.
- Given presentations at conferences in the Asia/Pacific region,
- Filmed the threats to crop biodiversity and community solutions in eleven countries and produced a one hour documentary, “Our Seeds”, for the people of Melanesia
- Donated 700 copies of “Our Seeds” to people and projects around the world
- Filmed and co-produced a ninety minute documentary, “Our Roots”, in Espiritu Santo, Malekula and Efate, Republic of Vanuatu, on how to re-diversify tropical root crops through reproduction with seeds.

- Filmed clips in twenty-one countries and uploaded them to Seedsavers Youtube Channel as a filmic blog on food production and distribution in eleven countries.

See details of these activities below.

Reconstruct Traditional Agricultural and Seed Systems in Former War and Disaster Zones
Bougainville - 2002
After decades of resistance to mining giant Rio Tinto and the Papua New Guinea central government, Bougainvilleans were naturally suspicious of transnational corporations. Michel had meetings with ministers of the local transitional government about re-diversification of their crops and discussed a UNDP initiative to fund the replacement of traditional varieties with eleven million hybrid cocoa trees.

Afghanistan - 2002 and 2003
With the arrival of the US and other troops in 2002 came FAO-funded seed and pesticide aid. We demystified the so-called benefits of such a programme in the province of Herat, western Afghanistan and trained teachers at the secondary school and lecturers at the Faculty of Agriculture. As an international juror with Slow Food, Michel initiated and nominated a Slow Food presidium for seventy-six famous varieties of Herat grapes, highlighting their material and cultural significance.We met with village elders on the redesign and reconstruction of a war-ruined karez leading water to a Hazara village below the foothills.

East Timor - 2002
East Timor gained its independence late 1999 after 400 years under the colonial powers, Portugal, Holland and Indonesia. This last had left them in shock, severely demoralised and lacking initiative.

On behalf of Caritas we trained NGO staff in Dili to wean themselves off pushing seed aid. In Oecussi, the East Timorese within Indonesian West Timor we trained NGO staff on how to coordinate multiplication of seeds by farmers, troubleshoot organic seed production and to market seeds at the small-scale local level.

Cambodia – 1998, 1999
Jude gave training workshops on the need to promote, collect and distribute local seeds to several aid NGOs in Phnom Penh.

Cuba - 1995
We worked with Fundacion de la Naturaleza y Hombre and Department of Urbana Agricultura in and around Havana on improving local seed supply in thirteen municipalities, training agricultural extension workers to end their dependency on Canadian and Dutch seeds.

Solomon Islands – 1995, 2000, 2003, 2005, 2007 and 2008

1. The Planting Material Network grew out of our first visit and continues today. Its name reflects the methods of propagation used in Melanesia, largely by tubers, rhizomes and cuttings rather than seeds.
2. The Melanesian Farmer First Network works across Papua New Guinea and the Republic of Vanuatu on livelihoods through small-scale production and marketing.
3. Kastom (customary) Gaden Association promotes, teaches and conserves customary and culturally appropriate practices.

Assist Civil Societies to Resist GMOs, TRIPs Agreements and IPR Violations

- Being involved, by supporting with micro-grants, in the collection of over 1000 varieties nationally of taro and over 200 varieties of bananas that are the staple on the island of Makira.
- Planning meetings with NGOs from ten countries of south and east Africa on local seed supply in Zimbabwe and in Kenya.

Encourage the Continuum between Cultivated Crops and their Wild Relatives

Malaysia – Sabah in Borneo: enrichment planting for Kadazan-Dusun tribal people in the buffer zone around the World Heritage Park, Mount Kinabalu.

Solomon Islands – collaboration with one of our former interns and the Planting Material Network on the production of an exhaustive ethnobotanical manual for the large island and province of Choiseul in the local Babatana (and English) language.

Solomons - Collecting Taro

Solomons: Taro Diversity Fair

Taiwan Environmental Group

Taiwan Traditional Cereals

Japanese Seed Grandmothers

Japanese Seed Grandmothers cleaning seeds

Cambodian Seed Keeper Winnowing

Seed Centre: Japanese cleaning seeds

An Historical Perspective on our Global Reach:

The Global Reach of our work in a roughly chronological order from 1992 onwards has been in the following countries - South Africa, Palau, Micronesia, Solomon Islands, UK, Italy, Tonga, Samoa, Fiji, Cuba, Canada, USA, India, Cambodia, Malaysia, Zimbabwe, Nepal, Philippines, France, Kenya, Japan, Pap, Sri Lanka, China, Vietnam, American Samoa, Vanuatu, Croatia, Bosnia, Serbia, Austria, Portugal, and Indonesia

Training Interns

At our Seed Centre in Byron Bay, Australia we selected and trained over seventy interns for periods of one week to six months.

Placing Interns in Seed Projects

We have assisted some twenty-five of our interns to travel to volunteer in seed saving projects in India, Solomon Islands , Brazil, Ecuador, Japan, East Timor, Cuba, Malawi and South Korea.

Allocating Small Grants to Seed Projects

Between 2002 and 2005 Seed Savers' Network received a fund to be channelled as small grants of AUD$1 000 to 5 000 to support seed saving projects in:

- Australia (publishing Alice Springs Garden Companion, creating resources for Local Seed Networks, book parcels to overseas projects, school gardens book production)
- Solomon Islands (Melanesian Farmer First Network - meeting of farmers from other Melanesian countries and visit of spice farms in Vanuatu; Planting Material Network - provide seed banking items and training on traditional food to the island of Tikopia; seed training for staff; production of Community Seed Saving book)
- Bougainville, Papua New Guinea (Paru Paru Education Centre, seed saving project)
- Bulgaria (The Community Genetic Resources Center, heritage varieties of fruits orchard)
- Italy (Civilta Contadina, historical orchard near Cesena)
- Cambodia (Dept of Women's Affairs, Pursat for seed saving training materials)
- Indonesia (IDEP in Bali for educational materials on seed saving)
- India (seed saving projects, establishing community seed banks, training community seed bank worker in states of Maharashtra, Karnataka, Orissa, Tamil Nadu, Ladakh and Tibetan refugee settlement)
- Afghanistan (Faculty of Agriculture, Herat University for labels for fruit trees, seed saving equipment)
- Cuba (for adaptation of Spanish translation of Seed Savers' Handbook to Cuban conditions)
- Ecuador (Guardians de Semillas_to expand their national seed network)
- Brazil (training on Seeds for Life project with former intern)
- Argentina (Italian intern to travel there and train Salvadores de Semillas and expand this seed network).

Making documentaries on seed saving with international themes and appeal

Making our documentary, "Our Seeds" and donating 700 DVD copies

We held the premiere of "Our Seeds" in Pago Pago, American Samoa at the Pacific Arts Festival in July 2008. Since then we have responded to requests for DVDs from NGOs within Australia and overseas and given away another 700 copies.

Making "Our Roots" on the Rediversification of Root Crops

We filmed "Nos Racines - Our Roots" in Espiritu Santo, Malekula and Efate, Vanuatu, for the Department d'Agriculture with support from the French centre de coopération internationale en recherche agronomique pour le développement (CIRAD) on how to re-diversify root crops through reproduction with seeds.

Local Seed Networks

The Local Seed Networks project is our way of sharing Seed Savers Network's knowledge, tools, and encouragement with anyone who wants to save seeds with their neighbours! There are many types of LSNs: from groups of friends who meet at each other's houses to community gardens with extensive seed banks. An LSN can be a part of an already existing organisation, such as a Permaculture group, soil association, biodynamic group, garden club or school. Affiliation with The Seed Savers' Network gives an LSN a national profile, advice and support.

History of Local Seed Networks

For many years, Seed Savers seed bank in Byron Bay was the "centre" of the Seed Savers' Network, providing leadership, vision, enthusiastic energy and seeds to everyone who would grow and maintain seeds. In 2001 we decided to decentralise, encouraging people across Australia to form their own seed saving groups. Today many people understand the value of finding local varieties that grow well without pesticides.We first discussed devolving The Seed Savers' Network into Local Seed Network in the mid 1990s. The formal process of registering them commenced in August 2001. Within a year there were thirty such groups and twenty more in the second year. By mid 2007 we had completed our five year plan towards the goal of setting up at least sixty Local Seed Networks (LSNs). Now we have more than100 Local Seed Networks in Australia.

Local Seed Network Charter

Inaugurated May 2004
Amended in March 2007
The purpose of this Charter is to provide a definition and set of guidelines for a Local Seed Network (LSN) that will help to direct their activities and also serve to unite LSNs under The Seed Savers' Network banner with a shared vision and aims.

Definition of a Local Seed Network

A Local Seed Network is a group, registered with The Seed Savers' Network, of three or more people living in the same bioregion who swap seeds and planting material with the purpose of conserving open-pollinated varieties of food plants.

Aims

To find, grow and distribute locally adapted seeds, particularly of vegetables and herbs as well as plants that are propagated by tubers, cuttings, rhizomes, bulbs, etc.,
To adapt new varieties to local conditions,
To promote the practice of seed saving and the importance of conserving diversity in our food crops, to schools for example,
To support other LSNs by sharing knowledge, skills, seeds and planting material,

Guidelines

As a Local Seed Network of The Seed Savers' Network, we ask that you:
Focus your plant conservation efforts on open-pollinated vegetable seeds and other culinary plants,
Do not trade or exchange illegal or restricted plants,
Establish your LSN as (or within) a non-profit organisation so that any revenue generated by your activities is directed back into your network,
Behave in a cooperative, tolerant, inclusive and respectful manner to fellow members and other Local Seed Networks,
Swap seeds and other planting material freely amongst yourselves,
Meet at least three times each year,
Sign up supporters to The Seed Savers' Network,
Keep in regular contact through email and social networks: facebook.com/seedsaversnetwork; youtube.com/seedsavers, twitter.com/seedsavers

The support the Seed Savers' Network offers includes:

Starter Kit

- a web page on the Seed Savers website for LSNs to promote their activities and gain new members, access to a purpose-written manual for establishing and maintaining an LSN

Ongoing Support

- general administration, including web site administration,
- providing advice on all aspects of running a seed network,
- training to give workshops or talks on seed production, banking, networking.
- technical telephone advice on all aspects of coordinating a seed network,
- publicity for LSNs around Australia through Seed Savers' public profile and media contacts
- support visits to LSNs

Training

- workshops by arrangement, screening of the film 'Our Seeds',
- Curricula for seed saving courses.

Conclusion

We continue to spread the seed saving message around the globe by request. The growing of seed and the free exchange of seed among farmers has been the basis to maintaining biodiversity and our food security.

**Michel and Jude Fanton, founders of the Seed Savers' Network and authors of the Seed Savers' Handbook, a complete reference for growing, preparing and conserving traditional varieties of food plants. 30,000 of the original edition sold with another 30,000 copies of translations and adaptations sold around the world. www.seedsavers.net*

Byron Hinterland Seed Savers

We are a local Seed Saving network (LSN) under the umbrella of the Byron Bay Seed Savers Network.

Four years ago Jude Fanton of BBSN asked me to start an LSN and as I am passionate about Seeds the BHSS was born.

It was in that moment that I became a true, dedicated and passionate seed saver.

Before that I had never saved a seed in my life. I feel such gratitude for this opportunity.

Now there are trees, plants, shrubs, vegetables and flowers growing in the garden from my own seeds and the seeds of other dedicated seed savers in my area.

For the past 4 years I have saved every possible seed from my organic garden and BHSS is now really a seed saving group.

We have small local events to spread the word and know-how of saving seeds, and get together with other seedsavers in our area to create seedbanks. Passionate seed savers stay in touch and share whatever seeds they can; to grow and save and pass on to others.

We are totally and absolutely against the criminal act of patenting seeds.

The importance of saving our heirloom and organic seeds is paramount for the future of our children and our planet.

Thank you for this opportunity to join the Global Alliance on Seed Freedom.

Rasa Dover: Australia.
Byron Hinterland Seed Savers
186 Repentance Creek Road
Federal. NSW 2480

Rosemary Stevenson

My name is Rosemary Stevenson. I co ordinate the local seed saving network in the Pyrenees/ Grampians area of Central Victoria in Australia. This is a dry inland area., with poor soil and short frost free period. For growing. For 8 years I have been trialling varieties of vegetables that do well in this area. I have as well curated several local heirloom varieties; turnip, lettuce, climbing bean, and tomato. I also grow out some varieties of peas, tomatoes, carrot, leek, marrow, zucchini, melon, pumpkin, parsnip, that are rare. We have a seed exchange once a year. There are about 50 people in this loose group.

Juanita Brokas

I am in Tasmania, Australia, and I am currently involved in a seed swap group to help promote the biodiversity and continuation of seeds and food. I am relatively new to the area, so my garden is small and in its infancy, but we are trying to grow different varieties of greens, root vegetables and legumes....its winter here, so its slow going. Some of the seeds recently swapped don't have official names attached, but are passed down from a few generations ago from families who migrated here. These families have instinctively kept their traditions of growing their food and saving the seed to replant. We are lucky enough all these years later to be benefitting from this wisdom.

I feel certain that the amazing group of people who are in this area and are passionate about the sharing of seeds means we will, as a group, continue to do our small part in keeping the biodiversity of our food alive!

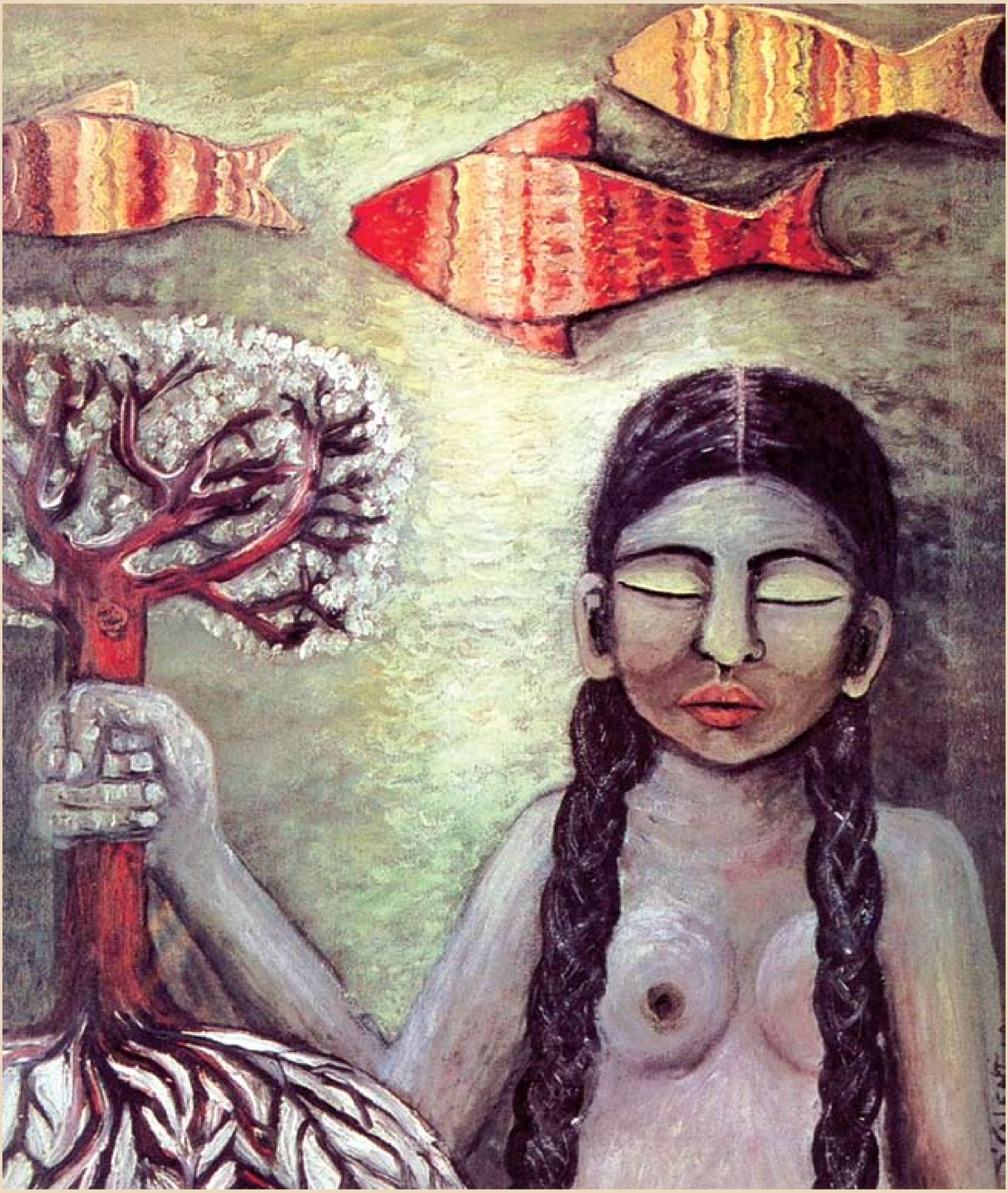
Weddin Heritage Food Plant Savers

My partner Sonia Groen and I are both Vegan so growing our own plant food organically, using heritage seed, is top priority. In an effort to get this happening locally for food security, I have convened a group called the WEDDIN HERITAGE FOOD PLANT SAVERS (weddin being the name of our shire centered on the small town of Grenfell on the Southwest slopes of NSW in predominantly grain and canola growing country).

We deal with the Australian groups Green Harvest, the Diggers Club, Phoenix Seeds, Greenpatch, Eden Seeds which occasionally source new varieties. Ou Weddin group aims to share propagation material and knowhow, sorting out cultivars suitable for our somewhat challenging climate here. We are always on the lookout for suitable varieties that can stand our hot, dry summers where humidity is low, and cold winters which are hopefully moist.

As vegans we are activists who want to see to the end of the various forms of the livestock industry whose products and practices are the main cause of the current human and environmental health crises. We urge everyone to access the copyright-free presentation by Dr. Aryan Tavakkoli "We're running out of time: Our Diet – leading to a Sustainable Future or Killing the Planet?" via www.vegsense.net.

For our children's future,
Ian "Bridgewater", Australia



Roots or Illusions

We live there, where our ancestors lay.
The Earth Wasn‘t theirs, nor is it ours;
we are of the Earth.
Where are our roots, buried beneath
so many false promises?

THE SEED

AFRICA

SEED SYSTEMS AND SEED SOVEREIGNTY IN AFRICA

Key Issues and Challenges

Mariam Mayet*
African Centre for Biosafety, South Africa

Introduction

Following decades of neglect, the past few years has witnessed growing external investment in African agriculture, including in seed systems. The context for this growing investment includes structurally higher food prices globally, driven by limited arable land and rising urban populations, as well as changing diets globally as well as in Africa. Maize prices are increasing as production in the US (the historical generator of surpluses for food aid to Africa) is diverted to biofuel production. Greater surpluses are required, and where better to turn than a geographical area viewed as underperforming but with potential in the form of "underutilised" natural and human resources?

Africa is thus seen as the 'new frontier' of accumulation (Goldman Sachs, 2012). Rising demand and constrained supply suggest profits can be made through investments in agricultural production. There is ongoing interest in using African land and resources for production of food commodities to other parts of the world (with China the current driver). Biofuels, maize, rice and cassava are key focus areas.

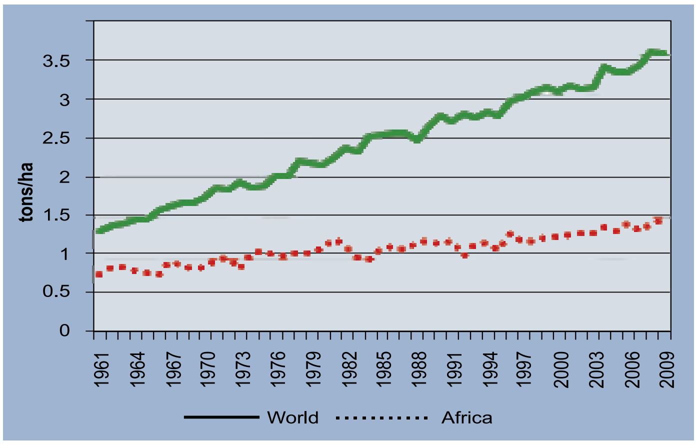
The dominant narrative is that Africa missed out on the first Green Revolution – the package of hybrid seed, synthetic agri-chemicals, irrigation and credit – that resulted in rising agricultural productivity in the rest of the world (Figure 1). Minot *et al.* (2007:1) talk about stagnating per capita grain production in Africa. In the core capitalist countries of the US and EU Green Revolution technologies were developed and put into place early on. The Green Revolution adapted these technologies for use in Asia and Latin America in particular.

Debate rages about why these technologies did not take root in Africa in the same way as they did in Asia in particular. Whatever the reasons, the underlying premise is that the Green Revolution is desirable. Lessons over the decades from Asia and Latin America have shown that this technological package has contradictory results.It has resulted in increased yields. However, as Susan George (1976) and subsequently many others have documented, this came at the cost of concentration of land and production resources, the exclusion of many poorer producers, and serious social and ecological damage.

The new Green Revolution for Africa pundits have adopted significant elements of agro-ecological practice. They appear to recognise the need to adapt technology to suit the agro-ecology. Coupled with this is recognition of the importance of soil health as a fundamental basis of sustainable agriculture, with acknowledgement of the centrality of increasing organic matter in the soil, the use of cover crops, inter-cropping and crop rotation (see for example AGRA, 2007). The World Bank belatedly recognises the folly of a narrow focus on export markets and is now arguing that "the most promising markets for Africa's farmers are domestic and regional markets for basic food crops and livestock products" (World Bank, 2009:xiv).

When it comes to seed and agri-chemical technologies, there is agreement in the mainstream that the ideal is to marry external technologies with indigenous or locally-specific

Figure 1: Average cereal yields, world total and Africa, 1961-2009



Source: FAOSTAT

technologies and techniques. There are some divergences here. The Howard G. Buffett Foundation (2011) argues for a 'Brown Revolution' rather than a Green Revolution, emphasising soil health as the key focus. According to the Foundation, these practices already exist and merely need to be supported, strengthened and scaled out. On the other hand, The Alliance for a Green Revolution in Africa (AGRA), sponsored by the Gates Foundation and others, argues that organic or agro-ecological techniques of production have proven to be inadequate in Africa and that external technologies and inputs, especially improved seed (whether hybrid or open-pollinated) and agri-chemicals are necessary for increased productivity (AGRA, 2007). The Buffett Foundation does not disagree with this in principle, arguing that a judicious blend of local and external technologies and techniques are required.

All investors share the principle that private enterprise is the ideal path to pursue, because the profit motivation generates economic activity. They do recognise that states can play a role, either in providing the basic infrastructure or more directly in public-private partnerships, especially around plant breeding research and development (R&D). However, when it comes to propagating, multiplying and distributing seeds for commercial use, these investors stand as one in the belief that this must be owned and managed privately for gain. The immediate emphasis is not on direct ownership by multinationals. Rather the short-term focus is on building markets. This means business and technical skills, institutional arrangements and physical infrastructure (left to the public sector as far as possible, since few capitalists will be willing to invest in collective goods that their competitors will also benefit from). AGRA has this explicit goal, of building scientific expertise and private agro-dealer networks to distribute seed and other inputs. Successful seed companies may be acquired by multinationals at a later stage, and it is not necessary for multinationals to exert direct ownership over seed multiplication and distribution in the early stages.

What is of interest to them in these early stages is to set the legal framework for private ownership over germplasm, and this is the current frontline of the battle for control over genetic resources. This may take the form of acquisition of companies that hold locally-adapted germplasm (e.g. Pioneer Hi-Bred's recent acquisition of Pannar, South Africa's last major domestic seed company) or it may take the form of securing intellectual property rights (IPR) over imported varieties and techniques.

This explicit profit motivation for investment is given cover by the argument that Africans are victims of poor policies and interventions. Food security and nutrition inside Africa are brought to the fore as reasons for investments in agricultural productivity. The recent G8 initiative named the African Alliance for Food Security and Nutrition is couched in these terms. It brings a humanitarian slant to profit-seeking investments in Africa, naturalising the relationship between profit-making and humanitarian investments. Unsurprisingly, the major governments and agricultural input and food multinationals have coalesced into this alliance.

From both the 'food security in Africa' and capital investment angles, low productivity is a key focus. Sustained, increased productivity is a common goal across organisations and ideologies. Howard Buffett (2012:3) argues that "no-one should be advocating for accepting current yield levels". The key question is how yields can improve in ways that nurture social equality and ecological integrity. Yields can refer simply to the ton/hectare produced, but can also refer to improvements in storage capacity, drought and pest resistance, and volume produced with similar input, amongst other measures.

There are many in Africa who welcome these initiatives, whether farmers, states or other agricultural entrepreneurs. The New Partnership for Africa's Development (Nepad) laid the groundwork more than a decade ago for African states to intersect with this expansionist agenda. The Comprehensive African Agricultural Development Programme (CAADP)[1] emphasises regional markets, crop commercialisation, investments in irrigation, conservation agriculture, entrepreneurship, local marketing infrastructure and dissemination of new technologies. The orientation is towards foreign direct investment (FDI) and public-private partnerships. Some of these initiatives can potentially be of benefit to Africa's farmers, while at the same time laying the groundwork for potentially unequal exchange of resources with external investors.

Seed sovereignty movements in Africa are confronted by these contradictory processes. Many members of smallholder farmer associations are attracted to the possibilities presented by these investments in infrastructure, capacity and the development of markets. We should recognise that there is a process of class decompression and formation going on, and that seed and food sovereignty movements will need to consider how to engage with these contradictory processes being driven by capital, as well as more clearly defining their core constituencies amongst farmers.

Background to African seed systems: colonialism, post-colonialism, structural adjustment and neo-liberalism

African seed systems have generally existed outside global circuits of capitalist accumulation apart from some enclaves or niches developed during the colonial era. The focus of these enclaves was on commercially viable crops, especially for export as part of the colonial system of extraction.

Colonisation of Africa produced two main types of economies: enclave and settler economies. In enclave economies, infrastructure was designed for the extraction of natural resources. The oil economies are most typical of this (e.g. Nigeria, Angola), with ports, roads, wells etc but only as required for extraction. There was limited development of the local economy under colonialism. In settler economies, there was a formation of a domestic market for the settler population linked to natural resource extraction (e.g. South Africa, Kenya, Zimbabwe).

This is significant in that the seed systems replicate the broader economic structure. Where domestic economies were developed for settlers, agriculture initially played an important role, and commercial seed systems were developed in line with this. Therefore the settler economies tend to have bigger commercial seed systems in the Western sense.

In the colonial period, scientific research was developed with a focus on what are now termed 'traditional' export crops: those crops nurtured for world markets under colonialism, e.g. cocoa, cotton, and oil palm in West Africa and coffee, tea, and tobacco in East and southern Africa (Minot, *et al*., 2007:8). Local food crops were essentially ignored. Food aid played a major role in displacing local production. It started off as a subsidy to support industrialisation and urbanisation, but when supplies ran short African governments were forced to borrow money to pay for food. The roots of the debt crisis in Africa are found here (Friedmann, 1994). Structural adjustment placed an even greater emphasis on export crops, including some 'non-traditional' types (e.g. fresh fruit and vegetables or cut flowers). Traditional crops are still of overwhelming importance in African agricultural exports, despite recent growth of non-traditional exports (Byerlee, 2011:4).

In the post-colonial period, the emphasis was on state interventions in agriculture, which translated into direct state participation along value chains, including monopoly ownership and marketing channels in some sectors. National agricultural research systems (NARS) were built up with multinational support through the institutes of the Consultative Group on International Agricultural Research (CGIAR). In Africa the International Institute of Tropical Agriculture (IITA, based in Ibadan in Nigeria), WARDA (now known as AfricaRice, based in Cotonou in Benin) and the International Maize and Wheat Improvement Centre (CIMMYT, based in Mexico but with offices in Ethiopia, Kenya and Zimbabwe) were the most important of the international research institutes, and focused on cereal crops.

From the 1970s until the 2000s, African agriculture was neglected as structural adjustment policies emphasised a narrow focus on export crops that could generate foreign exchange to pay off debts. At the same time, for the private sector, economies of scale are required to make profits, and most other crops are too localised to generate the necessary profits. This led to decades-long underinvestment in private sector R&D in other crops in Africa, which are often called 'orphan' crops even though they might be very significant local or regional food sources. Spending on R&D fell in about half the countries of sub-Saharan Africa in the 1990s (Smale *et al*., 2011:7). During these 'lost decades', African agriculture fell behind in technology and innovation, and agri-food systems became prone to dependency on external assistance.

Formal and farmer-controlled seed systems in Africa

What is the extent of the penetration of capital built on the commercial seed and agricultural infrastructure from the first wave of colonialism?

According to the International Centre for Tropical Agriculture (CIAT), 80-90% of the world's seed stocks are provided through what they call the 'informal' seed system, and Africa is no exception (CIAT, 2010:1). According to Smale *et al*., (2011:7) more than 80% of all seed in Africa is still produced and disseminated informally. Consequently, Africa and the Middle East constituted just 2.7% of the global commercial seed market in 2007 (Phillips MacDougall, 2008:28). CIAT defines the 'informal' as that which the formal is not. The formal system consists of government regulations on production and distribution of seed, and registered or otherwise officially recognised enterprises which have to subscribe to centrally-defined regulations and standards for recognition. A primary function of formal systems is to secure crop uniformity and quality for industrial processing, e.g. milling or machine selection.

In contrast, 'informal' seed systems – or what we may prefer to call farmer-controlled systems – are integrated and locally organised. They are based on the ways farmers themselves produce, disseminate and procure seeds through on-farm saving and exchange with neighbours and others (CIAT, 2010:1). This is connected to food supply and distribution systems, for example through the use of a maize harvest for a combination of food, feed and planting. According to CIAT (2010), farmer-controlled seed systems for maize are disintegrating but are not being replaced uniformly by formal sector products (hybrids).

The formal seed system is thus a small component of Africa's seed systems, centred on maize and both 'traditional' and 'non-traditional' export crops. There is some R&D infrastructure built around these both under colonialism and in the post-colonial period.

Table 1: Characteristics of seed sources and their general suitability for planting material or new varieties

Seed source	Characteristics	Source for planting material	Source for new varieties
On farm	Known quality, cheap, readily available	+++	– – –
Neighbours, friends and relatives (in the community)	No cash involved, readily available	++	+
Others in the community	No cash involved, readily available, not necessarily easily accessible (social differentiation)	+	++
Local market	Unreliable quality, last seed resource	– –	– – –
Middlemen	Non-cash arrangements/loans, unreliable quality	+ –	– +
Neighbours, friends and relatives (outside the community)	Non-cash arrangement, resources needed for travelling		
	+	+++	
Stores and commercial enterprises	Cash for seed and travelling	+	++
Seed agencies, public seed sector	Unreliable availability and quality		
Unknown	–	+++	

Ranging from +++ (generally very suitable) to + – (reasonable suitability, depending the situation) and – – – (generally unsuitable)
Source: Almekinders & Louwaars, 2002:25

Farmer-controlled systems do not always respond well to the need for new varieties to refresh biodiversity or for varieties with higher productivity, and seed selection practices and storage conditions and practices are not always optimal (Almekinders & Louwaars, 2002:28). Expertise on these is available, but is mostly used to build the formal system targeting high external input agriculture. There is an important role for individual farmer experts as key seed distributors and even as local seed producers.

Louwaars and others talk about integrated seed systems that combine the formal (especially improved varieties, not necessarily hybrid) with the informal or farmer-controlled (especially in distribution). There are many links between formal and farmer-controlled systems e.g. new varieties of seed may be launched in the formal system but may move into farmer-controlled systems quickly and be recycled by farmers or disseminated through farmer networks (Scoones & Thompson, 2011:8). Materials flow between the two systems, creating new fusions that are often more useful to farmers than those produced in the formal or farmer-controlled system alone. Farmers may draw seeds from both systems for different crops (e.g. maize through formal, beans or sorghum through farmer-controlled). Farmers may also use different channels for the same crops (Sperling & Cooper, 2003:6).

Almekinders & Louwaars (Table 1) show the pros and cons of different seed sources. Local and on-farm seed production and exchange are good as a source of seed, and do not rely on cash. Systems with links to outside technology tend to be good as sources of new varieties. Farmer-to-farmer exchange outside the immediate settlement is a good source of new varieties, and a commercial enterprise is not necessarily required. There are solid ecological reasons for on-farm seed saving and exchange. One of the advantages of inter-settlement seed exchange is that it does not necessarily involve cash. Drawing on work from the globe, Sthapit *et al.* (2012:99) highlight "the importance of a large number of small farms adopting distinctly diverse varietal strategies as a major force that maintains crop genetic diversity on farm".

Because the majority of African farmers are resource poor and do not have access to credit, they can not afford to purchase hybrid seeds, and rely on saved seed using open pollinated varieties (OPVs). Hybrid seed is up to 20% more expensive than OPVs, and constitutes less than 30% of the southern African regional maize seed market (excluding South Africa) (Langyintuo, 2005:3,6). The formal seed system contributes about half of maize seed requirements in southern Africa, but taking South Africa out of the picture indicates that other countries in the region generally rely on farmer-saved seed (Langyintuo, 2005:16). Although there does seem to be a speeding up of the process of commercialisation of some types of seed, Africa is also large and diverse and it is not always as easy for capital to expand as it might wish.

AGRA has been established precisely to build the necessary infrastructure for the further entry of capital – scientists, laboratories, centres of knowledge, a physical, populated seed production and distribution system, and some initial capital in the form of investment funds. It is on the face of it, a friendlier approach than colonialism: it is negotiated on a business basis rather than imposed by force, but the outcome is a second wave of extraction from Africa. It is similar to the first wave of colonialism in that it is based on the extraction of natural resources and building markets (social systems for the realisation of exchange value under capitalism).

"The 'technological distance' between growing conditions prevailing in Africa and those prevailing in developed countries is unusually large, so technologies travel even less well to Africa than they do to other developing regions" (World Bank, 2009:61), thus there is need for investment in local adaptation of available technologies.

Maize as the "thin edge of the wedge"

The main exception to farmer-controlled seed systems in Africa is maize hybrids, which have been "the main growth engine for formal sector seed and for profitable commercial enterprise in Africa" (CIAT, 2010:2). Maize is a staple food in large sections of Africa. In 2007 maize accounted for 56% of total harvested area of annual food crops in sub-Saharan Africa (SSA), 43% of which is in southern Africa (Langyintuo *et al*., 2008:1).

Because maize is so widely grown in the region, and African yields are so low when compared with other parts of the world, much attention has been paid to the improvement of maize varieties in Africa. Adoption rates of improved maize varieties (80% hybrid and 20% open pollinated) are highest in South Africa, Zimbabwe (80%), Zambia (73%) and Kenya (72%) and low in Angola (5%), Mozambique (11%), Tanzania (18%) and Ethiopia (19%) (Langyintuo *et al*., 2008:5). Rapid growth is being experienced in Zambia and Uganda and to a lesser extent Tanzania, Ethiopia and Malawi.

Maize is thus an entry point for the expansion of commercial seed systems in Africa. AGRA's activities reinforce this perception. Almost two-thirds of AGRA's Seed Production for Africa (SEPA) programme grants by value from 2007 to 2012 were allocated to maize, followed far behind by cassava and groundnuts as other crops with commercial potential (ACB, forthcoming).

Markets and systems of production and distribution can be built and extended through commercialisation of the maize sector. In this way it can be understood as 'the thin edge of the wedge', introducing new systems that link to the expansion of a class of commercial farmers. Markets for both seed and imported synthetic agrichemicals are created. Where the colonialism of the past was largely about extraction of natural resources as cheaply as possible, the new wave of capitalist investment in African agriculture is about building domestic markets while also extracting surpluses in the form of debt repayments and dividends.

However the basic infrastructure is not in place, and states do not appear able to create it. AGRA and others are doing the groundwork of building domestic scientific capacity (with multinational technical and financial backup), and building basic production and distribution capacity and systems in and outside the state.

Policy battles

A key question is whether policy is a terrain on which we think any meaningful gains can be made. We certainly can see the long term impact of policy decisions. For example the Nepad-inspired CAADP is a framework designed a decade ago within which investment decisions are now being made. This is a long lead time and we sometimes lose the connections between the neo-liberal origins and the material outcomes, which are only manifesting today. Therefore if we had engaged more directly with CAADP back then, we might see some slightly different outcomes. So we must look for the current critical policy issues and see where they are going, with the possibility of making interventions that can have longer-term impacts in relation to building seed sovereignty in Africa.

Top priority at this stage appears to be IPRs (also bound up in laws related to counterfeiting). Protection of imported technologies is of central importance for profit-making for multinational seed and biotechnology companies. Much effort is going into developing IPR frameworks that assist multinationals to extract revenues from investments in Africa. The adoption of the 1991 version of the International Union for the Protection of Plant Varieties (UPOV) is an issue here. UPOV 1991 explicitly narrows farmers' rights to save, exchange and sell seed. At present only Kenya, Morocco, South Africa and Tunisia are signatories to UPOV 1991 in Africa (Bruins, 2012:20). A push for more countries to adopt the 1991 version can therefore be expected.

Property rights more generally may be an issue in some places, especially where land tenure is not explicitly codified or where the legal system cannot or does not respond to disregard for the law.

Another area of policy contestation is around harmonising policy across countries for regional trade. As indicated above, there is a strong focus on regional trade and establishing market connections across national boundaries. The focus of harmonisation is on seed patent laws to ensure protection across the region to enhance regional seed trade.

Regional seed trade also contains a strong phytosanitary element. This needs expertise and infrastructure for testing. The multinationals argue that if the seed has already been tested in the exporting country then there is no need also to test in the importing country. This requires trust in the integrity of the paperwork of another country.

However, the US and others would not accede to a similar process in reverse (i.e. entry of unchecked seed into domestic markets from Africa). The argument being put forward by the multinationals is that African capacity to monitor seed is weak and therefore should be left up to the US or other importing countries which have the expertise. In this model there is no transfer of skills or knowledge, and the argument is advanced merely to shorten the regulatory processes to increase the pace of circuits of accumulation. In this case seed sovereignty movements should argue that local capacity in scientific phytosanitary testing, inspection and monitoring is a necessary part of the infrastructure, otherwise consignments can be swopped and no-one will be able to catch that. This can have damaging effects on biodiversity and ecological systems.

Although AGRA and others are not explicitly arguing in favour of technologies based on genetic modification (GM) in these early stages, the systems of production and distribution they are building are designed to spread hybrids. The same channels can be used for the spread of GM seed in future. Across the board, investors consider that GM technologies have potential, but robust legal, production and distribution systems, and greater access for farmers to agri-chemicals and markets are prerequisites for eventual successful adoption of GM seed. Contestation around regulations for the entry and commercial distribution of GM seed therefore remain critical as the groundwork for a future planned expansion.

There is a global convergence around the importance of smallholder farmers. The corporate (profit-making) agenda focuses on integrating small-scale farmers into formal production systems, including the formal seed sector, essentially growing the market for technology owners, but also potentially for private corporations in other nodes of value chains. For example, Technoserve is a private company that assists smallholder farmers to enter into formal value chains. Monsanto is one of Technoserve's sponsors and Walmart[2] has recently contracted Technoserve to carry out a pilot project in South Africa. This indicates the collaboration across nodes in agri-food value chains in realising a particular vision for how African agriculture is integrated into global circuits of capital.

South Africa's Green Revolution: a model for Africa?

We often hear that the Green Revolution passed Africa by. We can only take this to be true if we exclude South Africa from Africa. South Africa is a perfect example of the logic of the Green Revolution: high productivity, high input, high value outputs, but with a very concentrated economic structure and high levels of exclusion or 'adverse incorporation' (Hickey & du Toit, 2007), neglect of indigenous crops, and the decimation of an indigenous small-scale farming class. South Africa's Green Revolution was built on the back of apartheid, which is probably why it is not held up as a poster child. South Africa shows how Green Revolution technology is conducive to economies of (large) scale, and both relies on and facilitates mechanisation and oil-based manufacturing processes.

As with commercial markets in Africa, maize is at the heart of a powerful livestock-feed-food complex in South Africa. Maize constitutes 56% of South Africa's formal seed market (ACB, 2012), and South Africa's commercial seed sector is more than 2.5 times larger than the next biggest (Egypt and Morocco, followed by Nigeria in sub-Saharan Africa) (Bruins, 2012:12).

Is South African agriculture a model to emulate? We can see and feel the effects of intense concentration in the commercial seed market as well as all along agri-food value chains. There is growing dominance of multinationals in seed, primarily Monsanto and Pioneer Hi-Bred. Both have a long history of investment in production and R&D with local partners, which they later acquired outright. Monsanto purchased Sensako and Carnia, two of South Africa's biggest grain seed companies, in the late 1990s. In 2012 Pioneer was granted authority from the Competition Appeal Court to proceed with their acquisition of Pannar, South Africa's largest seed company[3]. Pannar was the last of the major domestic seed companies in South Africa. Foreign multinationals now own more than 50% of all agricultural seed cultivars (horticultural, agronomic and forage combined) (ACB, 2012:23). As with other multinational investments in South Africa, there is an eye on the African market. Pannar has an extensive African footprint and currently operates in 25 African countries[4].

Although seed R&D in South Africa has extended to a wide range of commercial crops (including fruit, vegetables and forage), much of this is in the private sector. The seed system is characterised by neglect of indigenous crops. There are some very small efforts to recover indigenous varieties and make them available for reuse through the public sector agricultural research system. But the public R&D infrastructure is heavily reliant on paid contract work for the private sector on commercial crops. The result is a loss of biodiversity, as indigenous crops disappear. Some are still saved on farm, but not all.

Not a lot of work has been done on the ecological impacts of commercial agriculture in South Africa. Irrigation is a big issue, with more than half of all water going to commercial agriculture for irrigation. A lot of this is wasted through inefficient spraying methods. The commercial farming sector has a high reliance on synthetic agrichemicals, but limited work has been done on the impact of this on soil health and water pollution.

South Africa has big GM markets in maize and soya and a smaller market in cotton, where GM dominates. This has increased yields to the extent of chronic oversupply and efforts to expand markets in Africa both for consumption of GM crops as well as for sale of GM seed. The Southern African Commercial Agricultural Union (SACAU)[5], driven by South African and Zimbabwe's (mainly white) commercial farmers' unions, emphasised this agenda in their 2011 annual general meeting where the topic was expansion of GM into the region.

Questions on technology and profit

Technology constructs our societies as much as the societies construct the technology. Technologies are at play throughout the seed system on farms. At the base, farmers propagate seed, whether that goes into the formal, patented system or not. Farmers may propagate and multiply seed on contract, but the technical expertise lies with them. Is it possible to detach that technical expertise from the credit-driven system of accumulation? This separation should in principle be possible because there is a material base to the technical knowledge that transcends its capitalist appropriation, i.e. it does produce use values in the form of food and fibre as well as newly created ecosystem values. Therefore the immediate challenge is to develop practical working relationships with the formal scientific system to bring laboratory-based scientists closer to farmers and their production needs based on diversity.

AGRA is busy building this scientific base, some of which will be of service to the agricultural system as a whole, such as new knowledge about local varieties. We can legitimately ask which varieties, and what 'improvements' are being developed.

Where will the resources come from to sustain such an edifice? Research institutes need money to pay for staff, equipment etc. The state used to pay this, with some global assistance in the form of the CGIAR institutes. But with deregulation, this function has been partially privatised, through the contracting of public research institutions by private companies. Public infrastructure is now used for private benefit.

The state itself is reliant on corporate and individual taxes to generate income. Otherwise they are dependent on borrowing, as many African countries have come to regret. Borrowing may be a way out when the risk is low, which in the current structure means higher debt repayments, because everyone wants safe debt and so it is pricier, if it even exists anymore. In fact there is currently no guarantee of debt repayments, which is at the epicentre of the financial crisis now engulfing the EU. The system is churning on, but creating bigger and bigger problems down the line. Even as money is created by the banks (the hallmark of neo-liberalism – so-called 'fiat money'), this money is given credence by the state system itself (bonds that can threaten the disruption of the entire state system if payment is no longer credible). How long that can last without collapsing is not known. We can logically conclude that a non-debt technological option is preferable to a debt-laden one in the context of a global debt crisis.

States therefore should be reticent of relying on borrowing to generate income. This leaves taxation which heavily relies on the facilitation of circuits of capital accumulation. Although we can argue that the public sector should support the bringing together of codified scientific knowledge around seed and plant breeding and farmer-based knowledge, we may have to accept that states themselves are caught in a trap where they require capital (with the inevitable concentration of resources and exclusion of many from economic activity and fair reward for their labour) for their own continued functioning.

This means that when we look for alternative ways of producing and disseminating seed, we have to look beyond the state, to our own collectives and activities, for answers. With regard to seed and plant breeding, the starting point is to nurture connections between farmers to learn and share from one another, and where possible draw scientific experts into the fold in non-commercial relationships.

External investments may come in the form of grants, loans or equity. A grant basically just gives money for particular activities that align with the donors agenda. To the extent that seed and food sovereignty movements share the agenda, this form of investment is welcome. A loan produces debt and repayments, and locks producers into a particular economic structure which includes hybrid and even GM seed, synthetic agrichemicals, and often irrigation. Movements might best choose to argue against loans as a form of investment since it is a form of extraction for the multinationals and investors in the early phase of market building, when circuits of accumulation through commodity production are not yet fully operational. Farmers are bearing financial risks as well as the inherent risks of weather, pests and diseases.

What alternatives are there for Africa's seed systems?

First and foremost, farmers can save and exchange seed amongst themselves. Farmers already produce the seed, and exchange is no more than a greeting. On-farm seed conservation is recognised in global treaties such as the International Treaty on Plant Genetic Resources for Food and Agriculture and the Convention on Biological Diversity.

A number of challenges face international efforts to build *in-situ* conservation systems including current institutional arrangements and incentive mechanisms (Sthapit, *et al*., 2012:98). Other challenges include locating crop populations for conservation and accessing material beyond the farm where it is being preserved (Sthapit, *et al*., 2006:7). This latter requires integration with formal systems or farmer-to-farmer sharing. *In-situ* conservation can only work if local diversity and the associated technical knowledge both exist (Sthapit, *et al*., 2012:106).

A key question is where new materials come from. If seed can be adapted for local use in a way that accords with the agro-ecological context, there is no reason why its productivity should decline, unless ecological conditions change. It can only exhaust the soil if the soil itself isn't properly nurtured, which means increasing organic content. There are many local solutions to this available, and most people agree that each of these systems works well. How to spread that knowledge and those practices across Africa is a positive agenda which all can subscribe to. This means farmer-to-farmer networks across the continent, on seed saving, food production and whatever else concerns them as farmers. This is part of a broader organisation which connects to non-farming aspects of the society. It is a transformation based on practice.

There is a focus amongst the seed and agri-chemical giants – Monsanto, DuPont (Pioneer Hi-Bred), Syngenta BASF, Bayer CropScience, Dow Agro Sciences – on drought and heat tolerant genetic modifications. Drought tolerant maize is projected to come out in Africa in 2017 (Bruins, 2012:32). This is a technological answer for a particular form of agricultural production dominated by large-scale global agribusinesses. It has its upsides in yields, but many downsides, including loss of control over food and fibre production to private interests.

Seed saving and exchange thus have to integrate into agro-ecologically appropriate production practices. This means tailoring of technologies to suit the agro-ecological zone, but also learning from the surrounding ecology.

Agro-ecology is a term AGRA and Monsanto use with familiarity, since their business is partly the adaptation of technologies for new zones, including agro-ecological zones. This is why they need a local germplasm pool, found either in the big private seed companies on the continent, with some crops in the public sector agricultural research institutes, and on farms. This on-farm, *in-situ* collection is a national treasure, nurtured through the practices of generations of diverse farmers. It is now available for sale to the highest bidder. Patenting of this resource base means parcelling it out to those that can afford to use it profitably. What other mechanisms of protection of input do we have at our disposal? Is there a collective form that can be developed that is built on sharing and co-operation? How do we go about building that in practice, or connecting up existing practices?

There is close collaboration between the international research institutes (CGIAR), national agricultural research systems (public and private) and multinational input companies. Agro-ecology is understood as zero-tillage, which GM is presented as supporting since weeds are killed using synthetic chemical herbicides that the seed has been bred to withstand. Therefore less need to hoe. Tilling the ground breaks up soil structure. But when soils are compact they may need to be tilled, especially to add organic matter.

To zero-tillage the Buffett Foundation (2011:20) in their 'Brown Revolution' adds year-round organic matter soil cover and diversified crop rotations with the principle of increasing organic matter in the soil. These should be core elements of agro-ecological production for anyone.

Resources are only sent in directions where there is 'proof of concept', hard evidence in the form of income, that the activity is financially self-sustainable. Hence the sponsoring of commercial seed enterprises that already exist to grow. The current investment gamble is that a comb through Africa will highlight many potential investment opportunities in the seed sector. Africa also has entrepreneurs. The question is how their activities align with the requirements of debt-constructed external capital.

The class dimension comes out strongly here. Commercial and debt-fuelled interventions will accelerate differentiation amongst farmers. This has implications for a sovereignty movement's approach to 'farmers' as an undifferentiated category. We should anticipate the emergence of divisions amongst farmers and be clear about who is the core constituency of a seed and food sovereignty network or movement.

Seed sovereignty may be defined as access to appropriate seed with production under farmers' direct control. For now in Africa it hardly matters which farmers, since there is high class compression. As a matter of principle, farmers should be able to have direct control over their seed if they so wish. This goes for large-scale commercial farmers as much as for resource-poor smallholder farmers and anyone in-between.

Input supply must be brought back onto the farm, with sharing across farms. There will be specialisation in seed and plant breeding, and in fertiliser and pesticide production as part of agro-ecology. Not every single person will want to keep animals, for example, and animals are a key element of an organic fertiliser system. Therefore some people may specialise in fertiliser production. The same goes for seeds, where not everyone will plant every kind of plant, resulting in some knowledge specialisation about types of plants, especially within agro-ecological zones. Efforts can be made to in trying to connect these pools of knowledge.

The basis for that system exists in the present on the farms and farmer practices. However, these can be disrupted by the introduction of Green Revolution technologies. Ultimately other have to be robust enough to confront that challenge and survive. It's for us to learn about this system and share that knowledge with others.

There is other seed on the farms, often considered less commercially viable, or where it is self–pollinated and it is difficult to stop seed saving and exchange on the farm.

We should work at bringing formally-trained scientists closer to farmers in participatory networks. State or the research institutes would need to provide resources for this as a contribution to strengthening farmer-controlled seed systems. We need to put into practice, wherever we can, aspects of socially and ecologically sustainable agro-ecological production.

The focus should be local production to begin with (household and neighbourhood or settlement), moving out as production expands. Again we come to the benefits of investment in capital goods: roads, storage and cold storage, processing facilities, information and communications technology. To what extent will these bring us into debt? What material basis does this debt stand on? The limits of growth can be considered in conjunction with this.

We have to think of systems that produce an alternative to surplus extraction as the driving force of economic activity.

The emphasis for now can be on nurturing and building farmer-controlled systems of plant breeding, seed production, multiplication, exchange and sale, or at least participatory plant breeding with formal institutions, integrating farmer selection and testing into R&D processes (see Sthapit & Jarvis, 1999). Building on-farm technologies (e.g. household and community seed banks) is another common agenda. The World Bank is now offering prizes for the most innovative on-farm storage technologies.[6]

Lessons from Cuba show the need for broader agro-ecological training of: i) farmers, using farmer-to-farmer models of learning and sharing; ii) existing scientists and extension workers to reorient their focus; iii) schools and university courses, and specialised agricultural colleges. These in turn are built on the basis of improved education systems overall (numeracy and literacy) (Garcia, 2002).

These lines of focus will not answer everything, but they are in the right direction of trying to gain greater direct knowledge about food production than we currently have. This is a crucial defence mechanism in the current political-economic climate. From a trade point of view, states could assist by protecting local/domestic seed economies (tariff barriers and technical support) to allow them to develop and grow.

Conclusion

Seed systems in Africa are a focus for investment and capital accumulation at present. There is a basic formal infrastructure built around historically export crops, with some expansion into local crops in some parts of Africa. By formal we must mean connected into the credit economy. The goal is now to expand that seed market deeper into Africa for the purposes of extraction of value. This will involve building food markets and assumes a population that has some financial wealth (a middle class or sizeable working class) as a launching pad.

On the other hand, most seed on the continent is saved on farms and exchanged by farmers. This gives a very solid base for alternative seed systems that can exist and thrive outside the credit market.

It is necessary for seed and food sovereignty movements to build an independent alternative, an alternative that is not dependent on credit for its survival. Along that line is the Green Revolution.

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Footnotes

[1]http://www.nepad-caadp.net/

[2]Walmart recently acquired South African wholesaler Massmart which has a large African footprint and a strong distribution network. There is an explicit orientation to grow the share of the South African and African food market.

[3]Indications at the time of writing are that the Competition Commission will appeal the decision, but it is unlikely that the acquisition will be prevented.

[4]Angola, Botswana, Burundi, Cameroon, Chad, DRC, Ghana, Kenya, Lesotho, Madagascar, Malawi, Morocco, Mozambique, Namibia, Congo, Rwanda, Senegal, South Africa, Sudan, Swaziland, Tanzania, Tunisia, Uganda, Zambia and Zimbabwe. www.pannarseed.co.za

[5]http://www.sacau.org/

[6]http://farastaff.blogspot.com/2012/06/g20-mexico-2012-launched-innovative.html

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NATURAL FARMING AND SEED SAVING- THE KEY TO SUSTAINABLE DEVELOPMENT

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Natural Agriculture Development Program Zambia (NADPZ)

In September 2010, The Natural Agriculture Development Program Zambia (NADPZ) was registered as an agricultural NGO in Lusaka Zambia. The NGO focuses on improving the household status and income of rural women farmers, by using Natural Agriculture and Seed Saving training programs as the powerful tool to changing the lives of rural women and their families.

NADPZ focuses on re-establishing the importance of environmentally friendly farming methods such as Natural Agriculture in the minds of rural farmers. Our training and re-establishment agenda concentrate on the elimination of fertilizers and pesticides in the crop planting process with the final lesson being***, "Healthier foods, Healthier living."***

NADPZ's second phase of the Natural Agriculture program is the Seed Saving training, which focuses on our small scale rural farmers saving adaptable indigenous seeds, which eliminates the usage of laboratory manufactured hybrid seeds.

Our Seed saving endeavors to highlight the advantages and disadvantages of local indigenous seed over the hybrid seed. We have over 30 demonstration farms in Mbabala and Pemba Constituency in the Southern Province of Zambia and the demonstration-farmers that manage the centers train between 2000 – 3000 members a year.

Our Seed saving curriculum highlights the strength, taste, deep root system and adaptable nature of the indigenous seed. The training also highlights that the indigenous seed is not dependent on chemical inputs to guarantee yield and that with the changing weather patterns and conditions the indigenous seed has a higher chance of adapting and surviving the changes.

In this changing world, growing population and struggling economies, our human mindset is focused on the accumulation of wealth. The situation in rural areas is no different from that of urban areas, large cities and first world countries. Trying to climb out of the grasp of poverty, farmers are willing to be manipulated into the marketing language of hybrid seeds and fertilizers, **"GUARANTEED HIGH YIELDS!"**

In this need to accumulate more wealth by harvesting more crops farmers are spending all their money on buying either hybrid seed or fertilizers, but as we all know one cannot work without the other and to get **"The higher yields"** you have to spend more money, which is not readily available in rural areas in Zambia. The situation seems futile and demoralized farmers feel that there is no hope at the end of the technological, lab driven tunnel of new age farming.

NADPZ hosts an annual event called the Natural Agriculture Show. This event allows the members to teach the rest of the comunity about the importance of Natural Agriculture to our health and the importance of saving indigenous seeds

NADPZ's first step is to re-educate the brain washing techniques brought on by money hungry corporations by concentrating on re-establishing the agricultural practices of our ancestors and our great grand parents, who managed to farm and to feed their families by using natural farming and seed saving methods.

Training the community

Once the dependency on hybrid seeds and fertilizers has been severed, the NADPZ focus is on addressing the issue and mindset of wealth accumulation, by establishing the role of cooperatives as the driving force to infrastructure development and under the cooperative umbrella providing farmers with access to markets and value chains so that they are able to get the right value for their hard work and crops and have access to extra funds.

In this global village, there is tremendous pressure on African countries especially 3rd world countries to meet benchmarks such as increased GDP. NADPZ is working towards changing the mindset of our government and leaders so that they can refocus their agenda to meet their people's conditions and circumstances. There is a great need for our leaders to reconnect with the communities and together create policies that will empower their people, instead of lining the heavy pockets of multinational corporations. Our leaders should spend more money on educating and promoting natural farming techniques and seed saving and abolish harmful policies and laws stating that farmers cannot save seed and must purchase hybrid seed.

In 2011 NADPZ begun packaging local indigenous maize and groundnut seed that is grown from the main demonstration farm in Mbabala. Packaged with our seed saving handbook and displayed at the NADPZ annual Natural Agriculture Show, the seed has received wonderful reviews and great demand from the community as well as recognition from the local Ministry of Agriculture office.

The women harvest maize from the 20hector natural agriculture feed and they carry the maize to the storage facility using old cement bags on their heads.

Since the inception of the pilot project in 2005, NADPZ has seen huge success and increased interest in its training programs. The participation of the community leaders and the community has been tremendous and there have been countless requests to increase the membership.

NADPZ aims to expand its program throughout Zambia and to the rest of Africa and with its expansion carry the messages ***"Healthier food, Healthier Living!"*** NADPZ also aims to campaign for the saving of indigenous seed, because it is one of the many keys to sustainable development.

**Barbara Hachipuka Banda, Executive Director of Mbabala Women Farmers Cooperative Union, Zambia*

SEED DEFENDERS:
Kenya Biodiversity Coalition

The Kenya Biodiversity Coalition (KBioC) is recognised as an authoritative voice on food and agriculture issues, with the widespread respect of politicians, media and the Kenyan public. With a diverse and active membership of over 60 organisations from across the country, the coalition has challenged the introduction of Genetically Modified crops into Kenya for many years. Respected for representing farmer and consumer interests, scientific expertise, environmental concerns and political analysis on issues of agriculture, biodiversity and GMOs, KBioC has offered a much-needed African voice to international debates on the future of agriculture.

The coalition was founded in 2003 as a response to the Kenyan Agricultural Research Institute's (KARI) initiation of a research programme in collaboration with USAID, using Monsanto technology for GM maize and GM sweet potato. At the time, few Kenyan organisations fully understood what GMOs were, and what their environmental, socio-economic and health impacts might be. African Biodiversity Network (ABN)[1] members in Kenya, in particular PELUM-Kenya, brought together other Kenyan organisations such to initiate a discussion and bring the issue to the attention of sustainable agriculture, farming, faith and environmental organisations.

Realising that this was a new issue that could threaten the sustainable agriculture aims that they worked for, these organisations formed a new Kenyan coalition. This alliance has grown to include organisations such as INADES Formation, Kenya Organic Agriculture Network (KOAN) and Africa Network for Animal Welfare (ANAW). Together they have worked effectively to build capacity and understanding of the implications of GMOs, and also to develop effective campaign, advocacy and lobbying skills so that their views areheard in the media and felt in policy work. They also work directly with farming communities to establish GMO-free zones. As it turned out, the GM sweet potato failed dismally and produced lower yields than conventional sweet potato – and was quietly dropped by KARI. But the rhetoric that "GM will feed Africa", remained, as KARI looked to trial new GM crops such as maize.

The coalition works closely with local communities and farmers' organisations, to ensure that farmers' voices are loudly heard in all debate. The Kenyan media appreciate that the farmers' voice is the most important in the debate about GMOs. By working closely with farmers and communities, they understood the issues and were clearly able to articulate how they would likely suffer from these expensive seeds. These farmers have learned about GMO failures elsewhere in the world, and how commercial interests wanted to make seed saving – the very basis of farmers' livelihoods and biodiversity - illegal. Media were interested to hear how farmers themselves challenged the simplistic pro-GMO narrative about how they would supposedly benefit from these new crops.

KBioC regularly puts out press releases, often responding to relevant news issues such as biosafety laws, food aid, government statements, or KARI developments. This ensures that their voices are heard on key developments around GMOs, and thereby influencing the national debate and decision-making around GMOs.

The issue of Biosafety is one of the key areas of work for the coalition. Biosafety laws were originally viewed by many NGOs as necessary to ensure the regulation of GM crops, and their safety for health, environment and farmers' rights. International law agreed under the UN's Cartagena Protocol on Biosafety requires that Biosafety Laws must be passed before GMO crops can be grown commercially. However, in 2004, with influence from USAID, the Kenyan government put forward a draft Biosafety Bill that was more of a mechanism to facilitate the import and growth of GMOs, instead of protecting farmers, consumers and the environment. Over the years, international donors such as USAID and now the Bill & Melinda Gates Foundation have been promoting this interpretation of "biosafety" and investing significant funds into African biosafety "expertise" programmes with the aim of influencing governments' policies.

As a result, instead of guaranteeing safety from GMOs, "Biosafety" now meant the opposite. This has meant that in the case of Kenya (as well as in many other African countries), protecting agriculture from GMOs has required the *challenging* the introduction of Biosafety laws.

Kenya is seen by many as the gateway to East Africa, and so it has become the front line in efforts to get GMOs grown on the continent. The pressure on Kenya to pass a Biosafety Law has therefore been intense.

In 2004, the coalition did a legal analysis of the draft Biosafety Bill. In addition to publishing these findings, they put out a damning joint press release highlighting how the Bill failed to protect farmers and the environment:

- that it favoured the import and growth of GMOs instead of regulating them,
- that it failed to conform to the minimum standards set by the UN Cartagena Protocol on Biosafety,
- that there were cheaper and more effective solutions than GMOs,
- that their health and environmental safety had not been proven,
- and that the patented seeds meant that farmers pay more and cannot save their seeds.

This press release was printed verbatim in the Kenyan media. The government appeared so surprised and unprepared for criticism, that the following week, the draft Bill was dropped.

This was an important success. However, the GMO proponents were not deterred. In 2007, the government brought out a new draft Biosafety Bill, with many of the same flaws. KBioC focused a great deal of energy on the legal analysis, capacity building, media and lobbying work. As a result of KBioC's campaigning, and demonstrations against the Bill attended by hundreds of farmers, the 2007 draft bill was also dropped.

However the GM proponents were still determined. Again the Kenyan government brought forward another draft Biosafety Bill (which still had the same flaws as the earlier versions) in 2008.

This time, KBioC obtained legal advice and developed an Alternative Biosafety Bill, which was put forward in parliament. Tragically however, the draft Biosafety Bill that had been developed by the GM proponents was unexpectedly fast-tracked through parliament in February 2009, and was passed before the Alternative Biosafety Bill could be passed. As a result, in spite of all KBioC's inspiring work, Kenya currently has a Biosafety Act that is designed to enable GMOs to enter the country.

But in 2010, KBioC made it clear to the Kenyan government and the world that they were still a force to be reckoned with! ABN ally the African Centre for Biosafety (based in South Africa) alerted KBioC that a shipment of GM maize from South Africa was destined for Mombasa port, for distribution within Kenya as food. KBioC sprang into media and political action, highlighting that this food had not gone through the proper approval procedures. The issue re-ignited the debate about GMOs in Kenya and focused attention on the responsible agencies' lax enforcement. Once KBioC blew the whistle, concerned voices came out to support them. The Permanent Secretary undertook fact-finding missions, and the Chair of the National Association of Millers advised millers not to process GM maize. The Catholic Bishop of Eldoret gave a high-profile statement. Even the Minister of Health came out and said that GMOs were not fit for consumption, and that Kenyans were not guinea pigs. The controversy led to the sacking of the director of the National Biosafety Authority for approving the import of GMOs without following proper procedures.

KBioC's energetic response to the GM maize shipment, and their continued and combined efforts are the reasons why GM crops have still not been commercialised in Kenya up to today.

Footnote

[1]The African Biodiversity Network (ABN) is a network of more than 40 grassroots African organisations from across the continent. ABN works to protect and revive resilient communities rooted in their own biological, cultural and spiritual diversity, and strives for African solutions to ecological, economic and social challenges.

Mphatheleni Maukalule, Venda, South Africa*

Mphatheleni Makaulule is a vhaVenda woman from Limpopo Province, South Africa. She is the coordinator of the Venda programme of The Mupo Foundation (Mupo). Mupo have been working with the women elders - known as Makhadzi - of the vhaVenda community for the last five years, reviving their traditional seed diversity and related knowledge. Mphatheleni explains the connection between women and seed, and why the knowledge held by women is critical in vhaVenda culture.

"The Venda women cannot be disconnected from soil and seed. Our food comes from seed and there is so much knowledge around seed. The women learn this knowledge from their forefathers, from the ancestors.

We have many different types of seed. Millet, or "Mufhola" in vhaVenda, is one of the most important as it is used in many traditional foods and is offered to the ancestors during rituals. We are reviving the millet and with it, the traditional food and drink in which it was used. For instance, Mubundo is a traditional millet drink which is very nutritious and good for the health of the community, but as the millet was no longer being grown, this drink was no longer being made. In order to revive the millet we first had to find out why it had been lost, because this is an important plant for many of the activities of the community. When we started to explore how millet was used in the past, and why some of this has been lost, we saw clearly how the relationships and connections between seed, knowledge and women has been broken.

When we started our work with the elders, we would dialogue about life. The story of seed came up strongly. They said they have lost their food, and to revive their traditional food they must revive the traditional seed. We then began to draw calendars together. These are ecological calendars which show the cycles of seed and Nature and farming. The women know the ecological flow of when they should plant and when it is best to harvest and to eat. When the women create the ecological calendars they look at the cycles of the seasons and of planting, and of the moon and the sun. They also look at the other animals and wildlife sharing this space. The seed - the food – it's not just for us. It must be shared with all of Nature.

Our own seed is not just about producing food. The seed of millet is used in different rituals carried out by the women. When the seed is in the field and it is ripe and ready, there are lots of things that you must do. You must do a small ritual to thank the ancestors for the seed, to plant it and to ask for rain.

For us, seed holds a lot of knowledge. When we find the real seed from the elders, then we are able to bring back the original seed. When we bring back the original seed, we bring back all the cycles of life, which are recognised in our traditions. These traditions have held us together as a strong community since the beginning of time. This is what we are reviving because we see other paths do not work for us. They create disorder with our territory and amongst us. This is why we look to the ancestral way to find the solution to rebuild what has been destroyed, so that our children can enjoy a healthy and ordered life.

Sabelle Kaguna Julius, Tharaka, Kenya*

My name is Sabella Kaguna Julius, from Tharaka, a dry region on the Eastern side of Mount Kenya in Kenya. I am passionate about my culture and the deep knowledge which was passed on to me from my parents and grandparents. Nobody seemed to care about the loss of our traditions and the destruction of our land, which resulted from this loss, andI was pained by the changes I saw.

With the support of local organisation RIDEP & the Institute for Culture & Ecology (ICE) I started to bring women together to talk about how we could revive our traditional seed and the knowledge surrounding it, and restore our Sacred Sites. First we shared our knowledge of the land, of natural cycles and of our indigenous seed. We drew theseas eco-cultural maps and calendars of the past, the present and the future. These helped us to visualise how our community lived before, when there was order. Now we see that we need to take responsibility for re-educating our community so that we revive our ancient knowledge and practices which kept our ancestors healthy for generations before us. We can see how our health depends on the health of our territory, our soils and our seed.

The Ministry of Agriculture brought new seeds to the community and told farmers that they will grow more from them and get more money in the market. So now people plant for money not for food, and they stopped planting our indigenous seed. But when people go to the market often prices are very low. These seeds need fertiliser too, which costs more money. And we see how fertiliser dries and destroys soils, so now people in our area refuse to buy it, because we do not want to destroy our soils.

From our experience, we see that our indigenous seed is the best for our soils, and especially with our harsh and changing climate. After drawing our maps and calendars we realised how many of our traditional seeds we have lost, and so we began to revive our seeds. We found people with indigenous seed, and began to multiply these seeds. Now we have a woman's group where we can get seed as long as we bring back twice the amount we used. So we have an abundance of our indigenous seeds, but we are still searching for lost varieties.

This is now responsibility of women, to ensure all our seeds come back and are available for everyone to plant when the rains come. Women are the custodians of the seeds of our community. Our indigenous seeds are very important for women, and each woman has to have her own seed, so that she is ready to plant when the rains come. It is shameful for a woman not to have her own seed. We are responsible for feeding our family, and for having enough seed for the rituals. With the climate changing, we need to be ready whenever the rains come to plant our seeds. Women have an even bigger responsibility now to revive our whole system again.

VhoMakhadzi Vhutanda, Venda, South Africa*

My name is VhoMakhadzi Vhutanda. I am aMakhadzi, (a mediator between the clan - the Vhutanda - family, territory and the ancestors) from Venda in North Eastern South Africa. I am responsible for leading the rituals in our Zwifho (Sacred Sites), and for ensuring that the Makhadzi are growing enough indigenous seed, especially millet, for our ceremonies.

Our indigenous seed, Mbeu, is very important to us, because it connects us with Mupo, the Creation, the source of our lives, since when we were first created. This is why our indigenous seed is used in all of our spiritual ceremonies. We cannot use any seed – only the seed which we have planted, only the seed which we know where it comes from. Each time we plant our seeds, it reconnects us with the soil, the Creation. Millet is our most sacred seed, which we use in all rituals, and we mix it with other seeds.

Seed is itself about Creation, and it reminds us about the cycles of life. That is why we use it at each important time in our lives. When a baby is born, we mix all our indigenous seeds with millet and plant them at the gate, as a prayer to ask for the baby to be healthy. When a child is ready for initiation, seed is used. When we marry and when we die, seed is used.

When the white people came to our territory, they brought new seeds which are foreign seed to the soil, and these seeds need chemical fertilizer. Their seed grows quickly, while ours take time. We thought this was helpful. But now we see how it erodes our own seeds, it has no nutrition and the chemicals destroy our soil. We are now calling all Makhadzi to wake up because this is a serious problem. Every Makhadzi must bring back the original seeds – the many different types of seed our ancestors developed and passed on to us for many different needs. This is our urgent task, because our children in the future will be lost if they do not have the seed which our soils and Zwifho understand. This is especially important now as we see the climate changing, and we see how our indigenous seed is much stronger and much more flexible. We must revive our indigenous seeds and pass on our knowledge to the young people, so they can deal with the challenges they will face.

The Kamburu Story, Kenya*

The Kamburu community in central Kenya is home to around 80 families who over the last fifty years have relied on growing tea, a popular cash crop in Kenya, to provide their income. In recent years, the price of tea has dropped dramatically as the markets have been flooded. As income became less reliable, families struggled to pay for education and health as well as retain enough income to buy food.

In 2007, following a severe drought in the region, the Institute for Culture and Ecology (ICE) began to work with the Kamburu community to pioneer a programme to revive indigenous and organic farming methods. In just 18 months this programme had not only catalysed a transformation of the livelihoods and confidence of all those involved, but alsoleft the community with a food surplus.

The programme started through working with local elders, recognised as the knowledge holders in the community and the last living connection to the ancestral traditions of Kamburu. Through ongoing dialogue with both men and women, the community first began to recover and cultivate the lost indigenous seeds of the region. Through this, knowledge of traditional farming practices also re-emerged, and this knowledge was combined with trainings to enhance regenerative agricultural practices such as rain harvesting and organic compost production. The organic farming methods re-learnt by the community allowed them to move away from expensive and polluting chemical fertilizers.

Kago and Rosemary were two of the elders who helped to initiate the dialogues and training with ICE. They now produce an extensive selection of organic fruit and vegetables, from bananas to kale to kumkwat. Their family has been united as they work together on the farm,eat healthy food together, and save money on both food and health care. Kago exclaims, "After the training I felt so much confidence in myself, I wanted to use the knowledge I had gained for my farm. I felt strong. I still feel strong.

The community have witnessedmany benefits since transforming their farming and returning to traditional seeds. Indigenous crops are rich in nutrients and natural sources of vitamins. One local woman diagnosed with diabetes has been able to leave expensive sugary substitutes behind since the reintroduction of the sweet potato into the community's diets. Indigenous plants have naturally adapted to the local weather and landscape, and are therefore able to withstand the droughts common to many parts of the continent, and likely to become more widespread with climate change.

Today the community is not only food secure, but also have sufficient surplus to take to market and share with surrounding communities. They are so impassioned by their journey that they are actively sharing their learnings with neighbours. Kamau is a farmer from a neighbouring community: "I've only been active in farming in this way since I saw what the farmers here in Kamburu were up to. I decided to try it on my own farm because my crops weren't growing well. I started visiting the farms in Kamburu to see what they were doing and I realised that you don't need fertilisers. The fertilisers had reduced the quality of my soil. I started to add cow manure to my crops and I'm starting to spread the word to my fellow farming community. I have been farming for 40 years but for the past few months I've seen the biggest difference in my crops. I've started applying this knowledge to a new area of land also. It's a gradual and long process but worth it for my children and future generations to continue after I'm gone. I'm learning about GMOs and have realised that even as a small farmer I can make a contribution to stand up against GMOs by using traditional seeds.

See "The Kamburu story - a short film about Kago, Rosemary and the local community's journey towards food sovereignty by using the following url: http://vimeo.com/channels/gaia.

Kechinu Legesse, Telecho, Ethiopia*

MELCAEthiopia (Melca meaning *ford* or the crossing point of a river) has been working with communities to revive agro-ecological farming practices since 2004. As a prominent member of the African Biodiversity Network, in 2010 MELCA hosted an international meeting on reviving traditional seed through the ABNs *Climate, Seed & Knowledge* programme. MELCA-Ethiopia haveused eco-cultural 3D maps as a means to help the community see how their landscape has been affected by deforestation and climate change, and how it can be restored. Reviving traditional seed diversity has been central to this programme of work.

Kechinu Legesse is from the village of Telecho in Wolmera District of Ethiopia. She is one of the seed savers who has been supported by MELCA:

"In the past, all the seeds we used were our local seeds. We didn't know about the new seeds and the chemical fertilizers. We didn't need chemicals because if the soil needed food, the farmers would apply cow dung to the soil in the months of May and June. We had many trees, our land was fertile and we harvested ample food, enough for every season. The land has gradually lost its fertility and stopped giving us enough produce and so the government came with new seeds and chemical fertilizers to try and solve the problem, but now we can see that it only made it worse. After this, people stopped using the local traditional seeds and we lost most of them.

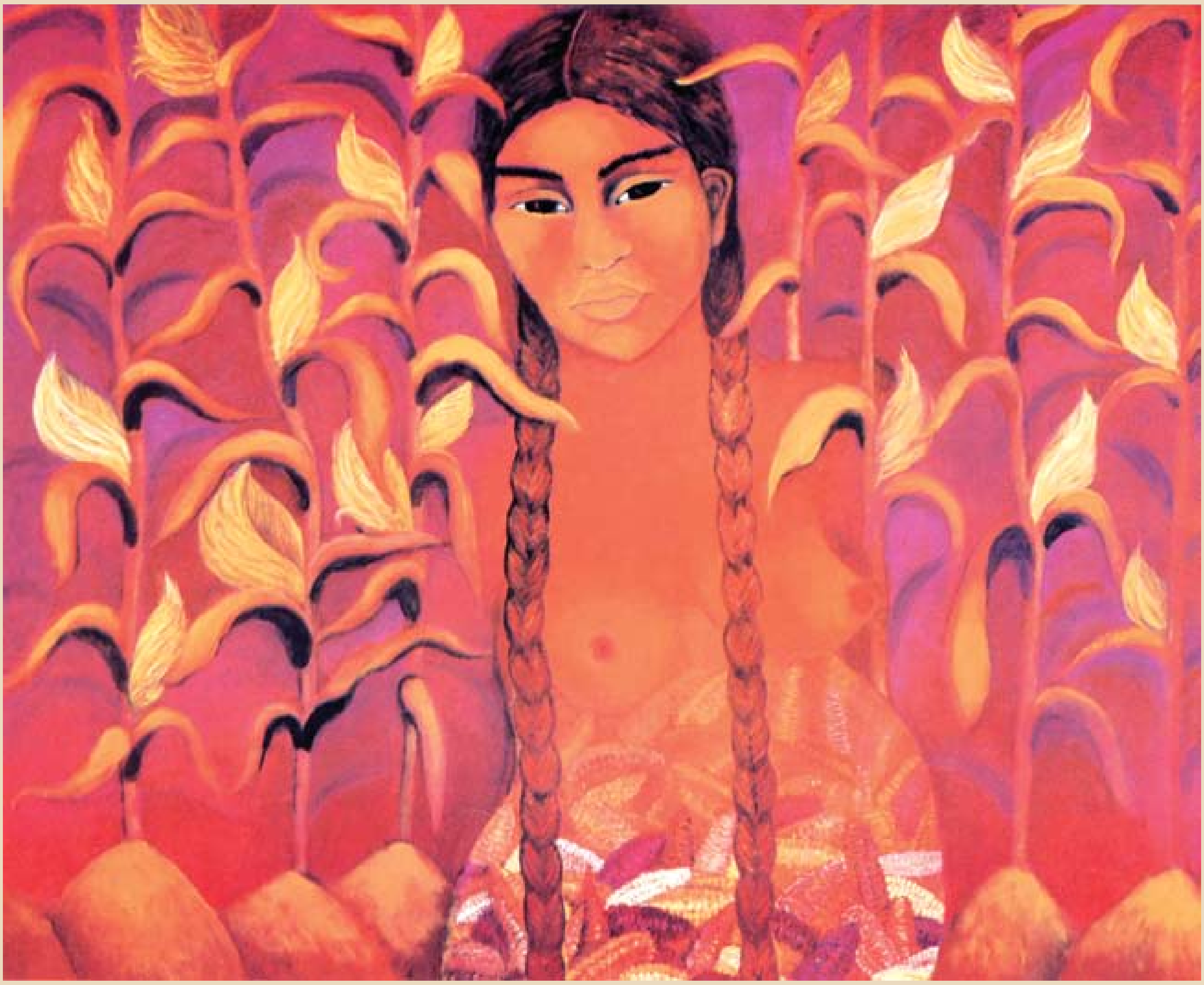
When we mapped the land as it was in the past, and then compared it with how it looks today, there was a big difference. We all felt saddened by the situation. We discussed why the land and climate had changed, and why the soil had started losing its fertility. The big difference was the number of trees. Once there were so many trees. Children used to eat wild fruits from the trees whilst they looked after the cattle. Now these trees are gone. Near my house there was a dense forest of Juniper. No one could even pass through it. Now they are gone.

The loss of the forest has affected the rains. Now we are experiencing long dry seasons that we have never seen before in our lifetimes. In the past the rains came in the month of January during *Astero Mariam*. There was even a song saying "come to see me in November, because it is rainy during*Astero Mariam*. In that season, we plant short season crops like tomatoes. The grasses will also grow and the cows get fodder to give milk. Now we don't get that short rainy season. It is dry. The rain stops in September and comes again in June, nearly 9 months later. So the produce of the long season does not suffice to take us through the whole year and we face food shortage in the middle of the year.

Now we can see that because everyone has chopped down all the trees, the soil is no longer being fed, and the rains are no longercoming. People have been too hasty to chop down the trees for their own needs. We realised that we must start re-planting trees, and that we should return to our traditional seed diversity. We prefer our local seeds for the taste, flavour and good return of the food. Our seeds are vital in our life. Not knowing about seeds is like not knowing about life and oneself. Everywhere everyone lives on seeds. I believe every human being should know about seed. We know the best seed while the crop is on the farm. We know it from how it grows, its size, the number of grains per spike and their colours. Then we select and keep aside the best seeds.

It was at this time that MELCA came and helped us to revive our local seeds. They gave us some of the seeds through seed shares with other communities and farmers. Things are already improving. I know because recently I saw children eating the wild fruits which we had lost. We are planting trees and doing soil and water conservation. Our land responds quickly to good treatment. Now we have high hopes because we are rehabilitating the area.

**From the report on African Women Development Fund to be released in November 2012*



Mamala Maiz

The hairs of the Maiz, when ripe, turn a feminine reddish in color. Mamala Maiz is a fertile, and eternally young, woman of the valleys. The spirit of the plants live in the parts that are blown and scattered by the winds; the seeds, the fruits, the kernels, the leaves, and the hairs. In one of the myths of the Maiz, it is the Sun that gives rise to it's origin. The gestation period of nine months happened miraculously in one day, between sunrise and sundown.

THE SEED

AMERICAS

MEXICO
Conservation of the Diversity of Peasant Seeds Notwithstanding Public Policies and Transnational Pressures

Ana de Ita*
Centre of Studies for Change in Rural Mexico (Ceccam)

Erosion of seed diversity and disappearance of open pollination varieties

The diversity of open pollination seed varieties is rapidly eroded in today's world. Open pollination characterises peasant seeds and enhances diversity. It is different from controlled pollination, in which the seeds of a crop originate from parents with known characteristics and thus are more likely to have homogenous characteristics. Controlled pollination varieties include hybrid seeds that are produced from two distant parent lines of the same species. The sowing of hybrid seeds yields the desired characteristics but the re-sowing of the harvest from the hybrid seeds does not produce the characteristics of the parent and generally has a lower yield. The development of hybrid seeds saw the beginning of the seed market. Given the fall in yield, farmers had to now buy new hybrid seeds each season, which resulted in the abadonment of their traditional practice of seed storing the for the next sowing cycle.

Globally, the progress of commercial agriculture is one of the main causes of loss of diversity of native and peasant seed breeds and varieties. Commercial agriculture is based on a highly reduced number of varieties, with characteristics that are important for the market, which results in the erosion of countless varieties and breeds, which will stop being sown if the demand for them ceases. The loss of peasant varieties also results in the loss of knowledge associated with them.

According to the FAO, the erosion of biodiversity severely compromises world food security[1]. During the last century, at least three quarters of the genetic diversity of agricultural crops has been lost. Now only 12 crops supply a major part of the world's food requirement and among these wheat, rice and maize contribute to 50 percent.

Mexico is one of the 17 mega-diverse countries, which together account for 75 percent of all the species of known vascular plants and living land-animals. In Mexico there are around 65000 species of fauna, flora and fungi. Besides this 10 percent of the higher plants of the world are found in Mexico and more than 40 percent are endemic[2].

Mexico and the countries that form the cultural region of Mesoamerica are centres of origin of a large variety of cultivated plants, the result of a process of domestication and breeding of species carried out by farmers for around seven million years. The domestication of maize was the greatest achievement of the Mesoamerican civilization. The country, besides being a centre of origin, is also the centre of diversification of the crop.

Mesoamerican agriculture was based on diversity. "...It was not about producing a lot with only one species of graminae or legume....but producing a wide variety of crops and species in moderate quantities to take into account geographical, biotic diversity and annual climatic cycles, which were frequently erratic. [3]

"The food system of the indigenous peoples is based on a thousand to thousand five hundred species with their variants, while the global food system is centred around 15 species[3]"

Currently in Mexico, commercial and peasant seeds selected by farmers from their own harvest are re-sowned in the following cycle; these seeds are informally shared on a constant basis and have been conserved through generations.

A main reason for the agrodiversity in Mesoamerica is *Milpa*, a traditional form of cultivation method which combines maize, beans and squash, and thus constitute a diversified sowing system. Historically the Milpa has adapted to different environmental conditions, resulting in 60 more breeds and hundreds of maize varieties, all of them open-pollination varieties. The *Milpa* system also protects wild plants which are being promoted such as tomatillo, chives and a large varieties of greens (amaranth greens, purslane, chipil, quelite cenizo); Aromatic plants such as the epazote or basil, as well as medicinal plants such as pericón (the Mexican marigold), ruda or arnica are either grown along the edges of the plot or interspersed. Magueyes, nopales, coffee and various fruit trees may also be present as plot fencing or integrated into the plot. At the end of the maize cycle, sweet potato, yucca or vines such as chayote and passionflower are also grown. By maintaining this form of cultivation, agro-diversity is maintained and the traditional practices and knowledge that sustain this agro-diversity, along with open-pollination varieties are also conserved[4].

Mexico is the centre of origin of maize and there are a number of varieties depending on each producer, indigenous group or climatic region[5].

The country report presented to the FAO in 2006 highlights that unfortunately, native diversity is suffering severe erosion owing, among other reasons, to the process of adoption of improved varieties, substitution of *Milpa* crops with more remunerative crops or due to the migration of rural people to cities and the United States of America. According to the INEGI (2002), in the states with largest production of maize, 70 percent of the surface is sown with improved variety seeds. In irrigated and rain-fed valleys with good annual precipitation conditions, native maize has been replaced by hybrid seeds. Given that hybrid seeds only maximize their yield in high sowing densities, they impede the coexistence of other crops and go against the diversity of the *Milpa*. The increase in the use of herbicides has resulted in the disappearance of many local varieties and species of beans, squash and quelites (green herbs)[6]. Lack of labour for weeding and commercial promotion of herbicides has increased the use of these agrochemicals in rural agriculture. Permenant or temporary migration of peasants from rural areas to cities, reduces the diversity of seeds, which when no longer sown, are slowly lost forever[7].

The FAO warned about the erosion of varieties and stated that of the varieties of maize existing in Mexico in 1930, only 20 percent remain. In the last 50 years in Mexico, many populations of the Celaya and Tuxpeño breeds, known for their high productivity were lost; Tuxpeño-Norteño, Apachito, Nal-Tel, Tehua, Jala, and Tuxpeño and Chalqueño varieties, as well as maize for special use[8].

However considering the overall population of farmers, the Census of 2007 records that 75.3 percent of all production units in the country sowed their own seeds and in terms of the total agricultural land, 86 percent of it is sown with farmer's seeds. The report of the Agro-food and Fisheries Information Service in 2009 indicates that native maize is sown in 85 percent of the agricultural surface of the country, in 7.2 million hectares of rain-fed land, by farmers who own less than 5 hectares. The cultivation is done in a large variety of agro-ecological zones at altitudes ranging from 0 to 4000 metres, from Equator to higher latitudes in the two hemispheres and in regions with precipitation of less than 40mm to 3000mm a year, in soils and climates that are very variable[9].

In an analysis of native varieties of maize in Mexico, it was discovered that although there were new high-yield varieties available and supported by the government, farmers continued to maintain complex populations of native varieties in order to deal with environmental heterogeneity, combat the effects of plagues and diseases, comply with cultural and ritual necessities and satisfy their dietary preferences.

Hernández-X and Ortega postulate that the higher the degree of cultural erosion and disorganisation , the greater the level of erosion of open pollination varieties[10].

Corporate and State threats to rural agriculture

The decade of the Forties marked the beginning of the Green Revolution, a project that was started under the auspices of the Rockefeller Foundation that stressed on increasing production in the private sector of Mexican agriculture, based on research and promotion of a technology package that sought to adapt seeds used in the United States to local soil, as well as the utilization of a suitable mix of insecticides and fertilizers and the efficient use of water. In the beginning the research was restricted to maize and wheat. Later it included bean (1949), potato (1952), fruit and vegetable (1953), sorghum, barley and fodder legumes (1954) and livestock (1956), which heightened the dichotomy between subsistence agriculture and commercial agriculture.[11]

The Green Revolution tended to concentrate the benefits in a small business sector, which had good irrigated lands, at the cost of the majority of the nation's farmer population. Moreover, by focussing on a type of research designed for conditions different from that in Mexico, it cast aside research which was already being done for the improvement of the maize production in traditional Mexican regions12.

In the Forties, two types of research programmes clashed with each other. The first with improved open-pollination varieties, which had the advantage of permanence as the farmer can allocate a part of his harvest for sowing in the coming year, as done by traditional farmers; the other type was that imposed by the Office of Special Studies

(OEE in Spanish) under the management and funding of the Rockefeller Foundation, which aimed at greater yields through the introduction of hybrids of exceptional productivity, but only in the first sowing. In subsequent sowings the productivity may be even lesser than the yield obtained with ordinary seeds. Besides, the high productivity of hybrid seeds depends on its capacity to respond well to fertilizers and this happens in conditions where there is regular water supply, that is to say irrigation. While the Institute of Agricultural Research (IIA in Spanish) worked to obtain improved maize seeds for areas of small traditional cultivation, OEE preferred to focus on the production of very high yield seeds, meant for irrigated regions and for producers with high resources. In 1948, approximately 80 percent of the maize cultivation land sown with improved varieties was open-pollination varieties. Around 1956, the seed production programme of the Secretary of Agriculture dedicated 96 percent of its capacity to hybrids, that is, the commercial production of maize:

The Green Revolution found its principal promoter in the Mexican State. The hybrids would have had very little impact without the build-up of strong investment in irrigation, extension of credit, support for agricultural extension agents, guaranteed prices and creation of an infrastructure for the storage of grains, agriculture insurance, support to mechanization etc. From the end of the Fifties onwards, the State controlled public research through the National Institute of Agricultural Research (INIA in Spanish) and later through the National Institute of Forest, Agriculture and Fisheries Research (INIFAP). A state company, the National Seed Producer (Pronase), had exclusive rights over the developments of the public research centres and was engaged in commercially reproducing and distributing the varieties of maize, bean, rice and oil seeds developed by them.

In the Sixties there was a process of reorganization of the seed industry through the *National System for Production, Certification and Marketing of Seeds* based on which all work associated with the research, qualification, production, benefit and certification, as well as the distribution, sale and utilization of certified seeds was considered as a public utility (although not a state monopoly). However, parallely there was a significant expansion of the national private and foreign industry in the field of production of improved seeds[13].

Till 1980, private companies were restricted to the production and marketing of seeds but with very little participation in improvements. The change in policy and in adjustment programmes (1982) marked the beginning of the end of Pronase, which was dismantled in 2007, once its production and market share had reduced drastically in the initial years of 2000.

The Seed Law of 1991, encouraged the participation of national and foreign private companies and ended the preferential access given to Pronase over INIFAP varieties, which could now also go to private companies. The seeds produced by the private sector, were meant for irrigated areas with good rainy seasons, whereas those produced by Pronase were meant for the other cultivated areas[14].

The Mexican seed industry is formed by individual farmers, large transnational companies, private national companies, national institutes for research and production of seeds, such as INIFAP and international research centres such as the International Maize and Wheat Improvement Centre (CIMMYT).

After the disappearance of Pronase, transnational seed companies penetrated the Mexican market and also increased the import of seeds. According to Ayala and Schwentesius[15], although there are around thirty major companies: Agroproductos Monsanto, Syngenta Seeds, Sakata Seed de México, Semillas Berentsen, Ahern Internacional de México, Bio Internacional Genética de Semillas, Bonnita Seed, Red Gold Seeds, Mar Seed Company, Semillas Conlee Mexicana, Semillas del Río Colorado, Semillas Mejoradas de México and Semillas Western, foreign companies predominate in the seed market by managing more than 90 percent of the capital.

Market Value of the seeds

The Mexican Seed Association (AMSAC) reports that the value of the seed market in Mexico is around a billion dollars. Almost twenty transnational and national companies hold 80 percent of the market, whereas the remaining 20 percent is for local producer associations, which market seeds. Mexico imports the entire vegetable seed requirement, worth about 200 to 250 million dollars, while between 70 to 60 percent of the sale of maize seeds is done by transnational companies[16].

Improved seeds are a fundamental input in commercial production areas, with very high yields and in continuous growth. For example, in Sinaloa, in the high-productivity, irrigated zones, almost all maize producers sow with hybrid seeds, supplied by four companies: Pioneer, Asgrow, Dekalb, Monsanto. The only Mexican maize seed company –Ceres ceased to be competitive in the North-eastern region because of low yields in comparison with the transnational ones[17].

The producers say that the cost of seed is very high and its useful life has reduced to merely three years, due to market competition.

Government Programmes

Government programmes through the various decades have promoted the use of commercial hybrid seeds and transgenic seeds, along with the technology package of the Green Revolution, as almost the only way of modernizing the sector. The substitution of peasant varieties by commercial varieties has resulted in serious genetic erosion.

Kilo por kilo

Between 1996 and 2001, through the Kilo por Kilo programme, the government tried to increase the use of certified maize seeds, from the varieties produced by the state research centres and meant for those areas with good production. However the Programme also distributed seeds without certification, poorly suited to local conditions, which did not result in the expected increase in yield, but caused the disappearance of many Criollo or native varieties[18].

Promaf

Given the global food price crisis in 2007, the government promoted a programme for small producers from the centre and southern states of the country, where the majority of the small farmers producing for their own consumption are located and who still maintain the *Milpa* and peasant seed sowing system. This programme aims at increasing the yield of the maize and bean crop with the help of technology packages validated by the INIFAB, with the use of improved seeds, population densities and sowing and fertilization. Once again and in spite of this causing the erosion of varieties of basic crops and their importance in terms of food security, the Mexican government allocated its financial resources to replace the *milpa* and peasant, native or Criollo varieties, with commercial hybrid varieties, produced by transnational companies, along with the inputs required for their production. The government is now focussing on opening new markets for the seed and inputs companies, instead of promoting an increase in the yield based on improvement of peasant varieties, the enriching of soils, use of organic manure, which will prevent the dependency of the farmers on industrial inputs.

Subsidies to Monsanto for promotion of transgenic seeds

The Mexican government since 1996 has subsidized the acceptance of transgenic cotton seeds from Monsanto through the Alliance for the Countryside (Alianza para el Campo) programme. The Mexican Government paid for the licence and part of the cost of seeds for those farmers who accepted to buy transgenic seeds.

A couple of years ago, through the Productive Reconversion Programme, the Mexican government once again subsidized Monsanto by giving a subsidy to producers deciding to sow transgenic soya. The objective of this programme is that producers with low maize yield switch to the cultivation of transgenic soya. The government has authorized the sowing of transgenic soya in 253 thousand hectares in the Yucatán Peninsula, in Chiapas and in the Potosina, Veracruz and Tamulipeca Huastecana regions. The majority of the producers of the Yucatán and Chiapas Peninsula are small indigenous producers (Mayas, Tseltales, Tzotziles) who cultivate in the *milpa* system for their own consumption, with few chemical inputs, in small parcels of land of less than 4 hectares, with their own seeds of native varieties. These farmers are also beekeepers. Subsidized transgenic soya is an attempt to expanding the cultivation to these areas but it has been met with resistance by the farmers and environmental organizations, who have filed various appeals against the authorization for sowing granted to Monsanto.

Seed Laws of 2007

In 2007 the "*Federal Law for Production, Certification and Marketing of Seeds*" was passed, replacing the 1991 Seed Law. After some effective lobbying, the seed industry was able to modify a legislative initiative, which attempted to once again give the State a priority role. In its place, it promoted a seed law which make the exchange and sale of farmers seed illiegal and reinforce one that reinforces the interests of the private seed industry to a greater degree than the existing law(law of 1991) .

The privatization of seeds is a global trend and the new laws promoted in different countries are oriented towards this. The Federal Law on Production, Certification and Marketing of Seeds (2007), openly attacks peasant seeds and attempts to classify them as illegal and pirate.

The new seed law promotes the interests of the seed companies and although it does not go to the European extremes of charging the farmers a percentage for re-sowing with seeds from their own harvest, it does prohibit the sale or exchange of peasant seeds.

The 2007 law is said to apply for all types of seeds, including varieties of common use defined as: "those used by rural communities, whose origin is the result of their practices, uses and customs". It is part of a group of laws that were drafted by large federations of seed companies that come together under what is called International Seed Federation (ISF). In Mexico, the ISF is represented by AMSAC, which is the Mexican Association of Seed

Producers A.C, an association that has very little to do with the Mexican reality. It defines itself as follows: "AMSAC is an association which brings together the entire seed sector in Mexico, which has power to influence government decisions, participate in laws and norms and is recognized for its services and infrastructure to resolve the issues of its members". Monsanto, Syngenta, Dow, Dupont or Pioneer, Vilmorin Inc. and various other transnational companies are members of AMSAC. The Mexican Seed Law faithfully complies with the objectives set by the transnational federation.[19]

The Seed Law lays down, by virtue of Article 34 and some others, that all seeds need to be either from the farmer's own production or purchased. There is no other alternative. Exchanging or gifting of seeds is now considered illegal and there is no exception to this. In articles 33 and 34 it requires that any seed that is "marketed or placed into circulation", that is to say exchanged, lent, gifted, purchased or sold: "...should carry a label on the packaging with the details required by the Official Mexican Norm. The Law of 1991, made an exception for peasant seeds. "The free marketing or circulation of seeds that are neither certified nor verified shall not be restricted"[20]

The other aspect is the imposing of the concept that good quality seeds should be uniform, that is to say equal and invariable and also stable, that is to say unchanged with time. Another thing that the law imposes is that seeds should also be stable and to maintain its name, it should not change. This means that in a country like Mexico, in some way or the other native seeds are now being forced to stop evolving. Peasant seeds and seeds from the Mexican indigenous people have persisted only because they have been evolving with time. The strategic objective of the National System of Seeds of Mexico is that by the year 2025, 60 percent of the seeds should be certified and all these certified seeds should be protected by patents[21].

Patents, transgenic contamination and laws – a threat to the farmer

At present almost 80 percent of the producers sow their own native or Criollo seeds. Many farmers are used to sowing small quantities of hybrid seeds to promote the strength of their native varieties and by crossing native and hybrid varieties they "creolize" them. This practice shall be prohibited with progress in patent protection, as companies would claim payment of rights for improved genetic material that may be in the Criollo seeds. As in the case of Europe with its "compulsory-voluntary contribution", although they have never paid for the peasant seeds, which are the patrimony of the human race on which they made their improvements. In Mexico improved seeds have not progressed in spite of sixty years of the Green Revolution, given that there are no varieties for each of the ecological niches in which maize is sowed and for which farmers have adapted seeds in over more than seven thousand years of farming. Besides this, the dietary and ritual uses of maize in Mexico cannot be satisfied by a reduced number of hybrid maize varieties, and in fact require cultivation of various varieties and species associated with them. The hybrid maize, in spite of the fact that it can increase the yield of harvests in hillsides and rain-fed areas, with less use of fertilizers, it is still not good enough to guarantee the food security of rural families as it cannot be stored during a large part of the year, and in fact within a few months is attacked by insects, unlike the native or Criollo maize that families in rural areas store from one year to another, to use it slowly over time as food.

Transgenic contamination of native maize has become a reality in Mexico from the year 2001, caused by the import of maize from the United States, which contain a transgenic maize blend. The imported transgenic maize was distributed in rural communities by the Diconsa state stores, which led to the spread of contamination to various regions, many of them indigenous, which cultivate maize to eat and which considered the invasion of transgenes in their native varieties as a contamination of seeds inherited from their ancestors. Transgenic contamination occurred in spite of the existence of a moratorium on experimental or commercial sowing of transgenic maize, as Mexico is among the countries that form the cultural region of Mesoamerica, the centre of origin and diversification of maize.

The Mexican State has systematically sought to make rural production disappear, promoting programmes for productive reconversion to commercial crops, preventing sowing on hillsides or the traditional practices of slash and burn agriculture, promoting replacement of native seeds with commercial hybrids. It has also played a pivotal role in promoting transgenic crops not only through subsidies to encourage their production, or the increase of imports without any type of segregation and distribution without labelling, but has also strengthened a legislative mechanism favouring patents, the interests of corporations, transgenic crops etc.

The Law on Biosafety of Genetically Modified Organisms was approved in 2005 and is a law that favours transnational corporations, as it only defines the steps to be followed so that transgenic crops may be approved. It does not penalise corporations when they contaminate native varieties or distribute transgenic seeds illegally etc. This law paved the way to lift the *de facto* moratorium in effect since 1998 on experimental or commercial sowing of transgenic maize. The Seed Law (2007) goes further by prohibiting the marketing, exchange or gifting of farmer seeds to promote the use of commercial hybrid seeds. This year (2012) the Congress tried to approve a law on vegetable varieties that would favour transnational companies but the opposition of farmer organizations led by the National Union of Autonomous Regional Farmer Organizations (UNORCA), member of Vía Campesina, resulted in the initiative being rejected.

Farmer Resistance

In spite of the efforts of the government and seed production and agrochemical corporations to destroy the rural economy and the users of peasant, native or criollo seed varieties, farmers have resisted, in order to continue with their way of life, sowing and culture. However it is an undeniable fact that capitalist modernization is a threat to the rural way of life and is slowly penetrating into the communities.

Indigenous and rural communities have resisted by continuing to maintain the *Milpa* system as the form of cultivation that ensures the family's food sovereignty. Many communities do not use the hybrid seeds distributed by the government, the more advanced have ensured that the government changes the industrial technology packages that it subsidises, to support for native and Criollo seeds and organic inputs. Given the declaration of the transgenic contamination of native varieties of maize, organizations requested the help of the Centre of Studies for Change in the Mexican Countryside (Ceccam) to carry out its own diagnoses on their native maize varieties. They declared collectively, as the Network In defence of Maize, that they would not use seeds from outside the communities, not sow maize distributed by the Diconsa State stores, not sow maize brought by immigrants, and only exchange seeds with known persons, not buy hybrid seeds, check their lands and remove weeds or destroy maize plants that seemed unnatural or deformed. Later they learnt to conduct a rural study to sample their lands and identify the presence of transgenics in them. The Ejidos have sought to make progress by using the agreements of the Assembly – a community institution that allows autonomous decision making on the land and its resources – to prohibit by an agreement made between the Ejido members and the co-proprietors, the sowing of transgenic crops or hybrid seeds in their territories.

The communities continue to maintain active interest in recovering their scarce varieties. They conduct seed exchange fairs among communities, where the farmers acquire different seed varieties that are suited to their region. The fairs combine the savouring of traditional dishes cooked with native varieties with conferences and theoretical presentations on the seed situation the world over and in the country and also have traditional music and dances.

Native seeds cannot be stored in isolation, without maintaining the way of life and culture, which gives them meaning. Thus the only way to maintain and protect the diversity of plants and varieties is to promote the indigenous rural economy.

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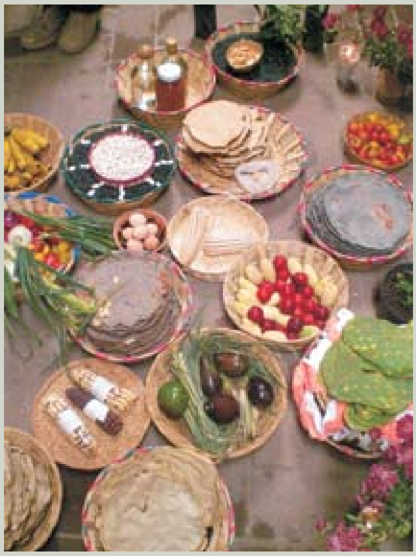
Experience of the Organización de Agricultores Biológicos, Oaxaca

Iván Hernández Baltazar



Our organization comprises Mixtec and Zapotec farmers from the communities of the Sierra Sur and Central Valleys of Oaxaca.

We are committed to ensuring a healthy diet for all families in our communities, taking care of our native seeds and inculcating respect for Mother Earth. We function as a network that is spread over different regions. Within the communities there are functionaries, who promote agro-ecological practices and local conservation activities.

To conserve o ur native seeds, we promote the sowing of different local varieties of maize, beans, squash, tubers and fruit plants. The process of diversification of seeds has been strengthened by selection, breeding and sharing of our native varieties. In this manner we have been able to get the best characteristics from our seeds.

In order to promote sharing of experiences in seed conservation, we organize maize festivals. Farmers from various regions attend these festivals and exchange a large variety of seeds and foodstuff. To strengthen production of our native seeds we improve the quality of the soil with natural fertilizers and conservation practices. We motivate communities to continue cultivating under the *Tequio* system, a community self-help system where members of the community help each other, both in farming as well as in community work.

Idelfonso Alcocer and Roger May Cab, Yucatán

Álvaro Mena

Idelfonso Alcocer and Roger May Cab, were b orn in the Chacsinkin community, Yucatan and have been *Milpa* cultivators. Along with other farmers they have been advocates of community culture. They state that saving native seeds is protecting life itself, because the seed, in particular maize seed, is the heart of the community.

Committed to the recovery of *milpa* seeds, Idelfonso Alcocer and Roger May Cab along with Misioneros A.C., encourage farmers who have conserved their native seeds to share them with those who have lost theirs. They conducted the first Criollo Seed Fair, which is a platform for exchange of seeds and to conduct various cultural activities. The seed fair has rescued native seeds that are at risk of disappearing, such as the Sak Nuk' Naal, K'an Nuk' Naal, Ee'ju', Naal T'el varieties of maize. At present seed fairs are conducted in the three states of the Yucatán Peninsula, in which at least 20 communities from each region participate. Each year a different community is given the responsibility to host the fair, the symbol of which is a basket filled with different *milpa* seeds. The community that is given the opportunity to host the fair assumes the responsibility of storing the seeds and organizing the activities of the next fair.

Experience of the Catechists of the Huasteca region of Hidalgo

In the Hidalgo Huasteca region, the storing and breeding of maize, bean and chilli seeds for sowing in the "*Milpa*"[1], allows families to have food through the year. The catechists of twelve communities of this region, during the community assembly, promote conservation of seeds and *Milpa* cultivation and by means of a resolution of the assembly, have prohibited the sowing of hybrid and transgenic seeds, one of the most common causes for displacement of peasant varieties. They do not permit the use of herbicides either, as they are harmful to diversified farming and contaminate the land and the springs.

The entire family participates in looking after the *Milpa*. The men and youth sow, weed and take care of the plot and women participate in saving, seed breeding and preparation of food.

The catechists have ensured that, within the community, sowing native seeds inherited from their ancestors is favoured. Storing, breeding, sowing and harvesting are an integral part of their life and cosmovision.

[1]Milpa is a crop-growing system used throughout Mesoamerica. A milpa is a field, usually but not always recently cleared, in which farmers plant a dozen crops at once including maize, avocados, multiple varieties of squash and bean

MAIZE

Traditional Knowledge and Flavours under Threat: An urgent appeal to help save Maize*

The elders of the El Salvador mountains talk of how in distant times, the four colours of maize came to live in these lands as humans: white, black, yellow and spotted. These coloured men and women remained in this land for four seasons of rain, during which they went from place to place, multiplying in numbers, sowing the seeds of life, giving birth to communities, sowing maize on steep slopes and hills, working hard to satisfy their needs by taking from Mother Earth and to preserve the life form that they had brought to these lands.[1]

Legends such as these abound through the length and breadth of our continent. All of them speak of how we are sons and daughters of maize and how small farms and cornfields are sacred, as are the grains of corn.

Maize was domesticated in Mexico from a wild grass called *teosinte*[2]. *Teosinte* [3] is so different in appearance from maize that for long it was doubted if these two species could actually be related.

The domestication of maize is a process that began around ten thousand years ago, when settlers in the Mesoamerican tropical forests began to sow this wild grass, from which they collected the grain, for use as a source of carbohydrates. Later they began to select the best seeds, storing and then sowing them, selecting the best again and so on....until many generations later this creative process produced maize. Maize is a plant that is cultivated with the most in-depth domestication processes that exist, as it is the result of a process that took between 500 to 2000 years, till it's creators managed to obtain a plant with characteristics common to a cultivated species [4]. It is women who initiated the process of domestication of maize, as part of their constant effort to acquire knowledge on the use and transformation of useful plants, learning where to look for them and experimenting on how to store them[5].

From the early attempts at domestication, maize cultivation spread to the rest of the continent, where agrarian communities continued to create diversity, adapting it to their own ecological and cultural needs. Thus, although the Mesoamerican region is the centre of origin of this crop, there are various centres of diversity throughout the continent.

The oldest archaeological evidence of maize: starch grains and maize phytoliths, more than approximately 8700 years old, has been found in the Balsas River drainage in the State of Guerrero. At this site there is also evidence of an early presence of a domesticated species of pumpkin and beans, which could indicate that maize was domesticated along with other crops, within a crop- growing system, the *Milpa,* which included maize, pumpkin and beans or some other legumes.

One of the oldest findings of the presence of maize in South America is in the Real Alto site (Santa Elena-Ecuador Peninsula)[6], which consists of maize phytoliths associated with leguminous plants and pumpkins, as well as grain processing and farming tools[7]; which sheds light on the application of an agricultural technology that included the combined sowing of maize, gourds and leguminous plants, as practiced in Mesoamerica.

The association of maize, beans and pumpkin has been present in the Abya Yala cultures for more than five thousand years. This combination constitutes the perfect balance for the soil, as the legume nitrifies it, the maize supports the beans and gourds help in plant coverage. From the nutritional point of view, the combining of maize (rich in carbohydrates and proteins) with beans (rich in proteins, iron and other minerals), pumpkin (with a high content of fat and protein) and chilli, provides practically all the nutrients required for a complete, nutritious and balanced diet. Upon arrival of the Spanish in Tenochtitlán, a large part of the population was fed thanks to the complex system of Chinampas (small man-made rectangles of fertile soil raised above shallow lakes), where maize, beans, pumpkin and a large variety of edible herbs known as quelites were sown. This combination of crops is maintained till date.

Maize cannot exist without human intervention, as the kernels do not fall off the cob on their own; they always need a human hand to remove the seed and sow it. Only then can the shrub grow and with its face turned towards the sun, produce its cobs. Therefore historically there is a very strong symbiotic relationship between this crop and the Mesoamerican, Andean and American agrarian communities in general.

Given its extensive use, versatility and because of it being an open pollinated species, the genetic diversity of maize is enormous and its culinary applications many, some of which have been included in this publication, in which we have shared only a small sample of the various culinary expressions around maize that abound in our continent. It's use is not only restricted to its value as a food product, but also to its medicinal value. Anthocyanins (red, blue or brown pigments with anti-oxidant properties) present in purple corn protect against the growth of tumours. Boiling and consuming of corn silk taken from the cob, is a traditional remedy for kidney problems, as it helps clean the urinary tracts, eliminate liquids and fights swelling. Corn flour applied as a poultice is anti-inflammatory; while poultices prepared with cooked kernels help relieve sores, wounds, contusions and rheumatic pains.

Maize, *sentli, sara, jank'a* or *avati*[8] is one of the most important crops in Latin America from the cultural, social, economic and nutritional point of view. Being a sacred plant, many American communities incorporate maize in their agricultural celebrations and rituals, through which they strengthen the bonds of solidarity and reciprocity within communities, reaffirm their agricultural practices, create biodiversity and achieve *Sumak Kawsay* (the Good Life). Many agrarian rituals revolve around blessing the seeds, sowing and attracting the rains, in order to get a good harvest.

In some Navajo communities (United States), they use deer masks fashioned out of the hides of animals that have been suffocated by introducing corn dust into their nostrils.

The masks are made during the Navajo Night Chant ceremony and once they are consecrated, the skins come to "life" by the ritual ingestion of maize while blowing smoke.

In the Andean world, the Inti Raymi celebrations (or June solstice festivals) start with the harvesting of maize and other crops. On this occasion, the members of the community share *Chicha*[9] , *Tamales*[10] and other corn-based preparations. Another Andean celebration is the *Koya Raymi* (or the Festival of Fertility), which coincides with the September Equinox, when sowing begins and the Pachamama or the Mother Earth is prepared to receive the maize seed.

The Tupí Guaraní (Argentina, Paraguay, Bolivia and Brazil) celebrate the Arete Festival, which coincides with the ripening of the avatí (maize) with which they prepare *kanwi* (chicha), a ritual beverage that is taken during the dance. For this occasion, women wear new clothes and look for uruku seeds, with which they paint their cheeks red. From a nearby hill masked groups head towards the houses, accompanied by music and led by one person carrying a stick or cross adorned with taperigua[11] flowers.

The agricultural and festive calendar of Mesoamerica is replete with celebrations linked to maize, such as the Candelaria or seed blessing festival (2nd Februrary), the Santa Cruz feast day (end of April and beginning of May) to pray for the rains and the San Isidro Labrador festival to bless the animals. The 1st and 2nd of November mark the Day of the Dead, in which a ceremonial drink called Colada Morada or Mazorca (a thick purple drink) is consumed. All these festivities are built around the cycle of maize, in a syncretism between the Christian religion and the Mesoamerican cosmovision. For example in Oaxaca, the various phases of the maize crop cycle coincide with Catholic festivals such as the Holy Week, Corpus Christi, SantaCruz, the Day of the Deceased and Christmas.

The ceremonies that are held are rituals propitiating fertility, to pray for rain at the time of planting or for the care and growth of the animals. When the harvest is done, the ceremonies are an act of thanksgiving. Many rituals which take place in sacred sites such as caves, hills and springs, are a continuation of the Agricultural – ritual calendar[12].

The transhumant Rarámuri communities that live in the Western Sierra Madre to the North of Mexico organize their existence around maize (*sunú*). The festive calendar is organized around the productive cycle. Agriculture is a ritual in which the mandate of *Onorúame,* the God of rain and good harvests, is carried out. The year begins with the Holy Week (Nolirúachi), which is the time to nourish the soul. The festival starts on a full moon day and people pray for a prosperous year. Later they go to their parcels of land, especially to the highlands to start sowing. In the end of summer between September and October – when the first ears of corn appear – household ceremonies called *Yúmare* are held; in this festival thanks are given for the material wealth received. Finally there are the winter rituals that coincide with Christmas or *Gualupa*, when they dance the *matachín* to help the sun that is now pale. The earth rests at this time [13].

In ancient Mexico, three months in the year (*Tozoztontli, Hueytozoztli* and *Ochpanizli*) were dedicated to the cultivation of maize, although in the other months too, ritual foods were also maize based. The ceremony that took place in the Mexican world to celebrate the harvest was initiated with an offering of two pairs of the first cobs of corn to the Goddess Chicomecóatl, freshly plucked from the field.

Among the Apaches (United States) the *hataali* or singer conducts a ceremony that can last many hours, in which maize flour, sand, coal and pollen are used to paint figures of great beauty on the floor of their *hagan* (homes), to attract the spirits and use their power to benefit an individual or for common good. These ceremonies are conducted for over more than a week.

At the end of the ceremony, the paintings are destroyed.

The Colombian peasants hang the largest cob from the harvest in their kitchens, as a symbol of prosperity and an amulet to protect against drought.

In the Cuban Santerian tradition, the cob is toasted and adorned with a red sash to keep away illness and if one wants to appease San Lazaro, then it must be hung behind the doorway to the house.

In the same manner, many legends surrounding the origin of the human race are also centred around maize in various regions in the continent. The Quiché Mayas of Guatemala say that they were first made of mud, but because they were soft and powerless, they crumbled before walking. Later they were made of wood although these wooden dolls walked and talked, they were dry. They had neither blood nor substance, sans memory or aim; and they did not know how to converse with the gods. It is then that mothers and fathers came to be made of yellow and white maize and this is how they became of flesh.

For the Mexica community, the maize plant was the God of all gods. *Quetzalcóatl* himself, after the creation of the Fifth Sun, took on the task of finding it to gift it to the humans; therefore maize had a divine character. In its masculine form, maize was known as *Centéotl*. In its form as food for humanity it took a female form and was Xilonen, maize that is in full bloom and flowering and which transforms itself into Chicomecóatl, when it is mature, when it is collected in the form of cob and is stored for times of famine [14].

Thus maize is inexorably linked to the future of the American people. "The identification of the origin of maize as the origin of the cosmos, the birth of human beings and the start of civilized life, is an expression of the importance that these peoples attributed to the domestication of this plant[15].

However native maize is in danger, as it is the crop that is most modified by the seed and biotechnology industry. From hybrids to transgenic varieties, from the grain to the seed of industrial maize that is available in the international market, everything is controlled by a handful of transnational companies that develop legal and commercial strategies so that the small farmer stops using his own seeds and enters into their circle of dependence.

On the other hand, maize is being used in non food-based applications, such as the production of ethanol as a fuel for automobiles, or to feed the aviculture and pork husbandry industry in detriment to food-sovereignty. Besides, more commercial varieties are used and the use of others is lost, because they are no longer desired owing to their size, colour and starch content, based on the needs of the industry. Thus more and more varieties of maize are being endangered in our entire continent. With this we are also losing agricultural and cultural practices associated with these varieties. Only some varieties subsist thanks to the heroic efforts of the farmers who are conserving them because of their cultural value.

However, the main threat that our native and Criollo maize faces is genetic manipulation. Through genetic engineering virus, bacteria or algae genes have been introduced into maize to make it immune to glyphosates, resistant to insects and drought; to produce plastics, fuel, vaccines and other industrial products. Once a sacred seed it is fast becoming a product at the service of capital. As Miguel Ángel Asturias [16] said, "When sown in order to be eaten it is the sacred sustenance of the man who was made of corn. When sown for trade it is the hunger of the man who was made of corn".

Transgenic maize is expanding in our region: in its cradle and centre of diversity. At present there are already millions of hectares of transgenic maize in Argentina and Brazil. It is cultivated on a smaller scale in Colombia, Uruguay and Honduras and there is a threat of it expanding to Paraguay and Bolivia. Experimental sowing has already been approved in Mexico... The reality is that no country in Latin America is free of this threat. This is the reality, as genetic contamination of varieties of native and Criollo maize has already been reported in Mexico and Peru, where the sowing hadn't even been approved. On the other hand the expansion of agribusiness in farming territories has resulted in the tendency to cultivate lesser and lesser maize in the traditional way, as small plots or farms are being replaced by crop monocultures that produce maize to principally feed farm animals. The fields are sprayed with chemical pesticides, causing the Pachamama, our Mother Earth, to become afflicted.

It is imperative to stop this as it jeopardizes the food future of our peoples. Therefore, the Red por una América Latina Libre de Transgénicos (Network for a Transgenic Free Latin America) proposes to the people of the world, to their governments, to farmer and indigenous communities, who are the guardians of native maize, TO DECLARE NATIVE MAIZE AS THE CULTURAL PATRIMONY OF HUMANITY.

In Guatemala, one of the centres of origin of maize, on the 22nd of September 2011, the Government declared it as part of the Natural and Cultural Heritage of the country, as it is fundamental as a food source and essential to the spirituality of the Mayan people. The Decree states:

Maize, in all its varieties, be it indigenous, own, distinctive, original or specific to the Guatemalan soil is henceforth the Cultural Patrimony of the Nation.

Given that the grain has been used since ancient times in Guatemala and given that it is part of the mythology, cosmogony and calendars and has been the essence of the spirituality and cultural practices of the Mayan peoples[17].

This is an example to be emulated, whether such a declaration is recognized by an official body, or decreed by the peoples of the world. What is important is that our native and Criollo maize must be protected, used, exchanged, crossed, stored, consumed, sown in such a manner that its continuity is assured, in order to prevent its genetic erosion, so that from this we continue to create diversity, which is the source of life of our Continent.

Transgenic maize is a threat to the Criollo and native varieties as these can be genetically contaminated through pollination or cultural practices such as the exchange of seeds and enter into the traditional production circuits. Therefore it is urgent to take measures to reverse the expansion of transgenic maize in Latin America in the areas where they are already being sown and prohibit them from being sown in areas where this is not yet being done.

In this regard, the Network for a Transgenic Free Latin America urges the world society to:

DECREE THE CENTRES OF ORIGIN AND DIVERSITY OF MAIZE TO BE TERRITORIES FREE OF TRANSGENIC MAIZE.

DECLARE NATIVE AND CRIOLLO MAIZE AND THE PRODUCTION SYSTEMS ON WHICH THEY ARE SUSTAINED AS THE CULTURAL PATRIMONY OF HUMANITY, IN THE INTEREST OF ITS PEOPLE.

To ensure that the biodiversity of maize that we received from our forefathers, is a heritage that must be passed on by us to our children and grandchildren.

In this publication we have chosen a small sample of the cultural wealth that Latin America possesses around maize, expressed in the form of poetry, legends, culinary recipes and stories. This is a small effort to contribute to the flow of knowledge, of traditions and flavours of maize and is an urgent call to save our native and Criollo maize. We have tried to draw from the memory of our peoples, as like the wise men of *Yoreme* say, "We must cherish old memories, to build youthful hopes upon[18].

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Daughters of the Corn

The indigenous women of Latin America have come together as a network, Daughters of the Corn, to protect their biodiversity, seed sovereingty, food sovereignty, land sovereignty in a ceremony organized on the 28th of August in Quito. The cermenoy dedicated to Pachamama(mother earth) and the corn, was organised by the elders of the community on the 28th of August, during Dr. Vandana Shiva's visit in Quito. We are the corn – Daughters of the Corn.

SEED SAVING AND WOMEN LEADERSHIP IN PERU

Patricia Flores*
IFOAM Regional Office

Peru is located on South America's central Pacific coast. Peruvian territory was home to ancient cultures, having one of the oldest civilizations in the world as Caral (about 3,000 b.C.). Its geography varies from the arid plains of the Pacific coast to the peaks of the Andes Mountains and the tropical forests of the Amazon basin. This geographical diversity gives place to a broad diverse ecology accounting 84 zones of life of the existing 104 in the world, giving exceptional conditions to cultivate a wide range of important food crops for the world.

Ancient cultures feed traditional and indigenous knowledge as an ancestral legacy. All this knowledge and wisdom, together with a rich natural environment, has been key factor to develop appropriate technologies and wise use of genetic resources which provide the basis of the staple food system of Peruvian society nowadays.

Peruvians are proud of their diversity, hence proud of their food and cuisine. Maize (purple maize, Urubamba maize), native tubers, roots and grains, tropical and Andean fruits, chilis and peppers, etc. are mostly grown by smallholder farmers in diversified production systems providing food for the local community and nationwide.

The National Association of Organic Producers of Peru (ANPE Peru, in Spanish) is a grassroots organization working on agroecology advocacy and capacity building for best agroecological practices, local market access, and leadership and empowerment. Women leadership has turned to be an important aspect developed by ANPE, as women farmers are considered as genetic resources conservationists, they handle their agro-biodiversity, are responsible for the seeds at the family and community level. For ANPE's organic farmers, seeds are considered as a masterpiece of "campesinos" and indigenous people. It is a collective creation expressing not only genetic features very well studied by scientists, but also expressing people's history and stories especially of women.

Without seeds there is no agriculture. In situ conservation of flagships of agrobiodiversity, is a prior issue and for that, local and national fairs are organized, Pachamama celebrations are organized since ancestral times, and knowledge and wisdom is permanently exchanged and transferred from one generation to another generation.

As in many other countries in the world, law enforcement with patent on seeds and other kind of life forms, are jeopardizing the freedom of cultivating with ecological and culturally appropriate techniques. Not only high yield hybrids but also genetic modified organisms are introduced even against farmers' will, in the food system. As a result of a national mobilization with opinion leaders against GMO liberalization, the Peruvian government declared a 10-year moratorium.

In August this year, as part of the strategy in the seed issue, ANPE established the Seed Safeguards Network, led by women farmers. 50 women from 16 different regions gathered in a national workshop. Those same days, they were strongly inspired by Vandana Shiva's messages during her visit to Peru.

But, who are these women farmers from ANPE? Here is a collection of their life testimonies.

Marisol Medrano – President of ANPE Peru

Photo by Roberto Ugas

Marisol is from Abancay, Apurimac, a southern Andean department of Peru. She is married and has four children. Her farm has 2 hectares and together with the family farm, they can manage to produce in 7 hectares in total. The farm, as it usually is in the Andean area, is split in two communities, Karkatera and Pacchajpata, and located in 3,000 meters over the sea level. There, she and her family grow a diverse arrange of crops and raise animals integrated to their production system. All practices are organic with an agroecological approach. *"I grow a diversity of crops and raise livestock, but my strength is as a maize grower. I have around 120 ecotypes of coloured maize in my farm. In my practice as a farmer, I crossed my corns. unintentionally Noticing that I had different types of corn as a result of cross pollination, I started to classify them systematically by their appearance. I didn't know that I was applying breeding techniques. I handle my own maize seeds according to my cross-bred varieties which are adapted to my local environmental conditions".* Marisol sells her organic products in the local fair of Abancay where she as former President of the regional producers organization, worked to establish a permanent space for organic producers to sell their products.

Marisol strongly delivers her message *"We, farmers, have to work on a diverse production system. Though it can be tough, it produces enormous benefits for the family: a diverse diet, a local pharmacy (she grows medicinal plants), a beautiful landscape (flowers), and a place where I can sit down to enjoy and reflection on my life. I cannot do this, if my freedom to use, exchange, sale and conserve my seeds is taken away."*

Rosa Alvina Sifuentes Portocarrero

Photo by Moises Quispe

Rosa Alvina is married, lives with her husband and her mother and has 3 children, in a farm located in Duraznillo, Pisuquia in Luya province, Amazonas Region at 1,800 meters over the sea level. *"I have 5 hectares, of which 2 are coffee and banana crops. In the rest of the area I grow cassava, fruits, sugarcane, peas and fodder for my animals (hen, guinea pigs, ducks) for family consumption. I have also cattle and horses for my transportation."* Rosa Alvina's farm is far from the next important city, Chachapoyas. She has to walk 3 to 4 hours to the main market where she sells her coffee. At her farm, she produces beans, maize, peas and carries out conservation practices to preserve her maize and beans seeds. Her grandparents gave to her a heritage of seeds so that she could take care of them for a food secure future. *"These seeds, from my ancestors, are resilient to climate change. They are my heritage and my family relies on them for a food secure future"* she continues, *"Banana is our staple food. I have 7 banana varieties. Coffee is important as cash crop and thanks to ANPE I started on coffee processing and now I can sell my coffee as "special coffee" . I also had the opportunity to showcase my experience at Mistura".* Mistura is the most popular food festival the gastronomy movement organizes once in a year in Lima, the megacity capital of Peru. APEGA, the association organizing Mistura, gives a strong political back up for ANPE's farmers. *"Presently, I regard myself as a rural small entrepreneur, my family income has significantly increased, and that has been an important change in our lifes".*

Rosa Alvina is the leader of the organization of farmers in her region. As a female leader of a farmers organization, it has been tough at the beginning. *"Male farmers do not trust on females as leaders. But after they saw how much I work for our organization, attaining results and being responsible with my role, they understood my contribution as a mother and as a member of the organic farmers organization. I will face the new challenges in the Amazonas Regional Association of Organic Producers. We are more than 600 smallholders, and 12 native communities of the ethnia Awajum are members of our organization."*

She ends with this message: *"Organized women conserve seeds for our future. Food Security and Sovereignty means to me that we have to be capable to guarantee food for our family with healthy, safe and local products. It means that we have the choice and freedom to grow our food with our own quality reference, which has to do with ecologically-sound systems according to our culture and traditions. Hence, it is important that conservationist communities and smallholders get organized to preserve our seed heritage to give our children what we once received from our ancestors."*

Gladis Dina Rurush Jorge

Photos provided by Moises Quispe

Gladis Dina was born in the rural community of Tauripampa, province of Carhuas, department of Ancash. Her farm is over 3,700 meters over the sea level. She had a difficult life as a child and had to work as a grazier over mountain tops for survival. She and her little brothers lived in despair and hunger. But with strong determination she completed her schools and went ahead to graduate as a nurse. Her marriage life was difficult and she ended the relationship after the birth of her daughter owing to domestic violence. Her finacncial situation was so bad that her daughter had to survive on governmental food programs. But Gladis determind to continue her fight and improve her living conditions.

Being a natural leader, she was elected as the President of the local committee. She started learning gender issues with support of the NGO Manuela Ramos. *"My family tradition as farmers, make me kept close to my farm to produce the food of my choice. I have a diversified farm where fullfil all my food requirment. I only buy oil, sugar and salt from the market. Despite all these issues, I managed to overcome my difficulties and now I am proud of myself".*

Gladis produces potatoes, mashua, oca, wheat, peas, broad beans, lentils, barley, quinoa, lupinus, and many other food crops. *"If I sum up all the small pieces of land I have, I got 3 hectares in total".* In the lower areas, she grows fruits such as lima, avocado, Peruvian golden berries, tuna, maize, inga, peaches, sweet corn and all kind of vegetables. She also raises animals such as sheep, guinea pigs, pigs and hens. *"Besides self-consumption, I sell my products with added value. 70% of what I produce is for my own needs, and 30% is for sale. With ANPE we have now better access to fairs and markets and have recently started on a bakery initiative with all the official requirements".*

Gladis told us how she manages her production system, *"I start with the seed. I classify my own seeds and afterwards, I storage them. Tubers are wrapped with ichu (native grass) or muña (aromathic native species), which will keep them free from pests and diseases. Cereals and legumes are kept in clay containers. I always keep seeds for the next sowing season. I rely on my own seeds".*

Gladis is the President of the Regional Association of Organic Farmers of Ancash. *"I appreciate the confidence that my pairs have on me. They have full faith in my dedication and and ability whic gives me the energy to continue in this path". Gladis also has another gift, she writes songs and sings folklore music. "I use my artistic skills to write and sing songs related to the Pachamama and Agro-ecology. I am soon releasing my third disc highlighting our agroecological messages".*

Project AGROECO "ecological and socioeconomic intensification for food security in smallholder agriculture in the Andes, Peru" is a research project aimed at documenting the development incidence on the food security status of smallholder families through agroecological interventions in traditional food systems. AGROECO's main partners are Universidad Nacional Agraria La Molina (UNALM), Sociedad Peruana de Derecho Ambiental (SPDA) and University of British Columbia (UBC) and is funded under the Canadian International Food Security Research Fund (CIFSRF) by IDRC and CIDA. Women farmers and leaders like Marisol, Rosa and Gladis, as well as ANPE as grassroots organizations where they belong to, receive support from AGROECO and together as partners they have committed to deeply study the current situation of the traditional seed systems in the Andes, from the technical, social and legal points of view.

Saving Potato Diversity

Roberto Ugas*

Women play a central role in the conservation, production and marketing of native potatoes. The Hancco family in Pampacorral, Cusco, conserves over 200 varieties of potato and other Andean roots and tubers. For a catalogue of these potatoes see: http://www.lamolina.edu.pe/hortalizas/catalogopapas/

The Hancco family. Photo by roberto Ugas

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A Call to Certain Academics

They say that we do not know anything.
That we are backwardness
That our head needs changing
for a different one

They say that some learned men are saying this about us
These academics who reproduce themselves
in our own lives

What is there on the banks of the river, Doctor?
Take out your binoculars
And your spectacles
Look if you can
Five hundred flowers
From five hundred different types of potato
Grow on the terraces
Above the abysses
that your eyes don't reach
Those five hundred flowers
Are my brain
my flesh

–Jose Maria Arguedas

Defending Seed and Food Sovereignty in the Andes

Alejandro Argumedo*
Asociación ANDES and the Potato Park Communities

Introduction

Seed systems – characterized by the selection, saving, trading, and breeding of traditional landraces according to customary laws of communal ownership – embody the very roots of Andean existence. Their protection is critical for maintaining a strong Indigenous identity. Andean Indigenous communities' practices of biodiversity conservation and landrace protection stem from their own interpretations of biocultural value; yet traditional seed systems and practices of biodiversity conservation have contemporary concepts of food and seed sovereignty at their core. In this essay, we reflect upon Quechua communities' customary laws and Indigenous worldviews, showing the principles in common with global food and seed sovereignty movements. To do this, we focus on the Potato Park (the Park), detailing its contemporary work to sustain genetic resources and Indigenous knowledge in the Peruvian Andes, in an effort to inform the global struggle for sustained access to and control over native seed and Indigenous territories. In recognizing the historical roots of food sovereignty, we hope to reframe the modern version of this struggle as a set of traditional practices in which communities around the world are already well-versed, and to provide a working model to inspire communities in solidarity across the globe.

The current state of the seed sector in Peru is characterized by trade liberalization and drastically strengthened plant breeders' rights (PBR). The *US-Peru Trade Promotion Agreement* (US-Peru FTA), signed in April of 2006, is in the process of being ratified. In its provisions, the *Agreement* includes Peru's adoption of the newest version of the *Convention of the International Union for the Protection of New Varieties* (UPOV).[22] UPOV significantly strengthens plant breeders' rights. It grant breeders exclusive rights to produce, sell, and market protected varieties. It also includes 'essentially derived varieties'[23] and a 'farmers' privilege' provision, which formally restricts seed saving practices. Within the international intellectual property rights system, UPOV is the most advanced instrument available for extending plant breeders' rights and for promoting the privatisation and commodification of natural resources. As such, it poses a serious threat to indigenous practices of communal ownership. The signing of both the US-Peru FTA and UPOV mark pivotal moments in the way the seed sector is governed in Peru, and present formidable challenges to Indigenous communities fighting for the integrity of their traditional seed systems.

It is in this context – of trade liberalization and the deployment of intellectual property tools that concentrate decision-making power and access to seed and plant-breeding materials in the hands of a few multinational corporations – that we look to traditional Andean customary laws and practices to guide the food and seed sovereignty movement. Traditional seed systems and biodiversity are under siege due to national policies aimed at forcing participation in international markets. These practices themselves hold the key to both their own persistence and the global seed sovereignty movement.

Our contribution first describes the concept of 'the communal' as the basis of seed and food sovereignty in the Andes. The foundation for contemporary expressions of sovereignty is provided through a discussion of the traditional *ayllu*, a system of community in which the biological, the cultural, and the spiritual are recognized as interconnected. We introduce the Potato Park as an example of how Quechua communities traditionally manage agrobiodiversity *in situ*, recognizing the inextricable link between potato varieties and their social and ecological contexts. We also take a closer look on the principles of food and seed sovereignty practiced at the Potato Park, suggesting that the traditional knowledge of Andean Peoples find contemporary expression in the right for self-determination – political, economic, and intellectual. We highlight progress made by the Potato Park in authentic participatory governance, and in strengthening resource claims. Potato Park is a great example for the communities involved in the global movement for seed sovereignty.

Seed and Food Sovereignty in the Andes

Equilibrium, Reciprocity, and the Quechua Cosmovision

While the language surrounding food and seed sovereignty is relatively new to policy arenas, they are ancient concepts which have been kept alive in the Andean region and can be found embedded within traditional seed systems. Indigenous communities have safeguarded plant genetic diversity for millennia via the traditional practices that stem from and nurture their bio-cultural heritage. The fundamental principles guiding the contemporary seed sovereignty movement have traditionally been – and continue to be – those that undergird the day-to-day reality of the Quechua. Quechua seed- and food-related knowledge, practices, and systems of innovation, as well as values built up over thousands of years, provides the ethos which guides the seed and food sovereignty movement for Andean Indigenous peoples. Moreo ver, it is the free exchange of knowledge – a tenet also at the heart of the seed sovereignty movement – which provides the foundation for existing Indigenous law. Under this law, seeds are viewed as communal property, belonging to past, current, and future generations in equal measure. Although individuals may have varying roles and responsibilities with regards to their use and conservation, individual property rights do not attach to seeds (Harry & Kanehe 2005).

Aymara sociologist Félix Patzi Paco (in Mignolo 2009) describes 'the communal' as the collective rights to use and manage resources, while communities, families, and individuals share the benefits of what is collectively produced. Indigenous property systems emphasize obligations to communal resources, many of which are considered inalienable components of their biocultural territory and integral to the collective cultural survival of the group (Oldham 2009). Genetic resources and Indigenous knowledge have profound social, cultural, and spiritual value, as well as the more commonly asserted economic worth. Seeds themselves are recognized to have intrinsic value, and are an inherent and inviolable part of peoples' collective heritage.

To understand Andean food and seed sovereignty concept, knowledge about their indigenous cosmovision related to spiritual, social and ecological aspects become necessary. Quechua societies have a profound respect for *Pachamama*, or Mother Earth; and reverence for the power and fragility of the *apus*, or mountain gods (Argumedo 2008). They are concerned about and try to keep an equilibrium with Pachamma in all their daily activities and agricultural practices- ecomomic system of Quechua is developed based on this principle.

Equilibrium and reciprocity are the ethical foundations for Indigenous food sovereignty in Andes. Equilibrium, or rakinakuy, refers to living in harmony with nature, with sacred world, and with one's community members. It encompasses respect for nature and a determination for conflict resolution with in the community to restore social harmony. In modern-day Peru, equilibrium is reflected in all aspects of Indegenous life- how they apply their laws, and in how they distribute the profits of labour fairly – concerning the needs, capabilities, responsibilities, and contributions of community members. Sacred reciprocity, or ayninakuy, is a Quechua principle. Ayni translates to action, or the day-to-day practice of reciprocity that ensures maintenance of traditional food and seed systems. For the Quechua, what they received must be paid back in equal measure; this conviction is the basis of Indigenous law in the Andes. This law is recognized not because it is backed by powerful institutions, but because each person acknowledges the benefits of behaving in accordance with this principle with the the expectations of similar behaviour from other members of the community. In other words: Quechua exchange the recognition of authority for mutual benefit. Ayni, or active mutual assistance, can be applied both to the people and to the elements of nature. This can be observed in the practice of both seed exchanges amongst Indigenous communities and in the distribution of agricultural work amongst their members.

Equilibrium and reciprocity are thus the cornerstones of the Quechua cosmovision. They uphold practices such as redistribution of land, water, and seed, and support responsibilities to the public good – a behavioural paradigm opposed to the capitalist morals of individualism, competition, and accumulation. Indeed, the concept of 'accumulation' is relatively alien to the Quechua, as this practice would destroy the balance between humans, nature, and the supernatural world. In the Andean Indigenous worldview, all resources ultimately derive from Pachamama, and all human knowledge and skills are collectively held. The logical conclusion is that profits from human interaction with the land and its resources should be equally distributed.

The Social-Ecological Ayllu

According to Quechua Peoples, nature is inextricably linked within the *ayllu* system, the traditional form of community in the Andes. Academic depictions of the *ayllu* vary widely, with some characterizing it as a socio-economic system (Godoy 1986); others as a unit of commonly held territory, comparative self-sufficiency, and relations of reciprocity (Lewellen 2003); and others view it as a process of collectivism (Ugarte 1926). We feel all of these descriptions as simultaneously correct, yet incomplete, since the *ayllu* is not only a social but also an *ecological* phenomenon. It can be understood as a social-ecological terrain made up of three intersecting realms: the *runa* (domesticated plants and animals), the *sallka* (wild animals, plants, and crop relatives) and the *auki* (the community of the sacred, including apus, *pakarinas,*[24] and others). According to Quechua belief, it is only by achieving balance between the land *(Pachamama)* and these three *ayllus* that one can achieve *sumaq qausay*,[25]or 'the good life.' These interconnected social-ecological *ayllus* reflect the long Andean history of co-evolution between mountain ecosystems and their Indigenous inhabitants. Thus, the Quechua cosmovision is of a natural environment that cannot be reduced to sum of its basic principles, since these principles cannot be isolated, abstracted, or removed from the system without disrupting the integrity of the whole. What is popularly termed as 'conservation' and 'development' is inherent in the the *ayllu* system. These ostensibly contradictory terms – development is intrinsically concerned with change, while conservation emphasizes continuity – are resolved when a continuous balance is maintained across ever-changing cultural, physical, and biological realms.

As it developed in Inca and pre-Inca societies, the *ayllu* in many ways anticipated modern-day food sovereignty, by establishing institutions such as customary land tenure, production and exchange systems, political organizations, and cultural identities. In contemporary times, it provides a basis for sustaining Indigenous livelihoods by reinforcing these institutions and enabling communities to renew their relationship to ancestral lands, historical memory, Indigenous discourse, ceremonial and economic practices, horizontal learning networks, and Quechua laws.

Quechua seed and food sovereignty is achieved by upholding the sacred responsibility to nurture healthy, interdependent relationships with *Pachamama* and the three (wild, domesticated, and spiritual) *ayllus*. These relationships have long provided, and continue to provide, identity and livelihood for the Indigenous peoples in the Andes. Linking society, ecology, and spirituality, the *ayllu* is a working model of communal organization that predates – and has survived – the advent of capitalism. This model is thus capable of acheiveing seed sovereignty, and to promote political action against both neoliberalism and its manifestations in the global seed sector. We also illustrate how the principles of reciprocity and equilibrium guide the indigenous notion of sovereignty, from the sacredness of the seed, to mutual benefit-sharing and the innovation in food and seed policy-making.

The Seed and Food Sovereignty Movement in the Potato Park – Principles and Practices

Re-asserting Political, Economic, and Cognitive Rights

Asociación ANDES is a civil, non-profit association working with Indigenous organizations at the local level to affirm the rights and responsibilities of communities and strengthen food sovereignty, health, and livelihoods. In 1998, ANDES helped to establish the Potato Park, an agrobiodiversity conservation area governed by a partnership of six Quechua communities, spanning over 9,000 hectares of land in Pisaq, in the Sacred Valley of the Incas. The Park protects and nurtures a traditional mountain agroecosystem that is one of the richest native potato diversity areas in the world – considered by experts to be one of the centers of origin of the potato. Dedicated to the preservation of the native potato through Indigenous tradition, the Park is emblematic of ANDES' approach to self-determined development.

Food sovereignty, first formally articulated in 1996, has been defined as the right of nations and peoples to control their own food systems and agricultural policies, to organize production and consumption to meet local needs, and to secure access to land, water, and seed (Wittman, Desmarais & Wiebe 2010). At the crux of the food sovereignty framework is the right to self-determination, on which all other principle are founded, and without which none of its goals will be achieved. For the communities of the Potato Park – just as it was for their Andean ancestors – seeds and food are sacred entities, gifts from *Pachamama*. Access to seeds and food, therefore, cannot be controlled by colonial or neocolonial laws, policies, or instruments (such as UPOV). Indigenous communities can fulfill their needs for healthy, sustainable, and culturally appropriate foods. only through self determination. In the communities of the Potato Park, self-determination takes many forms: participatory political processes, reciprocity-based economic exchanges, and cognitive self-determination that bridges innovation and Indigenous knowledge.

Local political control over natural resources and Indigenous knowledge in the Potato Park has been greatly strengthened through the development of an *Inter-community Agreement for Benefit Sharing (the Agreement)* – a formal arrangement amongst the communities of the Park, borne of the realization that any effective external engagement had to be based upon internal consensus. The Agreement now enables the communities to collectively negotiate equitable agreements with third parties. It also establishes a process for developing community protocols for a reciprocity-based, local barter economy. Of particular significance to seed sovereignty, the Agreement give specific significance to seed sovereignty and ensure the free flow of knowledge and seed genetic resources between the communities and their members. It empowers the Association of the Potato Park[26] to take charge of the distribution of benefits of genetic resources amongst community members through the activities of a special commission (the Benefits Allocation and Oversight Committee) and via the work of the Papas Arariwas (Guardians of the Native Potato), a collective created specifically for the distribution of repatriated potato seeds (ANDES, Potato Park communities, and IIED 2012). The Agreement was written so as to be consistent with international protocols on access and benefit-sharing (ABS), like the *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (the Nagoya Protocol)* and the Food and Agriculture Organization's *International Treaty on Plant Genetic Resources* (ITPGR). At the same time, it explicitly rejects conventional ABS models that seperate Indigenous knowledge from its biological and cultural context. While uncertainty still lingers over how the *Nagoya Protocol* and the ITPGR will be implemented, and how to enclose Indigenous knowledge within the restricted domain of 'property rights.' This Intellectual Property Right regime is not only foreign to Quechua understandings of 'the communal,' but also facilitates the commodification of Indigenous knowledge.

While local control is at the heart of the Potato Park's sovereignty, its active participation in food and seed policy-making at regional, national, and international levels has been a key strategy for reinforcing that sovereignty. The Potato Park attempts to reconcile Indigenous seed and food values with national laws and policies (including those imposed by bilateral free trade agreements and UPOV), and with the kinds of mainstream economic activities that characterize the neoliberal system. At the regional level, the Park's communities have been active participants in developing policies and processes pertaining to biodiversity, seed systems, environmental conservation, nutrition, agriculture, and rural and community development.

Two recently passed laws have been adopted to regulate bioprospecting and biotechnology in the region: the Ordinance on Biopiracy,[27] and a separate ordinance which declares Cusco province a transgenic-free zone.[28] A third proposed ordinance, currently being reviewed, would establish the Regional Brand "GE-Free Cusco."[29]

The legal instrument banning transgenics explicitly prohibits the introduction, cultivation, manipulation, storage, conservation, exchange, confined use, and commercialization of genetically modified organisms (GMOs), which are considered a grave threat to regional food security. The Regional Brand "GE-Free Cusco" proposes a stamp identifying transgenic-free products of the Cusco region, intended to help prioritize their sales and assure the quality of agricultural production within regional, national, and international markets. The logo would help small-scale organic farmers benefit from the prominence of the region as a center of origin of the potato, and to develop its economic potential sustainably. These ordinances illustrate how participatory engagement can result in substantive regional legislation that recognizes principles of Indigenous rights, and acknowledges Indigenous Peoples' food and seed sovereignty. Taken together, they provide a supplementary legal framework which incorporates both Indigenous and Western laws in an innovative approach to access and benefit-sharing. They also represent an opportunity to strengthen the position of Indigenous communities within the international multilateral benefit sharing system of the ITPGR, granting Indigenous groups legal recourse for their declaration of seeds as sacred entities.

The political activities of the Potato Park communities, such as the *Inter-community Agreement for Benefit Sharing*, reflect the extent to which millennia-old Indigenous principles of reciprocity and equilibrium nurture regional, national, and international policies.

The Lares market epitomizes the principle of reciprocity of Quenchua community. A network of *chalayplasa* (barter marketplaces) exist among the Quechua communities of the Lares Valley which provides non-monetary food procurement based on mutual obligation (Argumedo and Pimbert 2010). The Lares network carries on a longstanding tradition of barter in the region. The geography of the Andes, a landscape marked by unique agroclimatic belts (or what the Inca once termed 'life zones') from coast to mountain-top to rainforest, has spawned a system of 'vertical exchanges' through which crops from different zones are traded. Within these belts, Indigenous knowledge has helped to sustain significant crop genetic diversity, represented in populations of adapted landraces and crop wild vareities. For the Quechua, this genetic abundance was essential for survival, as it provide partial resistance to diseases and allowed farmers to derive multiple nutritional, medicinal, and ritual uses from harvested species (Argumedo 2008). By facilitating exchange between these agroclimatic belts, the traditional barter system fostered an economy based on reciprocity between different mountain agroecosystems. Today, the *chalayplasa* continues to serve as a dynamic, cooperative network through which a wide variety of biological resources are shared. It has also become a critical part of many households' food security strategies, helping families to establish buffers against uncertainty in food markets and volatility in the globalized food economy. The *chalayplasa* therefore plays an important role in food and seed sovereignty in the region, providing a non-capitalist model for market exchange that supports – and is supported by – high levels of agrobiodiversity and Indigenous knowledge. At a time of diminishing federal support for small-scale farming (particularly in the highlands), and of widespread re-orienting of agricultural systems towards export-driven food production, the barter market shields the Lares communities against the loss of control that many Peruvian smallholders face.

Beyond political and economic expressions of sovereignty, the Potato Park communities have also worked to attain 'cognitive sovereignty.' The Park, and the larger Andean agroecosystem within which it resides, represent a particular landscape that not only physically embodies millennia of human-land relationships, but constitutes a way of *thinking about agriculture*. The Potato Park and ANDES have co-developed the concept of 'biocultural systems' to describe social-ecological relationships based on Indigenous knowledge. This concept, in turn, underpins a new conservation model developed: the Indigenous Biocultural Heritage Area (IBCHA). ANDES and the Potato Park communities have proposed the IBCHA as a *sui generis* system for the protection of Indigenous knowledge across its cultural, temporal, and spatial dimensions. The model describes a community-led, rights-based approach to conservation that protects and enhances local livelihoods and biocultural diversity using the knowledge, traditions, and philosophies of Indigenous peoples – particularly as they relate to holistic management of agricultural landscapes. The model itself resulted from participatory processes within the Park, exercises intended to clarify how negotiations with outside groups should be managed, and how the benefits of common property (such as seed genetic resources) sould be distributed amongst individuals and groups. The communities developed a series of protocols to ensure local decision-making over matters pertaining to intellectual property, including a stipulation for prior informed consent. It also codified a reciprocity-based strategy to ensure profit generation through Park activities (for example, through the sales of potato products, Indigenous crafts, or medicinal remedies), and equal sharing of profits.[30]

Theoretically, the IBCH model can provide a foundation for Park policies in several areas, from intellectual property to water rights. However, it has been most effective in providing the Park's communities a language and a framework within which to address issues fundamental to seed sovereignty: like the access to biodiversity and genetic resources, and control over the Indigenous knowledge associated with such resources. Since the Park has been successful in incorporating biocultural terrutories into policy and legislation through the communities' strategic engagement with the regional government. The biocultural conservation model has also gained international recognition, through conservation protocols such as the International Union for the Conservation of Nature's Indigenous and Community Conserved Areas, and the *Convention on Biological Diversity* (CBD) provisions related to traditional knowledge, innovations, and practices. We emphasize that although the Potato Park has emerged from a non-replicable history of social and ecological co-evolution in the Peruvian highlands, the IBCH is an adaptable model for other communities, regions and knowledge systems around the world. I

Next Steps towards Sovereignty

ANDES is currently focusing on affirming the political, economic, and cognitive rights of Indigenous communities at the international level. We also aim to secure their food and seed sovereignty regardless of the direction of national legislation. The 2004 agreement signed between the International Potato Centre (Centro Internacional de la Papa, or CIP) and the Potato Park, to repatriate native potato varieties. The agreement supports a range of research activities around climate change monitoring and adaptation, and it does so within a contractual framework informed by Quechua law. At present, over four hundred native potato varieties fro, CIP gene bank have been cultivated in the park. The return of these seeds is more than symbolic – it represents a significant advance in communities' sovereignty over their seed. For the Quechua, the repatriation of native varieties signifies a return of sacred spirits, in the form of potatoes, back to Indigenous soil. By reversing the flow of genetic resources from *ex situ* research centers to the mountains from which they were originally collected, repatriation not only combats the threat of genetic erosion, it is considered an act of 'decolonizing the seed': when the seeds were returned, the Park's communities regained sovereign rights to these plant materials, and with these rights came the power to control everyone's – including capitalists' – access to them. The repatriation project also represents a significant shift in power from the global to the local level, as the Potato Park's claim to native plant genetic resources was recognized at the international level (ANDES 2011; Carneiro Diasa and Conceicao da Costab 2008). Beyond that, an internal evaluation of the repatriation project, conducted in 2010, revealed that community members have developed a strong affinity with these repatriated varieties and feel that their return was an important gain in terms of control over genetic resources. The agreement was the first major accomplishment in declaring potatoes an essential part of Quechua biocultural heritage, and has spawned a number of social benefits associated with the repatriated varieties – including greater food security, strengthened Indigenous knowledge, and a reinvigorated enthusiasm for self-determined development.

ANDES and the Potato Park have pursued subsequent collaborations with international collections and institutions, in order to further secure the place of potato biodiversity within Indigenous territoriality. For example, the Park has made its genetic reservoir formally available under the multilateral benefit sharing mechanism of the Food and Agriculture Organization's ITPGR, thereby setting a precedent for Indigenous communities to actively negotiate alongside nation-states in a more democratic global seed management system. By making their genetic resources available, the Park communities are, in essence, affirming their sovereignty over – including control of and access to – native seed varieties.

On February 15, 2011, the Potato Park submitted 1,500 potato varieties to the Svalbard Global Seed Vault (SGSV), in response to concerns about their long term *in situ* conservation in a region that is already showing measurable impacts of climate change. The seed vault contribution is part of a three-year project that involves the training of local *Papa Arariwas* in pollination techniques intended to produce botanical potato seed from the vegetatively propagated crop. According to the Global Crop Diversity Trust (which manages the Svalbard holdings), this effort to safeguard traditional varieties represents the first community-based contribution to the so-called "Doomsday Vault." As such, it has been recognized by the Trust as a milestone in collaboration between Indigenous communities and international institutions, and highlights the potential for mitigating the impacts of global climate change through Indigenous knowledge. This initiative is yet another affirmation of Indigenous Peoples' inherent rights and their control over resources.

Challenges

Although important steps have been taken in terms of affirming Indigenous seed and food sovereignty at regional and international levels, critical challenges persist. Politically, the Potato Park and ANDES are tasked with finding ways in which Indigenous laws can articulate with the evolving intellectual property regime, both in national and at international level. As previously discussed, current intellectual property frameworks tend to deny the network of social-ecological relations in which Indigenous knowledge is embedded. As a result, even well-intentioned efforts to recognize Indigenous knowledge often became confined into the existing notions of property (for example, public, private, or common property), and in so doing ironically exacerbate threats to biocultural heritage. For the Quechua, experiences with 'bioprospecting' (the term for biopiracy often used by corporations and in free trade agreements) have proven that existing access and benefit- sharing mechanisms based on intellectual property rights, are more a curse than a blessing. Thus far, conventional ABS mechanisms have only provided them with limited 'opportunities' as rewards for their knowledge, practices, innovations systems, and biodiversity stewardship, while a separate category for 'goods' is used to generate colossal profits for third party actors. Moreover, on this uneven playing field, conventional ABS models have been unable to deal justly with the issue of 'prior informed consent,' highlighting the asymmetrical power relations that characterize the negotiation of benefit-sharing agreements. These asymmetries, in turn, can lead to inter- and intra-community conflicts, and create uncertainty amongst Indigenous Peoples as to how they will govern themselves and represent their needs to the outside world (ANDES, The Potato Park Communities, and IIED 2012).

For decades now, Indigenous Peoples have expressed their concern on the fact that the national and international laws which meant to protect Indigenous knowledge have a narrow perspective. A holistic approach should focus on the adoption of mechanisms that strengthen and maintain Indigenous knowledge as a whole, including all elements of the knowledge system. It should consider different elements like languages, customary norms and practices, and the traditional resources. In the current political context of liberalized national economy, it is vitally important that holistic approaches to 'intellectual property,' defined and advocated by the Indigenous communities themselves should take precedence at all levels of policymaking. This will help secure the political foundations of Andean food and seed sovereignty.

Conclusions

Principles and practices of seed and food sovereignty are laced throughout the Indigenous laws governing seed systems in the Potato Park. In describing the traditional Andean cosmovision, we have highlighted the responsibilities that Indigenous communities towards their spiritual, natural, and social worlds – Interconnected elements that must be kept in balance through the practices based on reciprocity and communal wellbeing. In the context of the Potato Park, these sacred responsibilities are interlinked with sacred rights, as the communities strive for self-determination in policy and governance, economic exchange, and most importantly, and the knowledge processes that continuously shape Andean landscapes, food, and seeds. We emphasize that although the Park communities must remain innovative in their strategic participation in policy making in all levels, the core principles of the contemporary sovereignty movement have long been rooted within their Indigenous traditions. By recognizing the historical background of food and seed sovereignty, Indigenous communities worldwide can gain a firm foothold in the struggle against the neocolonial policies that seek to undermine their traditional ways of life.

Asociación ANDES and the Potato Park Communities with Contributions from: Maywa Montenegro, Raj Patel, Sam Grey

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Footnotes

[22]The Peruvian national government signed and ratified UPOV '91 on August 8, 2011, having never been party to its previous versions (drafted in 1961 and 1978).

[23]The Essence of "Essentially Derived Varieties": http://www.managingip.com/Article/2384298/What-is-the-essence-of-essentially-derived.html and UPOV article 14 (5c): http://www.upov.int/en/publications/conventions/1991/act1991.htm

[24]Pakarinas are sacred places to which communities trace their ancestry – they can be water sources, or other points in the physical landscape at which groups literally emerged into creation.

[25]*Sumaq qausay* itself represents an affront to the dominant paradigm, where wellbeing is often measured in monetary income or financial assets. Instead, the Quechua notion of wellbeing considers diverse elements of the human condition, including the values, knowledges, and practices that influence quality of life – with 'life' applying to humans and non-human beings alike. Anticipating the core tenets of food sovereignty, *sumaq qausay* supports the right of people to control their own resources, economies, and livelihoods; it enables local peoples "to choose what cultural values they embrace" (Argumedo 2010).

[26]The Association of the Potato Park is the legal organization representing the Park's six constituent Quechua communities.

[27]La Ordenanza Regional 048- 2008 CR/GRC.CUSCO.

[28]La Ordenanza Regional 010-2007- CR/GRC.CUSCO.

[29]La Ordenanza Regional 058-2011- AG/GCR.CUSCO.

[30]As has been mentioned, this entails allocation according to the needs, capabilities, responsibilities, and contributions of community members.

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COLOMBIA

Defending Seed Diversity as an Integral Part of Cultural and Environmental Patrimony
Peasant and Community Reserves, Santander, Colombia

The Collective of Peasant and Community Reserves, originated from a movement for popular education and agroecology within the local peasant communities of Santander, North-Eastern Andean region of Colombia in 2001. We have been constantly striving to reclaim our traditional rights to agrobiodiversity by recovering and exchanging native seeds, as well as associated knowledge related to community uses and practices: culinary, medicinal, biomaterials, foliage. Apart from reclaiming a wide variety of seeds in our farms, we were able to create awareness among local farmers to defend seeds as an integral part of local and cultural patrimony.

We have acknowledged that we are a part of an escalating food crisis in Colombia, exacerbated by mono-cropping, biofuels, large-scale mining, GMOs and new seed laws. All these elements triggered a displacement of rural communities from lands and territories, as well as the more recent climate-related disasters. Our local convictions to show real alternatives to this food crisis,take insipration from the alliances at national and international level with civil-society campaigns such as Seeds of Identity, More and Better and GenderCC, which struggle for climate justice, seed freedom and food sovereignty.

Our community meetings are inspired by workdays or mingas, where we share food, knowledge, happiness and solidarity in sowing and harvesting together. We believe that innovative education and communication strategies are fundamental to strengthening cultural identity and common understanding; during the years we have extended ties with other indigenous, peasant and afrodescendent communities in Colombia and we have also begun a path to reconstruct a process of rural - urban dialogue. All this motivates us to relive our role as custodians of agrobiodiversity:

Self-acclaimed Peasant and Community Reserves are another expression of our mission to defend territories and the commons (water, forests, landscapes and seeds), they allow us to learn again from the wisdom of nature and implement agro-forestry practices for food sovereignty. We join our hands and voices to this global movement for Seed Sovereignty: reclaim our seeds and our dignity ... Diversidad y Buen Vivir!

Video-clips of seed savers in Santander - Colombia:

http://www.youtube.com/watch?v=uD-7xQ1xF-E&feature=plcp
http://www.youtube.com/watch?v=OMhRs4OEl_s&feature=context-chv

NICARAGUA

For the Defense of Biodiversity and Food Sovereignty

Harold Calvo, Campaign Seeds of Identity, Nicaragua

The Campaign Seeds of Identity is a coordinated effort of men and women, belonging to organizations of producers, consumers and civil society's networks, promoting initiatives and actions based on local agro-ecological knowledge and practices in order to rescue the conservation, multiplication, self-supply, use and consumption of seeds of creole and creolized varieties as a strategy to address the future challenges of peasant production in harmony with the environment, biodiversity, food security and nutrition, quality of life and identity of people.

Member organizations of the Campaign Seeds of Identity:

- "Farmer to Farmer Program" by the National Farmers Union and Breeders (PCAC / UNAG)
- The Group for Promotion of Organic Farming (GPAE)
- Consumer Protection League (LIDECONIC)
- Interest Group for the Sovereignty, Food and Nutritional Security (GISSAN)
- Humboldt Center
- American Alliance for Biodiversity Protection (APB)
- Organic and Agro ecological Movement of Nicaragua (MAONIC)
- SWISSAID

The objectives and progress of the Campaign Seeds of Identity in Nicaragua are:

1. To protect, promote and encourage the use of creole and creolized seeds with an approach focused on ecology and alimentary sovereignty.

We now have presence in 14 departments in Nicargua and more than 250 community banks of creole and creolized seeds. More than 35000 farm families produce and consume creole seeds.

2. Disseminating information and promoting, in communities and organizations, actions against the problems related to genetic resources and GMOs

Fairs of genetic resources and healthy food, courses and workshops on the benefits of native seeds on the risks of GMOs and actions for campaign at community municipal and national levels.

3. Strengthen advocacy for the adoption of programs, laws and public policies that protect and promote native seeds and prevent the introduction of transgenic seeds.

We have had active participation in the development and adoption of the Law on Biosafety (Act 705: On Prevention of risks from Living Modified Organisms by the Means of Biosafety Molecular Biotechnology) as well as in drafting the Act of Biodiversity (to be approved by the National Assembly), in the CONARGEN (National Commission for the analysis of the risks related to living modified organisms). We support the development and adoption of Act 693, act of Sovereignty and Security on Food and Nutrition and the adoption of the Law of agro ecological and organic production. We are also part of the technical committee to develop the compulsory agro ecological and technical regulation.

ARGENTINA

Reclaim Seeds as Common Goods

Grupo de Reflexión Rural (GRR)

The Grupo de Reflexión Rural (GRR) was created in the mid-1990s in Argentina as a forum for those with common interests and as a space for multidisciplinary dialogue and debate on the impacts of global capitalism. We do not adhere to the common practice of having membership criteria because we prefer to emphasise the strength of the internal links which have formed us, in a way that the whole is always greater than the sum of its parts. We have witnessed the painful consequences of centralism and authoritarian structures and we are striving to adapt our group to the current decentralisation of power. As some anti-globalists scornfully say, the Winter Palaces still exist, but they are more likely to be assaulted by hordes of tourists than by revolutionary organisations. From its creation, the GRR has expressed its ecological and non-conformist views, and its relentless criticism of the agro-biotechnology model based on the export of commodities, such as genetically modified soya and maize.

The proposals made by GRR are based on Food Security, eco-localisation, local development with local markets, as well as the recovery of seeds as a startegy to overcome the domination of our agriculture by the multinationals. Within this framework, GRR views organic agriculture as an expression of local production and exchange, but never as an alternative to industrial production.

1. The erosion of seed diversity and the disappearance of open pollinated varieties.

The seed is a parameter of the technological trends experienced throughout Argentine agriculture since the end of the 1950s.

Seed improvement centres used to distribute national seeds through development programmes which, in many cases, were provided free of charge for on-farm trials. Their objective was to promote the adoption of improved, primarily open-pollinating, cultivars which would allow the possibility of expansion by growers who considered them to be suitable for use on their land.

Even so, the agricultural tradition among farmers persisted, and they continued to make their own selections. The plants selected were often given the farmer's own surname and, in the farmers' opinion, they produced better harvests and/or had better characteristics than plants that had "improved" by the technicians. In 1972, the experimental station run by the National Institute of Agricultural Technology (INTA) in San Pedro, Buenos Aires was running potato trials on varieties with names like "Precoz de Marelli" and "Zanahoria de Cribelli", sharing the 'surnames' with rural families and their limited, yet precise, pedigree allowed farmers to plant according to their requirements.

It is important to point out that sweet potato shoots or seedlings have always been exchanged between producers without "bills or invoices", and in most cases, free of charge.

In the case of other intensive production, such as fruit, the "Limón Marelli" is a peach tree which is still in existence today. It originates from the Marelli family and demonstrates their capacity for agricultural selection. Another example is provided by the "Paccelli", another family in San Nicolás who chose this peach as one of the earliest varieties in the region. These few examples are an indication of an agricultural life wher there is much contact between the crops and the "real farmer" who routinely examine their land a few times each day, taking the time to look at each plant and, by so doing, make HIS OWN seed selection and multiplication.

With INTA acting as the intermediary, Argentina quickly became involved in the Green Revolution. Norman Bourlaug was a frequent visitor to the experimental stations. In those days, we grew excellent quality wheat, which was developed and selected within a system of agricultural-livestock rotation and natural fertility. It did not take to fertilisers and would 'fall over' when they were applied. In the 1960s quality was cast aside in the search for higher yields, and wheat was cross-fertilised with Mexican hybrids. These were promoted by the International Maize and Wheat Improvement Centre (CIMMYT) and Norman Bourlaug with support from the Rockerfeller Foundation (in fact, Bourlaug is a frequent guest of the Argentine Association of NoTill Farmers (AAPRESID)). They have managed to breed cultivars that can be fertilised without causing them to wilt and which produce higher yields, but at the expense of quality.

The Flint type maize grown in Argentina was well-known on the global market. Its hardness and colour made it sought after for use as a feed in aviculture, as it gave the meat and the eggs an intense colour due to its beta-carotene content. Nevertheless, it underwent the same treatment as wheat and quality gave way to yield. The hybrid dent maize that the CIMMYT promoted for its improvement projects took over – another example of the Green Revolution, which was already preaching that it was well on the way to eradicating world hunger.

Not only was the "Flint" type lost among the hybrids, but the less rustic hybrid varieties of maize also facilitated the spread of the Mal del Rio Cuarto (MRCV) virus, a crop health-related problem which was tolerated by traditional cultivars such as Colorado la Holandesa.Today, this virus has serious implications for the maize crop.

In the mid-1970s, small and medium-sized farmers disappeared, and with them, large areas of land dedicated to the mixed farming which provided the typical diet of the Argentine population. The rice growing area was reduced by over 44%, maize by over 26.2%, sunflowere by 34.2%, wheat by over 3%, and there was a tenfold decrease in the area for cotton. Areas such as San Pedro in the province of Buenos Aires, lost 50% of their orchards and their plant nurseries to soya cultivation.

The soya model was based on the export of consumables with very low added value, the concentration of farmland and the depopulation of the rural environment. It was established indiscriminately and in a wholesale manner due to political acceptance of their dependency on this model.

The millions of hectares that have been planted with soya are owned by less than 2000 companies (through sowing pools and trusts). The widespread and complex network of sowing pools, the contractors of agricultural machinery, the local distributors of consumables, as well as the culturural and social life which took place in the small agricultural-livestock communities and rural towns have disappeared, leaving immense, empty tracts of land.

Our country has become a laboratory which is experimenting on the genocide of rural life. The 500 or more villages which have either been deserted or are in the process of disappearing are examples of this. The railways were broken up in the 1990s and immense routes and road systems were constructed to facilitate the export market. It is possible that Argentina, as a country, has the highest levels of recorded migration from the countryside to the poverty belts surrounding urban areas. The effects of this significant and progressive loss of the nation's cultural values and the uprooting of rural communities has a direct effect on the political and social life of Argentina and is reflected in a progressive weakening of the lives of the population.

The living conditions of the new urban poor are becoming increasingly sub-human. The majority of towns are suffering from social fragmentation and violence, not only in the Province of Buenos Aires but also in the rest of the country, where the clearances and the disappearance of regional economies continue to be a scourge, just as they were in the 1990s.

Francisco Loewy, a true activist for the values of rural life in Argentina, described the same reality in his book entitled 'La Encrucijada' (*The Crossroads*) and points to the following paradox:

'Even though productivity is increasing, the Argentinian countryside is losing its human presence. The majority of the population in the country's interior is languishing, while the fringes of the urban areas where people concentrate are overcrowded. There is no space, there are insufficient opportunities for employment and no infrastructure to meet their needs. The material costs, and doubtless the human costs, of this problem are far greater than the agricultural subsidies received from the industrialised countries.

There are still pockets of agricultural producers, their families and their cooperatives which steadfastly resist these destructive forces. What is at risk here is the loss of the last remnants of the culture and traditions of agricultural work. Our economists do not take these values into account. They are not found within their textbooks. Nor do they include in their calculations the tremendous social and environmental costs of these demographic changes, or the seriousness of their consequences. Nevertheless, the depopulation of the interior continues, and this places a stranglehold on Argentinian society and its economy.'

2. Threats to the seed sovereignty of rural populations from patents, legislation on seeds, and contamination by GM crops.

The legal situation relating to the use of seeds is an extraordinary phenomenon. It is increasingly interwoven into recent agricultural changes, both in Argentina and in other Latin American countries. This is due to technological changes in plant breeding, as in the case of hybrids and gentically modified organisms (GMO), and to the increasing support being given to applications for intellectual property rights (IPR) on technological innovations in order to claim royalties. This situation is linked to the privatisation of research and development activities (R&D) which are dominated by large transnational companies from technologically developed countries. These companies are looking to extend their industrial patents to include the new biotech products, monopolise profits through their exclusive rights on the patents, and increase their control over these innovations which have industrial and comercial applications. Intellectual property rights in Argentina are covered by two types of legislation and have two distinct types of protection:

1. The protection of plants through the breeder's rights.
2. The patents system.

In the case of the former, the 1973 'Seed Law' (Ley de Semillas y Creaciones Fitogéneticas No. 20.247) introduces the concept of protection of property for the creation of new plant varieties.

From the early 1990s, the Argentine legal and institutional system relating to seed activity and biotech products was strengthened through Decree No. 283 of 1991, which regulated modifications to the Seed Law. Additionally, the National Seed Institute (INASE) was created through Decree No. 2817/91 with the aim of controlling the seed market and to assure the quality and identity of seeds purchased by agricultural producers. According to the Seed Law, the National Register of Cultivars and the National Register of Cultivar Ownership were also created at this time.

There are two definitions which are of interest when considering the effects of these changes. The first definition relates to the Procurement of Plants. According to Article 1 of Decree 2183/91, Section b states: Any variety or cultivar, whatever its genetic nature, which is obtained through discovery or by incorporation of scientific knowledge.

The second refers to the definition of plant breeder which, according to Article 1 of Decree 2183/91, Section d states: A person who creates or discovers and develops a variety.

According to Article 20 of the Seed Law, the basic requirements to obtain property rights as a plant breeder are the creation of material that is distinct, stable and homogeneous.

In relation to this, Article 20 of the Seed Law states: Newly created plant varieties or cultivars which are distinguishable from others which are already known at the date of the application for property rights, and for which the individual possesses sufficiently homogenous and stable hereditary characteristics through successive generations, can be registered in the National Register of Cultivar Ownership and be considered as "property" under the above law. The appropriate procedures must be followed by the creator or discoverer, with the sponsorhsip of an agricultural engineer who posesses a national qualification or recognised equivalent. The new cultivar must be identified with a name which conforms to the relevant regulations of the Seed Law.

Two important points refers us to, firstly, the extent of the breeder's rights, and secondly, the exceptions to his property rights over a variety.

Regarding the former, in order to use the seeds of a protected variety, whether for production or reproduction, for sale or any other kind of market transaction, including import and export, it is necessary to have authorisation from the breeder.

The second point refers to the anticipated exceptions for the property rights of a plant variety. This has particular relevance, given that the patents system does not allow for this.

The exceptions favor:

a) Personal use by the grower on his own land;

b) Other plant breeders who may use the variety for the creation of new plant varieties;

c) Use or sale of the produce obtained as a raw material or food;

d) Public interest, where restricted public use of a cultivar can be established for a period of two years in order to ensure that there is an adequate national supply of the product. In this case, compensation may be paid to the owner of the property rights.

Argentine law only recognises the protection of the plant breeder's rights relating to intellectual property for seeds. It is worth mentioning that, in 1994, Argentina became a member of the International Union for the Protection of New Varieties of Plants (UPOV). The Union does not accept double protection. In other words, one can either be in the breeder system or in the patents system.

Argentina's Law on Patents, Inventions and Utility Models No. 24.481, which was amended by Law No. 24.572 (T.O. 1996), states in Article 4 that, in order to be protected by patent, an invention should satisfy the following conditions: it must have a practical use; it must possess an element of innovation, that is, a new characteristic which is unknown within the existing knowledge base, and it must be the result of an innovative activity. The requirement for the innovative activity cannot be part of the process used to obtain a new plant variety and, for this reason, it makes it justifiable to have a protection system which is outside the field of patents and which is exclusive to plant breeding.

Due to the above, the concepts of discovery and invention establish important differences for the protection of intellectual property within the Argentine legal system. Article 6a of the Patent Law establishes that, for this law to apply, discoveries will not be considered as inventions. Section g of the same Article states that any type of living material or substance which already exists in nature will not be considered as an invention. As a consequence, a discovery (defined as something which is found in nature), as opposed to an invention (which refers to an action created by man), cannot be patented.

It appears that, according to Article 7 of this law, one cannot patent:

a) Inventions whose use on Argentine territory should be prohibited in order to protect the health or life of a person or animal, to preserve plant life, or to avoid serious harm to the environment;

b) Any biological genetic material which exists in nature or any replication of this, or any biological process implicit in the reproduction of animals, plants or humans, including genetic processes to material which is capable of its own duplication under normal and free conditions in nature.

It is worth noting the importance of these regulations, as the act of patenting an invention is subject to the protection of even more important assets, such as public health and life, the preservation of natural resources and the environment.

These clauses demonstrate that, in an increasingly threatened world, there is a need to prevent changes being made to exisitng legislation which still values collective property linked to general societal interests, such as a person's life, the natural world and the environment.

Monsanto and royalty charges for the seeds of genetically modified soya.

Since early 2004, Monsanto has been asking the Argentine government for a system that will allow them to charge royalties for seed technology. Because of the difficulties that arose during negotiations between the Government, the Argentine Association of Seed Producers and the representatives of the unions, it was not possible to reach an agreement. Monsanto then decided to enforce its rights directly, by demanding royalties from the export companies in the courts of European countries where it holds the patent for soya RR.

It is worth remembering that soya RR was released in 1996, but given that Monsanto had not followed the necessary procedure through the Ministry of Agriculture, Livestock, Fisheries and Food (SAGPyA) for its immediate commercialisation, it resorted to a system of licenses in order to market the RR technology. It is also necessary to point out that Monsanto does not own the breeder rights, because they never completed the registration process with the National Register of Cultivar Ownership. Nor does it have the corresponding patent. With the help of other biotech industries, such as the Association of Argentine Seed Producers (ASA) and ARPOV (an Argentine subsidiary of UPOV), Monsanto's strategy has revolved around putting pressure on the Argentine government to modify both the Seed Law and the membership to UPOV91, which limits the farmers' own use of the seeds. Their strategy also demands payment of royalties for Argentine soya imports at the ports of entry. Monsanto initiated legal proceedings in Denmark and Holland in respect of global royalties.

In this context, a review of the existing legal system would be relevant, in so far as it reflects the conflicting interests faced by the new paradigm within biotechnology and its relation to the intellectual property rights.

This is an issue that requires more thought and debate, as there are signs that international agreements and national legislation is increasingly incorporating changes that adapt to the new industrial trends of the seeds trade, and which is largely driven by the large transnational biotech companies.

The agreement for the protection of plant breeders' rights to royalty payments within the patents system is evidence of these changes (comment by Lucila Díaz Rönner, GRR, Protection systems for intellectual property in Argentina).

3. The concentration of controls on seed supply by the transnationals.

Rural organisations in Argentina have lost sight of the reason for their existence and seeds are no longer part of their campaigns. Nor do they denounce or condemn the stark and non-negotiable soya and mining models proposed by President Cristina Fernández de Kirchner at a recent lunch with the Council of the Americas, where she stated: *"I have here – and this is the truth that I want to show you, because I am very proud of it – Monsanto's proposal. They will make a very important investment in Malvinas Argentinas in the Cordoba Province through a new, shall we say, genetically modified maize seed called 'Intacta'. They will also set up two centres for research and development, which are as important to us as their investment of 150 million dollars. One of these will be in Tucuman and the other in Cordoba itself"*.

She continued: *"Monsanto's investment is very important and will also help us to achieve both our Food and Agriculture Plan 2020, as well as our industrial plan… You can be sure that we will continue on the same path.*

I told them – and they were not aware of this – that we have Patagonia, where some Argentine producers grow forrage, for example, and where one can observe, in the middle of the Patagonian steppe, that only irrigation is needed to produce first class forrage.

The people from Monsanto recently explained to me that the maize that is going to be sown will allow, if the land is sown with maize and then with soya, an increase in the following soya crop of an additional 17 per cent. Also, it does not require… and this is the most interesting part… there is practically no need to apply pesticides. So, as well as increasing productivity, it will also improve the environment". (excerpts from this discussion can be heard on: (http://www.presidencia.gob.ar/discursos/25918-almuerzo-en-el-council-de-las-americas-palabras-de-la-presidenta-de-la-nacion*)*

GRR has published its position in a recent paper relating to the concepts of Food Sovereignty, Territory and the role of indigenous and rural organisations facing the agro-export and extraction models. This can be viewed at: (http://www.grr.org.ar/?donde=documentos).

We reiterate that, certain groups of leaders of rural and environmental NGOs have integrated themselves into the many subsidised structures offered by the State. Instead of rejecting the State's defence of the soya model, patented seeds and genetic modification, they postulate local advances, while no-one opposes them, although they adopt the role of victims when the peasants they represent suffer from acts of bloodshed and repression. They do not question the production logic behind the agri-businesses, perhaps thinking that, in this way, they are protecting a niche for 'family agriculture' and areas of indigenous and rural autonomy. The indigenous and rural groups that have managed to survive within Argentina's soya industry are negligible in number, but they are used as examples of the Government's supposed concern for the affected minorities.

There is a marked similarity between the acceleration of the harsh economic model proposed in the Strategic Agrifood and Agrindustrial Plan (PEA2) and the new Land Law. The leadership of the rural movements and those who oppose the agro-model are being assimilated into the State through significant financial incentives. They have taken on a double role, as opposers of the model and as salaried staff of a government that creates policies to offer benefits to transnationals within the food, agricultural and mining sectors.

The result is that, for years, we have taken part in an enormous pretence which has placed the vanguard of the rural struggle inside organisations which are tied to the enormous international prestige of the Via Campesina. This structure ensures that the actions and positioning of these Argentine organisations will be seen as the genuine expression of national agrarian resistance.

There is a link between the symbolism and claims which have instant repercussions throughout the media and which give the idea that they are the true representatives of the minorities oppressed by the agro-export extraction model. Their borrowed prestige conceals a seriously limited ideology and a thought process linked to anti-imperialist slogans that have not been reviewed for decades. Their policies focus on creating scenarios of autonomy and indigenous production, with the objective of demonstrating a presence, which is diluted by the poor results they obtain despite having so much economic, political, regional and international support.

In Argentina, the concepts of Agrarian Reform and Food Sovereignty, which are the foundations of the Via Campesina's struggle, mask the devastating scenario of advances made by the soya industry in the same territories as the above groups. The figures for the soya industry in Santiago del Estero are evidence of this. Meanwhile, at Argentine universities, "well-intentioned" urban students follow, applaud and idealise the revolutionary path of ruralisation and dream about travelling on a voyage of discovery to the lands of the rural autonomies and the supposed agroecological production.

In recent years, with the strengthening of production in genetically modified monocultures and the high profitability of commodities, there has been an increase in social control over the affected communities and the devastated territories. Within this productive logic, in an attempt to mitigate the serious consequences of the model, a great number of unusual strategies and plans have come into effect, including, the necessary active (if not complicit) participation of those who were once opponents of the agribusiness model.

The groups are not asked to abandon their extremist slogans. On the contrary, they are encouraged to continue denouncing the outrages and demanding the prohibition of local crop spraying only near populated areas, the "improper use" of glyphosate, and seeking justice over territorial disputes. In this way, they merely denounce the collateral effects which, when adopted as all-encompassing slogans do no more than confuse and conceal the corporate and insitutional matrix of scheduled plunder.

As a result, we take part in truly rhetorical battles for legitimate claims which have been fragmented in order to hide the stark reality of a complex model of neocolonial power intent on smoothing off the roughest edges in order to present itself as sustainable and protective.

If the strategy objective was to gain power in the threatened territories and focus the struggle on the rural and indigenous communities, we could say that it has failed. Not only have human lives been lost in these attempts, but also immense tracts of land. Those involved are trapped by the deceit of resisting the corporate advance at the same time as accepting the money and position that are generously distributed by a government which is skilled in dividing and coopting its adversaries.

GRR has been campaigning for rural traditions and local resistance for many years. We have also used every possible means to denounce the enormous impact of the spread of globalisation and the neocolonialism that exists in our countries, which are currently subjected to the multipolarity and regional dominance of the so-called emerging powers of the BRIC countries. We have systematically maintained our solidarity with rural communities and local production, and campaign against aerial crop spraying and land grabbing. In Argentina today, we are guided by the principle that Political Sovereignty is Food Sovereignty, and the defense of the National Territory is inalienable, as it affects all Argentinians, not just the rural and indigenous communities. But we understand that these struggles also have to take place in the centres of power, where corporate policies are agreed; where technological designs for genetic use and biotechnology are created; where corporate science subordinates research and learning in our universities and state organisations in order to serve private interests.

It is a case of putting ourselves in front of the bulldozers, cutting the barbed wire around the enclosure, defending our scrubland and our forests whether in the Yungas in Salta and Jujuy, or El Impenetrable in Chaco, or in the valleys and steppes of Patagonia. It is a case of publicly denouncing the Chinese state corporations or the Arabic capital on our soil, and providing evidence of Monsanto's collusion with the episcopal sector or their corporate lobbying in universities, the INTA, INTI, CONICET, and the Ministries for Agriculture, Health, Science and Technology. We believe that it is naive, if not complicit, to hold debates with academics on Food Sovereignty or Land Tenure when the same institutions are training the future employees of the large soya corporations and the agro-exporters, with their rucksacks full of GM seeds and agrochemical products.

It is a dangerous game to encourage the peasant struggle in the territories and criticise agri-business, and at the same time belong to the many parts of the state machinery that prodigiously hand out public money and jobs in public office - even to the most impassioned, self-proclaimed local enemies of imperialism. This is a game in which we have never taken part. We watch uneasily as those who claim to oppose the agri-business model and defend its victims, in their turn, call for us to close ranks with the progressive government and to be accomplices in their deceitful attempts to change the unstoppable pace of the plundering. Although these people work from within the state they do not understand the nature of extractive capitalism, the theory of Contradiction and the popular hegemonies.

We have had the patience to developed these thoughts and have waited for the necessary change, but this has not materialised. In fact, the leadership of the large rural groups and their allied intellectuals persist in their misconception, having been encouraged by the recent electoral speeches and believing that they have removed themselves from the stormy waters of the imminent global catastrophe.

When the blood of our brothers and sisters is spilled it hurts us deeply. Even more so when it falls on the barren and desolate soil of soya's greed. This solidarity means that the achievements of the agri-export model also have to be challenged. Among the many successes of the extractive agro-industrial model are the expulsion of rural communities and forced urbanisation. This model confuses the happiness of our communities with the incentivisation of consumerism, and lowers the flags of Sovereignty, Independence and Justice in order to raise the colonial banners of Science, Technology and Production. We cannot arrogantly demand real Capitalism if we aleady have it and its effects, which include innumerable victims and damaged ecosystems. A true National Plan requires us to return to the land that feeds us, to recover the strategic controls of our Sovereign State, and to disconnect ourselves from the train of Modernity which is dragging us ever closer to the abyss.

5. The increasing cost of seeds due to royalties.

As already mentioned, in Argentina, not only have native seeds disappeared, but with their disappearance so have the farmers and consequently the crops. These have been rapidly substituted by soya. At first, the soya seed was 'normal', that is, not mofied, but in the 1990s Monsanto distributed the soyaRR (gentically modified) at the normal price and without any mention of patent rights. During the following years, the sale of Monsanto's seeds fell noticeably, as the farmers' traditional practices meant that they kept seeds back and shared these with their neighbours, a method known as brown bagging (bolsa blanca). This allowed them to become independent of seed sales, although Monsanto was still the exclusive vendor of glyphosate.

A delegation from the US General Accounting Office visited Argentina and produced a report (GAO, 1998, http://www.gao.gov/archive/2000/r400055.pdf) which established the differences in price between Monsanto's seeds sold in both countries: Soya RR in the USA was 20-23 US$, and in Argentina 12-15 US$. Page 15 of this report states the following percentages for sowed seed: Commercial sales 28-50%, seeds kept by the farmer 25-35%, and black market 25-50%.

It is clear that the massive uptake was due to the reduction of manual labour needed for sowing and the possibility that most growers were given, rather than bought, the RoundUp resistant soya RR seed. Following agricultural tradition, when farmers find a variety they are interested in, neighbours share the new seed and each one grows it, as in the case of autogamous wheat and soya. The farmer then returns the seed he was given and carries on planting his own seeds in future years (this is commonly known as the "brown bag" seed).

6. The influence of the transnationals on government research, state-funded research and agricultural policy.

At the lunch with the Council of the Americas, Cristina Fernández de Kirchner spoke eloquently: *"… I was with Monsanto when they announced a very important investment in maize. You all know that we are the sixth largest global producers of maize, but we are the second largest exporters because we have a very large surplus due to the dietary habits of Argentinians. Furthermore, they were very happy because today, Argentina is – let's say – at the vanguard of biotechnological developments, the repatriation of scientists and, fundamentally, in relation to patents. As we have now attained our own patents, we have also become defenders of patents.*

Along with an American company and our own scientists from CONICET, that is, our own scientific organisation, we have recently patented a seed, genetically modified, a gene which was extracted from the sunflower so that we can transfer it to maize, I believe, if I remember correctly, and which has enabled those seeds, which were very resistant to drought but did not have a high productivity. Well, it has been achieved – through the Argentinian researchers in association with American businessmen who co-financed the research with CONICET – and today we have a joint patent on a product which is not only drought resistant but also has an increased yield.

The plan also includes an investment of 170 million Pesos for research and development in Argentina. For this, they are planning to build two new experimental stations (one in the Province of Córdoba and the other in the Province of Tucumán); to develop research and development programmes for maize and soya; experimental trials in the field, local biotech research and the expansion of laboratories". (http://www.presidencia.gob.ar/discursos/25918-almuerzo-en-el-council-de-las-americas-palabras-de-la-presidenta-de-la-nacion*)*

The communique released by Monsanto states: *"During the meeting, the executives and the President analysed the importance that the agricultural innovation would have, in the context of an exponential growth in global food supply during the coming years. In this context, the company foresees a key role for Argentina.*

The maize plant Project. The new plant, which according to plans will be inaugurated in December 2013, will treat and condition maize seeds and will have a maximum production capacity for 3.5 million hectares. It is worth mentioning that, with the installations we have mentioned, Argentina will have the two largest seed production plants in the world, both of which will belong to the Monsanto company.

Through this Project, Monsanto will provide an important boost for the development of maize in Argentina, and it is essential that this work is carried out in conjunction with the producers", the company reasserted. (http://www.monsanto.com/global/ar/noticias-y-opiniones/Pages/20120613.aspx).

The agreements between the companies and the state universities became evident in Argentina during the past years. Some courageous people denounced and exposed, with photographic evidence, the agreements between companies like Monsanto and state universities, or the sums of money that the large mining companies were pouring into many of these same universities.

7. Popular initiatives for the conservation of seeds and the restoration of seeds as a common good.

Current changes have created a multitude of controls over seeds. We are moving towards the registration of every seed which does not already have a patent, and because of this, peasants and rural communities are feeling the pressure from those that want to do away with "seed security". The limits and controls being placed on the exchange of seeds are impacting on family and ancestral relationships, and affect the most noble inheritance which can be passed from one generation to another - the possibility of susbsistence, the possibility of feeding oneself.

Without any public policies for the conservation of seeds, the ony seeds that will survive are those in the hands of farmers and rural communities.

We support a network of seed guardians who hope to be more than a seed bank. The network is a union of people who freely exchange seeds. It imposes no other conditions than those freely agreed, which are to conserve the seeds by sowing each variety every year. In this way, we can be assured that all the seeds we possess will be sowed annually, thereby maintaining their adaptability to climatic change and any possible pests, which will avoid the loss of seed diversity. Those taking part in the network agree to sow the particular seed they have agreed to conserve among their crops each year and to have a supply of seeds available for any other person, whether a member of the network or not, to continue to grow in other areas, and in the future, to be grown by our children.

We believe that what is grown will survive, and this network hopes to be a seed exchange for growers and breeders, who can adapt the seeds to different climates, maintaining the species through crossed pollination and assuring the genetic diversity within the varieties, and by these means developing local seed banks and networks.

We also encourage those who are new to farming. We support them in locating farmland and help them to resolve the day to day problems faced by small farmers. We provide them with seeds so that producers can re-learn to identify and grow the specimens they want for their own produce. Finally, this project hopes to re-create and systemise within the current scientific framework, the traditional rural knowledge that led to the domestication of plants, varieties and cultivars that we benefit from today and which today's productive agriculture is placing at risk of extinction.

We are convinced that agriculture is the fundamental basis of life and the means of support for real Food Sovereignty.

**We would like to thanks Ms Maite Bell for her translation for GRR from Spanish to English.*

Brazilian farmers vs Monsanto

The first transgenic soy seeds were illegally smuggled into Brazil from neighboring Argentina in 1998 and their use was banned and subject to prosecution until the last decade, according to the state-owned Brazilian Enterprise for Agricultural Research (EMBRAPA). Monsanto's soy seeds are spliced with a bacterium's gene that makes the plants immune to the company's popular herbicide Roundup, which farmers can then use to kill weeds while the soy plants flourish.

The ban has since been lifted and now 85 percent of the country's soybean crop (25 million hectares or 62 million acres) is genetically modified. Last year, Brazil was the world's second producer and exporter of soybean, behind the United States. Sales of GM soy – which is used for animal feed, soybean oil or biofuel – reached a whopping $24.1 billion and made up 26 percent of Brazil's farm exports last year. China is the main customer of Brazilian soy.

But four years ago, five million big and small Brazilian producers filed a lawsuit against Monsanto, accusing the US chemical giant of unduly collecting two percent of sales of their annual harvest. Since 2003-2004, Monsanto has demanded that producers of transgenic soy pay it two percent of their sales as crop royalties. Lawyers for the producers say this means that their clients end up paying twice for the seed."Monsanto gets paid when it sell the seeds. The law gives producers the right to multiply the seeds they buy and nowhere in the world is there a requirement to pay (again). Producers are in effect paying a private tax on production," said lawyer Jane Berwanger.

In April, a judge in the southern Brazilian state of Rio Grande do Sul, Giovanni Conti, ruled in favor of the producers and ordered Monsanto to return royalties paid since 2004 or a minimum of $2 billion. Monsanto appealed and a federal court is to rule on the case by 2014. In the meantime, the US company said it was still being paid crop royalties.

At the same time, transgenic soy cultivation is spreading like wildfire across Brazil, despite protests from environmentalists who say it leads to increased deforestation and from experts who say it results in less farm jobs.

Transgenic soy is now grown in 17 of the country's 26 states, with the largest production in Mato Grosso, Parana and Rio Grande do Sul.

On 4 April 2012, the courts of Brazil's southern most state of Rio Grande do Sul, in the way of a preliminary injunction, suspended the collection of royalties on GMO soy seeds by Monsanto. The ruling by Judge Giovanni Conti also provides for the reimbursement of license fees (royalties) paid. According to Neri Perin, the attorney of the farmers associations of Passo Fundo, Santiago and Sertão, who filed a class action suit in 2009, the claim lodged may lead to an advantage for up to five million farmers in Brazil and could mean for them a reimbursement of about 6.2 billion euros. Since the harvest campaign 2003/2004, as the business practices of seed multinationals Monsanto violate the rules of the Brazilian Cultivars Act (No. 9.456/97).

The Brazilian soybean farmers question the regulations prohibiting them from withholding seed for a renewed planting (after a first planting for which they have paid royalties) and from giving or exchanging seed under public programs. Monsanto has been accused of unlawful and abusive collection of royalties on seed and soybeans of the Roundup Ready (RR) cultivar. Until the ruling, royalties were required not only for the entire soybean crop, but also for soybean seed, that was retained from the previous harvest.

The farmers recognize that Monsanto is entitled to royalties when they buy soybean seed, but they demand the right to plant again the GM soybean seed they purchased and to sell this production, as food or feed, without another payment of license fees. As subsequent joint plaintiffs have arisen FETAG, the organization of farm workers from Rio Grande do Sul, and the farmers associations of the towns of Giruá and Arvorezinha.

(Source http://db.zs-intern.de/uploads/1335221694-MediaInfo_Monsanto_Royalties_Braz_ENG_2012_04_23-3.pdf*)*

(Source: Brazil farmers in legal feud with Monsanto over GM soy, Hector Velasco, AFP, 2 June 2012)

MOTHER SEED

Agro Biodiversity and Agricultural Culture in the Andes

Javier Carrera (Seed Guardians Network)

First of all, the seed is a daughter to us. Its interior has a chance to mature and offer up life, but is so small and fragile! The seed needs our protection, nourishment and care. That's why we plant it in fertile soil, we breed it and we help it to grow happy.

When the seed grows becomes our sister, our teammate. We work together under the sun; we worry about the excess or the lack of rain.

When the flower is produced, we say that the plant has become a "young lady". And when the flower gives way to the seed, we say that "she has given birth".

When grain is harvested and dried, the seed becomes our mother. Following the principles of the Ayni, a complex and profound form of reciprocity which has ruled social exchanges in the Andes since immemorial time, Mother Seed returns the favors she received: now it is she who cares, nurtures and protects. Now it is she who raises us.

The Origin of Diversity

The Andes are the longest mountain chain in the world. It would be absurd to expect to have a climate or a cultural uniformity. They are very diverse. In general, we recognize three major regions:

In the south, in what is now northern Argentina and Chile, the Andes are characterized by enormous heights.

In the center, in what is now Peru and Bolivia, there is the so called "Andean puna" where 70% of the territory is desert. A thin strip of sand, dotted with fertile river valleys, separates the mountains from the sea. The Andes rise abruptly to dry and stony plains at 4000 meters high, the so called "Puna". Here the mountain's chain is very wide, with a large number of valleys scattered among the plains and the ridges, where the ingenuity and the hard work of its people have achieved an impressive agricultural culture. The mountains are sculpted with terraces and irrigation canals that have fed people for thousands of years. In the fifteenth century, the inhabitants of Cuzco achieved a synthesis of the previous Andean central cultures and created one of the most impressive governments in human history: the Tawantinsuyu, the mythical empire of the Incas. Agriculture was the foundation of this empire, an agriculture based on manual labor, human scale, as the Andes had no appropriate animals to be used in the fields.

In the north, equatorial Andes are thin and definitely more humid. The land which replaces the "Puna" consists of a straw sponge of deep roots, which retains moisture; it goes down slowly and feeds forests and fertile valleys. Off its coast the cold Humboldt ocean current, originated from Antarctica, clashes with the warm tropical current of the so called "Niño", causing complex weather patterns. There are a large number of active volcanoes and consistently one or more of these are in some eruption process. The vast plains of the coast, dotted with small mounts chains, in some regions are dry and in others are very humid forests. On the other side of the mountains lie the Amazon plains, the planet's largest valley, which bathes the mountains with its clouds. The equatorial Andes also have the highest concentration of rivers and the highest rainfalls in the world. Due to these factors, these areas harbor the greatest biodiversity on the planet.

In these scenarios agriculture emerged, in a separate process, some ten thousand years ago. The hunters - collectors of the forest area of the coast found enough food in the forest to stay in their camps for months, or years even. In these campsites, women were able to experiment planting of seedlings, with the aim of reducing their expeditions in the woods to collect food. Some roots and sticks grow easily and could be improved by crosses. This is the first seed in the Andes: a piece of mother plant, which grows in a new plant, a clone. Then the most complex work with the seed itself came: the women, and then the men, started unraveling the secrets of plant reproduction.

The Andean peoples have given the world a large number of plants, first domesticated by their ancestors. In the tropical coasts they domesticated potato (Ipomoea batatas), peanut (Arachis ipogaea), papaya (Carica papaya), pineapple (Ananas comosus), passion fruit (Passiflora edulis), cocoa (Theobroma cacao), tomato (Solanum lycopersicum), and several types of pepper (Capsicum baccatum). The subtropical valleys gave us pumpkin (Cucurbita maxima), avocado (Persea americana), tree tomato (Solanum betaceum), guava (Psidium guajava), cape gooseberry (Physalis peruviana), canna (Canna edulis), and beans (Phaseolus vulgaris and P. lunatus). The Amazon region is the cradle of "cassava" (Manihot esculenta), the custard apple (Annona spp.), tobacco (Nicotiana tabacum), rubber (Hevea brasiliensis) and a large number of fruits that today the world is beginning to know. In the cold "Puna" they domesticated the potato (Solanum tuberosum), the grain amaranth (Amaranthus caudatus), the quinoa (Chenopodium quinoa), the lupine (Lupinus mutabilis) and the only important domestic animals: the guinea pig, the alpaca and the llama.

There are many valuable foods that have not been distributed beyond the Andes, despite its enormous nutritional potential and relatively easiness to be grown. Roots like oca, Maswa, tazo, jicama, parsnips, melloco. Fruits like granadilla, tacso, badea, mamey, babaco. Also, some legumes, leafy vegetables and many medicinal herbs. Ten thousand years of farming culture, in the region of the world with the biggest diversity, have created an impressive agro biodiversity. In the Andes, an half-hour walk can lead us to a different climate. Each valley has its own varieties, and their own cultural and agricultural features.

According to the Encyclopedia of Useful Plants of Ecuador, in this country there are 5172 species of useful plants. Of these, 1561 are eatable species belonging to 160 families and 461 genera (De La Torre, 2008).

Seed and Culture

Cultural practices related to this diversity are also multiple, but unfortunately are poorly documented. Globalization has had a very strong impact, and there is much that is already hopelessly lost. The cultural fragments left us a glimpse into a very complex reality.

Take for example two cases: corn and beans.

The corn came from the Mesoamerica to the Andes at least 6000 years ago, in the form of a small corn. It evolved through the work of many generations of guardians of seeds to reach the diversity of colors, shapes, sizes and uses that can still be seen today. It is grown in the three regions: coast, mountain and Amazon, in many different climates.

The Andean people are people of corn. Its cultivation governs the agricultural and social calendar. In the valleys of northern Ecuador, for example, the agricultural year begins in October with the land preparation for planting, which occurs sometime in the month, depending on the arrival of the rains. In May the harvest begins with the soft corn, called "choclo"; in June the harvest continues with the semi hard corn or "cau"; in July or August the harvest ends with the hard corn, which can be stored in the following months. Each of these states of the corn has its own recipes.

The other crops are located at some point in this agricultural year, always in relation to corn. The tropical lowlands allow up to two crops a year, as their corn grows in just four months.

Corn cannot be classified scientifically. In facts, it contains an indeterminable number of varieties, grouped into a few main types determined more by their use than by their botanical characteristics. The reason is that it is a species that develops rapidly genetics depression, requiring continuous crossing to retain their fertility and productivity. It means that corn is in a constant state of hybridization, and therefore it is impossible to define parameters of genetic uniformity.

This is expressed in the peasant culture in the Andes. One way to recognize the beginnings of genetic depression is to monitor the appearance of cobs showing more than a peak. When this happens, we use to say that the corn "wants to get married" or "wants to travel". The farmer takes a sack of corn to exchange it with a neighbor or relative, ensuring that the new grain obtained is roughly the same type. For example, if your seed corn is soft, you are supposed to look for another soft corn mix, albeit of a different color or size. Back home, you have to plant a row of corn obtained every 3 to 5 rows of your corn. This is the way to cause the crossing, the "marriage" of the grain. This process must occur at least every two or three years; such is the need of crossing that corn has.

The beans, that traditionally grow climbing in corn stalks, represent almost an opposite case. Most of its flowers are self-pollinated before opening, so give but not receive pollen. In a normal year, only 4% of the flowers will cross, accepting foreign pollen. But in a difficult year, this figure can rise to 20%, a strategy of plants to increase the crossing and with it the evolutionary possibilities facing a situation of crisis. The ancient practice is to plant as many varieties (or "colors" as they are commonly called) in a crop field as possible, without concern for maintaining genetic purity. It is not uncommon to see fields of only a few thousand square meters with fifty varieties of beans. On reaching the harvest, you can evaluate how well did the cultivation analyzing the amount of crosses between colors and patterns in the grain: a greater number of crosses represents a difficult year. In the syncretic religious festivals, grains are separated by colors and patterns and are presented as offerings in pottery, a breathtakingly beautiful sight. But with the planting, all colors are shuffled and seeded randomly, to allow the plant to decide whether the crossing is required.

In both cases we see understanding and appreciation for diversity, for the "mixing" of the seed. The mixture is always welcome. The criteria of racial "purity" that modern technology applies are alien and incomprehensible to the rural population in the Andes, especially for Native American cultures.

The official discourse, promoted since the beginning of the Green Revolution by public breeding research institutes, is that this attitude causes lower crop yields. In this view, farmers should be "educated" with modern standards to work with greater genetic uniformity. This criterion is expressed in laws and regulations on seeds in the Andean countries.

In the background there is a misunderstanding, a conceptual gap between Western science and empirical indigenous and peasant science. If we promote a monoculture that work with the technology package of the Green Revolution, it is true that genetic uniformity will provide us higher yields, of a given species, for a short period of time; but, on the other side, we are going to lose resilience, fertility, health, nutritional quality, and even amount of food produced per hectare.

Andean agriculture never favored monoculture but the opposite. The Andean mega-diverse fields, which the European conquerors considered as uncontrollable jungles, produce far more food than modern monocultures even if they have less than a given species. In fact, for example, there is less corn in them, but also beans, squash, quinoa, amaranth, beans, jicama and many other plants growing together, climbing, crawling, producing. Together, these plants provide a complete and diverse diet, feeding family and the local market.

We need science in the field, it is true. But a peasant science, a science born from ancient Andean culture, which we can understand and we can project into the future. Only then science can offer us valid responses in the uncertain times we live.

Genetic Erosion in the Andes

Andean agro biodiversity is seriously threatened. We know that we have already lost globally about 70% of diversity in seeds during the last five decades, but in the Andes, the percentage is impossible to determine. Despite being one of the most important centers of agricultural domestication, the region has received relatively little attention from scholars in the last century. When Vavilov (the father of research on agro biodiversity) toured America, for example, completely missed the Equatorial Andes, and based his judgment of the Andes on what he saw in Peru. This is only a percentage of climatic and biological diversity present. Subsequently, due to the proximity and ease of access, the Mexican agriculture was fully explored, and was attributed to Mesoamerica the domestication of many species that, only in the late twentieth century, were correctly attributed to the Andes, such as tomatoes, cocoa and avocado.

Recent decades have seen a flowering of studies in different regions of the Andes, with modern techniques such as genetic mapping or analysis of microscopic traces of pollen in archaeological sites. These discoveries have opened to us a much more complex scenario than was thought until few times ago. Special mention for the investigations conducted in the Amazon valley, recently still considered a low population area in pre-colonial times: today we begin to understand that this was perhaps one of the most populated areas of the planet by the end of the fifteenth century, with an efficient food production system, based on tropical forest management.

We do not know what was the real diversity of useful varieties in the Andes. 90% of the American population died in the century following the arrival of Christopher Columbus in the Caribbean, mainly due to the epidemics brought on ships: influenza, measles and malaria. With them most of their culture, science, art, and production management has been lost. What remains are just shreds, and those remains whisper secrets that we fail to understand. We must delve into the annals of the conquerors to find scraps of information, which does not allow us to rebuild the whole story.

There are more accurate records in the twentieth century. We can cite for example data on maize diversity: in the 1950s, there were 300 varieties of this plant in what is now Ecuador. By 2012, after a decade of fieldwork in search of agro biodiversity, the Network of Seed Keepers of Ecuador found just 50 cultivated varieties, most of them in very marginal growing conditions and obviously endangered. The data is just as dramatic for most useful species.

The responsibility of this situation corresponds directly to changes in consumption patterns in the region. Foreign cultural influence has been powerful in Ecuador and Colombia, causing most of the diet, including rural and indigenous models, to move towards "modern" patterns. Today, soft drinks, pasta, white bread, refined sugar, rice, eggs and chickens are at the base of the diet of the majority. The only Andean survivor is the potato that is eaten in abundance even if it comes from varieties that have little or nothing to do with ancestral diversity of this crop.

Peru and Bolivia, for their historical circumstances and the relative physical isolation of their rural communities, have suffered to a lesser extent the effects of this globalization of food. In the markets of towns and cities of the Central Andes is still possible to appreciate a great variety of roots, grains, herbs and fruits, both fresh and processed. But the shift to "western" diet also gained momentum, as is most identified with the desired and never achieved "progress".

In Ecuador, until only 50 years ago, urban gardens were common, and most people knew at least the rudiments of culture. It's amazing to see how quickly the change took place: today, not only the urban population but also a large and growing percentage of the rural population forgot the secrets of a good crop. It only took a generation.

But the change in consumption patterns responds as well to state policies enacted to favor large companies. Like the rest of Latin America, the Andean region remains an area of extractive colonialism, dominated by a small percentage of families and for the benefit of foreign interests. Production policies, therefore, do not seek to build food sovereignty and strengthen the local economy. The business of food import and export of raw material is easier to control and collect for the ruling elite, and the public policy is oriented towards this model. Advertising and television, controlled by the same elite, contribute to a cultural landscape that denies the importance of the field, of agriculture, and of course of the diversity of crops and food.

The effect on biodiversity is devastating. Until the sixties was common in the valleys the presence of "mountain papayas", relatives of the cultivated papaya, smaller but with an excellent flavor. The "chihualcán" and the "chamburo", the most popular, were everywhere in the townhouses and even more in the fields. In the early twenty-first century, both species declined and subsisted only in some small villages in the mountain peaks; the majority of Ecuadorians was unaware of the existence of these plants. Similarly, the "achira de almidón", a variety of "Canna edulis" domesticated in Ecuador and Colombia, today used industrially in Southeast Asia, has practically disappeared; other varieties of the same species are used for wrapping food in leaves and steaming, but practically the whole population ignores the fact that the root is comestible and that is possible to extract from it the best natural starch.

Threats to Native and Creole Seed

This pattern of cultural change clearly benefits companies engaged in industrial food production, as well as processing and transportation. As in the rest of the world, in the Andean region there is a growing concentration in this sector of mega firms with an increasing political influence. This influence has great impact in creating and enforcing laws in their favor.

Colombia's case is emblematic. Governments close to the U.S. have focused their economic policy toward the extreme neo-liberalism, accepting all the suggested economic packages from the north. Colombia allowed legal entry of GM in 2005. In 1990 the country was still a food exporter. In 2010 Colombia imported 9500 tons of food. This is not obviously an inability in production by farmers, but is the destruction of the rural economy by a market system designed to favor the enrichment of the mega companies. This planned impoverishment of the peasantry set causes a huge acceleration of genetic erosion.

Colombia is the first Andean country to cultivate extensively GM. The cotton zone of Cordoba is a dramatic example of the results of this policy: performance declined from 2000 kg / ha in 2010 to 1400 kg / ha in 2011, causing a loss of $ 42 million and leaving in bankruptcy four thousand entrepreneurs and families of producers. During this time, Monsanto gained $ 14 million in this region out of the sale of the seed only, which must be added to the profits from sales of agrochemicals. The company blamed bad weather and poor farming practices of producers for the failure of crops. Producers accuse Monsanto of misinformation and of poor quality seed. Social organizations point out irregularities in the approval process for the commercialization of GM, and that this was inappropriate for the actual situation of the Colombian countryside. BT cotton, for example, does not control the major pest of the crop in the region, the "Picudo" (Anthonomus grandis).

The most serious is that the seed from Monsanto has replaced other varieties, traditional and commercial, to become virtually the only affordable option for producers. (Vélez, 2012)

In June 2012, Colombia established the law 1518, which approves the application of UPOV 91 agreement. This international convention requires signatory countries to control their seeds, by a national catalog that only allows the circulation of those enrolled that must meet strict parameters of genetic uniformity. Traditional seeds obviously cannot meet those parameters, and are excluded from the catalog. The first confiscations of "uncertified" seed began the same month.

The case of Peru is somehow different. The National Congress approved the entry of GMOs, but the pressure of public opinion was able to pass a 10-year moratorium on admission and cultivation in 2011. What is interesting is the influence that the movement for the conservation of the country's food culture, initiated by peasant organizations, chefs and cooks, had on this decision. This movement has managed not only to place the Peruvian cuisine in the world but has also built a huge appreciation for it into the country, including the popular classes. We could say that was the pride in cultural identity linked to the food which achieved this moratorium. However, the pressure for GM by the business sector remains strong.

Ecuador and Bolivia have a third scenario, with governments defending traditional seed in the paper although in practice they have not been very consistent with what is written. Bolivia approved the entry of GM crops in 2011, mainly because of the pressure of the powerful soy sector of the tropical area of the country. To protect native agro-biodiversity, the law prohibits the entry of GM of native species. Unfortunately, this decision demonstrates a lack of knowledge of the current genetic theories; the horizontal transfer of genes between unrelated species which can contaminate protected species is, for instance, ignored.

In Ecuador, the Constitution adopted in 2008 declared the country free of GM seeds and crops, with one exception: in case of national emergency, the National Assembly may allow their entry. The 2008 Constitution has several provisions that protect the "rights of nature", a new concept worldwide, and articles that protect the seed and the ancestral knowledge. However, the executive has spoken publicly in favor of GMOs and there is now a strong media campaign to achieve its full introduction in the country. The government has long turned its back to the social organizations, so is the business sector that has wide access to the increasingly bureaucratic power structure.

In all Andean countries there are agricultural research institutes, partly or wholly funded by the state. These institutes were founded in the nineteen sixties and seventies, with the initial goal of collecting the genetic wealth of the national seed, the same that was sent to seed banks in the global North. The second objective was to develop national seeds that would work with the Green Revolution package, and distribute them in the field to replace local seeds. This work was very successful, in Ecuador, for example INIAP varieties (National Agricultural Research Institute) have largely replaced the traditional corn, rice, beans and other major crops. Being large institutions, they include different factions with different visions: inside INIAP for example there is a very positive initiative to create "intermediate seeds", seeds of native species managed by farmer organizations, with technical support from the institute. But in general these institutions have mostly represented a threat to agricultural biodiversity in the region.

Protecting Seeds

There are several initiatives for the protection of agricultural biodiversity in the Andes, unfortunately little connected.

On the one hand, some NGOs with an interest in protecting the ecology and sustainable development have led projects to protect farmers' seeds. The planning model, closed and time-bounded, of these institutions is apparently inadequate to the task, so that its success has been quite small. What they have achieved is to disseminate appropriate information in the field about the importance of the farm seed and risks of GMOs, which has been a great addition.

Secondly, peasant and indigenous organizations have taken the protection of agricultural biodiversity and ancestral knowledge as part of their political agenda. These organizations are especially strong in Ecuador and Bolivia, because of a long history of social struggles which have even led to the falling of governments in both countries. Their work has been essential to prevent GM and intellectual property and certification laws to be implemented in both countries, and has opened the opportunity for them to take the fight for the seeds to the level of legislation and regulation. Its real impact on genetic erosion and seed production was much lower, due to an increasing orientation towards the political and ideological discourse. The detriment of the organizational work in the fields has therefore caused a deep rift between the leadership and its bases.

An initiative that is not linked to the state or to the NGOs, which is interesting for its autonomy and development, is the "Seed Guardians Network" which operates in Ecuador and southern Colombia. Lacking institutional organization, is difficult to measure its impact, given its free-form on the local level. It has about a hundred seed producers, and serves the public through sale of seeds, advice and educational events. They are creating their own forms of marketing, certification and production and in this sense represent a resource for the region.

Other important initiatives at the level of information, organization, production or exchange, are among others: the campaign "Seeds of Identity", driven by Swissaid Foundation in Colombia and Ecuador, the "Semilla" group and their magazine "Semillas" in Colombia; the Agro ecologic Collective and its journal "Allpa" in Ecuador; the Bureau of Agro biodiversity driven by CEA - MAELA in Ecuador; the initiative to establish appropriate local varieties of vegetables at the University La Molina in Peru.

In Ecuador, civil society organizations have taken the debate on seeds strongly. In 2010 the "Multinational and Intercultural Conference on Food Sovereignty", an organ of the civil society formed in obedience to the Law on Food Sovereignty, received from the National Assembly the task of creating, in a participative way, the "Agro biodiversity and Seed Act". The process took two years, and was attended by more than two thousand people, belonging to 500 farmers' organizations, networks and activists. The result was a law which recognizes the difference between the farm and the industrial seed, maintains regulations for the control of the industrial seed and the prohibition of GM's entry and, finally, regulates strategies to protect and promote the farm seed. The law includes the recognition of independent Participatory Guarantee Systems, peasant bodies which certificate the quality of the seed under the criteria of each group. This law is still under discussion in the National Assembly but, although it has the support of the peasant sector, faces opposition from the business sector and the government.

Despite the strong introduction of industrial seeds in the region, yet it is considered that 80% of the seed used is a farm seed, under the control of farmers. This is because the industry has invested so far only on a handful of commercial species: maize, cotton, rice, potatoes, bananas, ignoring all the other crops.

The problem is that the knowledge of farm seed management is further eroded than the seed itself. The work of protecting seeds therefore implies the recovery of ancestral knowledge relating to the native species. In the case of foreign species such as European cereals and vegetables, there is no an adequate body of knowledge, so we need to transfer this information, preferably from farm seed guardians from their places of origin.

Conclusion

An ancestral and natural wealth which is impressive. A very advanced genetic erosion. A dramatic economic situation in the field. Governments that turn their backs to food sovereignty and to local economies. Extreme concentration of economic and political power. Strong social movements, with a large percentage of the population still living in the countryside. A vast social and political awareness among the population, historical strategies of resistance and survival. A deep cultural taste for diversity, community, good food, good living. A worldview that unites man and nature, Pacha Mama. These aspects make up a dramatic picture, hard but hopeful. Given the global ecological and economic crisis, to which we approached, we, the Andean peoples, have great advantages in our resilience, our culture and our natural environment. But these issues can only serve us if we can restore and maintain social control over the most important resource of agricultural labor: the seed. Our Daughter. Our Companion. Our Mother.

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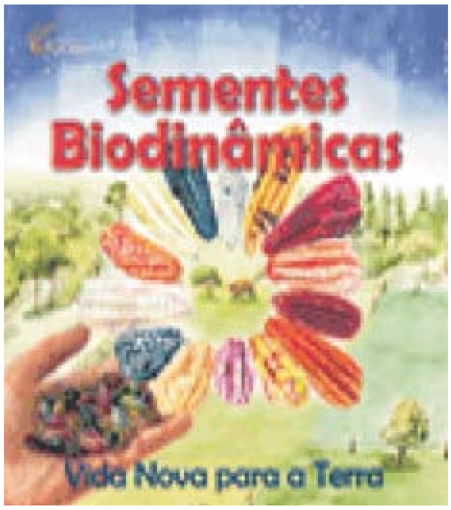
Brazilian Biodynamic Seed Network
Associação Biodinâmica

▲ *Perform tests with native seeds*

▲ *Participatory plant breeding*

▲ *Evaluation of quality of seeds produced by farmers*



▲ *Publications on native seeds*

◀ *Meeting of seed producers in Sao Paulo and south of Minas Gerais*

Seed Banks and Agrobiodiversity ▶

CUBA

Participatory Seed Diffusion - A Cuban Agricultural Innovation

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Programa De Innovacion Agropecuaria Local (PIAL)

For more than thirty years, the Soviet Union served as Cuba's key trading partner. With its long agrarian history, Cuba developed a modern agricultural system with the help of chemical fertilizers and pesticides supplied by larger socialist countries. Like many countries during the later part of the 20th century, Cuba adopted a chemical-intensive, highly-mechanized mono-culture that initially produced high yields and reduced labor needs, allowing the country to be an important provider of sugar cane to its trading partners. At one point, Cuba was the highest per-capita consumer of agrochemicals in Latin America. While the system served the country's economic needs for several decades, the chemical usage and single-crop dependence soon took its toll on much of Cuba's farmland, which makes up about 30% of Cuba's total land area. More than half of the farmland was devoted to sugar cultivation. On the remaining land, Cuban farmers had little choice about which crops or varieties they could plant, using only a small selection of seeds developed to produce high yields within a fertilizer and pesticide-intensive system. Thus, much of Cuba's environment was inundated with agrochemicals, threatening biodiversity and, over time, reducing crop yields. With the fall of the socialist countries in Europe, Cuba lost its chief trading partners along with its purchasing power and access to fertilizers and pesticides. As a result, Cuba's agricultural sector ground to a halt, and food shortages ensued.

Taking advantage of the opportunity presented by the economic crisis, a small group of professionals set out to address the situation. In 1999, they designed a pilot project aimed at developing participatory seed diffusion, improvement and distribution practices. This program, which has evolved over the years into a much larger, national level initiative, uses a variety of tools, including seed fairs and participatory variety selection, as strategies for seed diversification, yield improvement and the dynamic maintenance of genetic diversity in Cuba

Researchers and farmers discovered Participatory Seed Diffusion as a way to integrate diversity seed fairs with farmer experimentation. Seed diversity fairs are events where plant breeders, farmers and extension agents have free access to diverse varieties of one or more crops. Varieties from formal and informal seed systems are sown under the usual cultural conditions in the target environment, and then farmers are given free access to all the seeds and can choose the varieties they want in the fields. They take seeds from the selected varieties (or materials under development) back home for further experimentation.

Enthusiasm of farmers overwhelmed researchers and they felt as if they lost control. Soon, farmers took initiative to organize evaluation trials, involving other crops and other regions, being announced as Diversity Fairs. Music, competition of culinary dishes prepared by women, activities for children were part of these events. Farmers working with researchers were able to build up more than 95 local seed bank saving more than 200 varieties and 32 species of crops. Professional researchers realized their most important role: providing diversity and connecting the different regions in the country to spread ideas coming from the farmers. These ideas did not limit themselves to seeds but increasingly involve a broad range of other productive activities along the value chain like production of animal fodder and processing of fruits and vegetables.

This initiative made farmers aware of their most important capacity to generate knowledge: to experiment. The project also brought very important awareness to the researchers. They realize that they cannot limit their work to research stations: they need to share the experimentation with farmers in the field, to understand the problems and possible solutions in local conditions. This way of using, sharing and generating knowledge in joint activities is empowering for both farmers and researchers. The resulting increases in productivity and household economies are hard to ignore. Currently, the network links about 50,000 rural people and 250 researchers and technicians are involved. There are efforts by university staff to integrate the first lessons into the academic curricula. Policy makers show interest in the initiative to see how the impact can be scaled-up to parts of the country where the network has not yet reached.

Genaro a Cuban Farmer (on the left) displaying its experiments on Organic Cofee to lecturers and students of Las Villas University. (Photo Eduardo Calves)

Alda family displaying a community Seed Bank (Photo Michel Pó)

**Humberto Ríos Labrada is a Cuban folk musician, agricultural scientist and environmentalist. He was awarded the Goldman Environmental Prize in 2010 for his work for biodiversity and sustainable development of Cuban agriculture.*

SOWING LIFE IN AMERICA

The Kokopelli Pachamama Festival

First Meeting of Red de Semillas Libres (Free Seeds Network)
Sacred Valley of the Incas, Ollantaytambo, Peru

Public Declaration

We, the guardians of the seeds of the Americas, members of the Free Seeds Network, gathered here on this day the 7th of August 2012, in Ollantaytambo, Sacred Valley of the Incas, Peru acknowledge, value, honour and are grateful for the heritage of the people and their efforts to cultivate, domesticate, diversify, preserve, share, multiply and facilitate the evolution of the Criollo and native seed.

These seeds are the foundation of food sovereignty and autonomy, the health and the continuance of peoples and their culture in the territories. They represent the common good and are part of a world heritage to be employed in the service of humanity.

As their guardians we defend free and sovereign seeds, recognize diversity as richness in all its forms. Criollo and native seeds are the source of biological and cultural diversity as they inspire individual and collective creation within communities.

We uphold the right to freely store, propagate, multiply, exchange, donate, share, sell and gift seeds.

We are founded on friendship, trust and solidarity, basic factors for effective articulation of the network.

We declare that all varieties and species belong to the public domain and therefore enjoy the right to free circulation, without any borders, in order to freely share and exchange, given that the movement injects new life into the seed, facilitating its evolution, climatic and geographical adaptation etc.

We do not recognize genetically modified organisms and degenerative hybrids as seeds as they do not fulfil the role of creating and sustaining life.

Therefore we reject:

- All forms of intellectual property on live organisms and the associated knowledge.
- Corporate control on life as it generates monopoly and dependency.

- All forms of genetic modification and those technologies that prevent free propagation of the seed.
- Bio-piracy
- Illegitimate laws that criminalize the free flow and multiplication of seeds.
- Illegitimate laws that validate practices that are a threat to life.
- The use of agrochemicals, monocultures and all policies and practices that are an attack on life and are a threat to the health of ecosystems and people.
- All public investment in research, promotion and development of technologies that produce degenerative seeds and are subject to intellectual property.

We propose agro-ecology as a solution to the ecological, social and cultural problems that affect the world. Besides, it is a tool that allows us to become independent from the corporate agro-food system, thus promoting the autonomy of peoples.

We undertake to:

- Continue to exchange the seeds of life at the global level.
- Research on, recover and share traditional and agro-ecological practices for seed breeding.
- Promote the exchange and expansion of knowledge related to agro-ecology.
- Promote the conservation of biological and cultural diversity.
- Promote education at all levels, for cultivation, propagation and distribution of seeds, through a knowledge dialogue.
- Strengthen links and expand the Free Seeds Network.
- Create and multiply seeds with an agro-ecological vision and techniques.
- Promote active non-violence as a method to respond to the legal and technology driven attack against seeds, the people and Earth itself.
- Protect the centres of origin and diversity and liberate the territories from transgenic contamination.
- Work towards bringing dignity to life in rural areas, recognizing it as a form of sustainable and self-sufficient development.
- Strengthen individuals, family producers, communities and autonomous entities as propagators and distributors of seeds, in an open and participative manner.
- Defend seed freedom.

HISTORY OF SEED IN THE US

The Untold American Revolution

Debbie Barker*
Center for Food Safety

An exhibition at the National Archives in Washington, D.C., *What's Cooking Uncle Sam?,* traces the history of U.S. agriculture from "the horse and plow to today's mechanized farm." While the exhibition contains humorous elements, including a corporate campaign to win the War Food Administration's endorsement of its Vitamin Donuts—"For pep and vigor…Vitamin Donuts!"—it also chronicles a sobering story of American farming and how the effects of U.S. food and agricultural policies reach far beyond the borders of Uncle Sam. Throughout, it is clear that the path of agriculture begins with the seed.

Over the past 40 years, the U.S. has led a radical shift toward commercialization, consolidation, and control of seed. Prior to the advent of industrial agriculture, there were thousands of seed companies and public breeding institutions. At present, the top 10 seed and chemical companies, with the majority stake owned by U.S. corporations, control 73 percent of the global market.[1]

Today, fewer than 2 percent of Americans are farmers[2], whereas 90 percent of our citizens lived on farms in 1810.[3] This represents perhaps a more transformative revolution than even the Revolutionary War recorded in our history books.

This report will provide a summary of U.S. seed policy history in order to establish the trajectory to present-day policies that threaten seed sovereignty for farmers and citizens as well as natural resources, wildlife, and food safety. As an early adopter of industrial seed development, including genetically engineered (GE) seed, and a forerunner in developing intellectual property rights (IPRs) for seed ownership, the historical narrative of the U.S. may serve as a resource for other countries to investigate.

Following the short historical narrative, main topics discussed will include the current draft of the U.S. Farm Bill; existing legal challenges pertaining to seeds; the economic realities for farmers; effects of climate change, especially as manifested in the current drought; and "seed piracy" lawsuits initiated by Monsanto against U.S. farmers. The report concludes by discussing the renaissance of small, independent seed companies.

The Untold American Revolution

Soon after reaching the "New World," European settlers realized that the seed they had brought from Europe was unsuited for growing conditions in America. A vibrant trade of seed and agricultural commodities was quickly established with Native Americans, and this exchange established an important agricultural germplasm base.

Early founding fathers, notably Thomas Jefferson and George Washington, were as passionate about agriculture (and both were ardent plant breeders) as they were about governing the country. Their aspirations for the nation centered on agrarianism.

"Cultivators of the earth are the most valuable citizens. They are the most vigorous, the most independent, the most virtuous, and they are tied to their country, and wedded to its liberty and interests by the most lasting bonds," Jefferson espoused.[4]

George Washington concurred: "I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture…."[5] In the colonial era, the landed gentry formed "agricultural societies" that saved, cultivated, and exchanged seeds, though these were not widely distributed to the general populace.

In the early 1800s, the Secretary of the Treasury initiated a program requesting U.S. ambassadors and military officers to gather seeds and seed data from their posts around the globe. In 1839, this program became more methodical when the U.S. Patent Office established an agricultural division, which began collecting seeds and launching free seed distributions.

Established in 1862, the U.S. Department of Agriculture (USDA) devoted at least one-third of its budget to collecting and distributing seeds to farmers across the country. By the turn of the century, USDA had sent out over 1 billion packages of seed. The seed distribution program was enormously popular with farmers as public seed was free and of good quality. It also enabled farmers to conduct extensive seed breeding and provide the genetic foundations for American agriculture. Farmers developed steady genetic improvement mainly through a simple process known as phenotypic selection, in which seeds from the healthiest and most productive plants are saved and replanted the following season. Some of the most well-known farmer-bred seed varieties developed include Red Fyfe wheat, Grimm alfalfa, and Rough Purple Chili potato.

However, the nascent seed industry saw the federal programs as a barrier to potential profits and formed the American Seed Trade Association (ASTA) in 1883 to advocate for the end of government seed distribution. After forty years of intense lobbying by the Association, Congress eliminated the USDA seed distribution program in 1924.

Land Grant Colleges and Extension Services

Concurrent to government seed programs, legislation was passed to provide publicly funded resources for both institutions of higher learning devoted to agriculture as well as experimental and research services for rural communities. The Morrill Land Grant College Act of 1862, established by President Lincoln, provided public lands to U.S. states and territories to create colleges specializing in agricultural research and instruction. Some of today's top universities such as Michigan State and Cornell originated because of this Act.

The Hatch Act of 1887 supplemented the land-grant system by funding experimental stations. The Hatch Act stipulated that all research must be freely shared among the institutions and also made available to farmers. The Smith-Lever Act of 1914 established cooperative extension services to provide "useful and practical information on subjects relating to agriculture…."

Together, these Acts were intended to foster universities and institutions to improve agriculture, in part by breeding new, regionally adapted plant varieties. Publicly funded plant breeders at the USDA and land grant universities pioneered breakthrough technologies in plant improvement, including backcrossing and hybridization. Throughout most of the 20th century, publicly funded breeding programs provided farmers with steadily improving, high quality seed. For example, in 1980 70 percent of soybeans and 72-85 percent of wheat by crop acreage was planted with public sector seed.[6]

The Role of the Private Seed Sector

Until recently, private seed firms acted mainly as distributors of publicly developed seed varieties. Most of the private seed distributors were family-owned, small or regional businesses scattered throughout the country. The private sector played a more active breeding role only in developing hybridized crops such as corn, sorghum, and sunflower. Private firms concentrated on hybrid seed because selected traits do not breed true with each successive planting, resulting in weakened traits. With the advent of hybrid seed, farmers were required, for the first time, to purchase seed annually to ensure effective desirable traits.

The development of hybrid crops, such as hybrid varieties of corn introduced in the 1930s, was instrumental to the growth of a private, commercial seed industry. Hybrid seeds were effectively a biological strategy for seed companies to expand their market influence. Instead of on-farm seed saving, farmer seed breeding, and public research and distribution, hybrid seeds gave seed companies new opportunities to explore—and too often exploit—farmer dependency on purchased seed. As these companies expanded and gained more relevance in a shifting agricultural landscape, a new era of consolidation in the seed industry began.

The emergence of agricultural biotechnology, specifically GE seeds, in the 1990s intensified consolidation and solidified an increasing trend of seed and chemical company mergers. Thus, commercial agriculture today is often referred to as the agrichemical-seed industry. For example, nearly all GE seeds today are sold by Monsanto and are resistant to a single herbicide, glyphosate. These herbicide-resistant seeds and glyphosate—marketed as Roundup Ready by Monsanto—are sold together as a highly profitable, packaged system.

The advent of GE seeds has also led to increased pressure by agrichemical-seed companies to establish legal and policy mechanisms to further strengthen seed patents and IPR schemes. Thus, the emergence of two trends developed symbiotically: the advent of GE seeds and the dramatic rise in seed and plant patents leading to the consolidation of seed ownership. Genetically engineered seed patents are now a central mechanism by which to gain control and ownership of genetic material of seeds writ large.

Legal Origins of the Right to Own Seed

Legal and policy strategies establishing IPRs and patent regimes of exclusivity also provided for market dominance by a handful of seed and chemical companies. The legal origins of private seed patents began with the Plant Patent Act (PPA) of 1930. This Act allowed patents for unique plant varieties of only non-sexually reproduced plants. It is significant that when Congress passed the PPA, it explicitly did not allow a patent right to plants propagated by seeds (that is, by sexual reproduction). The law stated, "To these ends the bill provides that any person who invents or discovers a new and distinct variety of plant shall be given by patent an exclusive right to propagate that plant by asexual reproduction; that is, by grafting, budding, cuttings, layering, division, and the like, but not by seeds."[7]

Over the following decades, Congress consistently denied the right to grant patents to plants reproduced by seeds. In 1968, a proposed amendment to the PPA that would have extended patents to include sexually reproduced plants was defeated in Congress. During this period, the USDA opposed granting patents to sexually reproducing plants, arguing that patents would threaten development and introduction of new seed varieties.

USDA's concern was prescient of the grave loss of crop diversity that exists today. Promoting homogenous seed stocks via seed patenting and industrial agriculture has resulted in a dramatic loss of plant biodiversity. A 1983 study by the Rural Advancement Foundation International (RAFI) revealed that over the course of eighty years, the U.S. lost 93 percent of its agricultural genetic diversity.[8] RAFI's report concludes that 75 percent of today's food calories worldwide are derived from just nine plants.[9]

Under increasing pressure from commercial seed and chemical companies, including the ASTA, Congress passed the Plant Variety Protection Act (PVPA) in 1970. The Act authorized the USDA to grant Certificates of Protection for novel, sexually-reproducing plant varieties. The Certificates granted exclusive rights to multiply and market these seed varieties for an 18-year term. However, two important exemptions were established: 1) researchers must be allowed to use the PVPA-protected varieties to breed still better varieties, and 2) farmers must be allowed to save patented seed for re-planting.

Diamond v. Chakrabarty, a landmark Supreme Court case in 1980 granted the first patent on life, a decision that galvanized a great leap forward toward establishing full patent protection for sexually reproduced seed varieties. In a 5-4 decision, the Supreme Court ruled that living organisms—in this case, a bacterium—could be patented.

Shortly after this ruling, seed corporations stampeded the U.S. Patent and Trademark Office (PTO) with over 1,800 patent submissions for genetic material of seeds and plants.[10] Subsequently, the U.S. PTO began approving patent applications for sexually reproduced plants. These were classified and granted as utility patents which, unlike the PVPA Certificate, allow patent holders to exclude others from using the variety for research and agricultural purposes.

In 2001, in *J.E.M. Ag Supply v. Pioneer Hi-Bred International*, the Supreme Court upheld the U.S. PTO's practice of seed patenting by ruling that plants could be granted utility patents rather than the more limited patents, or Certificates, under the PVPA.

The industry consolidation that followed such policy changes has also led to a depletion of plant genetic resources as companies restructure and cut operating costs. As one example, Seminis Seeds, a leader in specialty crops and now a subsidiary of Monsanto, announced plans in 2000 to cut its seed stock by 2,000 varieties, or 25 percent.[11]

In sum, a single century's short-sighted industry consolidation and business practices have nearly eliminated thousands of years of selective and attentive seed saving for regional resilience.

Effects of Current U.S. Patent System—Consolidation, Rising Costs, Compromised Science

Utility patents spurred a trend of seed and chemical mergers and acquisitions in the 1980s that continues to the present. Monsanto, DuPont, Syngenta, and Bayer controlled 49 percent of the world's proprietary seed supply as of 2007.[12] As a direct consequence, the existence of small, independent seed companies rapidly declined. In 1996, there were 300 independent seed companies in the U.S.; by 2009, there were fewer than 100.[13]

Beyond the loss of small distributors, increased market concentration has also resulted in a dramatic increase in seed prices. Since the advent of GE seed, per acre soybean seed costs have risen an astounding 325 percent.[14] In addition, the "technology fee" that companies now routinely charge has significantly increased. For example, the price of a bag of soybean seed increased from $4.50 in 1996 to an estimated $17.50 by 2008 due to Monsanto's Roundup Ready trait technology fee.[15]

Restricting and influencing independent scientific research is yet another result of consolidation of the seed and chemical industry. Many believe that the legacy of the land grant universities and research institutes initiated during America's development has now become tainted as these institutions too often function as handmaidens of agribusinesses. Seed and chemical companies now partner with these public institutions by providing funding and sometimes personnel. The seed industry represents this as a win-win—it provides additional resources to these institutions and, in turn, the research benefits the public. Yet, the companies seem to derive the largest piece of the proverbial American Pie as they use the technology and research, much of it paid for by U.S. citizen tax dollars, to generate private profits.

Perhaps a more subtle, yet profound consequence of these public-private "partnerships" is that the scope of science and research can be altered. An increasing trend in universities is to focus on devising new technologies that are then appropriated by private companies for private profit. In other words, the direction of research and science in public educational bodies is more and more determined by private company agendas. Corporations provide funds mainly for quick results from technological research—such as biotechnology or nanotechnology—while long-term studies in disciplines such as biology receive little funding in comparison. It is perhaps then unsurprising that often biological consequences of the technologies developed, such as weed resistance and adverse effects on endangered species, are not addressed.

In addition to influencing the direction of science and research, public-private collaborations potentially threaten the independence, objectivity, and credibility of educational institutions. For example, Pioneer Hi-Bred prohibited university researchers from publishing their data on the mortality rates of lady beetles that had fed on an experimental variety of Pioneer GE corn (a nearly 100 percent mortality was found). Subsequently, Pioneer hired other researchers to produce more acceptable data.[16]

In sum, as noted by Bill Freese, science advisor of the Center for Food Safety, "The ability to obtain utility patents on plants has been a major factor in: consolidation of the seed industry; rising seed prices; a decline in seed-saving; reduced innovation; a narrowing of seed choices for farmers; and restrictions on independent scientific research."[17]

Current State of Play—Legal Challenges

U.S. civil society has initiated its own legal challenges in response to seed industry practices. Most legal challenges in the U.S. are focused on GE seeds given that patents for this technology serve as the primary gateway to seed ownership and monopolies. During the last five to ten years, litigation challenging commercial approval of GE crops has been somewhat successful. Much of the litigation has centered on the USDA's lack of meaningful analysis of the adverse environmental and economic impacts of GE crops in determining either approval of crops for testing or for commercialization. As a result of civil society's successful legal challenges, U.S. courts now must recognize as legal harms of the numerous adverse impacts of GE crops, such as transgenic contamination of natural crops and wild plants.

For example, legal challenges brought forth by farmer, consumer, and public interest environmental advocacy groups on GE biopharmaceutical crops, GE bentgrass, GE alfalfa, and GE sugar beets have successfully established that the USDA must undertake meaningful, rigorous risk analyses, such as analyzing the risk of contamination when considering approvals or testing of GE organisms. These lawsuits established "standing" for farmers and environmental advocates to seek compensation or relief in U.S. courts for the harms of GE crops, as well as be granted various forms of equitable relief (e.g., compensation) based on violations of the law.

In response, agribusiness has pumped up its volume of legal and political engagement. Millions of dollars spent in lobbying and the now well-entrenched "revolving door" syndrome seems to be paying off in terms of ensuring seed monopolies. Government agencies hire industry representatives from agribusiness and biotech firms while, in turn, these corporations recruit staff from government agencies. Numerous scientists, lawyers, and other professionals move seamlessly between employment at agribusiness/biotech companies and government agencies, compromising the regulatory system and undermining the efforts of civil society groups.

On the direct lobbying front, food and agricultural biotechnology firms spent more than $547 million lobbying Congress between 1999 and 2009, rising from $35 million in 1999 to $71 million in 2009—an increase of 102.8 percent. In 2010 alone, ag-biotech companies contracted over 100 lobbying firms in addition to employing in-house lobbyists. Additionally, millions have been spent to fund political campaigns. In 1999, more than $22 million was contributed by biotechnology corporations via Political Action Committees, or PACs.[18]

Such influence seems to have swayed recent policy decisions within the U.S. government, often circumventing or contravening prior court decisions. For example, in early 2011, the USDA approved unrestricted, nationwide commercial planting of Monsanto's GE alfalfa even though its own analyses and conclusions demonstrated that the approval would cause significant harm to organic and conventional alfalfa farmers and dairies as well as exporters. This decision is now under court challenge by civil society groups.

Major Legal Challenges By Civil Society

In the last half dozen years, the Center for Food Safety (CFS) and represented interested parties have brought a string of lawsuits successfully challenging USDA actions related to GE crops. One case regarding USDA's first approval of GE alfalfa went all the way to the U.S. Supreme Court in 2010. This was the first time that the highest U.S. court had ever heard a case regarding GE crops. To date, CFS's legal successes have established that proper GE crop reviews must consider the risk of transgenic contamination through cross-pollination and other means; increased herbicide use and herbicide-resistant weeds; the economic impacts of adoption on non-GE, organic farmers and businesses; and the potential loss of choice for farmers and consumers wishing to purchase non-GE foods. As noted above, the cases also established that farmers and consumers could seek recourse in U.S. courts for these harms. CFS litigation continues regarding numerous GE crops and is in various stages of litigation.

Challenge of *OSGATA et al. v. Monsanto Co.*

Another current U.S. legal challenge awaiting further action is a patent challenge filed by seventy-five family farmers, seed businesses, and agricultural organizations representing over 300,000 individuals and 4,500 farms seeking a court decision to bar Monsanto from suing them for patent infringement if they became contaminated by Monsanto's GE, "Roundup Ready" seed. A district court dismissed the case in February 2012, and a decision is now on appeal.

Challenge of *Bowman v. Monsanto Co.*

A little known case testing the scope of biotech company seed patents is under consideration to be heard by the U.S. Supreme Court. Farmer Vernon Bowman purchased seeds from a grain elevator for planting, some of which were Roundup Ready (GE) soy seeds, and Monsanto sued him for patent infringement. Bowman contends that the patents on the seeds expired upon sale of the second generation seeds he purchased from the grain elevator. Bowman is seeking a review of a lower court decision and invoking the doctrine of patent exhaustion. Under this doctrine, once an unrestricted, authorized sale of a patented article occurs, the patent holder's exclusive rights to control the use and sale of that article are exhausted, and the purchaser is free to use or resell that article without further restraint from patent law.

Challenge of *Association for Molecular Pathology, et al v. US Patent and Trademark, et. al*

Association for Molecular Pathology, et al v. US Patent and Trademark, et. al, is a lawsuit that addresses patents on breast cancer genes but it may have implications for seed patents as well. The lawsuit was filed on behalf of researchers, genetic counselors, women patients, cancer survivors, women's health groups and scientific associations opposed to patents on breast cancer genes. The lawsuit was against the U.S. PTO as well as Myriad Genetics and the University of Utah Research Foundation, which hold patents on two genes that correlate for an increased risk of ovarian and breast cancers. The lawsuit charges that patents on genes violate the First Amendment of the U.S. Constitution and patent law because genes are "products of nature" and therefore cannot be patented.

The case is slowly making its way to the U.S. Supreme Court. On March 29, 2010, a New York District Court ruled that the patents on the genes were invalid. The U.S. Appeals Court ruled in July 2011 and again in July 2012 that the patents on the genes are valid, but the patents on the methods to compare genes for gene testing are invalid. The case is expected to go the U.S. Supreme Court. If the Supreme Court accepts the case, the earliest a decision would be issued is spring of 2013. If the U.S. Supreme Court upholds the district court ruling that the patents on the genes themselves are invalid because genes are a product of nature, it will open the way to challenging patents on seeds as they, too, are products of nature. However, this will not apply to transgenic seeds, which are not classified as "products of nature."

The 2012 Farm Bill and the "Monsanto Rider"

Legal court cases remain a viable way to curb or halt GE seeds and crops, and in the process, chip away at the major means by which giant seed corporations gain ownership to seeds. However, large agribusiness is lobbying to add amendments to the U.S. 2012 Farm Bill that would effectively eradicate the current legal levers that have been successfully used to challenge commercialization and ownership of GE seeds.

Every five to seven years, agricultural policies are evaluated and reauthorized through the U.S. federal Farm Bill. The 2012 U.S. Farm Bill is currently under review and most likely will not be acted upon until after the November presidential election. While agribusiness corporations have historically played a central role in drafting farm policy, elements of a current draft extend corporate power and influence even further. Imposing these new regulations to curb alleged over-regulation is a perversion of good governance and restricts the ability of government agencies to better ensure food safety and protect farmer livelihoods, rural communities, and natural resources.

Collectively referred to as the "Monsanto riders" by civil society groups, the proposed legislation, if passed, could create serious risks for farmers, the environment, and public health by eliminating all meaningful review of the impacts of GE crops and instead "fast-tracking" their approval. (A rider is essentially an amendment attached to a Congressional bill. Riders are usually created as a tactic to pass a controversial provision that would not pass as its own bill and are often inserted into legislation in a clandestine manner and unvetted by Congressional members.)

Some of the most concerning aspects of the riders include:

- **Eliminating the ability to apply U.S. environmental laws, such as the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), when reviewing GE crop approvals. The riders also eliminate the role of any U.S. agency other than USDA.**

As noted above, court rulings in response to civil society's legal challenges demonstrate that, already, USDA oversight of GE crops is lacking and approvals have failed to comply with environmental laws. Severely restricting environmental or other types of reviews would effectively eliminate avenues that have been the basis of successful legal challenges to date and would remove issues such as contamination, increased herbicide use, or herbicide-resistant weeds from future GE crop impact assessments.

- **Establishing automatic default approvals of GE crops if the USDA does not approve or deny a commercial application within one year (with an optional 180-day extension).**

Such an unreasonable timetable would further stifle any impetus of USDA to perform meaningful environmental, economic, and public safety studies and/or adequately review public and scientific comments submitted to the Department.

A second "backdoor" approval process exists for current applications of GE crops such as Dow's 2,4-D corn, engineered to withstand exposure to one of the herbicides in the Vietnam-era defoliant Agent Orange. If USDA is unable to approve or deny a pending crop application within 90 days of the Farm Bill passage, the crop would be automatically available for planting and commercialization, even if required environmental reviews have not been performed.

- **Allowing levels of transgenic contamination in non-GE crops and foods.**

Not only does this threaten consumer choice to avoid foods with GMO ingredients, but it threatens the livelihoods of non-GE and organic farmers as their crops could be rejected both domestically and abroad if contaminated. And, given that adequate, independent research on public health effects from GE foods still have not been conducted, the health of the general public could be at risk.

In sum, not only do these provisions threaten consumer choice to avoid foods with GMO ingredients, but they also threaten livelihoods of non-GE and organic farmers as their crops could be rejected both domestically and abroad if contaminated. And, given that adequate, independent research on public health effects from GE foods still have not been conducted, the health of the general public could be at risk. Most alarming, however, is the increasing and overt influence of agribusiness in federal policy making, a trend that could have devastating effects for farmers and the environment and further erode the integrity of our democratic process.

Monsanto Versus America's Farmers

Better Seed for a Brighter Future. If there were one word to explain what Monsanto is about, it would have to be farmers. We create the seeds, traits, and crop protection chemicals that help farmers produce more food using fewer resources.

—Monsanto Advertisement

In sharp contrast to the claims of this advertisement, battling Monsanto has almost become a way of life for many U.S. farmers. Farmers are now presented with contractually binding technology agreements upon purchasing patented, mainly GE, seeds.

This agreement allows Monsanto to conduct property investigations, exposes the farmer to huge financial liability, binds the farmer to Monsanto's oversight for multiple years, and includes a variety of other conditions that have effectively defined what rights a farmer does and does not have in planting, harvesting, and selling GE seed.

Monsanto's treatment of farmers is an assault on the foundations of farming practices and traditions that have endured for centuries in the U.S. and millennia around the world, including one of the oldest traditions: the right to save and replant the seeds of one's crops. Indeed, George Washington cautioned against such behavior when he wrote, "Bad seed is a robbery of the worst kind: for your pocket-book not only suffers by it, but your preparations are lost and a season passes away unimproved." Through contracts, engineering, and patents, Monsanto has eliminated farmers' right to save seed, an inalienable right since time immemorial.

As of January 13, 2010, Monsanto had filed 136 lawsuits against farmers for alleged violations of its Technology Agreement and/or its patents on GE seeds. The majority of these cases ended in recorded damages awarded to Monsanto totaling around $23 million.[19]

However, these lawsuits do not record the whole story. CFS compiled information that was formerly available on Monsanto's website and arrived at estimates of sums paid to Monsanto by farmers in what the company labels "seed piracy matters." Such cases are often settled out-of-court when farmers cannot afford to pay legal fees and associated expenses. The investigation found that:

- As of June 2006, Monsanto had instituted "seed piracy matters" investigations against an estimated 2,391 to 4,531 farmers in 19 states.
- Farmers have paid Monsanto an estimated $85.7 million to $160.6 million in settlements.
- The number of seed piracy matters reported by Monsanto is 20 to 40 times the number of lawsuits found in public court records.[20]

American Farmers: No Longer Living the American Dream

Besides the harassment and persecution that many farmers have faced by Monsanto, other issues are turning the American dream into a nightmare. The state of seed and concentrated seed ownership largely parallels the plight of many U.S. farmers who are struggling to make a living as farm inputs such as seeds, fertilizers, fuel, and pesticides steadily rise.

Headlines earlier in 2012 touted happy days for U.S. farmers due to increased trade and high prices paid for agricultural commodities, yet most family farmers have not benefited as potential profits dissolve because of rising on-farm expenses and fewer or lower government payments. In addition, due to the economic recession, off-farm income has fallen. In 2009, real household income for family and small farms fell by 28 percent compared to 2007 levels, according to Timothy Wise, director of the Research and Policy Program at the Global Development and Environment Institute at Tufts University.[21]

Total farm expenditures in 2011 were $318.7 billion—averaging 11.3 percent greater than in 2010.[22] In particular, the price of seeds has contributed to the high cost of farm inputs. From 2001-2010, USDA's data reveals that corn seed and soybean prices rose 135 percent and 108 percent respectively.[23] With many farmers struggling, Monsanto's net income increased 77 percent in 2011, coinciding with a sharp spike in seed prices, with GE corn seed increasing 32 percent and GE soybean seeds rising by 24 percent.[24]

This generated an antitrust investigation of the seed industry by the Department of Justice in 2009, with a focus on Monsanto because it controls most of the market. (At the time of this writing, the investigation is still ongoing.) According to the Rodale Institute, at least one of Monsanto's patented genes exists in 90 percent of soy and 80 percent of corn planted in the U.S.[25]

Not having conventional, non-GE seed available appears to be part of the strategy to boost sales of higher-cost GE seeds. As Indiana soybean farmer Troy Roush noted, "You can't even purchase them in this market. They're not available." A farmer from Arkansas concurs: "It's getting harder and harder to find conventional [soybean] seed." A Texas cotton farmer similarly reports: "Just about the only cottonseed you can get these days is [genetically engineered]. Same thing with the corn varieties. There's not too many seeds available that are not genetically altered in some way."[26]

Another strategy to boost sales of GE seed involves promotion of a seed's chemical partner, such as Roundup, which contains the active ingredient glyphosate, the primary herbicide used on GE crops. In July 2011, the *Wall Street Journal* reported that the U.S. Securities and Exchange Commission issued a subpoena to Monsanto to provide documents related to its customer incentive programs for Roundup in fiscal years 2009 and 2010. [27] The investigation is ongoing at the time of this writing, but could reveal that Monsanto engaged in illegal practices aimed to squeeze out competitors and manipulate the market

In the face of rising costs, many farmers have looked to obtain farm credit, long the backbone of American agriculture. However, family farmers face significant barriers to accessing farm credit. A national survey conducted by farm advocacy organizations reveal that since 2009, farmers are increasingly being denied loans due to the recent contraction of credit markets, particularly financial stress on agricultural banks and an upturn in farmer loan defaults.[28]

The difficulty of getting loans and farm credit is also affecting the future of farming in America. The price of land, water, and ever increasing agricultural inputs puts farming out of reach for many, notably younger generation farmers. For example, there were nearly 180,000 farmers younger than 35 in 1997. By 2007, there were only 120,000 – a decrease of one-third. The high cost of farming was the major reason credited for this decline.[29]

Super Weeds, Super Problem

High priced seeds are creating high stakes problems. Agronomists around the world are alarmed by the growing epidemic of weeds, or "super weeds," that have evolved resistance to glyphosate as a result of the intensive use on GE crops.[30] As of June 2012, over 16.7 million acres have been infested across the country.[31] Some estimate that this figure could more accurately be 30-40 million acres if all of the infestations were reported.[32]

Eliminating super weeds is an additional cost for farmers. Farmers resort to more soil-eroding tillage operations to combat these weeds and also turn to increasingly toxic herbicide cocktails. As a result, pesticide usage has massively increased in the U.S. since the adoption of GE seeds. The most comprehensive independent study to date, based on USDA data, found that GE crops used upward of 26 percent more pesticides per acre than non-GE, conventional crops.[33]

In response to increasing weed resistance to glyphosate, seed and chemical companies are developing new GE crops resistant to more toxic herbicides. Dow AgroSciences is awaiting USDA approval of corn and soybeans resistant to 2,4-D, an active ingredient in Agent Orange, which is often highly contaminated with carcinogenic dioxins. Likewise, Monsanto is planning to introduce dicamba-resistant soybeans, corn, and cotton. Dicamba has been linked to increased rates of non-Hodgkin's lymphoma[34], as well as colon and lung cancer.[35]

Drought—Crisis in America's Heartland

More than two-thirds of the contiguous United States was under some level of drought as of July 31, 2012; more than one-quarter of affected regions are classified as being in extreme drought or worse, according to the *Drought Monitor*, a weekly report compiled by U.S. climate experts. Some degree of dryness affects over 79 percent of the contiguous 48 states.[36] Government records show that 2012 has been the hottest year on record in the lower 48 states.[37]

Nearly 40 million out of 96 million planted U.S. acres of corn are in drought conditions.[38] The primary corn and soybean agricultural areas in the U.S. had their sixth-driest April-July growing season since 1895, according to the National Oceanic and Atmospheric Administration.[39]

In addition, 37 percent of the main livestock-producing area in the U.S. is now experiencing severe drought levels. Farmers and ranchers are finding it difficult to find feed for their livestock. According to Mark Svoboda of the National Drought Mitigation Center in Lincoln, Nebraska, "This is something that we haven't seen, save for a couple of times, in the last hundred years."[40]

The impact of widespread drought on farmers is devastating. Yet, they have been left high and dry as Congress adjourned for the summer without passing a comprehensive, adequate relief package for farmers and ranchers. Texas A&M System's AgriLife Extension Service reports that agriculture has already suffered an unprecedented $5.2 billion loss from the drought; $2.06 billion attributed to livestock alone. Once associated industries are accounted for, such as grain elevators and processing plants, losses are reaching up to $8.7 billion.

Analysts also predict that low yields of corn and soy will increase food prices not only across the nation, but worldwide. Weather and drought were a partial factor in the 2007/2008 food crisis that sparked riots in Egypt, Cameroon, Haiti, and several other countries. The Food and Agriculture Organization (FAO) recently released figures showing that the world food index has increased to 6 percent.[41] "There is potential for a situation to develop like we had back in 2007/08," noted FAO's senior economist and grain analyst Abdolreza Abbassian.[42]

Climate Change—A Permanent Trend?

While most experts agree that La Niña was a major factor behind this year's U.S. drought, scientists also note that droughts may increase in frequency and intensity as anthropomorphic activities increase global temperatures. For example, high temperatures this year in the U.S. are part of an overall global warming trend predicted by the Intergovernmental Panel on Climate Change (IPCC). The extra heat means less snowpack to provide spring waters and parched soils combined with high water evaporation.

Climate models tend to concur that the intensity and frequency of droughts will increase in central North America, though there is uncertainty about which specific regions will be most affected. A 2011 report by the National Center on Atmospheric Research establishes that if the world keeps heating up, regions in North America will experience warmer air, leading to increased evaporation that will dry out soils, and persistent droughts will be more likely in the next 20 to 50 years[43], possibly leading to Dust Bowl conditions, or worse.[44]

In times of ever increasing extreme weather associated with global warming, seed diversity is critical for agricultural production and indeed global food security. Building and maintaining seed diversity provides the very resilience and adaptation needed in times of climate chaos. Instead of continuing current policies that encourage consolidation of seed ownership and uniformity of seed, societies should be shifting toward building dynamic farming systems and diverse seed repositories.

Back to the Future

Given that the majority of Americans no longer have any connection to farming, the numerous difficulties faced by farmers—notably smaller, family farms—and economic hardships of many rural communities, it appears that the U.S. has faltered in fulfilling the aspirations of our founding fathers and our agrarian inheritance. It may be time to go back to the future so there can *be* a future for farming in the U.S. The ideals of agrarian potential are astutely described by Thomas Jefferson in a letter to George Washington (1787):

Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals, and happiness.

Seeds of Hope—Emerging Independent Seed Companies

by Sharon Perrone

Despite dismal environmental outlooks and industry's best efforts to dominate the American seed supply, farmers across the country are reclaiming their fundamental right to cultivate, breed, and distribute seed in an ecologically sustainable manner. Independent seed companies have begun to emerge to meet an increasing demand for organic seeds as the organic market in general is the fastest growing sector of U.S. agriculture. Furthermore, with growing consumer interest in organic and sustainably cultivated crops, a new market niche has opened up for enthusiastic and innovative growers to collect heirloom, organic, and open-pollinated varieties.[45] Frustrated and disadvantaged farmers that have been precluded from purchasing culturally significant and geographically adapted varieties due to consolidation and lack of availability are starting to turn to these local and regional growers for their seed supply.

Today, there are at least 125 independent organic seed suppliers alone across the United States.[46] Due to increased activism in regenerating American agriculture, these seed suppliers are rapidly acquiring unique varieties donated by small farmers and grassroots supporters around the country.

The Seed Savers Exchange based at Heritage Farm in Decorah, Iowa, is a prime example. Diane Ott Whealy founded the farm in 1975 when her grandfather gave her two plants brought from Bavaria in the late 1800s. Today, Heritage Farm keeps over 25,000 varieties.[47] Similarly, the Baker Creek Heirloom Seed Company in Mansfield, Missouri, cultivates and sells over 1400 unique cultivars from 70 countries.[48]

Such encouraging examples provide inspiration for an increasing trend towards reliance on local, resilient, and biodiverse crops to sustain a new era of post-industrial agriculture.

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ORGANIC SEED GROWERS AND TRADE ASSOCIATION

Holli Cederholm*, OSGATA

The Seed Emergency

The reality we face in terms of seed integrity is stark—our seed is vital and it is at stake. And with it, so is the very foundation of agricultural systems worldwide. A stable food system, one that is resilient and adaptable, one that can whether the storms of climate change and ride the tides of an impending energy crisis, requires genetic diversity. Sadly, corporate monopolization of seed companies and agricultural lands on an international scale gives rise to monocultures and facilitates a staggering loss of biodiversity: over the past 100 years, based on UN estimates, 75% of seed genetics have been lost forever.

A stable food system is also reliant on our collective genetic heritage, the wealth of our human agricultural history, our seed remaining in the public domain. Granting of patents on seeds removes our seed from the commons, consolidating once universal resources into the hands of the few. Seed faces further, and irrevocable, threat of genetic contamination by transgenic or genetically modified seeds. Transgenic seeds are genetically engineered through the introduction of genes and regulatory sequences into the seeds' genome. In the United States, governmental funding has shifted from supporting traditional breeding programs to supporting transgenic breeding programs, with a focus on a handful of globally distributed commodity crops. Once released into the environment, these transgenic seeds contaminate organic seed via cross-pollination and human error; the lack of a regulatory framework to adequately maintain the integrity of organic seed exacerbates this problem. Our farmers' choices are narrowing.

OSGATA Fights Back

We at the Organic Seed Growers and Trade Association (OSGATA) remain hopeful. As a national not-for-profit agricultural organization, OSGATA's membership is comprised of organic farmers, organic seed growers, seed companies, researchers, plant breeders, and advocates of organic seed spanning across the US. Our goal, however, is global: we envision a thriving agricultural system founded in regionally-adapted, diverse organic seed which supports naturally integrated, local and organic farms.

Despite corporate consolidation and the risk of contamination of seed, the landscape of organic agriculture in the US is vibrant, and it is growing. Presently, over 4 million acres of farmland are in organic production, and organic sales are continually climbing. This movement is demanding organic seed—varieties that are suited to local conditions and low inputs, that are more biologically diverse and resistant to the pressure from disease, pests and climate, that are higher in nutritional value and taste.

OSGATA is committed to developing, protecting and promoting the organic seed trade and its growers, thereby assuring that the organic community has access to excellent quality organic seed, free of contaminants and adapted to the diverse needs of local organic agriculture. Since 2008, OSGATA has been influencing congress, the media, and the courts, and in 2011 we stood up as the lead plaintiff in a landmark lawsuit challenging the patents of Monsanto's GMO seed.

Organic Seed Growers and Trade Association et al. v. Monsanto

The widespread adoption of genetically modified crops by commodity farmers in the US—within the past two decades Monsanto's seed monopoly has grown to include 90% of the genetics of the five major commodities— has led to fear of genetic contamination by growers of organic, as well conventional non-transgenic, crops. We fear that not only are we unable to avoid GMOs in our fields and on our plates, but we also fear intimidation, harassment and litigation enacted by seed patent holders.

Principles of basic biology dictate that pollen drift can and will transverse transgenic crop fields and enter neighboring organic fields. This hard truth places growers of non-transgenic crops in a precarious situation—one in which they can lose their organic markets, and ultimately their livelihoods, and furthermore face corporate tyranny pursued through the court system.

Jim Gerritsen OWS farmers march

During 1997-2010 Monsanto admits to filing 144 lawsuits in 27 different states against farmers, and has settled out of court with some 700 other farmers for undisclosed amounts. And this pattern continues. Annually, Monsanto investigates 500 farmers for patent infringement with their now notorious seed police. Undoubtedly, this number represents growers who have shunned Monsanto's transgenic technology, who have never signed a legal licensing agreement for it, and who have taken action to avoid contamination.

OSGATA has had enough. We are fighting back, and we are not alone.

In March 2011, on behalf of OSGATA and 60 family farmers, seed businesses and agricultural organizations, the Public Patent Foundation (PUBPAT) filed suit in federal district court in New York, against Monsanto to challenge their patents on genetically modified seed. The plaintiffs (totaling over 300,000 individuals including over 4,500 certified organic farmers) feel increasingly threatened by the possibility of seed contamination and have joined together in preemptive action to establish a ruling that would prohibit Monsanto from suing organic farmers and seed growers for patent infringement in case of contamination by Monsanto's trademark "Roundup Ready" seed. Monsanto currently produces Roundup Ready soybeans, corn, cotton, sugar beets and canola.

Following the March filing of the lawsuit, Monsanto issued a statement saying they would not assert their patents against farmers who suffer "trace" amounts of transgenic contamination. In response, with hope that the matter could be resolved out of court, PUBPAT attorneys wrote Monsanto's attorneys asking the company to make this promise legally binding. Monsanto rejected PUBPAT's request and instead confirmed their ability to make claims of patent infringement against organic farmers who become contaminated by Monsanto's genetically modified seed. Monsanto's failure to provide a binding legal covenant to protect farmers led to an amplification in our numbers–23 new plaintiffs joined our suit prior to PUBPAT's filing of an amended complaint in June 2011.

Unfortunately, in February 2012 Judge Naomi Buchwald sided with Monsanto in their motion to dismiss the case, after hearing oral arguments on the motion from both sides earlier in January.

Still the fight continues. PUBPAT filed a brief in appellate court in early July in which 75 family farmers, seed businesses and agricultural organizations point out numerous errors in the district court decision that warrant reversal.

Though the request for court protection through a declaratory judgment is a primary objective of the case, PUBPAT is prepared to challenge the invalidity, under both statute and case law precedent, and the misuse of Monsanto's transgenic Roundup Ready patents should we see our day in court.

Four basic contentions, ranging from the patent invalidity, through the establishment of proper requirements for a finding of patent infringement, to patent unenforceability and Monsanto's lack of entitlement to collect damages were asserted in the original complaint filed March 29, 2011.

Topping the list of patent contentions is the fact that Roundup Ready seeds are not useful. The US Patent Act stipulates that anyone who invents or discovers any new and useful process, machine or composition of matter may obtain a patent on the invention or discovery. Monsanto's Roundup Ready seeds arguably fall short due to their lack of social utility. Monsanto's original promises of increased crop yields with decreased chemical inputs have proven untrue within the past 15 years of widespread adoption by commodity farmers. Instead farmers face increased costs from additional herbicide applications to combat an onslaught of Roundup-resistant superweeds; not to mention the increase in crop diseases or the loss of ability to save seed free of fear of legal repercussion.

Ensuring Seed Integrity

Saving our seeds is a battle on the ground and in the fields, as well as in the courts. While OSGATA hopes to achieve victory in the lawsuit, we also recognize that education concerning seed integrity is critical to our cause. OSGATA is firm when it comes to seed integrity– any detectable level of transgenic contamination is unacceptable. While maintaining this standard requires diligence in policy it ultimately relies on the stewards of the seeds.

So OSGATA is strengthening our advocacy regarding the value of organic seed at national and local levels, including advising the National Organic Standards Board (NOSB) and National Organic

Program (NOP) regarding organic seed issues, but we're also communicating with farmers, seed growers, seed distributors and concerned citizens via our educational campaigns. To this end, OSGATA has undertaken the researching and writing of the first comprehensive farmers' and seed handlers' manual outlining GMO Contamination Avoidance and Testing Protocols. We are hoping to minimize the serious risk to organic seed integrity through this peer-reviewed compendium of best practices for avoidance and testing for crops currently under threat of transgenic contamination which will be disseminated broadly–like pollen in the wind.

We are the narrators of this story. The future of our seed system is in our hands.

**Holli Cederholm is the General Manager of OSGATA*

(Full documentation regarding OSGATA et al. v. Monsanto is available at www.osgata.org.)

Citizens' Assembly

THE HEIRLOOM SEED MOVEMENT

Kent Whealy*

Plants that have been passed down from one generation of a family to the next have always fascinated me. I have given each of my children a large potted Christmas cactus started from cuttings of the plant my great-grandmother grew in her farmhouse. And the same Trumpet Vine that shaded the porch of the little house my grandfather built in Dalton, Kansas – in which my late father was born in 1907 – is blooming today in my garden. Knowing that I am touching the same plants that previous generations of my family have also touched is warmly and deeply satisfying. My family members may be gone, but the plants they grew are still alive.

Several events in the mid-1970s lured me into starting the Seed Savers Exchange (SSE). Flying out of the Wichita Airport in June 1976, I was looking around for something to read and found a discarded copy of *Plain Truth* magazine. An article "Sowing the Seeds of Disaster?" took me only a few minutes to read and changed my life forever. It started off with Thomas Jefferson's 200-year-old quote, "The greatest service which can be rendered any country is to add a useful plant to its culture" and then quoted several prominent geneticists trying to warn the public about the dangers of "genetic erosion" (how the breeding material for all of the future's food crops was rapidly dying out). The geneticists were candidly talking about how breeders and scientists were sitting around "fat, dumb and happy" before the mad scramble to recover from the Southern Corn Blight in 1970, which destroyed 20% of the U.S. corn crop (50% in the worst areas). The National Academy of Sciences had just released its report on the "Genetic Vulnerability of Major Crops" revealing for the first time the startling vulnerability of all major U.S. crops.

There was a full-page interview with U.N. biologist Dr. Erna Bennett whose report on plant genetic resources to the U.N.'s Food and Agriculture Organization had stated, "Everywhere that agricultural development takes place the old varieties disappear. It's a fairly direct relationship... Widespread use of improved highly uniform crop varieties is wiping the primitive varieties out of existence; they are disappearing by the thousands every year." Dr. Garrison Wilkes eloquently described how "….the genetic heritage of a millennium in a particular valley can disappear in a single bowl of porridge." And the late Dr. Jack Harlan warned, "The consequences of failure of one of our major food plants are beyond imagination….The line between abundance and disaster is becoming thinner and thinner, and the public is unaware and unconcerned. Must we wait for disaster to be real before we are heard? Will people listen only after it is too late?"

I had also begun an extensive correspondence with the late John Withee, a bean collector from Lynnfield, Massachusetts. John was born in Portland, Maine in 1910 and his bean collecting started while trying to locate the Jacob's Cattle bean remembered from his youth. From 1967 to 1981 John collected 1,186 varieties of beans mostly in the Northeast (U.S.), an area with a long history of baked beans. John founded Wanigan Associates, a nonprofit organization involving hundreds of gardeners who helped maintain his bean collection, which I joined. Wanigan Associates had gotten a tremendous amount of national publicity, too much actually, which had sort of rolled over him. About five years later (1981), John would ask me to take over his Wanigan bean collection, which I promised him I would always care for and protect.

One winter on the cover of John's little Wanigan Associates catalog was the phrase "Heirloom Beans." I had never seen the word "heirloom" used to describe plants, and it was one of those absolutely perfect phrases! They were indeed true heirlooms, living heirlooms, passed down through the generations like pieces of jewelry. "Heirloom beans" and "heirloom vegetables" and "heirloom apples" all rolled off the tongue as perfectly as my "Seed Savers." When I asked John if he minded if I used the phrase, he just laughed and said it was certainly okay with him, but the phrase wasn't his. To John's knowledge, it was first used by Prof. J. R. Hepler at the University of New Hampshire in the 1930s and 1940s to describe family varieties he had collected in New Hampshire and Maine. Just knowing that Prof. Helpler was collecting heirloom varieties back then, plus John's stunning success collecting heirloom beans throughout the Northeast, made me wonder if a vast unknown heritage of heirloom varieties existed all across the U.S. and Canada.

About that same time my family landed in the backwoods of northern Missouri – part of the back-to-the-land movement after the Viet Nam war– saving for three years to buy land there in 1975 before moving in 1976. I got a job in a printing plant (where some of Seed Savers early yearbooks were printed), built a handmade house out of native hardwoods, plowed a large garden and planted an orchard. Upon moving to Missouri, I started searching locally for heirloom seeds and soon met a 90-year-old woman who gave me lettuce seeds that her grandfather had given to her, grown by his family since before our Civil War (1861-1865). At a smoky old sorghum mill way back in the woods near Jamesport, Missouri, I was given the seeds of an old-time Mennonite sorghum ("A great syrup sorghum like the old ones we can't find no more.") It would take me another five years to track down the legendary Moon and Stars watermelon being kept by an old fellow on a farm near Macon, Missouri, which his family had grown in Tennessee.

I was also sending lots of "Letters to the Editor" to gardening and back-to-the-land magazines, trying to locate other gardeners keeping heirlooms. In a letter to *The Mother Earth News* (July 1975), I proposed forming "an exchange between seed savers" and asked gardeners to send me lists of varieties they could offer. Only five gardeners responded, and that winter we traded letters and seeds. A year later in December 1976, I typed and xeroxed the first seed exchange newsletter (only six pages) through which 29 members offered a few dozen heirloom varieties.

I soon discovered that a vast heritage of heirloom seeds was indeed still being kept by elderly gardeners and farmers in rural areas and ethnic enclaves. The United States and Canada are both nations of immigrants, so gardeners and farmers from every corner of the world brought their best seeds when their families immigrated, ensuring continued enjoyment of foods from the old country. Rugged, backwoods areas of the Ozark and Smokey and Appalachian Mountains all proved to be rich in heirlooms, especially in areas of severe poverty where seeds had always been shared rather than purchased. After a decade of slowly building trust in Seed Savers, I was deeply moved when Native American gardeners began offering their sacred seeds through SSE's yearbooks (eventually 140 varieties were offered by members of nearly 50 tribes). Some of these heirlooms have been grown by different generations of the same family on the same farm for more than 150 years. But as our older generations pass away, unless other gardeners step forward to replant their seeds, those unique genetic characteristics are lost forever to future gardeners, farmers and plant breeders. That's the gap that Seed Savers has successfully bridged.

Starting with that 6-page newsletter in 1976, it took me nearly 20 years to build *Seed Savers Yearbook* into today's 500-page editions containing the addresses of 1,000 SSE Members who annually offer 12,000 varieties to other gardeners and farmers. During the 33 years that I guided Seed Savers, 3,500 SSE Members offered 33,000 family heirlooms and rare garden varieties through SSE's annual yearbooks. During those years, SSE's Members distributed an estimated 1,000,000 samples of rare garden seeds often on the verge of extinction. And all of that was done virtually for free – mainly for postage and handling. That selfless sharing resulted in SSE's beautiful, flavorful heirlooms spreading throughout Farmers' Markets, being widely used by chefs sourcing local foods, and providing the resources for numerous alternative seed companies.

In about 1980 I started receiving lots of complaints from SSE's Members, whose favorite varieties were being dropped from seed catalogs, asking where to find other sources. I decided to compile an inventory of every mail-order vegetable seed catalog in the U.S. and Canada designed to identify and rescue the non-hybrid varieties being dropped. I worked steadily for three years compiling the first *Garden Seed Inventory*, which was finally published in 1984. Remember, this was still a decade before the internet, so the "total access" provided by my inventory was incredibly powerful. Indeed, its watershed effects changed all of our gardens.

GSI's Second Edition revealed that from 1984-1987, 23% of the mail-order seed companies in the U.S. and Canada (54 out of 230) were taken over or driven out of business! Agrichemical conglomerates had gone on a buying spree, purchasing the small family-owned seed companies that had been their competition. Outstanding regionally-adapted collections were dropped and replaced with generic varieties (usually the more profitable hybrids and patented varieties) that would grow reasonably well in all areas, assuring maximum sales. Many of the varieties being dropped were specifically bred to resist local diseases and pests, mainly developed by the outstanding breeding programs that used to exist at each State's agricultural university. SSE has now published six editions of my inventory, covering all mail-order catalogs from 1981 to 2004, and revenue from each edition was used to buy samples of varieties about to be dropped.

In 1981 SSE started maintaining a central seed collection, mainly as a back-up strategy so that SSE's Members could always get their seeds back, if ever lost. SSE's Seed Collection includes three main components: heirlooms from SSE's Members, endangered commercial varieties, and traditional varieties collected on foreign expeditions. Each winter after SSE's yearbooks were mailed, hundreds of letters requesting varieties not yet in SSE's Seed Collection were sent to SSE Members, who invariably donated their families' heirloom seeds. As mentioned, the six editions of my *Garden Seed Inventory* were used to identify and purchase samples of endangered commercial varieties about to be dropped from mail-order catalogs (1981-2004). Unlike the plant breeding of today, most of the varieties in SSE's Seed Collection were developed before the era of chemical agriculture and grow well without those toxic inputs, plus have never been exposed to GMO contamination, so are the perfect resources for organic production.

I also wrote the grants that allowed SSE to sponsor 12 plant collecting expeditions (1993-1997) in genetically rich, critically endangered areas of Eastern Europe and the former Soviet Union, for which I received Russia's N. I. Vavilov Medal. Totaling nearly 300 days, the expeditions included: Bukovina region of northern Romania, Carpathian Mountains in southern Poland, Azerbaijan, Maramures and Muntii Apusenti regions of northwestern Romania; Linosa and Pantelleria (islands between Sicily and Tunisia); Hissar Mountains in Uzbekistan, southern Sardinia, Volga River and Krasnoyarsk Territory (Russia), Uzbekistan (Aral Sea southern route), Kazakhstan (Aral Sea northern route), western Ukraine, and Altai Territory (southern Siberia). Some of the world's best plant explorers were involved – scientists from Vavilov Institute in St. Petersburg, Russia and the seed bank at Gatersleben in eastern Germany – which resulted in 4,000 traditional varieties from 30 eastern countries (and Cuba) entering SSE's Seed Collection.

Maintaining a large seed collection requires fertile land and specialized equipment and facilities, so in 1986 I made the first of five land purchases for SSE, eventually totaling 886 acres (360 hectares), which established Heritage Farm near Decorah, Iowa as SSE's national headquarters. Nonprofit donations from SSE's Members quickly paid off Heritage Farm's land contracts and provided the majority of the funds for a $600,000 complex of offices, greenhouses and seed storage facilities. Each summer SSE's members and thousands of visitors tour Heritage Farm's exemplary genetic preservation projects: 23 acres of certified organic gardens; Historic Orchard containing 700 varieties of pre-1900 apples and 200 hardy grapes; and two herds of Ancient White Park cattle, the rarest breed of cattle in the English-speaking world.

By 2007 SSE's Seed Collection had grown to 26,000 varieties (5,300 beans, 230 eggplants, 1,100 lettuces, 1,200 peas, 2,440 peppers, 1,310 squash, 6,200 tomatoes, and so on), plus the perennial collections at Heritage Farm (700 pre-1900 apples, 200 hardy grapes, 300 garlic and 130 horseradish). Seed multiplication also grew from a few small gardens in 1987 to 23 acres of "certified organic" gardens 20 years later. The goal each summer was to multiply the oldest 10% of the collection on a 10-year rotation (about 2,000 varieties annually), so that SSE's members would have access to the entire collection within a decade. Newly grown seeds were offered to SSE's members and the gardening public through *Seed Savers Yearbook*. Seed Savers became widely recognized as the finest source of unique plant material U.S. gardeners had ever known.

During SSE's annual growouts, hundreds of exceptional varieties were discovered. Imagine walking through Heritage Farm's gardens, observing that summer's 500 varieties of tomatoes and discovering 40 possible superstars. Some seed companies would visit Heritage Farm each summer just to use our growouts for their own evaluations (which was fine with me, just another way to spread our heirlooms). U.S. nonprofits are allowed to generate "project-related revenue" if it is aligned with their mission, so in 1999 SSE started selling packets of heirloom seeds through *Seed Savers Catalog*. My goal was for revenue from seed sales to eventually cover the annual costs of maintaining SSE's Seed Collection. By 2006, only eight years later, revenue from seed sales had grown to $1.2 million and was supporting 72% of SSE's total operations. Financial self-sufficiency was in sight and building the endowments to always support SSE's Seed Collection and Heritage Farm's genetic preservation projects had just begun. I actually thought I was within a couple of years of achieving my dream of a true "People's Seed Bank" that would be permanently self-supporting and always accessible to gardeners and farmers.

Seed Savers Exchange has always provided unfettered public access to seeds – offering our families' heirloom seeds virtually for free – the complete opposite of today's ruthless corporate efforts to legally and genetically prevent the saving of seeds. The same agrichemical corporations that were buying up small seed companies 30 years ago are still intent on total control of the world's food production. Today just six corporations – Monsanto, Syngenta, Dupont/ Pioneer, Bayer, Dow and BASF – have bought up more than half of the entire world's seed supply! A decade from now, if those corporations end up controlling virtually all of the world's seeds, gardeners and farmers and consumers may have won a few battles along the way, but will have lost the war. This is a death struggle to determine if the people will continue to have access to seeds and healthy uncontaminated food for their families, or will the entire world be held hostage by a few corporations that totally control seeds and food production worldwide?

**Kent Whealey, Co-Founder Seed Savers' Exchange (1975), a network of farmers and gardners dedicated to saving North America's diverse but endangered garden heritage by collecting, conserving and sharing heirloom seeds and plants. www.seedsavers.org*

Seed Sovereignty, Food Security and Pure Food

Randel A. Agrella*
Baker Creek Heirloom Seed Company, USA

The Main Issues, and Why They're Important to Baker Creek Heirloom Seed Company

Owners Jeremiath and Emilee Gettle have always felt strongly about food freedom, and everything that relates to it: seed sovereignty, individuals' control over their own food security, sustainability of the world's food supply, and increasing corporate domination of not just the food supply (including seeds) but, indeed, illegitimate corporate control over the very process of legislation itself.

Heirloom seeds are our specialty. By their very nature, heirloom seeds confer seed sovereignty to individuals and small local groups around the globe, which is precisely where it belongs. It seems to us that our freedom to choose, grow and purchase the foods we take into our bodies, is absolutely fundamental to any other freedom that humans have, or ought to have, no matter their beliefs, political system or economic situation.

We decry the modern trends of hybridization, loss of genetic diversity, increasing centralization of food production (including seed production), and, most recently, the patenting of life for the gain of a few individuals or corporate entities. Most of all, we abhor the tinkering with the very essence of life that is genetic engineering.


Photo courtesy: www.rareseeds.com

The Gettle Family

We support public domain breeding work, legislation to require labeling of GMO components in our food, and the efforts of people around the world to take back control of our agricultural process, which is the physical basis of our existence, not just for our own sake, but for that of our descendants as well. We feel that time is short, and that the coming decades will be decisive, one way or the other, in our struggle for seed sovereignty, food security, and ultimately, our very freedom.

We endorse and support Navdanya's work to this end, including the Global Seed Alliance's Declaration on Seed Freedom.

Baker Creek's Experience

Baker Creek Heirloom Seed Company was founded in 1998 by Jere Gettle, at the age of 17. Gettle started growing and saving seed as a teenager. Beginning by selling home-raised seed stored in shoe boxes in his bedroom, in little over a decade Gettle has grown Baker Creek into one of the world's premier heirloom seed-houses. As he recounts in his book, *The Heirloom Life Gardener*:

"In 1998, biotechnology was all the rage in America's seed industry....[A]s more historic varieties disappeared with each new year, I realized I had to do something. I wanted to establish a company that sold the old, unique heirlooms that were being neglected...I sent out my first twelve-page catalog that year [1998], offering seventy-five varieties of seeds that I had been growing on the farm. Soon after sending out that first list, my fledgling company suddenly had hundreds of customers. And within a year, my little operation was occupying all the free space where I still lived with my parents and sister...."

Gettle describes how his business grew in 1999, with the growth fueled in part by the Y2K scare, and how his sales that year provided the funds for construction of the endeavor's first building: the seed store where retail sales are conducted, and from which orders are shipped out. He further recounts how each year's expansion was fueled solely by his seed sales from each preceding year, culminating in the opening of an extremely successful California storefront, The Seed Bank, in Petaluma, California, and the acquisition of the historic New England seed house, Comstock, Ferre and Company, including the antique buildings on the site, in Wethersfield, Connecticut, in 2010. Today his company ships several million packets annually all over the world.

Such meteoric growth is a clear sign that heirloom, open-pollinated seeds are very much in demand by the public. Although in the first years young Jere Gettle was selling home-saved seed produced in the family farm in Mansfield, Missouri, the demand quickly outstripped the farm's ability to produce an adequate supply. Gettle turned to purchasing seed on the open market. Although he found and utilized a few like-minded suppliers, like Seed Savers Exchange in Decorah, Iowa, Southern Exposure Seed Exchange, Mineral Virginia, and several others, it quickly became obvious that conventional market sources were not up to the task of supplying seeds in the numerous heirloom varieties that Gettle envisioned. Most of the wholesale seed brokers were offering mainly hybrid types, which Gettle didn't want. Instead, he wanted to focus on open-pollinated heirloom varieties, with their rich diversity and history.

Why Grow Heirlooms?

Quality: Decades of modern breeding in vegetable crops has yielded some useful varieties, but at a price: quality has been sacrificed to the producers' convenience in harvesting and shipping. Too often, crops have been bred for uniformity, or to ripen all at once (to facilitate mechanical harvesting), or tough skins (to allow the produce to withstand rough handling and shipping, sometimes thousands of miles!).

Quality, taste, and even nutritional value have been the casualties of this trend. Plant selection always involves trade-offs, since it is seldom possible to achieve exactly the perfect blend of all possible traits. Very often, hybrid types are lacking real complexity and depth in their flavor, since appearance and shippability are so much more important under a mass-marketing paradigm. Tenderness and fine texture have also often fallen by the wayside. And, increasingly, studies are showing that the nutritional values in factory-farmed produce are actually lower. Protein content in corn is one example. Old-style open-pollinated field corn, the type grown for feed or for milling into flour, often contains almost twice as much protein as the new hybrids. Studies have also shown higher levels of copper, iron and manganese in at least some open-pollinated varieties. Agribusiness is okay with that because the increased productivity may result in more protein per acre of crop grown, but agribusiness standards seldom apply in the home garden!

Performance: Although heirlooms have the reputation for being finicky and not easily grown, this really needn't be the case. Heirloom varieties are often the product of many generations of careful selection by farmers and gardeners who knew what they wanted from their plants. If a variety has been carefully nurtured and its seed kept by generations of a family or in a small geographic area, it stands to reason that it must perform well in the conditions under which it has been preserved. Since many of these varieties have never been the subject of university studies, they may have no documented disease resistance, but will quite probably possess some tolerance to the diseases and conditions prevailing in the area where they arose. So, with some attention to choosing varieties from your own area, or those that come from similar conditions, it is quite possible to select varieties that will be very vigorous and productive in your own garden.

Saving Seed: A great advantage of heirlooms is the fact that, provided precautions are observed when growing a crop, seed may be saved for use in future years, and it will be true to type, year after year! You can't do this with hybrids; if you save seed grown from hybrid parents, the offspring will show a lot of variation and, in all likelihood, be markedly inferior to the parents. In fact, careful selection in your own garden can actually produce a unique strain of the crop grown, resulting in even better performance under your unique conditions and methods!

Seed may seem like a minor expense to strictly home-scale gardeners in developed countries, but to larger-scale operations, like market growers, or in the third world, the ability to save seed results in a substantial savings, and in some cases may make the difference between success and failure of the venture.

Tradition and Continuity: Heirloom vegetables represent a priceless legacy, the product of centuries of work by countless generations of farmers around the globe. When we grow heirlooms, we are the living link in a chain stretching back sometimes many hundreds of years. We are taking our turn in a succession of growers, each generation of which cherished their favorite crops and varieties and lovingly preserved fresh seed for coming seasons. As the current custodians, we are endowed with the opportunity to make our mark as well, because like previous generations, we maintain the varieties that we love the most. Heirloom seeds are our living legacy, bequeathed to us from the past, and passed on, in turn, to the future.

Open-pollinated, hybrid, heirloom?

Gardeners often want to know the meaning of these terms which are frequently seen in seed catalogs:

Open-pollinated: Seeds are produced in a population where all the members are similar, breeding freely by natural means. The genetic makeup of the parents is fairly uniform; their offspring are also uniform. There is still some breeding work being done with open pollinated varieties, including much work being done within the heirloom community, utilizing existing heirlooms to yield new open-pollinated types. Heirloom: Always open-pollinated, usually at least 50 years old. They usually were developed by selection of those individual plants that showed some outstanding trait, like earliness or large fruits. Farmers and gardeners would naturally save seed from their best plants to grow in future. Heirlooms may have been the product of university breeding in the days before hybrids were preferred, but often instead arose on an individual farm, within a particular family or group of people who shared their seeds.

Hybrid: Two quite different parents, often from highly inbred lines, are crossed under controlled conditions. Since the offspring carry the genetic material from two different lines, if their seeds were to be saved, the next generation reverts to something similar to the two parent lines, which may be quite different from each other, resulting in a lot of variation between members of the second generation. Many of the individual plants will be inferior to their parents. Since inbred lines must be maintained to produce hybrid seed, only large concerns, like universities or large companies, are typically able to maintain them. Thus, small farmers aren't able to save seed from hybrids. Instead, they are made dependent upon the large suppliers. And precious diversity is lost.

So it was necessary to engage contract growers to produce the rare varieties that fascinated Gettle, and that he wanted to offer to his customers. He set about creating a network of contract growers, starting with a very small circle of growers. When I took over the day-to-day supervision of Baker Creek's contract seed production in 2005, there were only about 8-10 established growers in our network. By the 2012 season, the total number has reached nearly 150 growers, with around 40-50 of them being major producers consistently submitting seed annually. At present, something like 20-25 percent of Baker Creek's 1400 varieties offered annually come from contract production.

Typical seed growers for Baker Creek are a fairly diverse group, but most of them have certain things in common: They are mostly working very small farms, from oversize suburban lots to, typically, a few acres at most. Most are engaged in diverse farm enterprises--I know of none who are strictly seed growers. Often they are also growers of produce for market, usually for sale at farmers' markets or to local-food restaurants. Otherwise they may be engaged in crop production for home consumption, but where they are, they are usually working with self-sufficiency in mind, and were already managing large gardens before they became seed growers. In virtually all cases, they are growers who already had an understanding of open-pollinated or heirloom crops, and in my experience virtually all of them brought not just experience and dedication to the table, but also high ethical standards toward production of clean, true-to-type open-pollinated seed. Finally, many or the participants in our network grow seed for several other small seed companies as well, which fully approve of and support.

GMO Contamination in Seed Crops Contamination by GMO crops is an ever-present threat to seed production at all levels; these small-scale farmers are especially vulnerable. There are several reasons for this:

- Small size of their farms often makes isolation difficult, giving them less control over isolation than would be the case with really large-scale production.
- Small quantity of individual seed lots make testing of every seed lot economically impracticable.

Fortunately, most of the prevalent GMO crop varieties grown in the United States are not crops that are typically grown by home gardeners. Therefore, most fall outside the scope of our contract seed production program, so there is no issue with contamination of our growers' crops. Also, many of our contract seed-crops are self-pollinating or are only pollinated across short distances. These relatively safe seed crops include legumes, tomatoes, peppers and eggplants.

SOME SEED CROPS ARE ESPECIALLY VULNERABLE: Unfortunately, however, there are a couple of major crops that are very prone to GMO contamination. These would be crops that are in widespread cultivation in GMO form, that are in especially high demand by home gardeners, and that are subject to contamination over long distances. The crops I'm referring to are corn or maize (*Zea mays*) and beets (*Beta vulgaris*).

Baker Creek began testing seed corn for GMO contamination in 2007. The tests are expensive enough to add appreciably to our costs for seed, and consume quite a bit of seed as well: a typical sample for corn seed weighs about 6 pounds, which is enough seed to make several hundred packets. Since the outset we have used testing by Genetic ID Laboratory, Fairfield, Iowa http://www.genetic-id.com/. The laboratory conducts tests, which are are sensitive enough to detect one contaminated kernel in a sample of 10,000 seeds.

What we found was disheartening, although perhaps not surprising. That first season, we were obliged to drop about half of our variety offerings in corn, due to GMO contamination detected by the tests. All of these were fine heirloom corn varieties; some had been offered for years. All are irreplaceable!

The reasons that corn is our preeminent at-risk crop for GMO contamination are several:

- Corn is wind-pollinated. Conventional isolation protocols require isolating of corn populations being grown for seed by a distance of one mile. However, one mile may not be adequate for maintaining pure lines of GMO-free corn (see below).
- Corn is one of the most prevalent of GMO crops, with something like 85 per cent of all US corn crops being grown from GMO seed.
- Corn is widely grown throughout most regions of the United States, unlike many crops whose environmental requirements are specific enough that commercial-scale production occurs within limited sections of the country.

One mile of isolation may not be adequate because this conventional isolation requirement probably allows more off-type seed than would be desirable in maintaining true GMO-free populations. The reason is simple: a mile of isolation results in seed where the number of visible off-types falls below an acceptable threshold, whereas the threshold for GMO-free seed is lower: one kernel in 10,000. In conventional seed production one kernel in 10,000 would be deemed an acceptable level of off-type seed. Indeed, several kernels in 10,000 would probably be deemed acceptable. Obviously, if a mile of isolation results in a few off-type kernels per 10,000, this isolation would not necessarily be sufficient where even a single kernel per sample is deemed unacceptable. Unfortunately, there is no safe documented isolation distance that guarantees that contamination would fall below this threshold. Therefore the only solution is to test each seed lot. (It should be added that even in seed lots that test GMO free to one kernel in 10,000, some contamination could still be present. With corn being such a strongly outcrossing plant, even one GMO kernel in a seed lot of, for example, 20,000 seeds, the GMO contamination could be expected to spread within the population if such a seed lot were repeatedly grown and harvested for seed. Thus, even starting with "GMO-free" seed, and even with absolute isolation from outside, GMO-contaminated populations, contamination could "appear" in subsequent generations.)

Nor is the financial burden posed by testing itself the largest problem. Since pollination may vary according to wind direction, timing, speed and duration, and since it is practically impossible to know what every farm is growing even within a one-mile radius from a subject plot (much less within some undefined radius!) the grower is faced with the very major uncertainty that, having grown and produced a potential seed lot for sale, such a seed lot may in fact prove unsaleable after harvest! Moreover, once a seed lot has been tested and is known to be carrying GMO contamination, the legalities of disposing of the seed lot *as* seed become very involved. Selling a seed lot that contains even a trace of patented genes may well constitute patent infringement, and may well open the grower (or the

How Can We Assure GMO-Free Corn Seed Production?

a) **Clean up contaminated lines:** A seed lot that shows minimal GMO contamination *could* be cleaned up by careful cultivation, but it would a time-consuming, expensive, hit-or-miss process. Suppose a seed lot was contaminated at the trace level of 1-2 seeds per sample of 10,000 seeds. It will be evident that within that 10,000 seed sample, there must be numerous lots of, say, 500 uncontaminated seeds. It is possible to plant, in isolation, lots of 500 seeds for increase, test the resulting seed lots, and identify uncontaminated lots in future generations. From such an initial seed lot, possibly as many as 18 uncontaminated lots of 500 seed probably exist. Unfortunately, it will take a lot of time, and be extremely costly, before an uncontaminated seed lot of commercial scale is reached. (Nevertheless, Baker Creek has begun seed-banking marginal lots of corn seed, in the event that this method becomes the only way to salvage threatened varieties)

b) **Utilize Hand-pollination to Maintain Clean Lines:** A contamination-free line can be maintained by bagging both tassels and silks of uncontaminated corn plants, thus precluding random pollination. Unfortunately this would then require hand-pollination, which is time-consuming and, therefore, expensive. The result would be corn seed at the retail level becoming many-fold more costly than has traditionally been the case. Nevertheless it *is* possible, if consumers are willing or able to pay for it. And it is feasible as a method for home and small-scale growers to maintain their own uncontaminated lines.

c) **Restrict, Isolate or Eliminate Cultivation of GMO Strains** in the environment at large. But obviously this scenario is unlikely at best.

distributor if the lot is sold) to liability, since the seed will not have been produced under contract with the entity that owns the patent.

In this scenario, the grower has spent all season producing a seed crop that now cannot properly be sold as seed. This uncertainty, coming as it does above and beyond all the usual problems that beset agricultural production, is sufficient to render production of open-pollinated, GMO-free corn very unattractive from a financial point of view. A gradual decrease in available varieties would be expected from the foregoing, as producers are literally driven out of the market. *In fact, we have witnessed such a reduction in available varieties just since we have instituted GMO testing of our corn seed lots.*

Photo courtesy: www.rareseeds.com

Should this trend continue, corn seed free of GMO contamination will become ever more scarce. And the priceless heritage of corn, our most important native crop, could potentially be lost!

GMO-free beet seed production is in jeopardy as well. With the deregulation of GMO sugar beet varieties in 2005, GMO sugar beet production received a green light; by 2010, 95 per cent of American sugar beet production was comprised of GMO sugar beet varieties.

But here, the problems are a bit different from those affecting corn. Beets, a biennial seed producer, are typically not grown for seed where the objective is to produce a root crop. The reason is that a crop of beet roots is usually harvested at the end of its first season, while for seed production, the roots must be allowed to grow and bloom the following year. Therefore, it is mainly in areas where beets are actually grown commercially for seed production, that non-GMO lines are subject to accidental contamination. In the US, beet seed production is confined mainly (but not exclusively) to the Pacific Northwest. Therefore, it is mainly seed produced in this region that should be of concern. However, small-scale production of beet seed is always at risk, anywhere GMO beets are grown, even if only for root production, if any roots are not harvested at the end of the first growing season, and if they are allowed to bloom and emit their pollen in their second year. Thus a much wider area of small-scale seed production is actually at risk.

How widespread is GMO contamination of beet seed? I was advised, strictly off-the-record, by a major seed distributor in 2011 that there is in fact already widespread GMO contamination of supposedly non-GMO (open-pollinated and heirloom lines), due to the very fact that most commercial beet seed production, of whichever type, takes place in such a small region of the United States. So it seems likely that a program of GMO testing for beet seed will have to be implemented quite soon.

These are the two major crops of concern to us for possible GMO contamination. However, no crop is ultimately exempt, because the pollination process of virtually all plants is potentially open to contamination from GMO plant varieties. *Overall, if GMO varieties are allowed to continue their proliferation around the globe, and if the area of ground planted to GMO crops continues to increase, it is hard to see how GMO-free strains of most crops can be maintained indefinitely.* It seems to this writer that only the complete elimination of GMO cultivation, or at least a drastic restriction and regulation on such crops, is the only way we are to have any hope whatever of maintaining clean, GMO-free seed lines in generations to come.

What Baker Creek Has Been Doing

DISSEMINATING AND PRESERVING OPEN-POLLINATED SEED: Our company has been at the forefront of the pure foods/local foods/seed/sovereignty movement from its inception. Our mission of providing heirloom/open-pollinated seeds to gardeners at all levels--from apartment dwellers with a few container plants on a balcony to market gardeners on medium-sized country places--has expanded annually from the very beginning. With our contract growout program, we have grown literally thousands of rare varieties for increase and distribution. We typically contract only varieties that are not available for purchase at the wholesale level. Many of our varieties have come directly to us from the original family or region where they have been preserved for generations. With our unique ability to get these rare varieties into the hands of gardeners world-wide, it is safe to say that our efforts have been directly responsible for the continued survival of many rare varieties, conserving this precious agricultural diversity which by this time might otherwise be completely extinct.

BAKER CREEK GROWER–Alan Adesse Hands-on Organics, Oregon, USA

Photo courtesy: Alan Adesse

Alan grew up in the big city but yearned for a life in the outdoors. Studied forestry in school to be close to the forest which he loves. With a background in botany started wildcrafting mushrooms, medicinal plants and floral items and native plant seed in the early 1980's. Self-taught herbalist and collector built his first business providing medicinal plants to plant medicine makers all over the U.S. Built network of collectors and growers to provide a service to same customers from areas all over the U.S. Started farming herbs in 1986, met and became friends with Dr. Alan Kapuler, one of the grandfathers of the organic seed movement in the U.S. Learned how to lay out a field of 100-200 varieties and isolate from crossing within the species. Field manager for Peace Seeds from 1989-92, which became the stock seed for Seeds of Change. Founding grower for Seeds of Change, the former Abundant Life Seed Foundation, and now contract grow for a number of small and large seed companies.

"I work with a number of younger growers trying to inspire and pass on the seed knowledge and passion. Member of Family Farmers Seed Cooperative, a new organization of 13 very experienced organic seed growers. We grow on about 4-5 acres and create 60-70 crops per year. Have spend much time up in British Columbia, Canada working with growers and seed issues. Love to experiment and attempt to grow and introduce new varieties for the public domain. We need to create a good support system for all the young and upcoming growers as well as supporting the elders who have pioneered this movement."

http://organicseedcoop.com/

BAKER CREEK GROWER–Kimb Leake Denny, Hopping Hen Farms, Wisconsin, USA

Photo courtesy: Kimb Leake Denny

Working as a small farmer and grower for Baker Creek Heirloom Seeds has been one of the most satisfying and important things I have done in the last decade. Not only do I continue the important work of helping other people nourish themselves while nurturing and preserving our shared agrarian heritage, it has focused my thoughts far more critically on how this relates to the actions of our society and those controlling it. It's time we had a more clear international conversation about the developing crisis we all are facing in our personal and environmental health with regards to the unnatural control and manipulation of our food source germplasm and the increasingly restrictive and nutritionally impoverished homogeneity of an industrialized supply chain. We need to set aside what might divide us and attend instead to what unites us. The world has gotten so small that a seed wedged in the sole of a shoe in Punjab is a mere day's travel from a field in England, and GMO corn tasseling in the USA can travel to pollinate land races grown in Oaxaca. We must begin to insist that our governments' policy makers step up and start working for us - all of us - instead of the corporations.

Permitting patents on seeds or indeed any inherent natural phenomenon is an Ivory Tower delusion. It is granting the right to a single entity to profit off of a shared mutual inheritance. Imagine that someone was granted patent on several of the underlying processes of human conception, and that now people were only allowed to have children upon purchasing the right from the patent holder. Now imagine that to increase profits, this patent holder streamlined several of these traits to only express in a certain manner, and you were only legally allowed to select from this diminished palate regardless, even if these traits were deleterious in your environment. Now imagine that the resultant child had a constitution so specialized that it could only be bathed with a proprietary soap and fed a specific pablum, the patents for which also resided with the breeder. It sounds insane, but this is precisely what corporations like Monsanto and Seminis are being permitted to do with our world's seed supply chain.

We must take back the debate with facts. Our governments' policies permitting GMO containing crops and patent controls are impoverishing our societies. They solely benefit the seed sellers and chemical manufacturers to the extreme detriment of the growers and their communities. Their yields are no greater than well grown and adapted historic cultivars, and in order to achieve even that level of production they require environmentally and financially deleterious amounts of petrochemicals, pesticides and herbicides, all of which have been proven highly teratogenic to most life forms. Some seeds even are altered to produce poisons within the plant shown to have negative effect on lab animals forced to consume them. Their pollens indiscriminately contaminate and alter the genetic structures of their wild relatives as well as other food crops. This is an absolutely uncontrolled environmental experiment that the entire world is being forced to take part in.

Heirloom seeds are not only valuable as historical material but also as source material. Many have unique character, nutritional content, climate adaption, disease resistance, or an ability to produce under extreme conditions that we as a world will need to call upon as already shifting climates and ever more extreme weather patterns rapidly alter our environment. Like word roots, these seeds are the fundamental languages by which our ancestors have lovingly communicated to us the ability to thrive. Whenever we allow one to be lost either by action or inaction, our collective germplasm's language becomes less rich and precise and far less adaptable to specific usage. We rob from our future generations, leaving our grandchildren that much poorer for its demise.

An excellent cultivar is like a beautifully crafted line of poetry, each plant characteristic, leaf and fruit a precisely chosen word polished to brilliance by the interplay of centuries of natural and human selection. But modern agricultural breeding has rapidly and arrogantly scuttled these considered years of slow adaptation as it continues to monopolize availability and short-shortsightedly select only for high-strung race-car style plant traits that will provide the sellers large financial return in the form of high bulk (but not high quality) yield only under specifically controlled and highly specialized situations, requiring huge amounts of environmentally and fiscally expensive inputs. These cultivars are selected exclusively for those traits that increase the corporations' profits, not the consumers' health. Most modern industrial varieties, even those developed through conventional breeding, are the vegetative equivalent of Cliff's Notes. They may contain some of the basic information and structure of the original literature, but utterly fail to nourish us completely.

How can we have so many people who are both obese and malnourished at the same time? Simply put, it is because through ignorance, clever disinformational campaigns, legal intimidation and a lack of access designed to benefit the corporations, the greater portion of society is no longer eating real food, but instead consuming increasing quantities of elaborate food-shaped science experiments chemically engineered primarily from three highly caloric and input greedy but nutritionally deficient crops; wheat, corn and soy. Statistics from the last several decades show that consuming these inedible experiments is simply making us fat and sick. We must with one voice call on our policy makers to reclaim from the corporations our birth right to real food, good health and good nutrition.

Ron Sjostrand Minnesota, USA (Ron Sjostrand has been a gardener, seed-grower, and amateur plant breeder for many years. He has been a seed grower for Baker Creek since 2005.) When Randel asked that I write a few words about my plant related passions, my first thoughts were that I couldn't be brief enough for his needs, thinking that everything concerning plants, particularly the ones that nourish us, I'd have a very keen interest...perhaps I should say obsession. At any rate, to try to be concise, much of what has gotten the majority of my attention in the last few years can be called collaborative diversity.

Due to my own, and my wife's health issues, our time in the garden is invariably a very painful experience for our bodies. That fact forced me to look more closely at how plants in the wild behaved...multi-storied forests, river valleys, etc. (or a ditch full of "weeds" for that matter) with plants and their roots systems taking up every available nook and cranny...and all vibrant and healthy...hence my belief that the health of either a wild and natural area, or an intentionally planted garden can be directly related to the amount of diversity that exists in it. So my personal gardens have been a long period of experimentation, not just in raised beds and companion planting/interplanting, but in recognizing the spatial zone each part of a plant uses, the time of growing season they use it, and how they interact with their neighbors. I have found a number of wonderful collaborations with the added benefit of being very low maintenance and far more productive than a raised bed that is monoculturally planted.

My limited energies for seed growouts have also been intentionally collaborative in what have been ongoing attempts to get as many others as possible involved in growing seed...for their own use, and/or to share or to sell to ethical companies. My input has primarily been informational and intstructional, while the person I am collaborating with provides the more physical needs of a growout that my body can no longer accomplish. Closely related to seed growouts is the time I try to spend in breeding, and subsequent selection and segregation, of "new" open pollinated varieties that get along well with our area. Naturally, that means a number of populations grown by as many people as I can convince to use some of their own (usually limited) space on a row of something that I can come and look at a few times during the season. Unfortunately, genetic pollution is becoming more of a concern with each passing year.

One more area, one of the greatest in my list of desires/passions, has come about as a result of good, healthy, living food has become too costly for those that most need it. Sustainably grown food can not continue to be available to a wealthier elite. So I've been having a number of conversations with area people, faith groups, curches, etc. in attempting to develop a community garden (with a twist) large enough to actually do some good for the community. The twist is in what each part of the collaborative element offers to the success of the garden. The people in the local nursing home have their stories to share, those seniors that are already part of the Senior Meals and Meals on Wheels programs could share their expertise on food preservation, and those in the churches, faith groups, school and other clubs would care for the garden from planting to harvest...all getting the benefits of fresh produce and their share of the preserved foods. The only cost being in the time each person gives and the containers used for preservation..all showing us that collaborative diversity is as important in each human community as it is to the plant community.

Dancing Bear Farm, Oregon, USA--Dancing Bear Farm, owned and operated by Steve and Patricia Florin since 1998, is located in beautiful southern Oregon in the Williams Creek watershed. Steve, as a former environmental engineer and medical technologist, and Patricia as a mother of three, we are committed to using only open-pollinated, non-GMO, untreated seeds for our crops. Fully certified organic, we started our farm by growing market and CSA vegetables. With the aim of maintaining these seed lines for generations, we started saving our own seed and contacting seed companies. In 2011 over half of our business consisted of growing over 20 varieties of seeds for six seed companies, including Baker Creek.

EDUCATIONAL EFFORTS: It makes us proud to think that seeds that we've grown on our own farm, or at least packed here, are reaching literally hundreds of thousands of gardeners around the globe. And we are happy to say that a fair proportion of them are novice gardeners, with many of them growing growing their vary first gardens. We offer generous technical support at no charge to anyone with horticultural questions, and we specifically offer suggestions on seed saving to anyone who asks.

In 2005 we inaugurated our on line forum, iDigmyGarden.com. There, we have created an on line venue for gardeners, farmers and activists all over the world. Discussions include cultivation and seed saving, organic- and market-gardening, pest control--literally thousands of topics of interest to seed sovereignty, sustainability, and food freedom. Our site also includes a growing resource of antique seed catalogs, from the late 19th to the mid 20th centuries, which is of inestimable value in researching these old open-pollinated varieties that were once common articles within the seed trade.

Our educational efforts go much further. We regularly offer classes at all three of our locations, covering all phases of pure food and seed sovereignty issues, organic gardening and seed saving. We publish a lavishly-illustrated quarterly magazine, Heirloom Gardener, which deals with the whole gamut of these subjects as well. First published in 2003, Heirloom Gardener has consistently grown in circulation, until today it is available in numerous mainstream venues. And with frequent coverage of GMO issues, it has been at the forefront of efforts to increase the general public's awareness of these issues.

POLITICAL INVOLVEMENT: Education overlaps with politics: once people become better informed on these issues, they are more likely to put pressure on their governmental officials to effect appropriate change. Our company has been involved in several political campaigns around GMO labeling. The Seed Bank, our Petaluma, California location, has become a local hub for activists working on the California Right to Know http://carighttoknow.org/ effort to get GMO labeling on the ballot via the California ballot initiative process. More than enough signatures were collected to qualify this initiative to appear on California's November, 2012 ballot. At the time of writing, the outlook appears favorable for passage of this legislation, now titled Proposition 37. Polls show that 90 per cent of California voters support GMO labeling.

The California Right to Know Genetically Engineered Food Act:

Would require by 2014 that most processed foods and raw agricultural commodities that contain bioengineered ingredients be labeled.

"Prop 37 is about our fundamental right to know what's in the food we eat and feed our children," said Stacy Malkan, a spokesperson for the California Right to Know campaign. "Given the broad support in the state—and across the country—for the right to know if our food is genetically engineered, we are confident California voters will make history by passing Prop 37 in November."

Wording: The labels would read "Genetically Engineered," "Partially Produced with Genetic Engineering" or "May be Partially Produced with Genetic Engineering."

Exemptions: Several food categories would be exempt, including alcoholic beverages, organic foods, restaurant food and other prepared foods intended for immediate consumption. Also exempt would be all meats, dairy products and eggs.

Other states have made similar efforts, but none has so far been implemented. A recent attempt in Connecticut, HB5117, was killed because legislators feared that Monsanto would file suit. We find it shocking that a US state should be so afraid of the resources of a mega-corporation that it would hesitate to pass legislation regardless of the potential benefits to its citizenry.

It is believed that if the initiative does pass in California, other states will quickly follow suit. And we believe that once GMO content is properly labeled in foods, the market will quickly move to discourage GMO production. So, to us, legally mandated GMO labeling is crucial.

LAWSUIT AGAINST MONSANTO: If education overlaps with politics, then politics certainly overlaps with law. Baker Creek Heirloom Seed Company, along with Comstock, Ferre and Company, have been plaintiffs in the OSGATA et al vs Monsanto. The original suit, analyzed below, was dismissed in February 2012 by Federal Court Judge Naomi Buchwald, but most of the plaintiffs opted to appeal, including our companies. At time of writing, the appeal is still pending. It should be noted that the appeal entails potential financial risk for all the appellants. Should the appeal be rejected and somehow shown to be frivolous, the appellants could be held liable for Monsanto's legal costs in the matter. So pursuing the appeal represents quite a commitment.

A class action suit has been filed by a group of plaintiffs connected with the organic/natural foods movement against the gene-splicing giant, Monsanto Corporation. The suit, filed March 29, 2011, in United States District Court, Southern District of New York, in Manhattan, seeks a declaratory judgment against Monsanto. If granted, the judgment will prohibit Monsanto from suing for patent infringement in the event that its patented genes, such as the glyphosate tolerance gene, should turn up in seeds or plants grown by organic or heirloom farmers.

The suit was filed by the Public Patent foundation, or PUBPAT, a New York-based legal firm specializing in aspects of patent law pertaining to the public's interest in such regulation. The suit was filed on behalf of about 60 plaintiffs, representing a broad spectrum of folks involved in the organic/pure foods movement. Trade organizations, like the Organic Seed Growers and Trade Association, Organic Crop Improvement Association International, Inc., and The Cornucopia Institute were named; such organizations in turn boast tens of thousands of members. Several seed companies are participating, including Adaptive Seeds, Baker Creek Heirloom Seed Co., Comstock-Ferre Seed Co., Fedco Seeds, Southern Exposure Seed Exchange, and numerous other companies. A number of individual farmers are also participating, including Wild Plum Farm, Montana, Abundant Acres, Jardin del Alma, New Mexico, Philadelphia Community Farm, Inc, and others.

The suit alleges that Monsanto's aggressive tactics have, in the past, resulted in undue hardships on small operations who inadvertently experienced contamination from GMO crops, especially those containing the glyphosate tolerance gene (commonly known as the "Roundup-ready" gene) as exemplified in the well-known Percy Schmeiser case. In that case, Schmeiser, a canola farmer, was accused of patent infringement because Monsanto-owned genes turned up in his fields, in the absence of any license from Monsanto.

In a press release, PUBPAT said, "The organic plaintiffs were forced to sue preemptively to protect themselves from being accused of patent infringement should their crops ever become contaminated by Monsanto's genetically modified seed." If the plaintiffs prevail, future situations like the Schmeiser case would not happen, at least in the United States, as Monsanto wouldn't be able to sue when the intention of the farmer was to raise GMO-free crops. (The Schmeiser cases happened in Canada; this ruling would affect only American farms.)

PUBPAT cited four grounds for the suit, any one of which, if proved, should be sufficient to cause the court to issue the declaratory judgment.

1) Monsanto's patents are invalid

By law, patents must be new, non-obvious and useful. The suit asserts that not only are GMO's not useful, but they may actually be harmful to public health, the environment and society as a whole. Moreover, they are obvious since they derive from gene sequencing. The complaint cites a number of studies and cases to support this claim.

2) Monsanto's patents are not infringed

Since there is *no* intention on the part of contaminated farmers to infringe patents, there can be no patent infringement. Instead, contamination is in fact a trespass, causing damage to *the affected farmers*. The complaint contends that it is "perverse" that farmers whose crops have been contaminated should also be subject to litigation for patent infringement.

3) Monsanto's patents are not enforceable

If both previous arguments fail and patents are still admitted by the judge as being valid and infringed, PUBPAT intends to demonstrate that they are not enforceable because they are being *misused* to gain undue control over the market.

4) Monsanto is not entitled to any remedy

Since the farmers in the class are seeking to produce only GMO-free crops, and GMO contamination destroys the value of such crops, Monsanto has not lost revenue due solely to the production of the contaminated crops. Consequently, it is not entitled to damages.

To be successful, the plaintiffs need only successfully prove any one of the four bases for the suit. Monsanto, on the other hand, must successfully refute all four of the claims to prove its case.

The suit has received widespread attention in the media and on the Internet, and has caused a sensation among pure food advocates and consumers, many of whom view the suit as yet another David-and-Goliath situation. (Originally posted on rareseeds.com, April 2011)

SEED DONATION PROGRAM: Over the years, Baker Creek has donated literally millions of packets of seeds to worthy causes. Typical donations are made from inventories of packets with expired packaging. Most of these donations take the form of tax-deductible donations to not-for profit groups. Schools, orphanages, community gardens, prison gardening projects are the usual recipients. But tax-deductibility has never been our only criterion in determining where donation seeds are sent. Often recipients are non-301-C missionary efforts (not duly registered with the US IRS) or foreign initiatives which are also not registered not-for-profits with the IRS. While a tax deduction is always welcome, we feel it is even more vital to get our seeds into as many hands as possible, around the world, both for the value of enhancing local food sovereignty and that of preserving the seeds. The more packets we can get placed, the greater the odds that someone, somewhere will in fact save seed of any given variety and seed-bank it. This ultimately benefits other growers locally and has the potential at some future time of safeguarding varieties that might otherwise be lost.

FESTIVALS and DEVELOPMENT OF A LOCAL MARKET: An underappreciated success that has been facilitated by Baker Creek Heirloom Seed Company is the development of a purely local market within southwestern Missouri, and in neighboring northern Arkansas. Through both our contract seed growouts (nearly half of which are grown within the state of Missouri) and our monthly Heritage Days festivals, a local market has emerged and coalesced around our store. Our monthly festivals, held at our farm in Mansfield since 2000, have outstripped most of the nearby farmers' markets, both in number of retail vendors and in the size of the clientèle that attends the events. These events have educational and political spin-offs, but here I draw attention to the fact that over a decade, a stable market has emerged. Many of the vendors and the visitors to the market are regular attendees. They know each other, having developed their business relationship over the extended time that this market is in existence. Pure food products, and a lot of inspiration, are finding their way into the hands of the local population; in turn, local, sustainable farms are supported. I know many of these farmers personally, being one of them myself, and I know that this market has been indispensable to our growth and success.

Our monthly festivals at Baker Creek's home location on its farm in Missouri, the annual Heirloom Festival, and above all out annual Heirloom Expo in Santa Rosa, California all feature speakers, vendors and, most importantly, a public that, in large measure, are passionate in support of pure food, food security and seed sovereignty. All these events feature top-notch speakers: authors, activists and farmers who are noted for their commitment and contributions to the cause. Vendors included in the events are dedicated to sustainable production of their wares, whether these be seedlings, crafts, or produce. And members of the public who attend our events reciprocate this passion. They are in attendance to learn, to network, and to support those of us who seek to make our livelihoods by following business models that are consonant with these values.

THE HEIRLOOM EXPO: (by Chris Fisher, Petaluma, California, USA)--Originally conceived as an educational event around issues relating to pure seed and food, the National Heirloom Exposition quickly transformed into something much larger, drawing from the abundant agriculture of the Northern California region to become a showcase for the nation's agricultural diversity. The overwhelming interest of local school teachers and parents led to the event's evolving into a benefit for area school garden and food programs.

Discussions of heirlooms and diversity led inevitably to talk of heritage breeds of livestock and poultry, and the event now includes judged competitions of such small livestock as Boer goats and Leghorn chickens, and Giant Pumpkin and Best Tomato contests as well.

This year the event encompasses the California Rare Fruit Growers' annual Festival of Fruit, and once again there will be a plethora of well known speakers educating and informing attendees on three speaker stages throughout all three days of the event. Keynote speakers this this year include Percy Schmeiser, the Canadian farmer who successfully fought Monsanto in court and later won the Right Livelihood Award; Carlo Petrini, who founded the international Slow Food movement in 1986, after McDonald's opened a branch in the Piazza di Spagna, in Rome; Andrew Kimbrell, head of The Center for Food Safety and author of Your Right to Know: Genetic Engineering and the Secret Changes in Your Food; Ronnie Cummins, Executive Director the of Organic Consumers Alliance; and Jeffrey Smith, of the Institute for Responsible Technology, and one of the world's leading critics of genetically engineered foods.

The 2012 Expo will feature dozens of published and prominent seedsmen, farmers, growers, and gardeners giving prescient and timely presentations, such as John Jeavons of Willits, California, the writer of the widely acclaimed book on biointensive gardening, How to Grow More Vegetables, now in its eighth printing; fermentation guru and author of The Art of Fermentation, Sandor Katz; Rachel Kaplan, author of Urban Homesteading: Heirloom Skills for Sustainable Living; permaculture instructor and writer, Toby Hemenway, and many more.

Rounding out the event will be dozens of regional, gourmet food vendors and hundreds of like-minded food, farm, garden, tool, arts and crafts vendors. Exhibitors from across the country will display over 3,000 varieties of the best heirloom produce.

The Expo will feature screenings of several important new films, including The Symphony of the Soil, by Deborah Koons Garcia, the filmmaker who created the groundbreaking documentary, The Future of Food; and Women On The Land, by filmmakers Laurie York and Carmen Goodyear.

Though there will be children-oriented activities and attractions all three days of the Exposition, and those under seventeen will be admitted free of charge, Wednesday the 12th of September has been designated Kids' Day and will be filled with activities for children on field trips and after-school visitors of all ages.

PUTTING IT ALL TOGETHER–BUILDING COMMUNITY: It could be said that our efforts and achievements come down to building community around those values that we all hold so dear. Everything we've done and continue to do is part of a synergy that is arising within the overall community. We're so happy to have been able to play a part in these events. Whether we talk about the freedom of the people to cultivate their own gardens, to save their own seed, to buy and sell pure food, to have free access to their common agricultural birthright, or to influence the laws under which they consent to live--it is all one thing. And there is ultimately one single, world-wide community that embraces these values. It is time for all members of the community, wherever they are in the world, to pull together to bring our values, and therefore our wishes and concerns, into sharper focus.

We must resist the forces that would divide us by playing us off, one group against another, while moving ahead with their own agenda of dominating our food, our values and, ultimately, our society. We find ourselves with our backs against the wall. The need is urgent. The time is now.

**Randel Agrella, Paul Wallace, Baker Creek Heirloom Seeds. The company carries one of the largest selections of seeds from the 19th century, including many Asian and European. It has been featured in The New York Times, The Associated Press, Oprah Magazine, Martha Stewart, and many others. www.rareseeds.com*

PEACE SEEDS

Dr. Alan Kapuler*

Using the paradigm that biodiversity is the staff of life, we have been collecting, growing, saving and learning about the kindoms of living organisms for most of our lives. Our focus on plant seeds, particularly on those involved in temperate zone human food plants began in 1973. After organic gardening with heirlooms and open pollinated cultivars for more than a decade we began using classical genetics to select and adapt improved cultivars for our gardens beginning with Rainbow Inca Sweet Corn. Subsequently our public domain plant breeding work has included onions, tomatoes, peas, sunflowers, beans, broccoli, kale, marigolds, cucumbers, squash, and beets as well as developmental work with the Andean crops yacon, oca, mashua, chocho, achocha, ulluco, mauka, ahipa, arracacia, topotopo, caigua and others.

During the past fifteen years, we have increasingly focused on foodplants and endemic species of the Pacific Northwest Bioregion called Cascadia. This includes wapato and other aquatic monocots, camas and other edible bulbs, lomatiums and other umbels Asteraceae, lupins and other legumes.

"Conceived in unity and born for the common good as part of the back to the land movement inspired by the consciousness revolution of the '60's" Peace Seeds germinated.

"We come from a long history of change.
It comes from the environment and is inscribed in our chromosomes.
It comes from the genomes and transforms the biosphere."
(from Public Domain Plant Breeding by AMK in Heritage Farm Companion Spring 2012 Seed Saver's Exchange)

Why Heirlooms?

1. The choice of generations of gardeners.

For a dependable, diverse, time-tested selection of temperate zone garden vegetables, fruit, fiber, medicinal, culinary and flower plants, heirlooms are our legacy for survival and sustainability.

Generally, heirlooms are plant varieties that have been saved by gardeners for at least 3 human generations.

To preserve the genetic integrity of seeds and plants that have taken millennia to select and that have passed thru diverse cultures and ecologies, heirlooms have been cherished by people and passed on from hand to hand, thru famines, weather disasters and human folly. They are part of the public domain.

2. Open pollinated seeds that breed true and can be saved by the grower.

Seed saving completes the biological cycle that promotes food security. Heirlooms breed true, dependably giving rise to productive plants and are the foundation of a healthy and sustainable food system.

For the wellbeing of humanity and to maintain our living food heritage, the wide distribution of garden tested heirlooms puts the responsibility for good health and a diverse agriculture in the hands of all people.

3. Selected for success, heirloom seeds give rise to vigorous, healthy and productive plants.

Gardeners face the trials of erratic and extreme weather, unreliability of water supplies, predation and the unexpected. The best heirlooms are the survivors that were successful during difficult times, tested by life and death, sustaining us when it was essential. In Siberia, there are millions of gardeners, most of whom are seed savers since there are no companies to supply seeds and gardening is the only insurance against famine and starvation.

We live in a crucible of the creativity of/in life. It is an ongoing marvel. We now see the perspective of the receding horizon of extincted and the emerging frontier of surviving organisms that extends unbroken in essence for billions of years if not older than the solar system.

Life is myriad, diverse, persistent, adaptive, a mega-genome of multigenomes encoded in DNA, RNA and protein. In our chromosomes are the genes for building ribosomes. They are billions of years old as is the making of proteins from translating messenger RNA.

These core discoveries are central to a unified biology. This is how life is able to remember the events of the environment, and adapt to circumstances as is clearly seen in the structure and behavior of our immune systems.

F.1. Sweet Corn

In the mid 1970's after collecting sw Amerind starch corns, I wondered why all the sweet corns we liked to eat were monocolors, all yellow or all white seeded. A consequence of this observation was Rainbow Inca Sweet Corn, the first of our multicolored sweet corns. A later one was Painted Hill Sweet Corn. Every once in a while a sweet corn would have some dark burgundy purple, high anthocyanin seeds. We picked out a few and began selecting so that now we have Double Red Sweet Corn with intensely dark purple seeds from a genetic trait that inherits in the female. Some years ago, Rosemarie LaCherez sent us a popcorn (Chires) that tillers and makes 3-5 little ears per stalk. Some plants will have several dozen ears. Crosses with Double Red Sweet Corn have given a remarkable diversity of new corns. Selection is difficult. The direction is still inscrutable.

The Future of the Future

The back to the land movement of the 1960's took many urban and suburban kids into the fields and countrysides. Partly in opposition to the endless wars, partly in search of an agrarian life built on healthy soil, clean water, fertile soil and the heirloom seeds of our ancestors, we have continued growing organic gardens, saving seeds of heirlooms and local native species. Impelled by the times that continue to change, we have begun breeding new vegetables and flowers for the public domain to promote a healthy biology unfettered by ownership in support of a path towards world peace and the well being of everyone.

As I grew up, service was not high in the goals of the society. Success was more important. Now as we encounter ecological catastrophe in the era of cyber communication, our disastrous ignorance about discovery and invention makes greed and profit the leading values.

As an anodyne to these problems, a virtuous, difficult endeavor like organic gardening is a good beginning.

Public domain plant breeding and kinship gardening are two of the next steps. The first develops new, original and adaptive gene combinations for our local ecosystems, their gardens and for sustainability. Plants that cross pollinate yield populations of F1's that give evolving grexes that can optimize adaptation and survival in these times of radical weather. Kinship gardening is an exploration and conservation matrix for getting direct experience within the 300,000 plant species and their manifold hybrids.

In the garden, our ten standard deviation units beyond the norm ideas can be tested out, explored for veracity and transformed into better soil, fertility, home grown seeds and new kinds for every season.

As pre-human biodiversity continues to decline, there has been an increase in patenting, ownership and MTAs (Material Transfer Agreements) for plants and other living systems. While the genetic systems of almost all life pre-exist humans, one can manipulate one or a few genes, or insert a gene from a distantly related organism and obtain ownership rights. This tends to close down innovative and more broadly useful work with these organisms. The basic framework of life, the wild species, are common to all, like the air we breathe. With decreasing wild diversity, more and more becomes property. Public domain plant breeding is a counter to this. Indeed, the original intent of agricultural universities with public domain plant breeding programs was to provide locally adapted cultivars so the growing of food was diversified to provide health and stability for the society at large.

This ongoing travesty of treating life as intellectual property is quite unlike the patenting of a computer or its parts. We did not invent the cell.

Public Domain Plant Breeding has for generations established improved plants. Primary foci are plant architecture, flowering, fruits, fertility, resistance to fungi, bacterial and viral diseases, ecological adaptation, nutrition, and beauty. By making crosses, growing them out, selecting in a wide variety of aspects, one engages the genetic system of life, a place of immense activity and potential. So as plant breeders who work for the common good in the public domain, we are allied with the genetic systems to provide changes that have benefits to humanity, local and planetary ecosystems. In this sense, the genetic systems and their codes are like common source computer code for which a system has been developed which allows one to use it, to change it, to add to it, but not to own it. Janet Hope's recent book Biobazaar, the Open Source Revolution and Biotechnology explores the analogy of the genetic code with the computer code in terms of open source and public domain.

**Dr. Alan Kapuler: Widely regarded as the founding father of the organic seed movement, Kapuler's reverence of living things is embodied in his daily work—planting, breeding, and cataloging of seeds he has done for almost 40 years. Kapuler believes, the interconnectedness of all living things—biodiversity itself, is the true seed of life*

CELEBRATING THE CHILE NATIVO

Isaura Andaluz*
Save New Mexico Seeds

Chile Defines New Mexico, USA

It is August. As I drive along the banks of the Rio Grande, a smoky aroma, tinged with the scents of the rich soil, accompanies me. My mouth waters in anticipation of tasting this year's first crop of Chile Nativo; the native chile of New Mexico. Freshly picked green chiles are fire-roasted, then carefully peeled and layered onto a flour tortilla, a traditional thin flat bread of New Mexico. The tortilla has been prepared with a generous dollop of sour cream, a bit of salt, and fresh crushed garlic. The coolness of the cream, the warmth of the chile and its spiciness unfold into a subtle explosion of flavors on one's tongue. Later in the fall, the green chiles are left to ripen on the plants where they will turn a deep red color. The red roasted chiles have a spicy, caramel flavor that is truly indescribable.

"Chile" is the Spanish name derived from "chil" the Nahuatl (dialect called Aztecan) word for capsicum plants. Its arrival in the 1500s to New Mexico (NM) has defined who we are as a people, while shaping our culture and diet. Chile is a constant reminder of how intricately we are entwined with the seasons, the land, the river, and our communities. The seeds tether us to the land in an annual ritual of planting, harvesting, saving and sharing of seeds, and for some, ceremonial dances. Passed down for centuries among the Native Americans and Hispanic people, the seeds are carefully returned to the soil, accompanied with a quiet blessing.

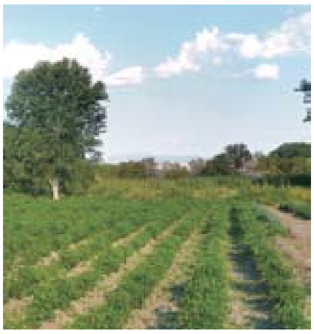
Chile Nativo

Through traditional practices, landrace varieties of chile have been developed and adapted to local microclimates. They are resistant to disease, and are identified by their specific pod shape, size and taste. They go by many names, usually in reference to the locality where they were cultivated: A partial list includes: Alcalde, Chimayo, Cochiti, Dixon, Escondida, Española, Isleta, Jarales, Jemez, Nambe, San Felipe, San Juan (Ohkay Owingeh), Santo Domingo (Kewa), Velarde, and Zía.

NM's unique bioregions create prime conditions for diversity. Chile Nativo must endure high solar radiation, arid and windy condition, and a broad range of temperatures from highs of 95F/35C, to nighttime lows of 65F/18C. The chiles range in length from 2 to 7 inches (5 -17.78 cms). Some are long and smooth; others curled and crinkly. The shoulders, the widest part below the stem, vary in width from ¾ - 1 ¾ inches (1.9 – 2.54 cms). The thin to medium skins make Nativo varieties excellent for drying, as they will not lose weight or flavor, due to excess water in the cell walls.

The Mysteries of Chile

Where do chiles originate? Chile is a *capsicum annuum*, one of five domesticated capsicums originating from Mesoamerica. As one of the earliest domesticated plants (7500 BC), its specific area of origination and domestication has evaded researchers.[1] Chile belongs to the solanaceae family that includes tobacco, potato, tomato, and petunia. Some consider chile a self-pollinating plant. But if one simply observes, insect pollinators can be seen flying from flower to flower ensuring cross pollination.



Domesticated crop plants generally retain approximately 66% of the diversity present from the wild source. [2] But chile appears to be a different case. In a 2009 study conducted in Mexico, researchers took 80 samples of chile from 10 states -- 58 semi-wild and 22 domesticated. The domesticated chiles were found to retain 91% of the level of diversity found in the semi-wild samples. [3] This finding is significant, as domesticated chiles like the Nativo may be invaluable in retaining diversity. For example, the commercial chile growers in NM have been experiencing severe problems with phytophthora, which causes chile wilt, for over twenty years. Farming practices such as monoculture or failure to rotate crops can be contributing factors. But phytophthora is uncommon among Nativo farmers. Does this mean the Nativo gene pool has a resistance that modern or hybrid chiles do not?

Chile has another equally significant aspect. Genetic engineering uses a technique called "protoplast fusion," wherein a plant's cell wall has been partially or completely removed. This allows protoplast from different species to be introduced. The cell is then regenerated creating a genetically engineered cell. Although other solanaceae such as tobacco are commonly used in genetic engineering, researchers have been unable to regenerate chile from protoplasts. The chile will just not cooperate.

Modern Chile Varieties and Commercialization

In 1888, Dr. Fabian Garcia, a horticulturist at New Mexico State University (NMSU), started the university's chile improvement program. Dr. Garcia's goal was to produce a stable canning chile that would have less heat, be larger, fleshier, smoother, tapered, and shoulderless. The breeding lines he used included the chile pasilla (long and dark brown) and colorado (a red chile).

Over a span of 13 years, Dr. Garcia selectively bred the New Mexico No. 9, released in 1921. This was the first standardized variety of a new pod type called the *New Mexican.*" It launched NM as a leader in the USA for industrialized chile farming, processing and canning. In 1958, a milder chile called *NuMex 6-4*, was released, which became and remains the industry standard. NMSU continued to develop a total of 21 modern chile cultivars through proven classical breeding techniques. These include: *Sandia* (1956), *NuMex Big Jim* (1975), and *Española Improved* (1984). The last variety officially released was the *NuMex Mirasol* in 1993; the first year research commenced for a genetically engineered chile resistant to phytophthora.

MONEY, POWER, AND GE CHILE

In 2008, New Mexicans were shocked. A bill was introduced in the New Mexico (NM) State Legislature requesting $250,000 for development of a genetically engineered (GE) chile. This was the first time the general public had heard about this. An appropriation using taxpayers' funds to develop a patented GE seed? Who is behind this? Who will own the patent? The taxpayers? No. This was a coup for the biotech companies.

The Threat - Contamination

In NM, many farmers irrigate their crops through the use of *acequias* – irrigation ditches. As land has been passed down generations, it is often divided into long narrow tracts to ensure access to the acequias. These drain into the Rio Grande River, which divides the state as it runs from the north to the south into Texas. Both waterways serve as venues for seeds to travel for miles, sprouting hidden volunteer plants the length of NM. In the fall, dried red chiles are hung into ristras and transported in the back of open trucks. If a chile pod shatters, seeds can be strewn along the road and carried by the wind.

Farmers may unknowingly come into possession of the patented traits in the seeds they save due to these volunteer plants or cross-pollination with the GE chile. This can result in the farmers being sued for patent infringement and, worse, almost certain loss of the invaluable and unique traits of their own seed, developed through years of breeding. Farmers have a right to save their own seed for future planting; this right is now at risk.

In 2008, the community sought to confront this threat through a united effort called the "Save NM Seeds Coalition" (www.savenmseeds.org). Its first action was to introduce a bill aimed at protecting farmers from being sued, if they were to unknowingly become contaminated. The Farmer Liability Bill was introduced three times through bipartisan sponsorship (2009, 2010 and 2011). Although it has failed to pass, huge progress was made in 2011 when the bill made it to the House floor in record time, ending with a tied vote. Heavy lobbying by the GE chile players contributed to it failing upon being reheard a second time. But New Mexicans have not given up; nor have the GE chile players.

The Players

Development of a GE crop usually includes three primary players: a biotech company, a university, and the promoter. In this case it is Monsanto and Syngenta, New Mexico State University and the New Mexico Chile Association. In the USA, the other players include BIO – the biotechnology trade association, the Farm Bureau, and money.

The New Mexico Chile Association (NMCA) was formerly called the NM Chile Task Force and was created in partnership with New Mexico State University (NMSU). In 2006 it changed its name and became a non-profit membership organization that lobbies for government and public funds. The NMCA is comprised primarily of chile processors and businesses. It works closely with NMSU and its Agricultural Experimental Station (AES); and the biotech companies. The NMCA directs how NMSU is to use some of the funds received from the NM State Legislature.

Until this year, the board of directors was comprised of the owners of three of the largest processors in NM – Bueno Foods (aka El Encanto, Inc.), Rezolex, Inc; and Cervantes Enterprises. Bueno Foods is one of the oldest chile processors in NM. Rezolex is one of two companies in the USA that extracts oleoresin from paprika and farms in New Mexico, Texas and Arizona. Cervantes Enterprises, with a farm operation in southern NM, is primarily a processor producing approximately 80% of all the cayenne pepper mash used in Tabasco sauces in the United States.[4] All three companies import chile from outside the US.[5] Dino Cervantes, of Cervantes Enterprises, is the current board President who has close ties to the NM State Legislature. His aunt, Representative Mary Jane Garcia, has introduced and supported bills funding the GE chile.

Justification for a GE Chile

The alleged need for the development of a GE chile is the unsurprising inability of our local chile industry to compete with nations such as Mexico, Peru and China. Labor costs, problems with disease, and cheap imports necessitate a GE chile that can be mechanically harvested to make NM competitive again. The NMCA begin exploring ways to market a GE chile to the public back in 2002. The result was a campaign promoting GE chile as "environmentally friendly agriculture," which included a GE market-friendly packaging strategy, as the solution to the industry's woes.[6]

Many of the issues facing the NM chile industry have been of their own making. Most commercial chile is planted in only three southern counties – Hidalgo, Dona Ana and Luna. Lack of crop rotation, overuse of fungicides, pesticides and herbicides all contribute to eroding the health of the soil. For over 20 years phytophthora and beet curly top virus have plagued fields. Palmer amaranth (*Amaranthus palmeri*), is a common NM pigweed that is edible. It is now a superweed resistant to glyphosate as a result of other glyphosate-resistant GE crops grown in NM; some used as rotation crops.

Palmer amaranth can harbor the insects that carry the phytophthora and curly top viruses; both which have mutated into varieties unknown in the chile fields. It can grow to heights of 6.5 ft. and produce up to 460,000 seeds per plant.

Although total acreage planted has dropped from its peak in 1992, the amount of chile harvested per acre has risen from 1.55 tons in 1992, to 7.25 in 2011. These statistics only include farmers participating in USDA surveys; all others, especially smaller and Native American farmers are not counted. Many commercial chile farmers have switched to more profitable crops. Farmers growing chile under contract for large processors make .50 to .75 cents a pound, versus $2.50 to $4.00, if sold at a local farmers' market.

NM does not have the capacity – land or water – to meet the chile demand for the mass- produced salsas and chile products manufactured by the chile industry, thus the continual need for imported chiles. The majority of chile products are exported from the state, and do not necessarily contain "New Mexico chile" – the mild cultivar preferred by industry. Once a GE chile seed is developed, what is to prevent the NMCA from taking the GE seed to Mexico, China or some other country?

Funding

So, how much money has the chile industry received? And why the lack of knowledge about the research taking place? It is murky to say the least. This is partly due to the fact that the NMCA and NMSU determine how the funds are spent.

In 1992, phytophthora became a major concern of the chile industry. This prompted NMSU to secure $250,000 of recurring research funds from the NM state legislature for the NMSU Agricultural Experiment Station. Funds were to conduct research on phytophthora control, development of resistant varieties, a glyphosate resistant GE chile and mechanical harvesting.[7] Initial funding for GE chile research was only 8% of the total. In 2010, NMSU Professor Steve Hanson stated that NMSU would own the patent on a virus-resistant crops GE chile being developed through cisgenics, a form of genetic engineering.[8] Total recurring funds since 1993 through 2011 total $4.8 million. In 2006, the NMCA lobbied for an additional $7 million in funding. From 2006 to 2010, an additional estimated $3.5 million was secured through various bills all for the GE chile.

The reason the public was unaware about the GE chile research is because the bills introduced in the NM State Legislature have had innocuous names like NMSU Chile Industry Research, Chile Task Force, and Economic Sustainability of NM Chile Industry. Bills were sent to committees not normally designated to hear these type bills, such as Corporations and Transportation, and Education. The net result: a lack of transparency, with evidence, outrageously, that tobacco settlement funds have been used for this chile.

GE Response and Strategy: New Mexico Grown

After the introduction of the Farmer Liability bill in January 2009, the GE players' first response was to conduct a survey to show public support for a GE chile. The NMCA's survey of consumers (C) and restaurant owners (RO), found (www.nmchileassociation.com):

- (C), "74% Support genetic modification of chile plants in certain cases, mainly because they feel it will help prevent disease and save the chile farms.
- (RO) "58% support taking a gene from one kind of chile plant and putting it into another because they feel it will help prevent disease and farmers could grow more chile."

Interestingly, consumers were asked about "genetic modification" and the restaurant owners were asked about "cisgenics" – where a gene from the same plant or related species is used to genetically engineer a seed. It is still "genetic modification," but the intent was to see how the customers and restaurant owners responded. What is even more interesting, is that two years later in 2011, the local KOAT Television station conducted a survey and 84% of respondents **were against** development of a GE chile.

In July 2009, the NMCA copied the Save NM Seeds website (www.savenmseeds.org), inserting the word "chile" instead of "seeds", www.savenm***chile***.org. A billboard was posted to "Save NM Chile" and "Demand New Mexico Grown."

Billboard to Confuse Consumers

This action backfired for the NMCA, because it only served to make consumers angry, as they discovered who was behind the GE chile.

"Demand New Mexico Grown" is the NMCA's emerging theme, and has been in use for years on Bueno Foods' packaging. This is the fourth "player" needed for a new GE crop -- an emotional aspect to rally people's support. The GE players are working to convince New Mexicans that their beloved "New Mexico chile," especially green chile, is in peril. Fresh green chile constitutes only 5% the NM chile industry.

In 2011, the NMCA successfully lobbied to pass the New Mexico Chile Advertising Act. The NMSU Board of Regents will enforce and administer this law, whose rules are promulgated in consultation with the "chile industry". So, now, the same entities that are developing the GE chile and who will own the patent, will decide what constitutes "New Mexico Chile." The NMDA, which is under NMSU, will enforce it.

The law went into effect in July 2012. It requires compulsory registration of farmers and chile processors who sell a chile or chile product that bears the name "New Mexico Chile." But there are different requirements for selling fresh or processed chile.

- Fresh chile requires registration of all farmers and the **location** of their farms.
- Processed chile requires only a copy of the label of the product.

Why do farmers selling "fresh" have to provide the location of their farms? This puts farmers at risk of being contaminated. NMSU and NMDA, who work with the biotech companies, will know where the chile fields are located. If a farmer becomes contaminated, they will have turn over their crop to the patent holder. ***This bill threatens seed sovereignty – the rights of NM farmers to plant their own seeds, save and exchange seed with neighbors, and pass them down for generations.***

Over the past few years, a proliferation of seed laws have passed in other countries that prohibit seed saving. Mexico passed one in 2007, after heavy lobbying by biotech seed companies. Now it is against the law for farmers to exchange seeds unless they are certified or registered with the proper entity. What does this mean for NM farmers? Will we have to register our farms, certify our seeds or be in database to exchange our seeds with our neighbors? Will farmers be forced to only purchase seed certified by NMSU in order to call it New Mexico chile? Bueno Foods already does, as evidenced on their website (www.buenofoods.com): "Bueno Foods requires its farmers to use certified chile seed to maintain integrity of the genetic strain."

For now a loophole exists. If a farmer's chile is called anything other than "New Mexico Chile" such as Chimayo, Embudo or any of the Nativo Chile names, then one does not have to register with NMSU. This law also serves another purpose: consumers can choose whether to support a GE chile by avoiding "New Mexico Chile" products.

Who Owns the Patent?

So who will really own the GE chile patent? NMSU has stated they will. Syngenta has been working with NMSU on a GE chile for years. Monsanto announced in January 2012 that their ***phytophthora resistant*** chile is in the "Advanced: Phase 3" out of 4 Phases. It includes Anaheim (from the NM long mild), cayenne, jalapeno, and pasilla from which the modern NM cultivars were derived. Will all three own the patent?

Seeds Are Sacred

No one knows what the true impact of a GE chile will be on traditional seed keepers, biodiversity or the wild species still remaining. The study on Mexican chiles cited earlier, co-authored by a Monsanto researcher, acknowledges this at the end of the article:

"Knowledge of gene flow (i.e., extent and directions) in chiles will be important to evaluate the potential **effects of transgene release into** the environment and the role of wild progenitor genetic diversity in conservation and breeding. Last, the impact of traditional farmer management in structuring genetic diversity and population dynamics of chile landraces should be investigated."

How can companies create and release a GE chile without understanding how it works? This arrogance may be the downfall of the agricultural system, leaving behind starvation, crop failure, superweeds and pests, destruction of germplasm and diversity. This is why farmers and consumers are uniting to sound the alarm about the potential destruction of our chile, culture, and freedom to farm.

As the season ends this year, some chiles will be left to dry on the plant for seed. They will have endured the year's extreme heat, dry conditions, pests and other fungi or bacteria that we cannot see. For now, the seeds will prevail as they have done for centuries. For seeds are sacred; they are the memory of life.








The Duel of the Chiles

In celebration of the 2009 New Mexico visit of Vandana Shiva, a local historian, professor and traditional musician - Estevan Arellano, Cipriano Vigil, and Enrique Lamadrid, composed, recited, and sung traditional poetry to honor her and the agricultural heritage of Nuevo México, manifest and symbolized in our beloved Chiles.

In the ancient tradition of the *Controversia trovada* with roots in the mountains of Andalucía and Nuevo México, the fortunes of the people are debated with humor and satire in an improvised poetic duel. Professor Lamadrid wrote, *La guerra de los Chiles:* Poetry, Biodiversity, and Seed Sovereignty vs. "Genetic Engineering." In one corner is *El Chimayoso,* the famous chile of Chimayó, New Mexico, who offers the best flavors of the land from which he is born. His opponent, "*El Number Ten*" is a novelty of agricultural science, born in a laboratory, the motherless child of so-called "genetic engineering." (*Full text and music at: www.savenmseeds.org*)

Chile Chimayoso

También, soy el Chimayoso	I am also from Chimayó,
y aquí te hago la guerra.	here I take you on in battle.
¡Qué bien mantengo a mi gente	How well I maintain my people
con solo labrar la tierra!	cultivating the land!
Número Diez presumido,	you, haughty Number Ten,
qué sepa el mundo entero,	the whole world know,
tu semilla no se guarda.	your seeds cannot be saved.
Sacrificas a mi gente,	you sacrifice my people,
tu semilla no se halla	your seed cannot be found
sólo si andas con dinero...	if not bought with money...

The *Corrido* or narrative ballad from Mexico is more directly combative. Cipriano Vigil takes off the gloves and charges that "genetic engineering" is surely the devil's work:

El chile y sus semillas	The chile and its seeds
pertenecen a nuestro estado,	belongs to our state,
si las perdemos del todo	if we lose them completely
seguro nos mandan al diablo.	we'll be sent to hell.

**Isaura Andaluz Member of the Board of Directors of OSGATA (Organic Seed Growers and Trade Association). She is a co-founder of Cuatro Puertas, which is guardian to the largest collection of native and drought-tolerant seeds in New Mexico, served on the board of NM Farmers Marketing Associations, and helped to organize the NM Seeds Coalition.*

Endnotes

[1]Buckler, E. S. IV, J. M. Thornsberry, and S. Kresovich. 2001. Molecular diversity, structure and domestication of grasses. Genetical Research 77: 213 – 218.

[2]Aguilar-Melendez, Araceli, et. al. Genetic Diversity and Structure in Semiwild and Domesticated Chiles (capsicum annuum; solanaceae) from Mexico, American Journal of Botany 96(6): 1190–1202. 2009.

[3]Interim Economic and Rural Development Committee, September 2010.

[4]Robinson-Avila, "Imports Scorch New Mexico Chile Producers, NM Business Weekly, September 2009

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APPALACHIAN AGRICULTURAL BIODIVERSITY: THREATS AND RESILIENCE

James R. Veteto*
Southern Seed Legacy

I have lived, worked, and conducted research in the most biodiverse foodshed in the US, Canada, and Northern Mexico for the past two decades. Southern/central Appalachia, USA, is home to over 1400 documented heirloom vegetable and fruit varieties, more than twice as many as any other foodshed studied in North America to date. The reasons for the stunning levels of agricultural diversity in our foodshed are complex.

Like many other regions of America, farming as a way of life has drastically declined in Appalachia due to the modernization and corporatization of agriculture that has taken over the globe since the onset of the Green Revolution. Corporate farms and biotechnology giants like Monsanto have made sure that traditional small farmers of Appalachia cannot compete with the vertically integrated mega-farms of the American Midwest. Yet, high levels of agricultural diversity continue to persist in the Appalachian region despite the loss of farming as a way of life, and the reason why is a question I have been investigating for the past decade.

Honey Drip Sorghum (Sorghum bicolor)

Marginality undoubtedly plays a central role. The steep and somewhat isolated mountain hollers of Appalachia are legendary for creating a relatively insular culture in the Southern mountains. The lack of political and economic power afforded Appalachian people (in Appalachian states the centers of power are situated in lowland capitals) has forced them to rely on their own resourcefulness more than your average American. A typical Appalachian person does not draw a steady paycheck from hard-to-find jobs in the region, but rather works seasonally at various odd jobs to help patch together a living. Whatever work may be found is supplemented by hunting, trapping, wildcrafting native plants, fishing; keeping cattle and hogs and other domestic animals, and of course, tending large homegardens. Economic anthropologist Rhoda Halperin described the Appalachian way of living as "multiple livelihood strategies," and this characterization is descriptive of many of the Appalachian people that I have befriended and worked with over the years. Living conditions in Appalachia through the 1960s (and in some areas even today) have been described as similar to those in the Global South. Noted Native American scholar and activist Vine Deloria once said, after touring the region, that "Appalachians are Indians," meaning that Appalachian communities were much like Native communities in terms of their material environments and lifeways.

The diverse microclimates created by mountain ecologies also provide environmental conditions that support the proliferation and diversification of local crop varieties. For instance, there are over forty different types of Candyroaster Squash, a deliciously sweet winter squash that is native to Southern Appalachia (it originated with the Cherokee Indians), in western North Carolina alone. Cherokee bean seed stock provides the basis for Appalachian bean diversity (greasy beans, October beans, half-runners, cutshorts, butterbeans, pinktips, etc.), but once European settlers began to populate the region in greater numbers than the pre-contact Cherokee, they took those Cherokee beans (and corn, squash and other crops) into previously uninhabited valleys and hillsides and began to select according to their own tastes, needs, and soil types—vastly diversifying Appalachian seeds in the process. This is in addition to all of the non-native crops that were brought into the region by Europeans, starting with the Spanish in the 16th century. Cherokee and European farmers traded crops back and forth (sometimes in the same family as inter-marriage increased) and native people became experts in stewarding European-introduced crops, such as the historical Cherokee practice of maintaining large and diverse orchards and developing their own varieties like Nickajack and the recently re-discovered Junaluska apple. The history of Appalachian agrobiodiversity is a long and fascinating tale and can only be touched upon here by the brief examples above.

The material conditions and cultural preferences of Appalachian people create a context in which higher levels of heirloom fruits and vegetables have been preserved more than almost anywhere else in the Global North. When asked why this is the case, Appalachian people usually give answers that are predominately cultural, rather than utilitarian, in nature. Cultural tastes that prefer heirloom foods for ingredients in unique Appalachian culinary dishes cannot be replaced by corn from Monsanto, for example. The endangered Yellow Hickory King corn is a favored variety for making hominy among locals. Cherokee White Flour corn is used, along with Cherokee Butterbeans, in making a special dish called bean bread, which is only prepared and eaten by Cherokee people. As tobacco growing has recently all but disappeared in southern Appalachia, many farmers have been turning to growing GMO corn for animal feed as a commercial crop to supplement other livelihood strategies. The mountain environment in some cases provides buffers to contamination that do not exist in the lowlands, but I still worry that GMO corn will interbreed with precious and endangered local corn varieties such as Yellow Hickory King, Cherokee White Flour, Coon, Haywood County Field, Puddin Pile, Neal's Paymaster, or many of the other dozens of local corn varieties that exist. No research has been conducted on GMO contamination of Appalachian corns, but it is highly likely that native varieties have already been infiltrated by corporate genes much like has happened in Oaxaca, Mexico, the world center for corn diversity. This trend will only increase as companies like Monsanto continue to make headways into the Appalachian highlands.


Cherokee Butterbeans (Phaseolus coccineus)

But Appalachia won't go down without a fight in terms of losing our treasured heirloom seeds and plants. There is a strong respect for traditional ways here in the mountains despite the inroads that modernity has made over the past fifty years. When I interview Appalachian seed savers, it is often the case that heirloom gardens are not only everyday occurrences, but everyday resistances as well. People who are growing the seeds of their forbearers are often doing it as a cultural performance and active resistance against the impending forces of modernity all around them. At the same time, they are doing what they were taught and brought up to do. Despite capitalist inroads that have raised the price of local lands and taxes due to the influx of rich outsiders who build lavish vacation homes in many areas of the picturesque Appalachian countryside, it is still not uncommon to see an old-timer tilling his or her garden plot and planting family heirloom seeds—even as the luxury cars roll on by—much as their ancestors have done for hundreds of years. It is worrisome that most heirloom gardeners today are elderly and that the younger generations are typically uninterested or do not see farming as a viable way of making a living, often leaving the impoverished areas of Appalachia for factory jobs in big cities. Such rural to urban migration is common worldwide.

In order to encourage *in situ* and *in vivo* Appalachian seed saving, conservation, and ways of life, I direct two organizations dedicated to these purposes. One, the Southern Seed Legacy, is a 16 year-old project dedicated to the preservation of Southern American cultural and genetic diversity. We maintain a seedbank of nearly 1000 Southern heirloom seeds, a high percentage of which are from Appalachia, coordinate a network of almost 100 seed savers across the American South, and host annual seed swaps throughout the region. The second project is called the Appalachian Institute for Mountain Studies, which is located on twenty-five acres in the heart of southern Appalachia, conducts rare seed grow outs on Seed Legacy Farm, and maintains the one-hundred variety J.R. Dawkins heirloom orchard. Our mission is not only to conserve and increase agricultural diversity, but to support a new generation of Appalachian gardeners and farmers in carrying forward the seeds of their ancestors. We are proud to be part of the Global Citizen's Alliance for Seed Freedom and add our voices to the millions across the globe calling for an end to corporate dominance of our food systems and resisting hegemonies over biocultural seed saving traditions that have been the cornerstone of humanity's sustenance for the past 10,000 years.

**James Veteto, PHD, Director, Southern Seed Legacy a project that strives to reverse the plant erosion of genetic diversity and cultural knowledge in the American South by encouraging and supporting local seed saving exchange networks and in situ conservation of plant genetic resources. http://anthropology.unt.edu/anthatunt-ssl.php*

FOUR BRIDGES TRAVELING PERMACULTURE INSTITUTE

Emigdio Ballon*, Pueblo of Tesuque Agricultural Initiative

The seeds for native people in South America are very sacred living organisms. We treat our seeds as if they were our brothers and sisters. We have a special relationship with them. Before we plant our seeds we hold a special ceremony, like a fiesta. We eat, dance, and play music. At harvest time, we conduct a similar ceremony.

I began taking care of seeds when I was only four years old. I received some seeds from my grandfather. He put the seeds in my hand and said, "This is life, take care of them, and they will take care of you!" As I grew up in my native country of Bolivia, I chose to study agriculture at University. After receiving my degree I was hired as the National Coordinator of the Crops of High Elevation.

I became one of the curators of quinoa, canahua, amaranth, and small tubers such as oca, ollucos, and mashua. I established a seed bank for canahua, with 450 eco-types of seeds. In 1978, I sent some quinoa seed samples to Utah State University. In 1984 I went to Colorado State University to work with Dr. Duane Johnson. I studied the adaptability of quinoa to different environments. In 1986 I moved to New Mexico working with the small organization Talavaya, under the direction of Carol Undergil and John Kime. We collected close to several hundred cultivars from Hopi people, special seeds having similar characteristics of dry land crops, similar to how the Quechua people perfected Quinoa. At this time, some of the seeds no longer existed, and big corporations became interested in destroying heirloom and native seeds to break the connection between indigenous people and their traditional seeds and foods.

Indigenous people are connected to their seeds. All native people have a tradition that involves corn. The varieties of corn join together nations of people from North, Central and South America. This alliance makes the people strong in their struggle to persevere, and to continue the seed movement.

In 1986 I joined Gabriel Howard, Kenny Ausabel, Alan Kapuler, and Ricardo Pacororo, to start the first organic seed company in the United States, "Seeds of Change." I continue that responsibility today with my work at the Pueblo of Tesuque, a native Tewa speaking pueblo. Working with tribal leaders Louie Hena, and Clayton Brascoupe we have developed the Seed Resolution against GMO and GE seeds. We are fighting to keep these seeds out of our communities, and keep our traditional and heirloom seeds pure.

Currently I am working at Tesuque along with Gailey Morgan, and Randy Moquino to build a seed bank from recycled materials, straw bale, and adobe construction. Seeds represent our history, culture and beliefs. We live in the present, and will walk in the future to protect our past.

I am also the Co-founder and Executive Director for the Four Bridges Traveling Permaculture Institute a non profit organization developed with my partner, Lorraine Kahneratokwas Gray, a Mohawk from the Akwesane Mohawk to continue our work in the seed movement. We are based in Santa Cruz, New Mexico, operating an educational farm built on the principles of permaculture and traditional agriculture. Our 3 acre farm offers a small greenhouse, seed bank, and several styles of traditional farming that we call our Sacred Gardens which hosts students and visitors from New Mexico, and other areas of the US, as well as visitors from indigenous communities in other countries.

We offer workshops and presentations at conferences throughout the United States, Mexico, Peru, Bolivia, Argentina, Ethiopia and wherever our work is needed and requested. Four Bridges, along with Tesuque Pueblo are the main organizers of the annual Traditional Agriculture and Sustainable Living Conference, celebrating its 7th year in October 2012. This two day event brings experts from around the globe to educate participants in the perils of GMO's and offers hope and inspiration to live a lifestyle based on organic, local, and traditional foods. Information about the work that we do can be found at www.4bridges.org. I hope that our organization will provide a legacy for my life's work, offering training, education, and support for indigenous communities around the globe for many years to come.

**Emigdio Ballon, plant geneticist and director, Institute of Natural and Traditional Knowledge and has in-depth experience of germination techniques, seed saving and sharing, bio-dynamic and organic farming and sustainable agricultural practices. http://intk.org/directors.htm*

REVIVING THE PAST TO SUSTAIN THE FUTURE: NATIVE SIOUX AGRICULTURAL SYSTEMS

Suzanne Foote* – Manitou Institute, Colorado, and USA

Every year, native plant species and traditional farming practices are increasingly vanishing globally. Since the early 1500s, well over half of all native crop species have been lost as well as the knowledge of traditional native agricultural practices. A collective effort must take place now to save remaining seed species and revive traditional agricultural practices to ensure future food security and cultural integrity.

Years ago, Sam Moves Camp, a Sioux Medicine Man, told the Lakota Nation that they must return to their traditional core diet of native corn, beans, and squash as well as wild-crafted foods indigenous to the Lakota people. Sam gave very specific directions and delivered a compelling message to his people, stating

We must get back to the land – this is a priority. We must acknowledge the spiritually based, ecologically sound relationships and traditions of the Lakota and the plant species that we have evolved with and depended on. Together we must preserve our ancient food crops for our future survival as a people.

He also declared that, "If these traditional food crops become extinct, our culture and our spirit also will become extinct."

Sam's message correlates with several prophecies, such as those of Padmasambhava, or Guru Rinpoche as he is also known. In eighth century Tibet, he warned that certain conditions would come to pass in our time because of humanity's behavioral patterns. People will die of starvation even as there is food to eat because the food itself will become lifeless.

In direct response to these kinds of messages, a Native American non- profit organization – Ta S'ina Tokaheya Foundation – was established in 1989 on the Pine Ridge Indian Reservation. Ta S'ina Tokaheya, meaning 'First Robe', is the Lakota name of the founder: Michael Burns Prairie Sierra, a member of the Oglala Sioux Tribe. Michael had been searching for many years to find a way to address the Third World living conditions present on the Pine Ridge Reservation.

Ta S'ina Tokaheya Foundation promotes economic self-sufficiency through sustainable/organic farming, seed banking based on traditional farming practices, and Ti O'sapaye development (sustainable community development based on traditional Lakota models). Green building and wind energy enterprises also were incorporated. By utilizing affordable and sustainable lifestyle alternatives and reviving and incorporating traditional Lakota principles, this model has served as an example and opportunity to improve quality of life for other reservations and non-reservation communities.

A key component of Ta Sine's work was the creation of a Native American seed bank to preserve ancient seed species. These seeds are vital to providing a consistent, reliable, and healthy food source. Traditionally, the Lakota were nomads who obtained their food primarily by hunting buffalo and harvesting wild-crafted foods. Eventually they adopted native farming practices from surrounding plains tribes. On reservations today, however, the Sioux diet, like that of most tribes throughout North America, is heavily reliant on federal food commodities. Every registered member of the Sioux Tribe receives white sugar, white flour, powdered milk, eggs, lard, coffee, and canned meat.

As cultural traditions eroded on reservations and government food subsidies replaced the incentive for practicing sustainable food production, traditional diets based on hunting/gathering and agriculture vanished. As a direct result, death rates from diabetes, obesity, heart disease, and cancer have soared among Native Americans. However, preliminary studies have indicated that this trend can be reversed by a return to the ancestral Native American, Paleolithic diet of protein and fiber found in corn, beans, squash, grains, greens, deer, bison, and other wild-crafted foods. The traditional diet, high in fiber and protein, normalizes blood sugar levels, suppresses cravings for processed foods, and significantly reduces the occurrence of diet related diseases.

Over the past two decades, Ta S'ina Tokaheya Foundation has focused its activities on the collection and cultivation of endangered seed species to preserve crops that have evolved in Native American cultures. The ultimate value of seed-banking native seeds is to preserve the inherent genetic memory they possess. This genetic memory contains a natural resistance to harsh climate conditions and an inherent resistance to pests and disease. These seeds are extremely hardy and reliable and are naturally acclimatized to particular bioregions; they are also high in nutritional value. Since these seeds were the source of survival foods for the plains tribes, their cultivation and perpetuation is essential not only for their nutritional value but for future food security. These efforts have provided ways to simultaneously reclaim Native heritage and improve health conditions. In addition, the sale of surplus crops and related value-added products has contributed to a growing local economy by creating sources of income for participating members of the Lakota community.

The endangered Native American Seed Preservation Project, a program under Ta S'ina Tokaheya Foundation, researched traditional scientific planting methods used by the plains tribes hundreds of years ago. These methods included techniques to prevent cross-pollination, such as utilizing various plant barriers to separate agricultural plots. Companion planting also was used. As an example, pole beans would be planted with corn for fixing nitrogen levels in the soil. Floodplains and bottomlands were typically selected for garden plots.

The seed project primarily implemented Hidatsa farming techniques as the Hidatsa women were among the most advanced farmers and ecologists of the plains tribes. The Hidatsa and Mandan knew the importance of keeping strains of corn and squash pure, because each variety had a special use. There are nine principal varieties of corn that were cultivated by the plains tribes: Ata'ki tso'ki – hard white corn; At'ki – soft white corn; Tsi'di tso'ki – hard yellow corn; Tsi'di tapa – soft yellow corn; Ma'ikadicake – gummy corn; Do'ohi – blue corn; Hi'ci ce'pi – dark red corn; Hi'tsiica – light red corn; and At'ki aku' hi'tsiica – pink top corn. The Hidatsa would refer to the cross pollination of corn as the 'traveling corn'. To maintain the integrity of the various strains, they configured their fields to prevent cross- pollination by creating barriers of sunflowers and separating the cornfields by variety.

The Ta S'ina Tokaheya Foundation began the seed project by selecting a 5-acre bottomland parcel outside of Oglala, a site that had the richest soil on the Reservation. The parcel was hand dug by members of the Lakota tribe, ranging from children to elders from the community. The gardens have brought community members together and have fostered a sense of pride. A half-acre mandala garden was designed in the shape of the Morning Star and a medicine wheel garden was designed and planted with medicinal herbs. The mandala garden represents the Lakota belief that all Lakota life originates from the Morning Star.

We, the co-founders of the foundation, [the author, her husband at the time Michael Sierra, and sister Kristina Mayo] engaged in a vigorous seed collection and location campaign in 1992 and began with a letter to Seed Savers Exchange requesting heirloom Native American seed species. The request for heirloom seeds was later published in the Seed Savers Exchange 1993 *Harvest Edition.* The response was overwhelming. Rare seeds were donated from individuals, seed banks, and universities throughout the US, Canada, South America, and Africa. We received many native varieties of corn, beans, and squash that date back as early as the 16th century from Fort Berthoud. These particular seeds originated from peoples of the Hidatsa, Mandan, Arikara, and Sioux Nations. Other seeds were located and collected from USDA seed storage facilities.

We were able to acquire and grow out all nine-corn varieties mentioned previously, and this practice continues through 2010. Gummy corn seed was the most difficult to obtain, perhaps because it was one of the least favorite varieties used by the plains tribes. Throughout the Ti O'spaye cornfields,1 companion planting was used by growing multiple varieties of dry climbing beans. One of the most prolific and flavorsome varieties is the 'shield figure bean,' which was grown by the Hidatsa 150 years ago. Dry pole beans climb the corn stalks while fixing nitrogen levels in the soil.

Pests such as grasshoppers have been a big problem in the plains and have wiped out entire crops throughout Nebraska and South Dakota. To remedy this, turkeys, guinea hens, and chickens roam free throughout the gardens eliminating grasshoppers and depositing manures. They also provide eggs and meat for consumption within the Ti O'spaye while excess is sold to the local community.

The Lakota view food as very sacred. The 'three sister' groups – corn, beans, and squash – are used for ceremonial purposes. During harvest season, a 'giving thanks' ceremony is performed. Women prepare a large feast using all the crops from the garden while ceremonial foods are placed in Nature to show gratitude for the abundance of food and seed. Everyone from the Ti O'spaye (community) gathers together for this celebration. The children and elders are inevitably the most enthusiastic participants. Both men and women go to the sweat lodge to pray and give thanks. For several weeks after the last harvest, seeds are collected, dried, and stored. Pumpkins and squash are sliced and dried to prepare soups during winter months.

Ta S'ina's garden is augmented by a 30'x36' greenhouse to propagate seedlings and to extend the growing season. Crop pollination is enhanced by two adjacent bee colonies, which produce several pounds of honey annually in addition to by-products such as propolis, the glue that holds beehives together, and beeswax. Many more saleable and value-added products are produced from the garden and a proposed line of cosmetics is in the making.

Ta S'ina also initiated an alternative housing project. Within close proximity to the garden, two model homes – one adobe and one straw-bale – were constructed from local materials, both utilizing solar energy. These models are very important because, shockingly, over 80% of the existing homes on the Reservation are without a heating supply, lack sufficient insulation, and were built with toxic materials.

Ta S'ina Tokaheya's programs have established a working sustainable community model, an 'ecovillage' if you will, through integrating traditional values and knowledge and by renewing a sense of cultural identity.

Currently, the primary focus is on sustainable energy systems and production. The Foundation is working very closely with the tribe in these areas, with the result being the creation of a whole new economy on the Reservation.

As a closing, I would like to share Michael Sierra's message to Ta S'ina's Tokaheya's Ti O'spaye:

When we first began to come together as young men and women, we started a process of restoring our customs and traditions. As a result we became healthier and also restored our own pride and dignity because of the completeness and beauty intrinsic in our way of life.

Because of our culture we learned to work towards building a better future for the next seven generations. However, we could see the reality of the conditions our people have been subjected to in America. We realized it would require our full commitment and begin with accepting the responsibility ourselves to change our environment.

Ta S'ina Tokaheya culminated to become the focus of our efforts for modeling a way of life that incorporates a foundation based upon continuing the restorative efforts and practices of our Spirituality, that encompasses our role as 'Caretakers of Mother Earth', that utilizes sustainable and renewable concepts and technologies, and permits us to endeavor to achieve economic self-sufficiency.

**In the early 90s, Suzanne Foote helped found and establish Ta S'ina Tokaheya Foundation, later serving as one of the directors. In 1995 she formed Earth Origin Seeds, a program under the Manitou Institute, which focuses on sustainable agriculture and seed preservation. Currently she is serving as the Executive Director of both the Manitou Foundation and the Manitou Institute. Since 1988, the Manitou Foundation has provided land grants and financial support to various wisdom traditions for contemplative retreat centers, educational groups, and environmentally sustainable projects. Through Hanne Strong's vision, the Manitou Foundation established the world's largest intentional interfaith community. The Manitou Institute was later formed in 1994 to support local spiritual and environmental projects and programs, and to administer the Manitou Habitat Conservation Program, a local land conservation program.*

Notes

[1]TiO'spayeistheSiouxwordforcommunity.TaS'inaTokaheyaTiO'spayeisoneofmanyTiO'spayes throughout the Reservation.

LUPINE KNOLL FARM

Jonathan Spero*

Section 1: The Issue

Without secure and reliable access to seed, any human population is more at risk of hunger or genocide. Farming systems that don't collapse without external inputs are essential to global food security. The farmer who is able to be become input free or self-sustaining makes it more likely that people will eat following a catastrophe. Open pollinated varieties keep open the possibility that local agriculture can continue if the patented seed becomes unavailable or unwanted. We are all safer when every region, and maybe every farm can supply itself with planting seed. Regional varieties may prove resilient if the others fail.

New, unrestricted varieties are needed for tomorrow's farms. Someone needs to develop those varieties. There are relatively few public or university based plant breeding programs left. Plant breeding in recent years has been done by big corporations, is usually proprietary, and is not selecting for the traits sustainable agriculture needs. Today's corn is bred to be proficient at converting ammonia nitrogen into ever higher production. We need varieties able to produce adequately with low fertility inputs and high weed pressure.

Nearly all plant breeding from the dawn of agriculture until the last century or two has been done by farmers. Farmers should be encouraged to save their seed and adapt it by selection to their local conditions.

Section 2: Our Work

At Lupine Knoll Farm I am breeding sweet corn that is both open pollinated and sugary enhanced. I have three new corn varieties in development, two of which have one parent that is an Anasazi landrace, bred to survive tough conditions. The Organic Farming Research Foundation is funding a portion of this corn breeding work. I have a broccoli variety (in conjunction with Oregon State University) and a kale variety in development, and grow some lettuce, squash and tomato seed for sale. Both the broccoli and the corn breeding projects were started in 2002. Lupine Knoll Farm has been certified organic since 2001.

Enhancing sweetness in Open Pollinated sweet maize:

Currently I am using a unique, simple, low cost approach to enhance sweetness in open pollinated sweet corn. The method I use is based on the idea that kernels with higher sugar content have greater osmotic potential and those kernels should lose less water and maintain plumpness for a longer period.

This procedure selects sweeter ears, then sweeter kernels from those sweeter ears, out of cross or population that includes an *se* component and/or has other variability for sweetness.

- First, select the plants that have sweeter ears. When the corn us ripe to eat, test for sweetness. A tasting party in groups of 3 is one fun way to do this.

Taste selection is easier with 2-eared plants, as one ear can be harvested and tasted while the other ear is left undisturbed. When testing plants that have only 1 ear, peel the husk back and take a bite, or cut off the tip of the ear for tasting.

The most efficient method for us was a crew of two or more practiced tasters working adjacent rows and consulting each other when uncertain as to if a particular ear should be selected as "in" or "out."

A refractometer can make approximate brix measurements, and is a useful tool for comparing sweetness.

Delayed sampling better tests the ability of the corn to hold its sweetness after harvest. Secondary ears can be harvested and numbered, with corresponding numbers marking the plant and/or primary ear. The secondary ear can then be sampled a couple of days after harvest. If the secondary ear is found to be sweeter, the sibling primary ear can be flagged and kept.

Select sweeter kernels from those sweeter ears.

About 2 weeks after "tasting" ripe, when signs of wrinkling can be seen on 10%-20% of the population, harvest the corn. If there is variation in maturity, more mature ears can be harvested ion a first pass.

Lay out the rest of the corn with the husk still on. Check each ear for wrinkling kernels daily, by peeling back some of the husk.

Kernels on those ears will begin to show signs of wrinkling n the following 7 to 8 days. As the first kernels on each ear begin to show signs of wrinkling, remove the husk form that ear. Place the ear so that it gets airflow all the way around it.

The kernels, now exposed to the air, will begin to wrinkle within hours. The goal is to select the kernels that remain plump the longest, and commence wrinkling last.

If there is variability for *se* between different kernels on the ear, it is possible for a few hours to clearly see which kernels are starting to wrinkle first, and which are maintaining plumpness for the longest time before beginning to wrinkle.

At the point where some kernels have clearly started to wrinkle and other have not yet wrinkled at all, us a paint brush or marker to mark those kernels that are not yet wrinkling. Select out the marked kernels after the corn is fully dry.

At Lupine Knoll Farm we have Top Hat and Tuxana in the f5 generation in 2012. We are also breeding a white and multi-colored variety from the Tuxana cross.

Section 3: Solutions

The following are resolutions I prepared for and submitted to the United States Grange, a rural agricultural organization. These are not Grange policy, merely proposals that our local community hall of the Grange has submitted to the larger Grange organization. They may be valuable as policies or that other organizations might wish to support. 3 resolutions follow:

ALLOW FARMER SAVING or "BROWN BAGGING" OF SEED

WHEREAS a farmer with seed can recover from disaster and plant again; and

WHEREAS many plant varieties, developed over centuries by farmer-breeders around the world, have been in some way modified and then patented, depriving the cultures that developed the seed from access to the seed developed by generations before; and

WHEREAS farmers, by selecting the best plants and saving seed, can develop and improve seed stocks for local conditions; and

WHEREAS farmers should not have to pay to save seed form their own crops for future planting on their own farms; therefore be it

RESOLVED that the right to save seed for future on farm use ("Brown bag" seed) should be protected by law; and be it further

RESOLVED that no farmer should be subject to fines or penalties for planting seeds from plants grown on the farm.

RIGHT TO FOOD SECURITY

WHEREAS: the preservation of local agriculture is a basic purpose for which the Grange was founded; and

WHEREAS: production, commerce and shipping can all be disrupted by war or natural disaster; and

WHEREAS: all humans require access to food on a regular basis; and

WHEREAS: none of us wish to see famine and starvation; and

WHEREAS: all nations should have the right to take action to protect local food sources,

THEREFORE BE IT RESOLVED

The Grange requests that the United States Federal Government make provisions in all Treaties and Trade Agreements for the right of each nation to enact laws to protect the viability of our and their local agriculture.

EXCLUDE SEEDS FROM PATENTING

WHEREAS a diverse selection of seeds is necessary for a stable agriculture; and

WHEREAS saving seed for future planting has been the norm since humans first began farming; and

WHEREAS the 'U.S. Plant Variety Protection Act' gives a path to exclusive marketing rights to developers of new varieties, and does this while protecting farmers rights to save seed for on farm use, and allowing research and development of future crops; and

WHEREAS Utility patents on seed prevent farmers from developing seed best adapted to differing localities and farming methods; and

WHEREAS the life in the seed is a divine gift and rightly belongs to everyone; Therefore be it

RESOLVED that the U.S. federal government recognize the existing 'Plant Variety Protection Act' as the sole remedy for protection of owners rights to new plant varieties; and be it further

RESOLVED that the U.S. federal government should make a determination that seeds are not human inventions in the sense intended in patenting laws.

**Jonathan Spero – Lupine Knoll Farm*

Seven Seeds Farm & Siskiyou Seeds

Don Tipping

Siskiyou Seeds operates at our family farm, Seven Seeds Farm. We have been growing certified organic seed for many national scale mail order seed companies for the past 15 years. We are fairly unique within the world of seed companies in that we actually produce much of the seed ourselves, as opposed to most companies that buy most (or all) of their seed from multinational corporate seed houses, many of whom also produce genetically engineered vegetable seeds.

Siskiyou Seed is a bioregional, certified organic seed bank and seed source for gardeners and small farmers. Our offerings are the result of connecting seed growers, gardeners and farmers in a mutually beneficial relationship to support small-scale agriculture with superior genetics selected for the Pacific Northwest. We grow and distribute certified organic, open pollinated seeds through seed racks, a catalog and our website. Our goal is to produce most of the seed on our farm, Seven Seeds Farm and fields we manage in Southern Oregon's Applegate valley. We also work with successful, organic seed growers in the Applegate valley to increase the diversity of our offerings. In this way we are able to offer well-selected fresh seed of exceptional vigor and quality that larger commercial sources cannot match due to their having to rotate stock through a variety of middlemen. Through developing this network of seed producers we are strengthening our local seed security.

Siskiyou Seeds is one spoke of a larger movement that is occuring under the name of the Family Farmers Seed Cooperative, which is a national scale cooperative of organic seed producers pulling together to breed, select, produce and distribute high quality certified organic seeds. The family Farmers Seed Cooperative has close collaborative ties with the Organic Seed Alliance and a variety of land grant University Plant Breeding departments. Many of our members including Siskiyou Seeds have been active in challenging the USDAs decision to deregulate the open planting of GMO Sugar Beets in the USA. We are also engaged in a lawsuit brought forth by the Public Patent Foundation against Monsanto to challenge issues of GMO contamination, utility patents on plant traits and genetic trespass.

In addition to commercial seed production, Seven Seeds Farm produces Biodynamic fruits and vegetables that we distribute through a cooperative Community Supported Agriculture (CSA) program called the Siskiyou Sustainable Cooperative (www.siskiyoucoop.com) in the Rogue Valley. We also raise ducks, chickens, turkeys, and sheep. Seven Seeds hosts numerous on-farm classes and workshops in a variety of sustainable agriculture related topics.

About our site: We are located at 2,000 elevation, 43 degrees North latitude. Our average frost free season is from June 1st until October 15th. We are technically a Zone 7 site, however this can fluctuate. Summers are hot and dry with high temperatures in the upper 90s or low 100's not uncommon. Our evenings are cool in summer due to our arid, mountain environment. Winters are cool and rainy with periodic cold snaps down into the teens or below. Our average rainfall is 42 per year, coming mostly between October and May.

Although we are blessed with abundant summer sun here in the banana belt of southern Oregon, the Siskiyous can be a challenging place to garden with our winter rainforest, summer desert climate of harsh extremes. The varieties that we offer in this catalog have proven themselves through years of homesteading filling countless harvest baskets and serving as the foundation for many nourishing meals.

Our approach to plant breeding and selection is determined to help develop varieties that will perform well under organic conditions that are able to forage for nutrients, resist disease, adapt to pest pressure and stress and also possess superior nutritional traits. We firmly believe in the ethics of maintaining open pollinated strains within the public domain and honoring plant breeders efforts through fair royalties. It is my hope that we will help to develop seed systems that honor indigenous cultures, seed freedom, farmers' right to save seed and fair access to genetic resources.

Seeds For Life A Living Seed Bank (Arcata, California) was conceived in the winter of 2012. After doing much research on the various forms of seed banks and seed libraries we made the decision to start a living seed bank to begin the process of growing, improving/adapting and saving seed for our bioregion. We are focusing our attention on training a cadre of backyard gardeners who will become proficient in all aspects of seed breeding and saving. These members fill out an application, pay a nominal fee and take a pledge to save seed and return it to the bank. Once a bank of locally adapted seed has been developed we will open a seed library where any one can borrow seed. The members are given a basic seed saving pamphlet and are required to attend workshops designed to increase their skills as breeders and seed savers. Each member is focusing on one crop and will continue to work with that crop in successive years. We have begun our project with the easiest seeds to save, those that are self pollinating. As our skills improve we will move on to the out crossing crops.

Founding meeting for Seeds for Life Seed Bank in Arcata California

We are feeling our way as we go and there is much to learn and share. We welcome every opportunity to share information and work with other groups.

Rita Jacinto
Founder, Seeds For Life A Living Seed Bank

Seedling stage of Seed Freedom in Atlantic Canada: AV Singh, Perennia

A host of small-scale, principally organic, seed companies and growers have been producing and distributing seeds in Atlantic Canada for some time. Their efforts have served as the foundation for citizens understanding the importance of food sovereignty and food security. Through their work there has been an increase demand for locally grown, organic produce which in turn has led to a greater demand in regionally-adapted organic vegetable seeds.

Expectedly, larger seed companies lacking an ecological perspective are seeking to capitalize on the resurgence of local, organic vegetable production. Unfortunately, these larger seed companies have defined organic solely as the absence of synthetic chemicals and have put little effort in holistic selection traits like root morphology, leaf structure, taste, robustness, etc.

To our small-scale seed growers this presents a new challenge in that they have to expand their seed-saving efforts to a scale that can provide seeds to both the burgeoning numbers of backyard gardeners as well as bulk quantities to our market farmers. The scaling-up of seed-saving is being done thoughtfully to ensure that the passion, commitment, and integrity of regionally-adapted, disease free seeds are being harvested. Despite efforts made by the Eastern Canadian Organic Seed Network (ECOSN) and Seeds of Diversity Canada, through seed saving workshops sparking a new generation of seed savers has been limited. In large part, these workshops have placed a greater emphasis on the technical aspects of seed saving and place a relatively lesser role on “why” seed saving is important. In discussions with our current seed savers, common reasons given for why they seed save include: 1) Certain varieties are no longer commercially available; 2) Rising costs of purchasing seed; 3) Improved agronomic performance using regionally-adapted seeds; and 4) It is enjoyable. Strikingly, the notion that seed saving is a farmers’ right was not a prevalent thought. Perhaps the lack of this as a core principle may explain the relatively poor adoption of seed saving practices among market farmers.

Arguably, Canadian farmers and consumers have unfortunately not equated the corporate control of seed as a loss in sovereignty. In an increasingly complacent manner many farmers who can no longer source a particular seed simply choose the newest and sexiest variety as marketed. Too many farmers are taking a passive role in determining what they should grow and have all but relinquished any responsibility in maintaining their collective ancestral history.

Seed saving as a farmers’ right helps move the concept of seed saving from individual self-sufficiency to food sovereignty, and as such moves from the individual to the community, and in time a collective understanding that the local is part of a much larger global movement. Seed-savers in Atlantic Canada are now looking to introduce the concept of seed banks (or seed libraries) at the community level. It is these initial steps that will serve to increase interest in the value of having seed sovereignty and will engage more farmers in exercising their right…a right that they inherited by the millions of farmers before them who saved and shared seeds.

IMPACT OF IPRS ON FARMERS' RIGHT TO SAVE SEED

Evidence presented by Mr. Percy Schmeiser at the Bija Panchayat – People"s Seed Tribunal, organized by Navdanya and RFSTE at Bangalore, on September 24-25, 2002

A farmer from western Canada who had been sued by Monsanto for his allegedly using Genetically Modified rape seeds, Percy grew rape seeds for the past 50 years and had maintained his own seed bank. Monsanto did a aggressive campaigning claiming that the genetically engineered rape seed provided by them was more nutritious, had high yield and would consume less chemicals. But this was not entirely true. His neighbor sowed genetically engineered rapeseed, which resulted in contamination of his indigenously grown seeds. In the pre-trials although Monsanto admitted that they had no evidence of Percy illegally acquiring them. Thus he narrated his experience as saying that the genetically modified seeds pollute the environment that the creators cannot themselves stop. In the contracts drawn by Monsanto makes them the masters of the seeds. By taking IPRs as the cover they encroached upon the sovereignty of farmers' individual rights. Since then, the Canadian Court, even while recognizing that Percy was not at fault, decided that he had to pay royalty to Monsanto to the tune of several hundred thousand Canadian dollars, as his fields had got contaminated. Percy has now appealed against the decision.

I am Canadian farmer, farming in Western Canada, and I primarily grow on my farm wheat, canola26 and peas. I have been farming for approximately 53 years and in those 53 years I have grown canola almost every year for 52 years. And I want to share with you the plight of the farmers of Canada where genetically engineered canola has already entered, and genetically engineered wehat is soon to enter.

Patented seed and farmers' right to save seed

In 1996 Monsanto comercialised and sold to farmers their Roundup Ready canola or their genetic altered canola. Before you could buy the canola seed from Monsanto you have to sign a Licence. And in that Licence you give up many of your rights as a farmer. You give up your rights to use the seed from that crop in the following year, you have to sell all your seed, you have to buy seed from Monsanto, you have to buy the chemical from Monsanto. Worse than that, you have to also sign that if you violate your contract that they could fine you, and you cannot defend yourself. In addition to this, you also have to pay a technology charge, which is $ 15 an acre.

So basically they have complete control over you with regard to the seed that you bought. It is just like renting the seed. And you have to buy back next year. The same contract is still being forced on farmers. Now there are lots of farmers like myself who refused to grow that type of canola. We continued to grow conventional canola. And we used our own seed. I, as a canola grower of over 50 year, had developed my own canola seed which, I thought was quite superior and which I used.

And some of the things that I am going to say to you here today, I know that you will be concerned and I want you to be concerned. I want you to be concerned to see what really happens in other countries. So not only what you hear from the companies but hear from me as a farmer as I have gone through.

Monsanto knew that I was a canola grower and they know also that I was a farmer and using my own seed. As I said I was a farmer who did not sign a contract with Monsanto, I never met a Monsanto representative, I never had nothing to do with Monsanto.

So in August 1998, one day, I get a law suit field against me by Monsanto, in which they said that I had grown some Monsanto Roundup Ready Genetically Altered canola. When I said that I had never bought that seed, they said I must have illegally got that seed from another farmer or I stole the seed or whatever. And I deny this because I never had anything to do with Monsanto.

So I fought the lawsuit. In the pre trial appearances they finally admitted that they have absolutely no proof that I ever had bought their seed or obtained it illegally.

GE and destruction of agro-biodiversity

But what really happened was that in the course of the case, I found out that a farmer in 1996 right next to my farm had grown Roundup Ready canola. And some of the canola pollen before harvest may have blown in to my field and contaminated my canola. So had contaminated and polluted my canola seed that I had developed over many-many years. And basically ruined my seed. And I said I use my own seed and in the following year Monsanto seed was also in my crop.

There are many ways that genetically engineered canola, which is rape seed, will spread. I mentioned to you that a farmer next to me even without a fence line in between some of the canola blew into my field in 1996. But it also can blow off the trucks that transport canola, it can blow of farmers' machinery carbines, and it can also come in by birds. So that how it can spread.

So they tell you that you should just keep a bumper one and it won't spread. But we have found that just even with cross-pollination it can spread at least to ten miles. So there is no safe limits. If your neighbour grows it is almost sure that you are going to get it in your own field and you can be tried, as same as I have and they would say it is their property.

In the lawsuit they said they found some canola plants in my canola fields. We questioned how did you find them in my canola fields. And they had to admit that they went into my field without my permission, without my knowledge. And they stole from my field canola plants that indicated that they were Roundup Ready plants. So that's the extent they went to try and get evidence that I was growing Roundup Ready canola.

When they admitted that they had no evidence that I ever had bought their seeds they withdrew their charges that I had obtained their seeds illegally. But then they changed their direction of attack then they said that it does not matter how genetic altered canola got on to my field - whether it blew in from another farmers' field, or through cross-pollination. They have a patent on it and that they own it. Regardless of the fact that they contaminated and polluted my fields, they say they own that canola. And they said in my case they can come in, destroy my crop, they can take all of my profits or they can destroy all the crops produced from it. That statement has really startled not only the Canadian and American farmers but people all over the world. They are claiming the right to go and contaminate, and pollute your field and ruin your seed and then sue you and file a lawsuit against you and say it is their property.

So that is a very-very serious situation and that is something that can happen anywhere in the world. I counter sued Monsanto and I said, you put that canola in my field through cross- pollination, with pollen blown in from my neighbour's field. You contaminated the environment and you polluted my field and you ruined my seed. So my case went to trial in June 2000 before a Federal Court of Canada and my trial lasted for two and a half weeks. And it was a very stressing trial because they had a very multitude of lawyers and I had one lawyer. It was trial by judge and the judge ruled that he would not come down with his decision until August of year 2000. Till Today (25th September 2000) the judge has not yet come down with his decisions.

There are many reasons why the judge may not have come down with his decisions as yet. Some of the reasons are this. My case will be a precedent setting case. Because in Canada we have a law that says that a farmer who buys seed has all the right to grow a crop from that seed in the following year. So that protects a farmer. He may not be able to sell to his neighbour but he can use it himself. Monsanto says they have a patent on it. And it's their property.

GE and the creation of superweeds

And what has happened, and this is in my lawsuit against them, they introduced a seed into the environment that was genetic altered, that they knew that they could not control it and they had no intentions of controlling it and now it is out of control. Now it has become to many-farmers a major weed. And now we have to use more and more chemicals to try and get rid of this new weed. We call it New Weed for farmers who do not grow canola.

What has also happened that organic farmers, it is basically ruining organic farmers and taken them out of business. Because an organic farmer cannot guarantee that his canola is free from genetic engineering. So all the sales to Europe, which does not buy genetic altered canola, so they have lost all their sales to Europe. This has put a lot of organic farmers out of business. So it has basically ruined the canola industry in Western Canada and organic farmers are penalised the same as the farmers who grew genetic altered canola. And our canola has dropped in price in one year to $ 4 a bushel. So right now we hardly get the cost of production back. Not only that but this genetic altered canola has poor yield, is of poor quality. It takes more chemicals to control it and now we consider it a toxic noxious weed. And we will now never ever get rid of it.

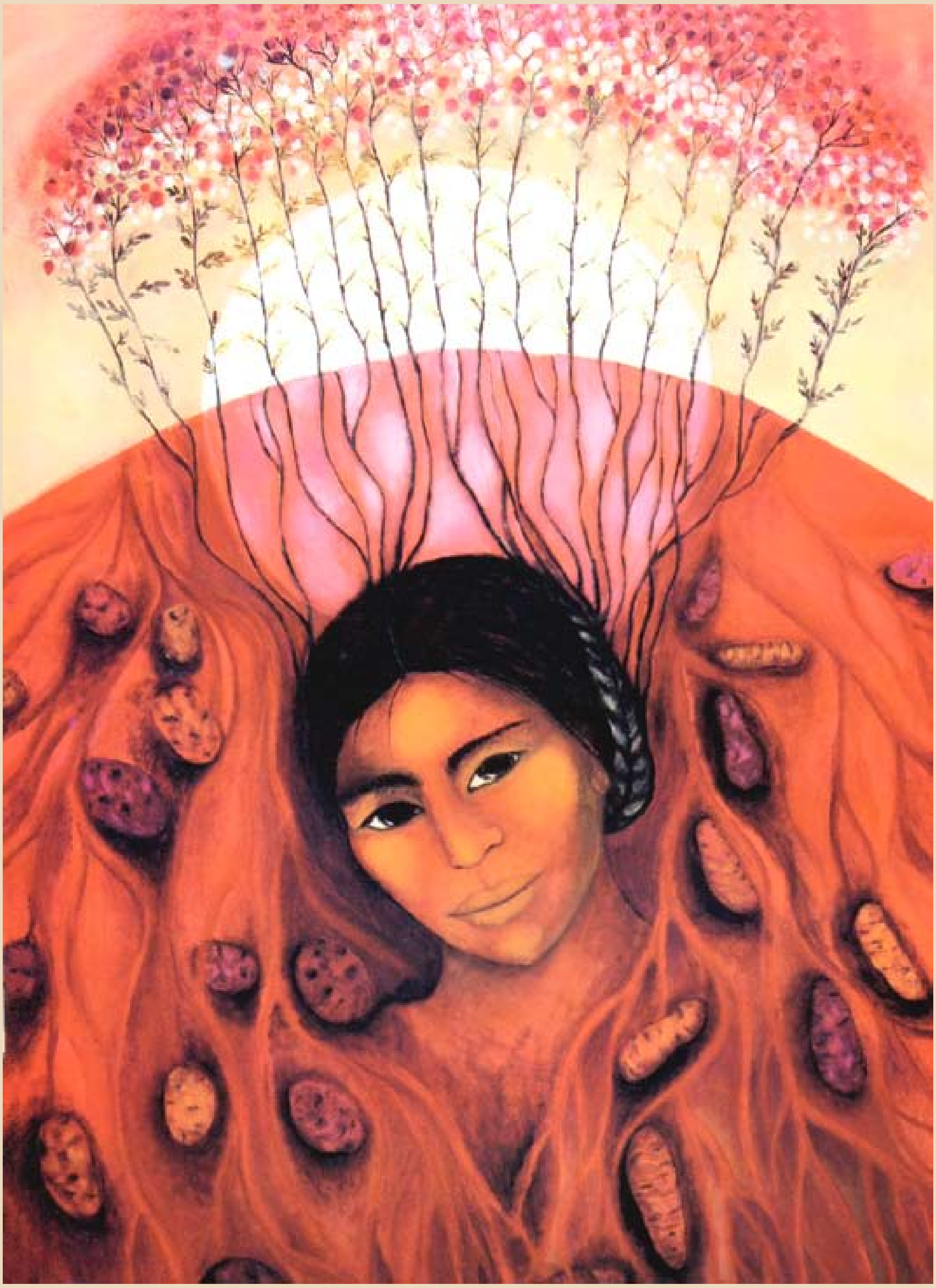
Now what has also happened, as I mentioned, it was introduced in 1996, we now it have grown in 1996, 1997, 1998, 1999, and year 2000. This canola has now become so resistant to other chemicals and it not even be controlled by 2-4-D. So the company now have come with a super chemical to try and kill it. So first of all they create a problem, then they come out with a chemical to kill this problem they created but it increases the costs to farmers. So there is a major-major more use of chemicals.

Patented seed - creating a state policed by corporations

How does Monsanto find out about a farmer if he is growing genetic altered canola without a Licence. And what Monsanto has done, they have advertised in the newspapers and on various brochures that if you think that your neighbour is growing Roundup Ready canola or genetic altered canola without a licence you should squeal and rack on him. Monsanto has its own police force. And they will go to farmers, even though they never sign a contract, they can check their farm, they harass and threaten the farmers. So it is almost like a police state.

If you sign a contract with Monsanto you give them right for three years afterwards to come into you fields with or without your knowledge, to check your fields, to go into your granary to check to see that you have grown more acres than you have a licence for. So it is real control over the farmers. In my case I never signed a licence I never have to do anything with Monsanto, they are trying to exercise their power even over farmers that did not sign a contract. Basically it has taken my property rights away. Where are my rights? And that's what my case all about, the property rights of farmers. How far the rights of MNC's go over the farmers.

It was common knowledge in my community and it was common knowledge by statement by Monsanto representatives that they wanted to make an example of me that no farmer would ever stand up to Monsanto. I stood up to Monsanto. But it has been pretty stressful and it has been pretty expensive. At the end of trial Monsanto asked for damages amounting to $ 400,000, a sum that would completely break me and put me out of business. And that's what their intentions are for any farmer who stands upto them, they will try and break that farmer. What Monsanto and other seed companies want, is to control seed supply. And anybody has control over seed supply controls the food supply. And anybody who controls the food supply really controls the country.



Mamala Papa

She belongs to the inner world. In the myth of the origin of Las Papas (potatoes), the Moon Goddess exhaled her spirit over her new descendants of the Earth conceiving, predominately, daughters. She created the first potatoes by blowing directly upon the surface of the Earth.

THE SEED

EUROPE

PATENTS ON SEEDS AT THE EUROPEAN PATENT OFFICE[1]

Christoph Then & Ruth Tippe*
No Patents on Seed

Summary

At the European Patent Office patents are being filed on seeds and breeding material, plants and animals, processes for breeding and food derived thereof, such as oil, flour, tomatoes, melons, milk and eggs. While the technical innovation in most cases is only minor – some of the patents are just based on conventional breeding - the scope of the patents is extremely broad, covering the whole chain of food production, from farm to fork. Several such patents have already been granted. From the perspective of patent law, there has been a major change in the paradigm, the main impact of these patents is not about the protection of inventions, but the monopolisation of resources.

If even conventional breeding is seen as patentable, the consequences will not only hit farmers and breeders. In patents such those on broccoli, tomato and melons, the food products are within the claims as granted. Therefore this development will not only affect the farm and seed sector, but also consumers and food producers. Further countries of the south with a high genetic diversity in food plants will be concerned by a new wave of biopiracy: By describing and analysing naturally occurring genetic conditions or plant components, the companies can turn them into patented industrial inventions.

Modern patent law is in danger of being abused for taking over control of resources and products needed for global food production. If this trend is not stopped, companies such as Monsanto, which not only apply for patents, but also have the economic power to access and dominate markets, will be able to decide which seeds are used in agriculture, which products are available for the food market and which prices will be paid by farmers, food producers and consumers. Market concentration in this sector has intensified steadily within the last decade and patents are a main driving factor in this context.

A short history of 'Live Patents'

Modern patent law has developed over centuries. While in the 17th century the British Crown issued patents as privileges that guaranteed monopolies in trading salt, glass, steel and beer, modern law is driven by the guiding principle that patents can only be granted on inventions. According to the principles of modern patent law, patents can only be granted on technical developments with an inventive character, but not on discoveries or natural resources. But recent developments show that this fundamental distinction between invention and discovery is about to be abandoned, especially in regard to patents on genetic resources and conventional breeding.

In 1980, a patent was granted on a microorganism in the US. This case, which is known as the *Chakrabarty* case, represents a milestone in the history of 'life patents'. In 1987, the US PTO stated for the first time that it would grant patents on multi-cellular organisms (in this case it was an oyster). In 1988, also in the US, the first patent on a mammal was granted, the so-called *OncoMouse*, a genetically engineered mouse created specifically to be susceptible to cancer, it was invented by Harvard University and Philip Leder and licensed by Dupont.

In 1992, the patent on the *OncoMouse* was also granted in Europe (EP 0169672). This patent was the starting point for a controversial debate in Europe about the future of patent law, which continues to this day. The patent on the *OncoMouse* was accompanied by early patent applications on human genes and genetically engineered plants. For example, in 1980, the Germany company, Hoechst filed an application for a patent on a gene sequence on human interferon (EP 0034306), that was granted in 1987. In 1991, a patent on genetically engineered plants for the Dutch company, Plant Genetic Systems was granted (EP 242236), and in 1996, a European Patent was granted on Monsanto´s *Roundup Ready* soy (EP546090).

The European Patent Directive

Before 1998, patents, in particular those on plants and animals, were granted without sufficient legal basis, because the European Patent Convention (EPC) excludes patents on plant and animal varieties (Art. 53B, EPC). Thus, in 1995, patents on plants and animals were stopped by the Board of Appeal at the European Patent Office after opposition from Greenpeace (T356/93) against the patent EP242236. However, in 1998, the European Union adopted *The Directive on Legal Protection of Biotechnological Inventions* (98/44 EC) which changed the legal landscape in Europe. Its adoption was debated for more than ten years. During this time, controversial debates in the European Parliament were accompanied by a well-orchestrated campaign by industry, which threatened Parliament with slogans like "*no patents no cure* ".

The EU Directive, in its article 3, defines very generally that biological material which is existing in nature as can become a patented invention of industry:

> *"Biological material which is isolated from its natural environment or produced by means of a technical process may be the subject of an invention even if it previously occurred in nature."*

With the adoption of this directive, the patentability of human gene sequences was permissible, and the existing prohibitions in EPC concerning plants and animals (Art. 53b, EPC) were substantially narrowed by the new interpretation. From now on, this exclusion was only relevant for those cases in which a specific plant variety is claimed by a patent. All other plant or animal material is regarded as being patentable, even if varieties are within the scope of the claims: On the one hand, patents on plant and animal varieties are still excluded from patentability (as they were before under the EPC), but on the other hands, patents can be granted if the patent claims are not directed to a particular variety.

Article 4 of the EU Patent Directive reads:

1. *The following shall not be patentable:*

   (a) plant and animal varieties;

   (b) essentially biological processes for the production of plants or animals.

2. *Inventions which concern plants or animals shall be patentable if the technical feasibility of the invention is not confined to a particular plant or animal variety.*

The patent directive was adopted by the EPO, and, following this, the EPO's Enlarged Board of Appeal decided that patents can even be granted if plant varieties are within the the scope of the claims (decision G1/98). In result the prohibition of patenting plant varieties was eroded completely. If, for example, a particular tomato variety with big red fruit was to be claimed as an invention, this application would probably be rejected. However, if someone applies for a patent on tomato plants in general with bigger red fruit, this might become an invention, even if dozens of varieties are included. As a result opposition to patents such as Monsanto's patent on *Roundup Ready* soybeans (EP 0546090) covering plant material, gene sequences and plant varieties were rejected. Even legal experts at the EPO perceived this situation as comparable with a law prohibiting bigamy but allowing polygamy (T1054/96). Patents on genetically engineered plants are routinely granted by the EPO; they cover all relevant material, such as seeds, plants and harvest, and subsequent crossings and generations. Meanwhile, around 2000 patents on plants are already granted in Europe and more than 1000 patents on animals have been granted, in addition to several thousand patents on human gene sequences.

While consequences for the plant-breeding sector are set out in the next chapter, it should also be mentioned that patents on human gene sequences are now viewed with increasing scepticism. For example, in August 2011, a UK National Health Service (NHS) expert is quoted in the Financial Times as saying

> *"The view from the NHS is that, for diagnostics, gene patents are unacceptable, unenforceable and detrimental to the delivery of patient services."*[2]

Patents on seeds - Consequences so far

In the last ten years, the seed market has experienced an ongoing process of concentration and restructuring. According to the expert group ETC, just ten companies control two thirds of global seed sales.[3] The process of concentration has led to the takeover of big seed companies, such as Pioneer, DeKalb and Seminis, and led to the disappearance of many smaller companies[4]. The big players in international seed market such as Monsanto, Dupont, Syngenta and Bayer originated in the agrochemicals sector. These companies have shown a special interest in the global seed market ever since the 1980s when genetic engineering in plants became technically feasible. From the beginning, the introduction of genetically engineered seeds was strongly connected with the idea of a new quality of corporate control. For example, a 1992 OECD publication[5], stated that within the seeds sector, the main company focus should be on the reorganization of the seed market, leading to a greater integration and dependency with the agrochemicals sector. Genetic engineering and patents served as a major tool in this context. Any gene sequence introduced into plant material also confers its patent protection to seeds, plant and progenies, all along the chain of farm and food production, up to markets such as food and biofuels.

Thus, patents became an important driving factor in the concentration process. They made it possible to hamper or even block access of other breeders to the biological material. Contrary to the principle of *breeders exemption* in the plant variety protection system, no other breeder can use patented seeds for further development and marketing of new varieties if the patent holder does not issue a licence. From the perspective of patent law, this was a major change in paradigm. The main objective of these patents is the monopolisation of resources rather than the protection of inventions.

European seed-market experts are raising major concerns, since the process of market concentration has also reached the breeders within the EU. Especially plant breeding in the Netherlands has eminent importance in the European seed market. A report from the University of Wageningen warns of the consequences of patenting for Dutch breeders[6]:

> *"Patent positions in combination with technological developments have in recent decades led to a large consolidation move among breeding companies. For most crops only a few companies are controlling a large part of the world market. This makes a growing part of the global food supply dependent on a few companies. The access barrier for new companies to the plant breeding sector is high, where IPR plays a role next to the large amount of knowledge and expertise required to set up a breeding company and the long development period for new varieties. Farmers and growers fear that their freedom of choice is threatened and that no varieties will be developed for certain crops that specifically meet their requirements when the decision power in breeding moves away from The Netherlands."*

A case study from a German breeder working on sunflowers shows how proprietary claims can be used to hamper further breeding. Upon request, this breeder received sunflower seeds from Syngenta, which he needed to develop his own, new varieties. Contrary to plant variety protection, where unrestricted use of genetic material is provided to enable further breeding, he found that in this case the usage of the material was largely restricted. As the breeder received the package from company of Syngenta he found out that he was not allowed to conduct any breeding or further research with the material. As it was written on the seed package:

> *"Important notice: The use of this product is restricted. […] By opening and using this bag of seed, you confirm your commitment to comply with these use restrictions. This product […] is proprietary to Syngenta Crop Protection AG or its licensors and is protected by intellectual property rights. Use of the seed in this package is limited to production of a single commercial crop of forage, fiber or grain for food or feed. Unless expressly permitted by law, use of the seed for producing seed for re-planting, research, breeding, molecular or genetic characterization or genetic makeup is strictly prohibited."*

Patents require costly legal procedures that very often smaller breeders cannot afford, while plant breeders' rights can also be used by small companies. Patent applications require specialised patent attorneys, it may take years before rights are granted and it might be contested afterwards. The legal costs of such a procedure may cause a financially weaker party to give up if threatened with a court case.[7]

Patents make it possible to fix higher prices for seeds. In recent years, the prices for patented seeds in the US have increased dramatically[8]. However, yields from these crops have not increased proportionally. Thus, there is an increasing difference between the noticeably slow growth of yields and the rapid increase of prices especially in those plant species such as soy, maize and cotton where patented genetically engineered varieties were introduced.

Farmers are not only facing soaring seed prices, but very often have fewer products to choose from. The National Family Farmers Coalition (NFFC) reported several cases, in which seed companies were first bought up by Monsanto and then the traditional varieties were taken off the market, reducing the farmers choice substantially.[9]

Besides the negative impact on breeders and innovation in plant breeding, there are other issues under discussion, which could affect markets and world food supply. For example, there has been increasing discussion within the UN. As Miguel d'Escoto Brockmann, President of the General Assembly, remarked on 25 September 2008 at an event on the millennium development goals[10]:

"The essential purpose of food, which is to nourish people, has been subordinated to the economic aims of a handful of multinational corporations that monopolize all aspects of food production, from seeds to major distribution chains (...)." [11]

Concerns about the implications of patented seeds on developing countries have been expressed by many experts in the field of patent law. For instance, the UK Commission on Intellectual Property Rights stated in its report in 2002:[12]

> *"Because of the generally negative effects of patents in plant breeding, the UK Commission on Intellectual Property Rights explicitly advises developing countries to completely ban patents on plants and seeds."*

Further, the European Group on Ethics in Science and New Technologies to the European Commission (EGE) voiced its concern in a report on the future of agriculture in 2008[13]:

> *"The Group supports promotion of innovation in agriculture but is concerned about the impact of patents on agricultural crops."*

Patents on conventional breeding are increasing

There has been an interesting trend in plant breeding in the last few years. In many areas, innovation has been shifting from genetic engineering back to conventional methods supported by some technical tools. These tools include methods like marker assisted breeding (MAB), which are offering a more efficient approach to many goals in plant breeding when compared to methods used for genetically engineered seeds. Tools like marker assisted breeding, however, simply support conventional breeding to make it more efficient and do not require the same level of input as genetic engineering.

With these conventional plant breeding methods, existing biological diversity in plant genetic resources is screened for important genetic conditions, such as drought and pest tolerance. In most cases such seed qualities are not based on single DNA sequences but on complex genetic patterns and, thus, these qualities can normally be captured more effectively by using traditional breeding than by relying on genetic engineering. Conventional breeding has been making significant progress in relevant goals like yield and pest and stress resistance.

These developments in conventional breeding are highly relevant for companies such as Monsanto, Dupont and Syngenta, the main drivers in GE seeds. These companies have access to a broad range of high quality genetic material owned by the seed companies that they bought within the last few years during the process of market concentration discussed above. Faced now with the new shift toward conventional breeding these companies are highly interested in extending patent monopolies to the area of conventional breeding.

In fact, companies such as Monsanto, Syngenta and Dupont are filing more and more patents on plants and seeds derived from conventional breeding. There is a steadily increasing number of such patent applications and patents being granted by the Patent Office. According to our research, there are about 800 applications pending, with around 100 patents covering conventional breeding that have already been granted by the EPO[14]. The proportion of patents covering conventional breeding being filed by corporations such as Monsanto, Syngenta and Dupont is also increasing, these are now 20 to 30 percent of their patent applications in the context of plant breeding.

At the same time, the number of patent applications in the field of genetic engineering has been decreasing. Currently some patent applications reflect the technical limitations of genetic engineering in plants as compared to conventional breeding. By way of illustration, one can read this telling quote in Monsanto's patent application WO 2004053055:

"Nonetheless, the frequency of success of enhancing the transgenic plant is low due to a number of factors including the low predictability of the effects of a specific gene on the plant's growth, development and environmental response, the low frequency of maize transformation, the lack of highly predictable control of the gene once introduced into the genome, and other undesirable effects of the transformation event and tissue culture process." (page 2)

Patent applications by Syngenta also follow this trend, thus applauding the methods of conventional breeding and at the same time calling into question the technical advantages of genetic engineering. For example in Syngenta's patent application WO2008087208 it is stated:

"Most phenotypic traits of interest are controlled by more than one genetic locus, each of which typically influences the given trait to a greater or lesser degree (...) Generally, the term "quantitative trait" has been used to describe a phenotype that exhibits continuous variability in expression and is the net result of multiple genetic loci presumably interacting with each other and/or with the environment." (page 1)

Categories of patent applications and technologies used

The patent applications in the field of conventional breeding were, for example, directed at the:

- content of compounds in plants (such as oil or protein)
- phenotypical features (such as number of leaves or size of plants, yield, growth, biomass)
- resistance against biotic or abiotic stress
- screening for naturally occurring genetic conditions (with methods such as marker assisted breeding)
- methods of breeding (like variations in hybrid technologies)
- methods for certain types of selecting and crossing
- mutagenesis (also including more recently targeted methods such as tilling)

Many of the technologies are directed at analyzing the naturally occurring genetic diversity of crop plants (all of these methods have been known for years). Some of them are listed here with a short overview:

- **Genetic fingerprinting**: Genetic fingerprinting is not directed at specific, single regions of the genome, but reveals the distribution of general elements and structures in the genome. The resulting patterns are characteristic for each individual. The method is often used in crime investigation to identify persons, but can be applied to the genome of plants and animals as well. The results are not linked directly to genetic qualities, but might be used for further comparison of different genetic fingerprints, thus looking for statistical correlation with phenotypical characteristics. Fingerprinting can be performed by several methods; the most well known is Restriction Fragment Length Polymorphism (RFLP). In this method an enzyme is used to cut the genome in parts and pieces at locations with certain structures identified by the enzyme. Another method is haplotyping, which looks for genetic structures that are transmitted together from generation to generation.
- **Marker assisted breeding** (MAB): This method looks for correlation of specific DNA sequences with wanted phenotypical characteristics. It is more specific than genetic fingerprinting. Another term sometimes used for this method is genotyping.
- **Quantitative trait locus** (QTL): This method tries to find correlations between genetic markers and genetic conditions (traits) that cannot be reduced to a single gene locus but are based on the interactivity of several parts of the genome. The way these traits are expressed in the plants can follow quantitative patterns.
- **TILLING** (Targeting induced local lesions in genomes): This method is a kind of targeted mutagenesis. The plant is exposed to stimuli that can trigger mutations in the plant. The resulting plants are selected by screening for desired genetic structures.

In most cases the technical input for the overall breeding process in the above-listed methods is low (further insight is given by some patent examples below). Monsanto, for example, has been trying to monopolize large parts of the maize and soy genome by using a kind of unspecific genetic fingerprinting, trying to link the fingerprint with some genetic conditions of economic interest, such as yield or pest resistance with the use of statistical methods. This type of genetic fingerprinting is not directed at a single piece of DNA, but is more or less aimed at representing the whole genome and can be applied to various genetic conditions. In fact, the scope of these patents is very often not technically defined.

Finally, these patent applications are especially relevant to the centres of biological diversity and to developing countries, from which many of the most important global crop plants originate. Screening for interesting gene material seems most promising in so-called "exotic" varieties, which are not used in high yielding crops in industrialised agriculture. Thus, patent applications based on methods such as marker assisted breeding or genetic fingerprinting open the way for a new kind of systematic biopiracy in developing countries (see below).

In 2010, the EPO's Enlarged Board of Appeal decided, based on precedent cases, that methods used for conventionally breeding plants are not patentable (G2/07 and G1/08). The patent cases under discussion in this decision were a patent on broccoli (EP1069819) and on tomatoes (EP1211926), both derived from conventional breeding. These patents claimed the process for breeding as well as the seeds, plants and edible parts of the plants. In G1/08, the EPO decided that the process for breeding had to be regarded as "*essentially biological*" and therefore could not be patented because of Art 53b of the EPC, which excludes patents on "*essentially biological processes for the production of plants or animals*":

> *"a process for the production of plants which contains or consists of the steps of sexually crossing the whole genomes of plants and of subsequently selecting plants is in principle excluded from patentability as being "essentially biological" within the meaning of Article 53(b) EPC."*

However, this decision does not solve the legal questions or the underlying problems regarding conventional breeding in any way. For example in May 2011, the EPO granted a patent on melons derived from conventional breeding (EP 1 962 578). The examiners only removed the process for breeding from the claims – the products such as plants and fruits were regarded as an invention. In May 2010, a similar decision was taken by the EPO's Board of Appeal. In the reasoning of this decision it was explained that conventionally bred plants, their seeds and harvested products could be patented, even if the process for breeding them could not (T1854/07). Thus the EPO explicitly argues that the prohibition of Art 53b, EPC, would only exclude the process of breeding, but not the products derived. This interpretation of the wording of Art 53b, EPC, rules out any meaningful content and as a result conventional ("essentially biological") breeding would be patentable, even if process for breeding was excluded.

Case studies: Patents on methods for conventional breeding[15]

Example 1 & 2 of patent applications: Monsanto recently filed several patent applications on conventional breeding. For instance, WO 08143993 claims marker assisted breeding and genetic fingerprinting in maize; and WO 08153804, claims the same features in soy. In both of these patent applications Monsanto claims whole libraries of DNA markers. Further, their use in any statistical evaluation is part of the so-called invention. As the patent claims in WO 08143993 ('the patent of monsantosizing maize') read:

"What is claimed is a library of nucleic acid molecules" (claim 1)
"a computer based system for reading, sorting or analyzing corn genotype data" (claim 24)
"a method of genotyping a corn plant to select a parent plant, a progeny plant (...) for breeding" (claim 37).

Each of the two patents lists 100 claims. By applying these patents, the genomes of maize and soy could be turned into a minefield for other breeders. In theory the claims cover all possible characteristics of the plants. These patents seem to show that Monsanto is devising a strategy for claiming more or less all possible goals in plant breeding for two of the most important crop plants in the world.

Example 3 of patent applications: Patent application WO2008021413 also uses similar methods, such as genetic fingerprinting (in this case based on a method called haplotyping). In more than 1000 pages and 175 claims Monsanto enumerates various relevant markers, especially in soy and maize. Monsanto even goes as far as explicitly claiming all maize and soy plants that incorporate the described genetic patterns in their genomes. And Monsanto asserts that the method used on plants are also applicable to animals:

> *"the methods of the present invention can be used for breeding any non human organism. Specifically, the methods of the present invention can be used in breeding mammals, such as mice, swine, and cattle, and birds such as poultry or livestock." (page 1037)*

Example 4 of patent applications: The Syngenta company's patent application WO2008087208 is based on the description of Quantitative Trait Locus (QTL) in maize for characteristics such as grain yield, moisture of harvest and architecture of tassel. Syngenta claims all relevant genetic markers, the plants which inherit the relevant genes, all products derived, and:

> *"processed maize products, particularly maize grains and kernels obtainable from a plant to any of the proceeding claims." (claim 31).*

Example 5 of patent applications: Monsanto's patent application WO 08054546, shows another strategy for the misappropriation of plant genetic resources. This patent application claims soy bean plants that are resistant against several diseases. This was done simply by selecting those plants which have a natural resistance against the diseases. Claim 1 reads:

> *"A method for assaying a soybean plant for disease resistance, immunity, or susceptibility comprising the steps of: detaching a plant tissue from said soybean plant. . . . exposing said tissue to a plant pathogen; and assessing said tissue for resistance, immunity, or susceptibility to disease caused by said pathogen."*

All soybeans derived from these procedures are claimed as the company's intellectual property.

Example 6 of patent applications: Several patent applications include these conventional breeding techniques combined with genetic engineering. And in some patents the use of gene sequences in their isolated form (for genetic engineering) is claimed as well as their usage for conventional breeding. One example that combines several conventional breeding procedures with genetic engineering, thereby showing some of the essential limitations of GE in plants, is the application by the U.S. company Agrinomics, WO2008076834. Agrinomics works in cooperation with Bayer. This patent aims to appropriate as many plant genes as possible that are likely to influence fibre, protein, oil or energy content in plants. Interestingly, the biological function of the genes listed is unknown. Agrinomics names these genes HIO (from high oil content) and explains their functioning rather vaguely on page 18:

> *"The HIO (...) does not necessarily relate to a plant having high oil (HIO) phenotype. As used herein, the gene (...) refers to any polypeptide sequence (or nucleic acid sequences that encodes it) that when expressed in plant causes an altered phenotype in any part of the plant, for example the seeds."*

The gene sequences referred to could even be mis-expressed in a plant (as is happening in many cases with genetic engineering in plants). Nevertheless the plants produced would be covered by the patent as long as they were of any economical value. A technical failure of genetic engineering could now be turned into an economic advantage:

> *"In yet other preferred embodiments, mis-expression of the HIO polypeptide causes unchanged oil, high protein (...) and/or low fiber (...) phenotype in the plant."*

Consequently a broad range of qualities in plants are being claimed (with lowered or enhanced contents of several compounds), as are a broad range of plants, such as corn, soy, cotton, cocoa, oil palm, coconut palm, peanuts, wheat and rice.

Example 7 of patents granted in Europe: EP0483514 covers genetic fingerprinting in breeding trees in general. It was granted to Advanced Technologies (Cambridge) Ltd in the year 2000. This patent is based on a technology called Restriction Fragment Length Polymorphism (RFLP), which simply works due to the phenomena that DNA, cut in pieces by certain enzymes, will show individual patterns. It is one of the most common methods in genetic fingerprinting. The patent was granted for any kind of breeding purposes in trees. Claim one reads:

> *"A method of forest tree breeding wherein Restriction Fragment Length Polymorphism (RFLP) technology is applied to samples of tree material from a plurality of forest trees; the data derived from said RFLP technology is statistically analyzed thereby to cluster genetically similar trees of said plurality of said trees; two of said trees of genetic diversity are selected based on the statistically analyzed RFLP data; and a further tree or trees is/are derived from the two selected trees."*

Example 8 of patents granted in Europe: Another example is EP 0537178 which was granted to the Dupont company in 2007. This patent refers to the use of fingerprinting in soy to select soy with a certain quality in its oil. In claim 13, the use of RFLP is patented to screen soybeans derived from conventional breeding for the relevant genetic condition.

Example 9 & 10 of patents granted in Europe: Another example is EP 1465475, (Pioneer, granted 2006) which claims sunflowers with resistance against a certain pest, this feature having been derived using similar methods as described by Monsanto's WO20008054546. The same company, Pioneer, holds a European patent, EP 1042507 (granted in 2008), which generally and very broadly claims the use of methods such as QTL and MAB, and statistical evaluation based on these methods.

Example 11 of patents granted in Europe: In August 2011, the European Patent Office (EPO) in Munich has granted a patent for the German company Bayer for breeding plants with a higher stress tolerance (EP1616013). The comprehensive patent will give Bayer monopoly control over important food crops including both genetic engineering in plants and the process for conventional breeding and plants derived thereof. The patent even is in conflict with G1/08 that excludes at least patents processes for conventional breeding, based on crossing and selection. However, in claim 14 of the Bayer patent nothing else is patented than what should be excluded according to G1/08. Also the other patent claims granted to Bayer are in a grey legal area. The patent also covers plant varieties. Furthermore mutational breeding was patented despite the fact this technology is used since a long time in conventional breeding and lacks inventiveness.

Example 12 of patents granted in Europe: In September 2011, the EPO finally granted a patent on conventional bred sunflowers, EP 1185161. The patent of Consejo Superior de Investigationes Cientificas in Spain was opposed by Greenpeace. In a public hearing in May 2010 it was decided by the EPO that even in cases in which breeding methods are not able to be patented, the products derived can be regarded as an invention (T1854/07). Patented were the seeds, oil, plant and progeny, the use of oil in production of margarine, confectionary or bakery. According to communication from Syngenta it is likely that the company is holding the license for this patent (high oleic sunflower) and is using this patent to block further breeding (see below).

Example 13 of patents granted in Europe: In December 2011, the European Patent Office awarded Syngenta a patent on melons "with a pleasant taste", after an opposition filed by another seed company had been rejected. It is the first European patent protecting a conventionally bred plant for its taste. In the patent application (EP1587933) the taste of the melon is described as "tart-refreshing-sour-sweet". With this patent Syngenta claims intellectual ownership of all melons with a certain citric acid and sugar content as well as a specific pH-value, including everything from the plant and seeds to the pulp and its uses. The "invention" is the result of common breeding and selection techniques (no genetic engineering), using, as source materials, among others, melons of Indian origin.

Strategies of biopiracy and theft of seeds

The case of the Enola bean or yellow bean gives some insight into how modern patent law can be abused to steal seeds and promote biopiracy. The yellow bean, long used in Mexico, was claimed by Larry Proctor as his invention. In 1999, he successfully applied for a U.S. patent, which was granted (U.S. patent number 5,894,079) and followed up by accusing Mexican farmers of infringing his patent by selling yellow beans in the United States. As a result, shipments of yellow beans from Mexico were stopped at the US-Mexico border, and Mexican farmers lost access to lucrative markets. It then took eight years for the patent to be battled out successfully.[16]

More recent patents on methods like genetic fingerprinting are much broader and effective than the Enola bean (yellow bean) patent, and are also much more difficult to identify as cases of actual biopiracy. Patents on basic methods in plant breeding, such as genetic fingerprinting, QTL and MAB, can be applied on an undefined and large group of plant species. They are a perfect tool for systematic biopiracy, as they enable the patent holder to turn global commons, essential for food production, into private property by simply describing them using technical means. Many of these patents are nothing but well-organised theft and global robbery supported by patent offices and certain political institutions in industrialised countries.

Moreover, several patent applications show that this method of biopiracy is a systematically applied strategy. As Monsanto explains in patent application WO2008121291:

> *"The genetic base of cultivated soybean is narrow compared to other field crops (...) Due to the narrow genetic base, soybean is more likely to be impacted by disease and insect attacks. (...) Exotic germplasm possesses such key traits as disease resistance, insect resistance, nematode resistance, an tolerance to environmental stress (...) Markers associated with plant maturity facilitate the use of exotic germplasm. Breeders create crosses between exotic and cultivated germplasm." (page 81)*

In the patent Monsanto claims the crossing of soy varieties that are not common in the U.S. market. Because the origin of soy is in Asian countries, it is likely that this patent aims at the misappropriation of biodiversity in those regions of the world in particular.

Similarly, Pioneer/Dupont claims crossing with so called "exotic varieties" of soy beans to achieve better resistance against common plant pests (WO2006017833, WO200605585). Pioneer also claims MAB for selecting high oil varieties in maize (WO2006055851), which are known to be common in Latin America but not in the United States.

In the past few years several cases of biopiracy of this kind at the EPO have been brought to light by organizations like Greenpeace, Misereor, No Patents on Life! and the Declaration of Berne—for example, Dupont's patent on high oil maize varieties from Mexico (EP744888) granted in year 2000, and Monsanto's patent on wheat from India (EP445929), granted in 2003. Both of these patents were revoked (or withdrawn) after legal oppositions were filed. The only way to protect the centres of biological diversity from being pirated in this way by international companies is to issue a clear regulation in patent law, excluding all patents on conventional breeding of plants.

Another granted patent shows that biopiracy is still going on at the EPO: European Patent EP1962578 claims melons originating in India with a natural resistance to certain plant viruses. The patent was granted in May 2011 as an invention to the US company Monsanto by the European Patent Office (EPO) in Munich, Germany. Against this patent the European NGO-platform "No Patents on Seeds" filed opposition together with Vandana Shiva and her organisation Navdanya from India. The Indian melon, which confers resistance to the Cucurbit yellow stunting disorder virus (CYSDV), is registered in international seed banks as PI 313970. With the new patent Monsanto can now block access to all breeding material inheriting the resistance derived from the Indian melon. The patent might discourage future breeding efforts and the development of new melon varieties.

Controlling the chain of food production

Recently it was made publicly known that Monsanto has been applying for patents on feeding of poultry, aquatic organisms, pigs and cattle. Even products like eggs, meat and fish fingers are listed in the patent applications (WO2010/107422, WO 2010/027788, WO 2009/097403, WO 2009/102558).

For example in a Monsanto patent application WO2009097403 which reads:

"a pork product for human consumption ..." (claim 1), "(...) consisting of bacon, ham, pork loin, pork ribs, pork steaks (...)" (claim 18), "A method of producing pigs comprising: a) providing a nutritious composition (...), b) feeding said nutritious composition to at least one pig; and c) producing progeny from said at least one pig ..." (claim 34).

The wording of the claims typifies the current strategy of particular companies and the general underlying problem. Mostly trivial technical contributions, such the analysis of plant components or description of naturally occurring genetic conditions or the feeding of animals with certain crops, are used to issue broad claims on the whole chain of food production from seed to salad oil, from animal feed to the bacon.

One can even find 'patents on beer' and 'patents on noodles' or dairy cows and pigs. The Carlsberg brewery claims everything from breeding barley to beer (WO20050879349). The Australian Commonwealth Scientific and Industrial Research Organization in 2011 was granted a patent (EP1649022) that covers wheat with altered branching enzyme activity and starch containing products derived therefrom, such as grains and starch and products like flour.

Also 'the patent on broccoli' (EP 1069819, granted 2002 for Plant Bioscience Limited) covers the food production chain from seed to food. Since 2011 the broccoli is sold at Marks&Spencer in UK retailers under the brand-name "Beneforte" in license with Monsanto (EP 1069819).

Further examples of cases covering the chain from seed to food are (EP 942643, granted in 2008 for the Rijk Zwaan Zaadtelt en Zaadhandel B.V. company), and another patent on melons (EP 1587933, granted in 2008 for Syngenta). In addition, the Cargill company holds a European patent on breeding of Brassica plants, which covers industrial lubricant (EP 1100310, granted 2008) and Dupont holds a patent on breeding in soy beans (EP0973913, granted 2005) that covers soy sauce, tofu, natto, miso, tempeh and yuba, soy protein concentrates, soy protein isolates, textured soy protein, soy milk and infant formula. In another patent (EP 0537178, granted 2007), Dupont used genetic fingerprinting to identify soy with a certain oil quality and claim seeds, plants and crushing of the seeds for the production of oil.

These patents contribute to a food market enmeshed in a spider web of exclusive monopoly rights that make it possible for companies to fix prices, distribute commodities and control access to resources. Normal food producers and smaller trading companies are likely to get lost in this morass of intellectual property claims, while some large companies will survive, cooperating and also struggling with one other. These larger companies will likely control the chain of production, if not more, of the most important food and biofuel plants on the world market. Ultimately, patents and market concentration will probably change international markets dramatically; soaring prices and rising hunger will most likely be the results of these developments.

Increasing resistance in Europe

development is under fire in Europe from various sides. For example discussions on a patent on pig breeding (EP 1651777) that was granted in 2008 by the EPO were especially controversial. This patent was revoked after opposition from several organizations, which had collected thousands of signatures. In other cases though, opposition was rebuffed, for example, a patent on the selection of dairy cows with higher milk production (EP 1330552), a procedure that now is pending at the Board of Appeal.

Not only the NGOs but also the state authorities see urgent need for clarification. In February 2012 the German Parliament adopted a resolution without counter votes which states:

"Conventional breeding methods are not covered by patent law. This concern is also acknowledged by the ruling of the Enlarged Board of Appeal of the European Patent Office on the so-called broccoli-tomato-patents, dated 9 December 2010. According to this path-breaking decision, processes are also "essentially biological", and therefore not patentable when technical steps are used to carry out plant cross-breeding processes and subsequent selection of useful plants. The ruling of the Enlarged Board of Appeal clarified that when making use of an essentially biological process the subsequent plants as well as the seeds and edible parts cannot be patented. The open question is whether pure product claims on plants with specific properties are still permissible, and this decision has been re-referred to the Enlarged Board of Appeal in the tomato-patent case. However, one can expect further attempts to use legal loopholes in order to obtain wide- ranging patents. Therefore, there must be a guarantee that conventional breeding methods and products derived through such methods remain excluded from patentability in the future."[17]

The German government made similar demands[18]. Farmers and plant breeders in Europe are at least partially of the same opinion in their criticism of plant patents. For example, even the German Plant Breeders Association made a statement in 2010 saying[19]:

"Recently more and more patents are applied on naturally occurring genetic resources on the basis of new technologies that allow precise description of natural genetic conditions up the sequencing of whole genomes. This practice in patenting opens up new conflicts and inherits the risk to erode the principles of plant variety protection, especially concerning the access plants and therefore to genetic variability. The development is a threat of slowing down innovation in plant breeding, to narrow genetic diversity and increase dependency from license holders."

In the light of this dispute it is of high interest that the European Parliament in 2012 adopted a resolution stating:

"Calls on the EPO also to exclude from patenting products derived from conventional breeding and all conventional breeding methods, including SMART breeding (precision breeding) and breeding material used for conventional breeding."

It is an open question if the EPO will now follow the line of the EU Parliament. The EPO is not part of the EU system. But the EPO adopted the EU patent directive 98/44 – now it should now also accept guidance from EU institutions how to interpret this regulation. Far more activities will be needed from civil society to stop this development and to exclude plants and animals from getting grabbed by patent monopolies.

The coalition *No Patents on Seeds!*, which started the opposition is supported by the Berne Declaration (Switzerland), GeneWatch (UK), Greenpeace (Germany), Misereor (Germany), Development Fund (Norway), No Patents on Life (Germany), Reseau Semences Paysannes (France) and Swissaid (Switzerland). These organizations are calling for a revision of European Patent Law to exclude breeding material, plants and animals and food derived thereof from patentability.

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Footnotes

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[13]The European Group on Ethics in Science and New Technologies to the European Commission (EGE), *Ethics of modern developments in agriculture technologies,* Opinion Nr. 24 (2008)

[14]C. Then & R. Tippe, *Seed monopolists increasingly gaining market control,* 2011, www. No-patents-on-seeds.org

[15]Source: Christoph Then & Ruth Tippe, 2009, The future of seeds and food under the growing threat of patents and market concentration, www.no-patents-on-seeds.org

[16]The story of the yellow bean patent can be found in detail at the ETC website: http://www.etcgroup.org/en/materials/publications.html?pub_id=683

[17]Deutscher Bundestag, Drucksache 17/8614

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[19]*Bundesverband Deutscher Pflanzenzüchter (BDP), BDP-Position zur Ausgestaltung des Patentschutzes in der Pflanzenzüchtung BDP fordert Änderung der europäischen Biopatentrichtlinie 98/44/EG www.seedquest.com/News/pdf/2010/**BDP**2.pdf*

SEED EMERGENCY IN GERMANY

Susanne Gura*

Legal Restrictions to Seed Diversity

In Europe, the seed market is highly regulated. Seed varieties which are not admitted to the EU Common Catalogue administered by the EU's Community Plant Variety Office (CPVO, based in Angers, France) are banned from sale in the market. Approximately 2500 varieties are admitted annually, half of which are ornamentals. The UPOV criteria of distinctness, uniformity and stability (DUS) are applied and extensive DUS testing is performed. In addition, field crops have to show a "value for cultivation and use". Of particular concern here is the emphasis on uniformity as uniformity has detrimental impacts on biodiversity. Industrial varieties are required to have very little internal genetic variation. This is why they can't easily adapt to changing environmental conditions. They need chemical crouches and often irrigation to deliver their promised yields. Under difficult situations, such as the dry and hot European summer of 2003, yields are much lower. Traditional varieties, instead, dispose of a large internal variation enabling them to adapt to various challenges and changes in their environment.

Over a decade ago, the EU Council recognised the loss of biodiversity and asked the Commission to act with regard to the seed legislation. Only in 2009, the Conservation Variety Directive was decided. However, throughout Europe, seed savers still did not make use of the new Directive. In Germany, after its implementation in 2010, not even a dozen "conservation varieties" were registered. What went wrong?

The seed savers continued to swap their varieties or give them away in exchange for a donation since sales of unregistered varieties was illegal. The new directive is no exception. It merely set different conditions for admission (called "registration") for conservation varieties. The fee for admission is much lower than for industrial varieties, and the DUS testing is not compulsory. But, conditions are set in order to limit the quantities reaching the market – as if there were already too many rare varieties being bought and sold. Also, restrictions are imposed so that a 'conservation variety' can only be propagated in its region of origin, as if agricultural plants were static entities, not moving all over the cultivated parts of the planet.

The official set price for rare varieties are admittedly not very low. However, in order to sell rare varieties, seed savers must not only apply to register them, but also agree with others to keep total amounts within the limit, and they must report on every gram of seed sold. According to the authorities, administrative work for the seed saver in Germany amounts to between 5.5 and 11 hours per variety each season. For example, the association Freie Saaten ("Free Seeds"), a regional initiative in South West Germany, would have to hire more than 3 full time staff only to fulfil these requirements to sell its 1200 varieties. This is in addition to the admission fees. Such costs would not nearly be covered by the small amounts of seed that the association could sell.

Freie Saaten cultivates rare cereal and vegetable varieties in its garden plot in Hassloch, Southwest Germany. Photo: Susanne Gura

All over Europe there are legal risks for seed savers. Only in February 2012, the owners of the Latvian farm Neslinko were persecuted by the regulative authorities for selling tomato seeds at a garden club event. In response, european seed saving associations have sent an open letter to the EU Commission in protest, pointing among others, at the Legal Opinion of Professor Kokott. The charge against Neslinko was withdrawn the day before the Kokopelli Judgment, as if to demonstrate that biodiverse seeds are not illegal. But what really needs to be withdrawn is the registration requirement from the EU Conservation Variety Directive. A requirement that, the ESA pronounced it supposedly rejects many times.

Moreover, what are registration and admission policies good for? The people who get seeds from seed savers are not interested in official stamps. They want advice from farmers when they purchase the seed, which fosters a personal relationship between the producer and consumer. This interactive relationship goes far beyond what is available from the seed industry. But above all, people want open-pollinated seed that thrives without chemical inputs and is free from GMOs.

The Kokopelli Judgement by the European Court of Justice

The French seed saving organisation Kokopelli was sued in 2007 by the breeding corporation Graines Baumaux for selling unregistered varieties. The relevant French court in Nancy requested a preliminary ruling from the European Court of Justice. On 12 July 2012, the Judgement was published,[20] confirming the existing EU Seed legislation, in particular the principle of admission, and the Conservation Variety Directive. Kokopelli's defense in Nancy is due next year, and it is made more difficult by the preliminary ruling of the European Court of Justice. Graines Baumaux, with an annual turnover of € 14 million, demands a penalty of € 100,000 and the discontinuation of Kokopelli's activities. This would be a hard blow against one of the largest seed saving organisations in France.

The European Court of Justice made a very unusual move by not following the Legal Opinion of its own Advocate General. The Legal Opinion of Juliane Kokott, professor of St. Gallen University, was in favour of selling biodiverse seeds, contrary to the Judgment, and seed saving organisations all over Europe have been thrilled. The only point the Judgment agreed with its Advocate General is Farmers Rights: The EU Seed legislation does not offend the FAO Seed Treaty, because this treaty leaves implementation of farmers rights open to the national legislation.

The European seed industry association ESA has pronounced its rejection of the Conservation Variety Directive many times. It was easy to proclaim the confirmation by the European Court Judgment as a victory for seed savers, and the German media became confused.

All over Europe there are legal risks for seed savers. Only in February 2012, the owners of the Latvian farm Neslinko were persecuted by the regulative authorities for selling tomato seeds at a garden club event, and European seed saving associations have sent an open letter to the EU Commission in protest, pointing among others, at the Legal Opinion of Professor Kokott. The charge against Neslinko was withdrawn the day before the Kokopelli Judgment, as if to demonstrate that biodiverse seeds are not illegal. But what needs to be withdrawn is the registration requirement from the EU Conservation Variety Directive.

EU Seed Legislation Reform

The EU Commission created a new seed legislation draft, as part of the Commission's "Better Regulation" initiative. An evaluation resulted in largely, a very positive assessment of the existing legislation. Unsurprisingly the assessment was carried out by a company that has served the agro-industry on several occasions. The "small" changes the seed industry wants, concerns privatisation of large parts of the DUS testing; streamlining the two different testing procedures for registration and for variety protection, and extending variety protection to products so that royalties have to be paid not only for seeds, but also for products such as bread or jam. In addition, according the the ESA and its counter-part COIPORA, identification of varieties must be done using biotechnology methods.

Variety protection is for property rights, not for varieties

In addition to registration, the European seed legislation has a second important component, the so-called seed variety protection. Breeders apply for protection of their varieties at the already mentioned CPVO.Currently, a total of 19,000 varieties are protected. The protection lasts for 25 or 30 years and allows the charging of royalties to farmers. The objective is to finance the breeding work. According to German cereal breeders, the development of a wheat variety costs about € 2 million, and the farmers pay between € 5.95 and 10.75 royalty per tonne of seed,[21] equivalent to 2% of production costs. The cereal breeders claim that they invest 16% of their turnover into research.[22] Their argument is that they have to convince farmers to declare that they have used farm-saved seed of a protected variety, and pay half of the royalty.

But this information is not very assessable, the evaluation report simply stated that the EU variety protection legislation "encourages breeders to invest in research and develop new plant varieties that meets sustainability objectives."[23] It also reports that on average, the market lifespan of a protected variety "is much shorter than the protection period provided under existing legislation. Nonetheless many breeders would still like to see the duration of protection extended to 30 years for all plant varieties."[24] The positive result of the evaluation of the variety protection rights is not based on data, but on interviews with seed industry representatives who want to extend options to cash in royalties. There was no discussion of the aspect that the seed industry has been using varieties bred by farmers for millennia, without any declaration of origin.

While farmers are not allowed to save seeds without royalty payment, breeders allow each other the free use of their protected varieties for further breeding purposes. Such a "breeders' exemption" does not exist in the patent legislation. Breeders have to check the varieties they are using for patents on their genetic components and negotiate rights to use them, a costly procedure. There are attempts by European breeders to add the "breeders' exemption" to the EU patent legislation.

In an evaluation of the EU Seed legislation, it is noted that distances between plant varieties have decreased in recent years, indicating a decrease of biodiversity.[25] Many of the new varieties, even though distinct from existing ones, are built on the pre-existing varieties in order to preserve breeding progress that has been made earlier. Genetic diversity in the market is therefore very narrow. For example, all European apple varieties in the market have at least one of the three varieties, Golden Delicious, Cox Orange, or Jonathan in their parentage.[26]

Seed savers all over Europe have been discussing their views and presented them to the EU Commission on various occasions, including an open letter to several Commissioners[27] in hopes of addressing these potentially future-altering, and detrimental policies and practices.

Open-pollinated varieties are fast disappearing

Hybridization was first applied in the 1940s by Henry Wallace, the 33rd Vice-President of the United States (1941-45). He developed Pioneer Hi-bred corn as well as hybrid chicken. When two different breeding lines are cross-bred, productivity of the offspring can increase substantially. This hybrid vigour, or "heterosis effect", gets lost in the next generation, so that farmers have to buy new seeds or breeding stock in order to keep up with the market economics. Hybridisation allows not only higher productivity, but also more market control if the original lines are kept exclusively in the breeding company. The breeding industry has developed hybrids for an increasing number of species and as a result, open-pollinated varieties are disappearing from the market. Their numbers are decreasing in the catalogues of the seed industry with every new growing season.

Furthermore, much of the claimed breeding progress does not hold its promise. For example, the most important apple disease is scab, and a gene was found in a wild apple that is claimed to be resistant to the disease. It was bred into many apple varieties, such as Topas. After only 10 to 15 years, the fungus causing scab was found in a number of the varieties, indicating that the disease had broken through the 'resistant' properties. resistance. Meanwhile, the oldest known German apple variety Edelborsdorfer is resistant to scab and has been for approximately 800 years.[28] Not just one gene is responsible for it, but a multitude of genetic factors, which continue to stay beyond the control of biotechnology based breeding.

The oldest German apple variety, Edelborsdorfer is scab resistant since 800 years. Topas, a modern variety with a scab resistance gene, shows clear signs of the disease which widely affects the apple industry.
Photo: Hans-Joachim Bannier

Even organic farmers are relying on hybrid seeds and breeds in order to be able to reduce the price which is already high. (Interestingly, in Germany it was found that organic methods are not more costly than conventional agricultural methods, but the distribution system is less efficient due to the smaller market).

Open-pollinated varieties could be brought back into the market and biodiversity restored if consumers could make a point in buying open pollinated varieties through knowing how to identify them. Hybrid varieties in Europe have to be labelled with "F1". Vegetables can also be labelled differently, e.g. "Trademark". But, this is not widely known. In addition, garden seeds are offered at price thresholds labelled in capital letters, for example A to G, creating additional confusion for the consumer.

Around half of the wheat in Germany is grown from farmer-saved seed. Wheat is self-pollinating and hybrids of self-pollinating plants are difficult to breed. The wheat seed industry, however, still attempts to earn profits from

Ears of traditional cereal varieties are fascinating visitors of the exhibition "Korn".
Photo: Susanne Gura

the whole wheat area sown, including from farmer saved seeds and does so through unjust legislation. Wheat is a major crop in Germany, so the seed legislation received an addition: Since 1998, farmers have to pay royalties in the event that they sow seeds from their own harvest. But, a considerable number of farmers are resisting this legislation. In Germany, they are collaborating within the Arbeitsgemeinschaft Bäuerliche Landwirtschaft (ABL) to fight these unjust, profit driven laws.

The German cereal seed industry claims that 150 varieties of wheat are registered in the catalogue of varieties admitted for sale in the EU, which would be a large diversity and choice for farmers.[29] But, the German cereal industry should see the exhibition of ears of 100 cereal varieties "Korn"[30] collected by four seed savers which has been attracting thousands of visitors on various occasions in Germany. Many were touched by the powerful look of the traditional varieties, a very rare sight nowadays, made possible by seed savers. Another exhibit on maize diversity attracted demand even of the German branch of the global maize seed market leader, Pioneer.

The All-Powerful and Consolidated Seed Industry

Five corporations which originated in Europe are among the ten largest seed suppliers in the world: Syngenta (CH), Groupe Limagrain (F), KWS (D), Bayer (D), and DLF-Trifolium (DK). Particularly the vegetable seed market is consolidating. Bayer has bought the vegetable seed companies Nunhems in 2002, Hild in 2010 and Abbott & Cobb in 2012. Monsanto bought the market leader Seminis in 2005. According to a study commissioned by Swiss NGOs, the vegetable seed markets in Europe are dominated by the two chemical corporations Syngenta and Monsanto: peppers 56%, tomato 62%, cauliflower 71%.[31] The carrot seed market is dominated by Bejo Zaden and Vilmorin, seed companies based in the Netherlands and France.

The seed markets of France and Germany are valued at € 3.15 billion; they account for nearly 50% of the EU market (about € 6.4 billion). These two countries also account for 56% of all protected varieties.[32] And it is primarily these two countries which are shaping the EU seed legislation. The CPVO is located in France whose Board President is German. In France all seed related interest groups are jointly represented by the GNIS (Groupement national interprofessionel des semences et plants) dominated by large seed corporations. The EU Commission has hired a GNIS staff member to administer the seed legislation reform. The heads of both the European Seed Association and its horticultural sister organisation CIOSPORA are both Germans.

Syngenta, Bayer, and of course the global market leader Monsanto, predominately chemical corporations. They have developed the business model of seeds which are dependent on agrochemicals. Monsanto became known for its Round-up Ready GMO technology: genetically modified plants that resist Monsanto's herbicide glyphosate with the trade mark Round-up. If this devastating weed killer is sprayed, nothing survives except the GMO crop (most of them maize, rapeseed and cotton). Bayer offers Liberty Link, a gene resistant to its glufosinate trademarked as Basta.

Another large chemical corporation, BASF, has become known for its influence on the German government. The current coalition of Christian-Democrats (Angela Merkel) and Liberals (Guido Westerwelle) agreed in their coalition treaty to foster BASF's genetically modified potato Amflora– the first industry product ever that is mentioned in such an agreement. In the meantime, however, attempts to get Amflora approved for the market were withdrawn. BASF decided to also withdraw its biotech research unit from Germany and relocate it to the United States.

A Front Against GMOs

GMOs are facing rejection by the German public. Monsanto's maize MON 810 is now banned and a demonstration plot where GMOs are grown solely for public relation purposes remains closed. But the approval procedures at the EU Commission continue. BASF has applied for approval of a disease-resistant GMO potato variety by the EU Commission. The European Food Safety Authority EFSA endorsed cultivation of Monsanto's herbicide resistant soy. If the EU member states can't agree on a decision, the EU Commission will decide, likely in favour of the GMO. A Commission proposal to allow national GMO bans got stuck. Several organisations are campaigning and lobbying against GMOs. At the European level, the EU Group of the International Federation of Organic Movements (IFOAM) has a focus on GM free seeds. The Interessengemeinschaft Gentechnikfreie Saatgutarbeit (IG Saatgut) was set up in 2005 by seed savers and organic breeders in German speaking countries. The Bantam campaign spread seed of an open-pollinated maize variety and asked growers to register a map indicating where GMO maize is grown, since GMO cultivation has to stay within a minimum distance from conventional crops.

Patents on seeds in Europe

The EU Bio-patent Directive 98/44/EC stipulates that genetically modified plants and animals are patentable. With regard to conventionally bred plants and animals, the Directive has been interpreted by the European Patent Office in a way that an increasing number of patents have been granted in recent years. Stipulations that varieties and breeds, and essentially biological breeding processes are not patentable, in fact have not hindered their patenting.

The German parliament on Febuary 9th 2012 unanimously adopted a resolution, insisting that no patents are granted on conventional breeding methods, livestock and plants derived by such methods, as well as their offspring, and that the scope of product-by-process patents which cover livestock and plants is limited to the process described in the patent. Similarly the EU Parliament on May 10th 2012 has adopted a resolution calling on the European Patent Office "to exclude from patenting products derived from conventional breeding and all conventional breeding methods."

The No Patents on Seeds initiative campaigns for clear EU patent regulations to exclude from patentability plants and animals, genetic material and processes for breeding of plants and animals and food derived thereof. The coalition is initiated by large environment and development organisations and is supported globally by over 300 NGOs and farmers' organisations. The coalition assesses that patents on seeds are not used to protect inventions, but to control the basis of global food supply. In times of steeply rising food prices, royalties are out of place.

Demonstration against patents on life in front of the European Patent Office in Munich, **Photo: No Patents on Seeds**

There Remains Hope for Organic Breeding

Organic farming associations and breeders have become alert to the disappearance of open-pollinated varieties – which is related to corporate consolidation - and have begun actively working on the issue. In Germany, in the 1980s an initiative for vegetable seeds from Demeter organic agriculture started to produce open-pollinated varieties, and in 2001, the breeding company Bingenheimer Saatgut AG was founded. Today it is Europe's largest producer of organic seeds. A non-profit breeding association, Kultursaat, was established in 1994. It has since registered 43 newly bred vegetable varieties. Variety specific information is given to professional gardeners so that it can be passed on to consumers and is called "Vegetables with Character". Another project entitled 'Fair Breeding', is supported by several organic shops. A new association, Saatgut started breeding cauliflower and broccoli, two vegetables where open pollinated varieties were almost completely removed from the market. The foundation Zukunftsstiftung Landwirtschaft (ZSL) has been funding such breeding initiatives for a decade. At the European level, organic breeders cooperate under the association ECO-PB. Their demands for the EU seed legislation reform include a new window for officially tested varieties for special breeding programmes (for organic and low input cultivation, for on-farm breeding and for increasing biodiversity); reducing the restrictions of the Conservation Variety Directive, and removing the sales ban for the informal biodiverse seed sector.


People queue at seed markets where interesting varieties are given away without official registration but with lots of advice against a donation. They can't be sold, since EU law requires registration.
Photo: Susanne Gura

Seed savers conserve thousands of varieties

Let's Liberate Diversity 2012 meeting in Scotland,
Photo: Susanne Gura

During the 1980s, the massive loss of agricultural plant varieties became known, and a few concerned people started collecting the remainders and set up associations to provide protection. In Switzerland, the foundation, Pro Specie Rara was established, in Austria the association Arche Noah, and in Germany two associations, the Verein zur Erhaltung der Nutzpflanzenvielfalt (VEN) and the Pomologenverein. Dreschflegel, an organisation of around a dozen professional seed producers was built. Organisations were founded to look after livestock breeds, such as the Gesellschaft zur Erhaltung der Haustierrassenvielfalt (GEH) in addition to many other regional examples such as Freie Saaten in the Palatinate; Lebensgut Cobstädt in Thüringen, VERN in Brandenburg, and individual collectors such as Lilatomate and Samenfest. An umbrella association for German speaking countries was founded in 2009 to join advocacy, education and public relations efforts as well as cooperation in other important areas such as data bases and workshops. At the European level, seed savers have set up "Let's Liberate Diversity"; since 2005 annual meetings are held to swap seeds, and discuss seed industry and policy developments. A European Coordination, supported by EU funded projects, has been established where position details are developed and concrete activities during the EU seed legislation reform are organised. The Seed Campaign unites European seed savers for specific actions, such as demonstrations and seed swaps.

**Susanne Gura, President of the VEN Association and seed Activist. www.nutzpflanzenvielfalt.de*

Footnotes

[20]http://curia.europa.eu/jcms/upload/docs/application/pdf/2012-07/cp120097de.pdf

[21]http://www.bdp-online.de/de/Branche/Sortenschutz/Nachbau/2012-03-29_Vertragssortenliste_2011-2012.pdf

[22]Newsletter des Gemeinschaftsfonds Saatgetreide 1/2012 and 3/2011

[23]Key messages, http://www.cpvo.europa.eu/documents/evalreports/cpvr_evaluation_final_report_2011.pdf

[24]p. v, http://www.cpvo.europa.eu/documents/evalreports/cpvr_evaluation_final_report_2011.pdf

[25]P. vi, http://www.cpvo.europa.eu/documents/evalreports/cpvr_evaluation_final_report_2011.pdf

[26]Hans-Joachim Bannier Modern Apple Breeding: Genetic Narrowing and Inbreeding Tendencies: Loss of Vitality Is More Visible in Fruit Growing Without Fungicide Application, in: Erwerbsobstbau 3-4/2010

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[31]Toralf Richter, Strukturen und Entwicklungen des Schweizer und internationalen Marktes für Saatgut 2012

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Verein zur Erhaltung der Nutzpflanzenvielfalt (VEN)

(Association for the conservation of agricultural plant biodiversity)

The parsnip, on our logo since 25 years, is no longer a forgotten vegetable. Nutritious and tasty, it makes us work with pleasure "at the roots" of agricultural biodiversity. The picture has been taken from Theodor Krümpler, Illustriertes Gartenbaulexikon 1882

Our association was founded in 1986, after Pat Mooney's "Seeds of the Earth" was published in German and Bernward Geier published his book on seed production in the home garden. Since then, our logo shows the parsnip, a thousand years old food plant of the temperate climate with very tasty and nutritious roots. Their shelf life however is rather short, and they had disappeared from the markets. Consumers could find parsnips again, along with other forgotten vegetables, first at organic shops and now at the organic supermarkets that have sprung up in most German cities over the past decade.

Around 650 members of our association share the work of cultivating and propagating seeds, describing and studying the varieties, their properties, their use and their history. A growing number of rare varieties are adopted by people who commit to care for them for five years and return a specific amount of seed to the association. These "godparents" are helped with advice by experienced members.

Seed production is no longer part of the curriculum of professional gardening education. Scientific education in agricultural botany has reduced taxonomic knowledge – the identification of plants - to a bare minimum. Senior experts now deplore that young scientists know all details of the genome, but do not know the plants. Our association offers both theory and practice of taxonomy, variety description, seed production and other knowledge needed to grow, conserve, study and enjoy the huge number of vegetable varieties that still exist and continues to be developed.

Some VEN members, some of the founders and Vandana Shiva at the 25th anniversary celebration in 2011. **Photo: VEN**

We have collected some 6000 varieties of around 800 plant species, with an emphasis on vegetables. We select the "Vegetable of the Year" on which we focus many of our activities. We develop and share knowledge in seminars, leaflets, and other media, and we organize the "Day of the cultured plant", which is an event rather than a specific day. We are experiencing a fast growing interest of the public, with rising demand for our varieties and for information. We participate in the Slow Food Fair's new seed market and have a booth at many other garden related events. Along with others, we are setting up a growing number of seed swaps all over Germany, with presentations, tasting of food and discussions. Our exhibits attract thousands of visitors. They are shown in various places, such as botanical gardens, museums, universities, but also in other public or business places. Our association itself has no garden, no shop (except on internet), no staff, no office.

In order to build a commercial basis, the organisation "Dreschflegel" (flail, a tool for threshing) as set up by some of our members in 1990. Today around a dozen farms produce and offer a large diversity of organic seeds. It has also a non-profit arm.

Political work has been on the agenda from the start. UPOV and the EU Seed legislation were identified to have contributed to the heavy loss of diversity. When in 1996 FAO held its Technical Conference on Plant Genetic Resources in Leipzig, our association used the opportunity to inform the German public about Farmers Rights (at that time, the FAO Treaty negotiations were ongoing), about the biodiversity losses, the adverse legislation and the consolidation of the seed industry.

There have been European meetings since 1988, and in 2005, Let's Liberate Diversity was founded and holds annual meetings attracting several hundreds of participants. We participated in organising the Halle meeting with a manifestation at the Gatersleben gene bank to protest against the genetics companies who were carrying out GMO trials in close vicinity, with extremely high contamination risks.

Together with Dreschflegel and others, we have founded the IG Saatgut, since we want to keep our varieties free from GMO contamination and need close collaboration with like-minded organisations. We also helped to establish the German umbrella for seeds and breeds, since many activities such as lobbying, public awareness, databanks, fundraising are improved if jointly carried out.

Another fight not yet won is the saving of Germany's oldest and largest agricultural plant diversity garden, belonging to the Botanical Gardens of Bonn University. The University plans to build a new campus. In 15 to 20 years it will extend to the garden area, and the garden that has served many hundreds of students and in recent years also the public, will disappear. The University ignores the pleas of many citizens, of biodiversity experts from within and outside of Germany, and of three Right Livelihood Awardees, including Vandana Shiva. This is in spite of Bonn hosting 13 UN organisations, the Global Crop Diversity Fund and the new science body of the Convention on Biodiversity, the Intergovernmental Panel on Biodiversity and Ecosystem Services.

www.nutzpflanzenvielfalt.de

Try this tomato! Ursula Reinhard is VEN's most experienced seed saver. Her grandchildren call her "Tomaten-Oma". **Photo: Susanne Gura**

Dachverband Kulturpflanzen- und Nutztiervielfalt

(Umbrella organisation for crop and livestock diversity)

Under the German umbrella organisation for crop and livestock diversity, 15 member organisations are cooperating since 2009, in particular in the areas of public relations and education, and representing their interest vis-à-vis policy decision makers. We share technical knowledge and experience relevant to their conservation work in a German network, and are setting up our databanks along agreed criteria. We are collaborating with seed saving, organic breeding, environmental and scientific organisations in Europe and the world. We are meeting once or twice a year. The exchange between experts in livestock, fruit, vegetable, cereals diversity is very rewarding, and our joint representation towards policy makers and the general public has proven really useful, as we are presenting our issues in a consolidated way. In addition to member organisations, a large network of people and organisations are exchanging news over a network. Some of them have participated in consultations of the national programme to conserve plant genetic resources and several other official documents – with very limited success though. The same is true for the Conservation Variety Directive. Its implementation in Germany is not at all useful to seed savers– our interventions have had very little impact. We could however, convince the lawmakers to keep registration of fruit varieties for marketing open ended, as old varieties and also their denominations continue to be found and identified. The lawmakers had planned to close the list in 2012. We also want new varieties with small economic interest to be admitted to this list and thus, the market. Regarding vine, cultivated in Germany since Roman times, we could draw attention to the ban on cultivating old vine varieties, an impossible regulation but still in force.

We insist that a red list of endangered vegetable varieties can only be established on the basis of field research. Instead, there is now a list based on names that have been mentioned somewhere else – who knows whether they still exist? Field research could be used to strengthen regional engagement – people who know how to grow, multiply and use traditional varieties are as important as the seeds. Without such people, the varieties are not cultivated, not adapted to changing conditions, and easily lost. While we value the important emergency role of gene banks, it happens that their seeds have a low germination rate, are mislabelled, or a mix of varieties.

We are working on a campaign to place private and public collections under UNESCO heritage. One aim is to attract public attention to risks such as GMO contamination – trials have been run in close vicinity to almost all gene bank sites in Germany. Also, half of the fruit gene bank sites have disappeared within only a decade due to plant diseases or due to financial or other problems, without anyone noticing or protesting.

On European level, we are collaborating with Let's Liberate Diversity, a forum that has annual meetings since 2005. In order to impact on the EU Seed law reform, the European Coordination has been set up. It comprises seed savers and organic breeders from many European countries. We also collaborate with the Seed Campaign, IG Saatgut, the organic breeders and their associations.

www.kulturpflanzen-nutztiervielfalt.de

Birth of a project, which became a movement and a business

Seed saving pioneer Ludwig Watschong/Germany

The birth of a child or a project is never a beginning as there has been development before the "delivery". So where to start? The idea to save and produce seeds on a commercial scale had its roots in my interest and dedication to save seeds from distinction and my resistance to hand over the control over our seeds and food to multinational corporations.

I was personally influenced in the early eighties by the books from Pat Mooney ("Seeds and world hunger") and from Bernward Geier ("Seeds from your own organic garden") which sensitized me for biodiversity of cultivated plants. I educated myself e.g.in seminars and Bernward Geier supported me to start an association for the protection of heritage seeds. This led 1986 to the foundation of the "Verein zur Erhaltung der Nutzpflanzenvielfalt"(Association for the protection of cultivated plant diversity) known as VEN.

It became soon clear to me that saving and propagating seeds could not be done anymore as a hobby.Nowadays I produce up to 70 vegetable seed varieties with old cabbage beieng my passion. Members of the VEN who had also interest to "make a living" with seed production got together and started a business. The foundation was 1990 in Witzenhausen, which was a logic choice as it was clear for us that we will produce organic seeds. For this the agricultural faculty of the University of Kassel, which was at this time already fully organic, was a fertile ground for the start up as there was a concentration of students wanting to engage in seed saving. We called us initially working group for organic seeds and targeted hobby and self sufficiency gardeners, which we supply with our organic seed. It was important for us to establish a business without hierarchy and bosses. Therefor we established a cooperative, and named it "Dreschflegel", which is the name for the wooden hand tool used in old times for threshing The 14 seed producers work with about 900 varieties, of which 600 are available for sale in the seed catalogue.

For more information about Dreschflegel: **www.dreschflegel-saatgut.de**

Story of Linda

Linda is a German potato variety known for its taste, texture and distinct aroma. The plant breeder Friedrich Bohm of Saatzucht Bohm (Bohm Seed Cultivation) company in Trauen evolved Linda by cross breeding two established potato varieties Clivia and Hansa during 1964. In 1974, Linda was granted an official listing as a German potato. The variety became very popular especially among the consumers in North Germany. In 1990s, Saatzucht Bohm merged with other North German breeding companies forming Europlant Pflanzenzucht GmbH, Germany's largest potato breeding company.

Under German law, the owner of a licence has the right to remove a potato from the market when the licence expires. Europlant, Linda's licence holder, decided to withdraw the potato from market when its licence period expired on November 2004. They also announced that Linda would be replaced by a tastier and more disease resistant model named Belana. Usually, varieties will be deregistered only if it has little prospect to succeed in the market. In contrast, Linda was a success story among consumers as well as farmers.

The news of Lindas' 'demise' met with nationwide protest led by Save Linda committee. Farmers in northwestern state of Lower Saxony planted hundreds of acres of Linda in protest. Europlant responded to the protest with a law suit for breach of contract. Two hundred and fifty tones of Linda potatoes were confiscated and placed under the supervision of federal authorities. By the time, many organisation like Rette Linda, Small Farmers' Association (Abl), Slow Food groups, Bioland and many more joined the cause. In response, the government granted Linda an additional two years on its listing. In 2005, the Europlant suit was settled and the confiscated Linda potatoes were handed over to the company.

Meanwhile Linda met a huge success in Great Britain when it got approved as a new potato seed on 19th August 2009. The approval made it possible to sell Linda potato anywhere in the Europian Union as seed potatoes. In February 2010, The Federal Plant Variety Office in Hannover decided to renew Linda's licence and included it in the German list of seed potatoes. Now Linda is a German or European potato which can be freely marketed as seed potatoe.

At present, Linda is a proud parent of around 1001 breeding lines. Two popular varieties of potatoes, viz, Violetta (purple flesh) and Rote Emmalie (red flesh), are derived from Linda. Both these varieties got listed in the United Kingdom's National List of seed potatoes.

Linda's story shows that it is possible to save many varieties from being banned from the markets, so the consumers, not the companies, can decide what they want to eat.

GMO resistance in the region of Kitzingen

Crop Diversity versus GMO

Barbara Keller

Kitzinngen region was a hub for the introduction of Monsanto's Genetically Modified crops in Germany. For several years, everything- the agricultural agency, the farmers, and even the land- was prepared for the cultivation of GMOs. These developments also marked the beginning of mass movements against GMOs.

Open House- a network of people campaigning for sustainability and cooperation- was founded in 2011.Our main focus is to strengthen the interest, appreciation and consciousness of people for diversity. Our aim is to protect the diversity, which is still alive. Furthermore, we focused on utilizing the energy of the resistance against GMO for building a positive future. We not only want to prevent GMO in our region. We want to reverse the process: Our region had been a hot spot of GMO cultivation in Germany- why shouldn't it become a center of diversity?

Let's have a look at an abstract outline of the developments after the introduction of GMOs in Kitzingen..

First, there was Monsanto preparing mass cultivation of GMO plants in the region of Kitzingen. Soon, local groups started to resist Monsanto's action. For instance, Barbara Keller launched a campaign with the Green party against the GMO tests. However, the impact was small. So she decided to bring together all local organization interested in preventing the introduction of GMOs and she founded the "Bündnis gentechnikfreier Landkreis Kitzingen" (Confederation for an GMO free region Kitzingen).

The confederation was founded at the right time. During that period, several farmers were getting ready for the large scale cultivation of GM corn. The Ministry of Agriculture was publishing the details of GMO fields in the country on internet. So everybody could see where those plants were cultivated and how large the fields were.

Demonstrations, lectures and film shows on GMOs were initiated all over the region. Mass media- Newspapers, radio, and TV - started to publish reports on GMOs and our resistance against it. The people in our region became well informed about the risks of GMOs and they rejected the GM crops. As a result of public rejection, the farmers reduced their acreage of GMOs.

At that point more and more groups from outside, who wanted to do something against GMO in Kitzingen, joined the movement.

The action group "Gendreck-weg" added a new dimension to the resistance . They pledged remove the GMO corn through non-violent means. As the percentage of GMO fields in the region was very small, the group was successful in removing the remaining GM corn plants!

In the following year, an important election took place in our state. One of the candidates contesting for the post of agriculture minister promised that she would ban the cultivation of GM corn in Germany. By this time, majority of the public and the farmers were against the GM cultivation. So she got elected kept her promise when she became the minister. Only the GMO tests, with which everything began, were left untouched.

The crown land canceled GMOs test, but it was continued in a privately owned land. A novel form of resistance took place in this small area. A group of people occupied the land, shortly before the corn sowing. Gradually, the owner of the land agreed to stop the cultivation of GM corn.

The activists not only wanted to fight GMOs but also wanted to show alternatives. So the "Frauen für die Vielfalt" (Women for diversity) invited presentations on diversity- presentations that celebrates the diversity of cultivated plants like beans or potatoes. They initiated a seed market.

We people from "open house" continue to believe in this idea and celebrate seed festivals once in a year. In these festivals, we distribute seeds and inspire people to become seed keepers. Our experience has shown that there are two substantial factors for success: involve as many people as possible in the fight against GMOs and create as many seed keepers as possible to stop the loss of diversity.

To obtain this goal we founded "Saatgutarche Franken" (Seed Arc Franconia) - a regional group of people who grow heirlooms verities and support each other with seeds and advices. They harvest the seeds to save and distribute them in Kitzingen region.

The Campaign for Seed Sovereignty

The *Campaign for Seed Sovereignty* was launched in 2009. A recently started revision of the EU seed legislation, which is likely to result in a worse situation for traditional seed varieties and for farmers' rights (worldwide), made it necessary to act. The campaign has a double strategy: We call for "seeds swaps everywhere", as a positive way of "reclaiming the seeds" and building alternative structures. At the same time, we organise protests against the seed industry and regulations that favor the seed industry and its industrial seeds.

In 2010 and 2011, 58.000 signatures were collected in about twenty European countries for the petition "*Sowing the Future, Harvesting Diversity*", demanding:

- the right to produce seeds from our own harvests, to re-sow and to give them to others,
- support for regional crop variety by supporting those keeping and breed of organic varieties,
- a prohibition to market and cultivate GMOs and varieties that require intensive chemical use, and
- to end high energy inputs in agriculture which are typically the result of monocultures, long transport routes as well as industrial crops that require chemical fertilizers and pesticides.

The petition was handed over to the European Parliament as part of seed action days organized by the campaign in Brussels on 17th of April 2011, the worldwide action day of peasant's struggles of La Via Campesina. The seed action days also featured the first big European seed swap, in which seed activists and savers from over ten European countries participated. Hundreds of visitors came to swap seeds and learn that many people are already using alternative ways in gardening and food production. Moreover, nearly a thousand people participated in protests against the influence of the seed and agriculture business on the EU legislative process. The participation of guests from Turkia and India was particularly important. They stressed that EU seed laws will eventually be exported to the rest of the world by (for example) free trade agreements, with devastating consequences for small farmers in so called third world countries. Oliver de Schutter, the UN Special Rapporteur on the right to food, supported the seed action days by sending a video message.[1] He made clear that free access to seeds is part of the human right to food!

There is, in particular through the financial crisis, a growing awareness in Europe of the importance of people getting more involved again in producing their own food and seeds. Urban gardening and urban-rural-partnerships like community supported agriculture projects are starting in many European countries. To maintain a certain independency, they need to use their own, free and fertile seeds. One example of this growing awareness is the seed festival in Greece April '12 organised by the Greek seed saver network *Peliti*, in which the campaign took part. About 7000 people from the region came to get locally adapted seeds.

Seed sovereignty is also the basis for food sovereignty. In order to connect these two struggles, the campaign also participated in the Food Sovereignty Conference Nyeleni-Europe in Austria in August 2011. Such international meetings are important, because they allow us to get to know other European seed initiatives, to exchange information and coordinate our activities with them.

The Europe-wide *Campaign for Seed Sovereignty* has a website in several languages. The website features, for example, the film "Resilient seeds" about the seed action days in Brussels with subtitles in seven languages.

This year, the campaign calls for decentralised protests in front of seed industry locations in all European countries on the 16th of October - in solidarity with the struggles of *La Via Campesina* and to support the worldwide *Seed Emergency Campaign* of Navdanya.

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[1] The video is online at http://www.seed-sovereignty.org/MPG/Olivier_De_Schutter.avi

IG Saatgut: GE-free Seeds for Growing GE-free Diversity

Photo courtesy: ProSpecialRare

The initiative for GE-free seeds and breeding, IG Saatgut, is an association of commercial and non-commercial seed conservation organisations, cultivators and breeders from Austria, Germany and Switzerland. These organisations represent about 40 breeders, 200 seed producers and more then 20.000 voluntary seed growers. Our aims are

- Saving and providing GE-free seeds.
- Preserving and developing the diversity of GE-free crops as a basis for future nutrition and plant breeding.
- Safeguarding in the long-term the existence of any initiative and company working on GE-free grown plants, their conservation, development, breeding and use.

We reject genetically modified agriculture and patents on life.

Challenge of GE-free seed

In 2005 we founded IG Saatgut against the background of discussions on thresholds–for GMOs in seeds. We spoke about how there would be no GE-free agriculture without GMO free seeds We are now talking about how breeders, seed producers, gardeners and farmers – will be able to keep our seeds free of GMO.

IG Saatgut calls for stopping the growing of GMOs in the fields and stopping further approvals of GMO. We demand a reliable zero tolerance policy for GMOs in seed. BUT in the current situation we also advocate for the polluter-pays principle. Precautionary measures and the risk of loss as well as liability in cases of contamination should no longer be the burden of GE-free seed producers, farmers and gardeners. The contamination issue has to become the polluter's responsibility.

To support this, IG Saatgut is working on a report of case studies from Germany and Switzerland, by Siegrid Herbst. It will give an overview about the current situation of GE-free – conventional and organic – seed producers: documenting the constraints of the precaution measures against GMO contamination, that all of them are taking, at all levels of seed production and on their own account; assessing the threats in case of allowing for a low level of GMO in seeds. Furthermore IG Saatgut and AbL (Arbeitsgemeinschaft bäuerliche Landwirtschaft) have commissioned a legal opinion on approaches to implement the polluter pays principle.

We say NO to biopatents

Fourteen years after the passing of the EU Biotechnology Patents Directive, biopatents continue to be contentious throughout Europe. Social and economic concern is increasingly raised in addition to ethical and scientific concern: Particularly in agriculture and plant breeding, patents can hamper and even partially block access to genetic resources. Also, research and development can be impeded and disproportionate costs arise in the agricultural and plant breeding value chains. Preservation initiatives and organic breeding organizations that aim to secure and make available GE-free seed for future use can also be affected by biopatent developments.

To help estimate this impact and to support the critical discourse on biopatents IG Saatgut has commissioned the study: *"Biopatents and Agricultural modernization. Patents on plants and their possible impact on the work of preservation and organic breeding organizations in the field of GE-free seed"*, written by Eva Gelinsky.

The study, amongst other things, gives an overview of developments in plant breeding protection under private and public law (plant variety protection and patent rights in Germany, Austria and Switzerland). It presents the current situation with respect to biopatents, with particular focus on patents in the field of conventional plant breeding and discusses possible impacts on the work of organic breeding organizations and preservation initiatives. In this context, a patent on a conventionally bred sunflower is presented as a precedent which could influence an ongoing organic breeding project. The study also sets out approaches that implicitly or explicitly present themselves as alternatives to biopatenting, such as *open source* and commons concepts, and sketches out potential demands and perspectives for action. This differentiates between demands that can be made within the existing system – such as calls for comprehensive, freely available information on patents applied for and granted, legal aid and (state) support during opposition proceedings, or the prohibition of certain patent contents - and demands that could go beyond the existing framework. A central question is how breeding could be organized and financed without protection under private law. A discussion will also be needed on how to change modernization in agriculture in favor of ecological reform and greater regionalization.

IG Saatgut will continue working on GE-free seeds and biopatents by providing information, representing our interests and our position in politics, public relations and technical discussions, raising public awareness of problems and networking with initiatives on both a national and an international level.

Members:

- ABDP (Association of Bio-dynamic Plant Breeders)
- Arche Noah (Society for Preserving and Growing the Diversity of Cultivated Plants)
- Bingenheimer Saatgut AG
- Dreschflegel e.V.
- Kultursaat e.V. (Association for Breeding Research & Crop Conservation on Bio-dynamic Basis)
- ProSpecieRara (Swiss Foundation for the Historico-cultural and Genetic Variety of Plants and Animals)
- ReinSaat KG
- Sativa Rheinau AG
- VEN (Association for Preserving the Diversity of Cultivated Plants)

Contact: IG Saatgut (Initiative for GE-free seeds and breeding) info@ig-saatgut.de, www.gentechnikfreie-saat.de

Resistance against unjust seed laws in Leipzig, 1995: The case of Joseph Albrecht

In 1995, the world community met at Leipzig for the UN FAO Plant Genetic Resources. The conference woke up the world to the rapid loss of agricultural biodiversity due to the spread of industrial monocultures. On the FAO assessment ,by 1995 75% of the agrobiodiversity across the world had been displaced by monocultures of a few industrial varieties and species bred for uniformity.

Reversing this trend of genetic erosion requires conservation and ecological breeding for diversity and resilience. The is what Joseph Albrecht was doing.

The organic farmer Josef Albrecht from the village of Oberding in Bavaria was not satisfied with the conventional seed on the market. For this reason, he developed his own ecological varieties. He was convinced that his variety was much better suited to organic farming in his area than the high yielding; varieties (HYV) offered in the market. 10 other organic farmers from neighbouring villages also became convinced because they saw that Josef Albrecht's wheat really did well. Farmer Albrecht exchanged his seed with them.

At a time when Joseph Albrecht should have been celebrated for his contributions to enriching Plant Genetic Resources,he was criminalized under new Seed Laws imposing compulsory registration on all seed.

Albrecht received a notice of a fine by the government of Upper Bavaria because he traded with uncertified seed. He registered a protest against this fine. Farmer Albrecht was willing to go all the Way, even up to the Supreme Court, to fight his case against the unreason-ableness of the Seed Trade Act, from the point of view of organic farming. He felt restricted to freely exercise his occupation as organic farmer by this law.

Those of us committed to Seed Freedom,organised a major civil disobedience action with Joseph Albrecht in a Church in Leipzig while we were there for the UN conference. We exchanged and distributed Albrecht's Seed and sent letters to the Govt telling them to take action against us for violating the Seed Law that threatened the freedom of farmers to conserve, breed, and exchange seed.

The seed package that we shared had a label which said

"The wheat grains in this bag are dangerous. Not because they are poisonous. On the contrary, they are a particularly valuable and rare ecological variety. But precisely because this variety is rare, it is illegal as seeds. You may eat the grains, but you may not sow them. How can it be possible that the seed of our daily bread is 'forbidden'?"

SEED REPRODUCTION REGULATIONS - OUR CONTROVERSIAL STRUGGLE

Georg Janssen*
Via Campesina - Europe

Farmers of Europe, beware! Once again, breeders are trying to influence regulations on the use of farm-saved seed to their own advantage, thus tightening the rules for farmers. Thanks to fierce political and legal resistance from IG Nachbau and the Syndicate of Traditional Agriculture (Arbeitsgemeinschaft bäuerlich Landwirtschaft - AbL), they have failed to push their plans through in Germany in recent years. However, a change in the EU legislation on plant variety rights is now being negotiated behind closed doors in Brussels, with the aim of making seed reproduction regulation "more effective, easier and fairer". This means that breeders want to make it simpler to claim seed reproduction fees and get their hands on farmers' money. But those doors in Brussels are not completely closed. As an IG Nachbau delegation was told by a European Commission official, representatives of European professional agricultural organisations (COPA) and agricultural cooperatives (COGECA) are also back around the negotiating table. The same happened back in the 1990s with the reform of EU plant varieties regulations. At that time, the Association of German Plant Breeders (Bund der Deutschen Pflanzenzüchter) and the German Farmers' Federation (Deutsche Bauernverband) had agreed at the highest level on ways of restricting farmers' seed reproduction rights and cashing in every year. They proceeded without consulting IG Nachbau and AbL (the former was founded on the occasion of the AbL assembly in 1998). Since then, we have fought for the right to use farm-saved seeds on both the political and the legal level. Over 1,000 lawsuits have been brought against farmers by plant breeders. However, the highest court in Germany, the Federal Court of Justice in Karlsruhe (9 proceedings) and the highest court in Europe, the European Court of Justice in Luxembourg (4 proceeding) have proved us right on crucial points. Plant breeders may not make a blanket claim: it must be based on evidence and they must issue a different claim for every single variety. Seed reproduction fees were deemed far too high and are now limited to a maximum of 50% of the licence fee. Moreover, companies in the seed processing industry are under no obligation to provide the addresses of all their agricultural customers. We were only able to achieve this thanks to a combination of luck and courage, the help of other campaigners supporting our struggle (the original syndicate was founded by 15 farmers - it now has about 1,000 members) and the assistance of good lawyers fighting the farmers' case. Over 40,000 farmers are currently refusing to provide this type of information.

What are the breeders' plans and what kind of amendments to the EU law on plant variety can we expect?

The breeders are calling for:

- Farmers and seed processing companies to provide information on their activities, whether they have any evidence or not;
- Support from public bodies (e.g. naming the varieties covered by EU funding);
- Seed processing to be permitted only in cases where the variety is known or a sample has been taken;
- Fees to be extended to small-scale famers;
- The number of varieties for which re-use is permitted to be restricted;
- A restriction on the quantity and area for the use of farm-saved seeds;
- Full licence fees for seed reproduction.

Everything that IG Nachbau has managed to achieve (through rulings obtained from the European Court of Justice and the Federal Court of Justice of Germany) should be extended to the whole of Europe through new legislation. And what do breeders want? They want reform plans to be discussed within a working group of European breeders' associations involving not only small- and medium-sized breeders, but also Monsanto & co.

These ideas are reflected in a report by the Community Plant Variety Office in Brussels addressed to the EU Commission. It states amongst other things, the need for urgent action to establish a better system for obliging farmers to provide information on seed reproduction.

COPA and COGECA were in agreement with this. A 10-strong delegation of IG Nachbau representatives went to Brussels last October to talk to MEPs and "shake them by the shoulders", as they had not yet heard about the concrete proposed changes. We urged them to question the European Commission about how reproduction rights are being handled in Europe (in some countries, there are no fees at all), about what the European Commission's plans were, about how high the deal imposed by the EU would be, and, above all, about what the money would be used for. During a conversation with Ms Mannerkorpi, the EU Commission official in charge of plant variety rights, it became clear that the arguments presented by breeders to introduce a simple fee collection system have not fallen on deaf ears. From our side, we made it clear that we would use all possible means, be they political or legal, to fight for the unrestricted right to use farm-saved seeds. We made it clear that seed breeding is a right that must be protected by society. This is why a fund must be established to collect money from the state, breeders, farmers and businesses, who would then make democratic decisions on which breeding projects the funds should be allocated to.

During the International Seed Meeting organised by Via Campesina Europe and Uniterre on 20 and 21 October 2011 in Geneva, we were able to inform farmers' delegations about our struggle in Germany. It emerged from the discussion that Germany's experience is crucial and that we must fight together at the European level, organising information campaigns and activity to promote the right to use farm-saved seeds. IG Nachbau farmer representatives would be prepared to attend meetings to talk about our experience in Germany. But we have to accept that our struggle is far from over. We must carry on fighting for the right to use farm-saved seeds, for GMO-free agriculture and against patents on plants and animals.

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ARCHE NOAH

A Noah's Ark for Future Seed Diversity

ARCHE NOAH was founded by farmers, gardeners, breeders and journalists in 1990 as a non-governmental, common profit seed savers organization in Central Europe with today 10.000 members and supporters. We aim at preserving, spreading and further developing crop diversity by working on a practical as well as an educational and political level.

The ARCHE NOAH seed collection

Started as a network, the decentralized activities within ARCHE NOAH still play an important role – through free exchange of seeds and knowledge, hundreds of rare varieties are kept vivid and available, the "collective knowledge" increases steadily, and hopefully this well established network of seed savers will prove resilient to any economic crisis that might hit centralized structures. Today the central seed collecting run by our association, is an important source of seeds, information and Know How for many farmers and gardeners, and serves both as a security backup and provides specific knowledge.The collection contains 6.000 seed samples of open pollinating vegetable and field crop cultivars. Those and hundreds of fruit-trees and berries are regenerated in two organic propagation gardens, one of them public and visited by 30.000 people from different backgrounds every year – children and grandfathers, students and city-farmers, many arriving from far away.

The central collecting allows for specific research activities, related to agricultural practise and often carried out in cooperation with groups of mostly small scale farmers, that share common goals to revitalize and enhance traditional and rare varieties. This also includes participatory plant breeding activities. Some of those agriculturalists and seed savers also provide their experiences as experts in educational programmes and books, addressing professionals as well as home gardeners. But of course, awareness raising and experiencing agricultural biodiversity – in all its cultural, social and culinary dimensions and with all our senses – also tries to reach the public in general, and especially schools and children.

ARCHE NOAH is presently working from Brussels on the review of the EU legislation on the Marketing of Seed and Plant Propagating Material (S&PM Law). Part of it is to network with other civil society groups – e.g. environmental and consumers´ groups – to bring the importance of seed for our future to their attention. An Open Letter for a better EU seed legislation was published in May 2012, broadly supported by more than 250 civil society organisations throughout Europe (www.SeedForAll.org) and is an effective tool for public campaigning in future months.

A proposal for a new S&PM regulation from the EU commission is to be expected in winter 2012. Arche Noah intends to make our voices heard – in the European Parliament, but especially on the national level in all EU Member States throughout the European Union. It is our ministers that will finally decide on the future S&PM legislation. It is very clear that we do not want measures like an obligatory registration of varieties that further promotes a non-sustainable, high input agriculture and discriminates genetically diverse, locally adaptable, open pollinated varieties, and that cuts down farmers´, seed savers´ and consumers´ freedom to choose, use, exchange and provide diverse seeds.

**Arche Noah is an Austrian based seed savers association and now active in Brussels lobbying for a better review of the legislation on Seed and Propagating Material. www.arche-noah.at*


The organic propagation garden


Isolation tunnel


Manual pollination of zeamays


Manual harvest of seeds


Cleaning of seeds


Testing germination rates


Filling packages for providing samples


Swapping plants and seeds


Maintaining old varieties in garms and gardens


Practising selection together


Keeping cabbage seedbearers during winter


Collecting seeds


Vegetable diversity on farmers markets in Austria


Making documentations

Tomatoes and chiles are very popular

SEEDS IN FRANCE

Tiphaine Burban*

At first sight, the seed sector in France seems healthy. With 74 selection firms, 241 production firms, 18,800 multiplication farmers, it leads the European market of seeds and plants. Plus, for some plants like wheat and sunflowers, France is proud to benefit an international leadership. It is the second international exporter of seeds, and the first one in exporting maize seeds. The turnover of the whole seed sector would not stop increasing.

However, to look at it closer, the situation is not so rosy. For biodiversity and small farmers, the evolution of agriculture has been painful, since last century.

The erosion of crop biodiversity has been strong. Numerous varieties disappeared during the 20th century at an abnormal rhythm. Thus, 80% of the vegetable varieties cultivated in France during the fifties are not cultivated anymore (Brac de la Perrière and al., 2011, p. 7). Only 3 to 4 varieties cover 60% of the wheat fields in France (Fondation Nicolas Hulot, 2011). They are commercial varieties, with a very poor genetic patrimony, and have a low capacity of adaptation to climatic changes.

The situation of French farmers is also very critical. The weight of farmers' debt has got heavier in the last few years. It reached around 147 500 euros per exploitation in 2009, a figure that has been continuously increasing since 1990 (agreste.agriculture.gouv.fr). Principally, major crops, poly-cultures and above all cattle farms are concerned. Sometimes, debts become so important that farms are liquidated. These financial difficulties which farmers face can prompt radical solutions. Farmers' suicide is a reality in France. Agriculture is the professional category that shows the highest suicide rate. It is considered every day in France that 2 farmers take their lives.

The situation for seed users is really not so healthy. They have become dependent on seed and other agricultural inputs companies. Yet, only sixty years ago, farmers were autonomous. Seed breeding belonged to farmer's activity and varieties were adapted to every soil. French crops diversity was very rich. How did we get to this situation that divides big companies and small scale farmers, hurting the environment?

Evolution of seed in France is fascinating and worrying. The story of seed in our country, most probably similar to many other countries, is a story of giving up, of our farmers' autonomy, of our crop patrimony. With the development of the seed sector, peasants progressively lost the control of the seed, this grain is essential for their activity. But this evolution is not a fatality. Even though, threats to French agriculture and seeds are multiplying, peasants' initiatives to recover the control of the seed prove it. There is nothing left that is encouraging them.

A STORY OF GIVING UP

In France, till the 19th century, every peasant used to select and produce his own seeds. They controlled all their activity, among the universal law of the living. During the 19th and 20th centuries, and mainly after 1945, the seed sector has been constructed between laboratories and fields dedicated to seed multiplication. It has been a complete overhaul for peasants. In this race for modernity, they lost their seeds and their autonomy. The nature of their activity changed a lot. They were peasants. They turned to be farmers, agricultural exploiters, and even now agri-managers. In the process, they became simple seed users.

Two main strategies, promoted by the State and the private sector, supported the monopolization of the seed in France: the technological strategy and the regulation strategy.

The technological strategy.

The Second World War created in France the need for reconstruction and national recovery : planning and modernization were the two principles used to orientate the building of the seed sector during the second half of the 20th century. The promoted varieties had to be efficient on every soil. Seed, this grain of life, tool of human food, became a « modernization machine » in any standard environment.

Pure lines seeds

Seeds, therefore, had to become a controllable tool. This is why the French National Institute of Agronomic Research, INRA, created in 1946, started the creation and promotion of « stable » varieties. Pure lines were designed so that the crop yield would be known exactly beforehand, as long as farmers used the same variety. The maximization of the yield was the objective. And in fact, the numbers proved that the pure lines were efficient in achieving this goal. For example, tender wheat was developed with better baking strength. Thus, French wheat baking strength has been multiplied by two within the second half of the 20th century. With pure lines, the expected "genetic progress" started.

Hybrids

However, it is the introduction of hybrids in our agriculture that really confirms the technological strategy of private and public seed research. Contrary to the United States, it has been much later and tougher in France. In fact, hybrids F1 invaded French fields after the Second World War, when they had already spread throughout United-States a few years previously. This time gap offered the opportunity to France to assess these new modern « seeds », which had high production costs and obliged farmers year after year to get new seeds from the market. They contributed to increase farmers' dependency. Nothing could suggest then that hybrids would benefit French agriculture. On the contrary, hybrids were considered as the « Trojan Horse of a merchant economy in a peasant economy until then autonomous". (Bonneuil, Thomas, 2009, p. 198). However, it was not the American giants who invaded the French seed market and our farmers' fields. French public research itself did. With the INRA, it undertook hybrids promotion during its modernization period. The maize hybrids F1 became the models of modernity. They were supposed to help and prove the successful recovery of French agriculture. In 1949, a propagandist campaign was launched by the French government to strongly encourage farmers to adopt the hybrid maize: « Increase your maize crops ! Sow hybrids! Your interest depends on it… ». (Bonneuil, Thomas, 2009, p. 199). Farmers ended up accepting these « modern seeds ». At the end of 1950's, hybrids F1 had settled in France.

Orienting its research towards the creation of stable, pure and almost sterile varieties, the French government industrialized agriculture. Specialized companies were necessary to produce these modern seeds. Farmers became simple producers, sowing the seeds stemming from the market. Seed companies developed, and progressively monopolized seed breeding, with the support of a new regulation system.

The regulation strategy

The development of strict regulations progressively sectorialized the farmer to its simple function of agricultural production. In fact, in order to be able to commercialize a seed, it is required to get it subscribed and certified.

Subscribed varieties

A subscribed seed is a seed registered in the Official Catalog, from France or from the European Union. To get the subscription, the variety of the seed must meet the specific criteria of Distinction, Uniformity and Stability (DUS). Distinction refers to the unique characteristic of the variety, compared to others. Uniformity requires a strong similarity among plants of the same variety. Stability demands that the plant's characteristics stay the same crop after crop. This subscription is granted by the Permanent Technical Committee of the Selection of Seeds and Plants, (CTPS), created in 1942. Through the control of the three criteria, this public organization ensures the fixing paradigm of the variety.

Seeds must also meet the Agronomic and Technological Value criterion (VAT). This one is used to assess the "genetic progress" of the variety compared to other varieties famous for their high performance. It is based on criteria such as yields, use value or yields regularity factors. Progressively, new varieties replace previously created varieties, according to technical progress. A decree passed in 1960 imposed the radiation of varieties from the Official Catalog that were "outmoded". Even though private breeders opposed this law, that imposed a very sustained pace for seeds improvement, the Ministry of Agriculture and the National Institute for Agronomic Research managed to get the law passed.

Concerning seed breeding, requirements are strict, and so are the costs. In order for a selected variety to be registered and sold, the breeder must pay a big amount of money: 15 000 € for 10 years for big crops and 10 000€ for vegetable species. This requires producing seeds in very high quantities, to absorb subscription costs. As a consequence, the investment needed for plant breeding and production became very onerous.

Certified varieties

Not only is the breeding controlled, the production is as well. Commercialized seeds must be certified by the Official Service for Control and Certification (SOC). It checks the quality of products in seed production companies and with seed multiplier farmers, according to the rules of the Ministry of Agriculture.

Intellectual property rights

This is why, to protect varietal innovations and to recognize breeders' work, a system of intellectual protection was created by the Union for the Protection of Plant Varieties (UPPV), founded in 1961. It is the Plant Variety Right (PVR). Delivered by the Geves, a branch of the Permanent Technical Committee for seeds and plants Breeding (CTPS), the PVR is an alternative to a patent since it protects the product of the research and not the process, or genes included in the variety. It has thus the advantage of preventing firms from monopolizing genetic resources discovered in nature, or in farming communities' stocks. However, it doesn't oblige the breeder to communicate the details of the breeding.

In the early 1960's, while the PVR was created, farmers could still preserve their right to sow seeds stemming from their own crops, saved-farm seeds, les semences de ferme. Few years later, in 1970, a new UPPV convention considered the use of farm seeds as forgery. In theory, it became illegal to save and resow its own seeds. Fortunately, tolerance was prevailing and saved-farm seeds remained a "farmer privilege". In 1991, the 3rd UPPV convention tried to forbid farm seeds. France, faced with the amazing mobilization of organizations defending farmers' rights to sow their seeds, proposed to authorize saved-farm seeds, with the condition to pay a tax. Finally, the French government decided to keep the law of the PVR 1970. A few years later, the European Economic Commission itself adopted the law, with the French provisions. Since 1994, according to the European legislation, saved-farm seeds are authorized for 21 varieties under the European PVR with the condition to pay a tax. For the other species, every farmer who would plant seeds stemming from its past crops could be accused with forgery. In France, two systems are working: the French PVR of 1970 (reformed recently in 2011) and the European PVR. Seed breeding was intrinsic to farmers' activity. It became a privilege, and then finally considered as forgery. It is a progressive privation of farmers' rights.

Regulated access to seeds breeding and selection

Consequently, for seed breeding companies, there are advantages in specializing in vegetable innovation, since the created seed is protected. To get a monopoly for a seed delivered on the market, where every farmer goes to get its seeds, is a great advantage. However, access to breeding was becoming more and more difficult, despite being part of farmer's activity. The CTPS created a card delivered to peasants who applied to be professional breeders in 1955. They had to answer some very demanding criteria: reserving 5 ha to seed production, not being a miller or a baker, and to have sufficient tools. Many peasants were refused their breeder card. The method was too direct and tough to digest for farmers. Subsequently, the conditions for seeds selling were selected to regulate in an indirect way the access to seeds and plants breeding. The decree of the 11th of June 1949 made the registration to the Catalog a condition to sell seeds. But, as mentioned earlier, DUS and VAT criteria were very demanding and made a very important selection between seeds, and so breeders, that can have access to the market, and those who must to give up this ambition. Between 1950 and 1960, half of the demands for the subscription of a variety to the Catalog were refused. (Bonneuil, Thomas, 2009, p. 93) Many peasants chose then to delegate seed breeding and seed production to private firms. Thus, the law system has been conceived so that the monopolization did not appear as forced, but as a compromise with farmers.

An unfair system conceived by professional breeders for themselves

The result of this regulation and technological strategy is the promotion of a strong private seed sector. Private seed companies spread out on the market, and managed to defend their interest, with the support of the public sector. The CTPS selects potential varieties for the Official Catalog and controls in this way French agriculture. Since it is composed of private and public researchers, it is the illustration of public and private partnership in the orientation given to the seed sector. However, the private sector is leading the sector more and more. Public interest is becoming second. What matters are not farmers' rights or healthy food, but private companies' interests. Jean-Pierre Despeghel, research leader for oleaginous plants in Europe-Monsanto, explains that what motivates him in his vocation is « among many things, freedom to create. The breeder is free of his choices ». (http://www.gnis-pedagogie.org/pages/vocation/temoignages.htm) On the other hand, farmers, as far as they are concerned, have lost their capacity of choice.

Freely the private sector gives the temperature of French agriculture. They create what they call "biodiversity", a way to monopolize French fields, French food, and French environment. On the contrary, farmers, descendants of generations of autonomous peasants, are simple producers, users of seeds that they don't control anymore. The savoir-faire is not transmitted anymore from one generation to another. Speeches about farmers discredit their competences. All this contributes to discourage farmers getting involved in breeding activities and in defending peasants' practices and knowledge. During a colloquium organized in February 2012 for the anniversary of the PVR, one of the people attending asked what farmers could really bring to research in vegetable breeding. The National Seed Interprofessional Grouping of Seeds and Varieties (GNIS) explained on its website « the conservation of genetic resources requires technical competences that overpass farmer's job ». (GNIS, in Guillet, 2009, p. 14). Nevertheless, it is too easy now to affirm that farmers are simple seed users without proof that he cannot participate in the breeding activity.

This presentation, partly historical, of the seed sector, underlines the complexity of a system that has progressively escaped the control of peasants,. Of course one could say that demand determines offer. In that case, peasants should stop buying the market seeds, if they don't fit their needs. However, the offer is poor. Distinction, Homogeneity and Stability criteria, created clone seeds. Above all, the seeds and plants market is dominated by few multinational companies only. Few seed companies are dominating the sector in France. Limagrain is the first French seed company, and the 4th one at the international level (after Monsanto, Pioneer and Syngenta). It is the illustration of the monopolization of the seed, and consequently of agriculture. The company bought the big vegetable seed companies Vilmorin, Clause and Tézier, Limagrain imposed itself as the second international leader in vegetable seeds, proving the positive effect of concentration. Plus, it focuses on wheat, and hopes to control the sector, from seeds to consumers' plate. This is why it is a shareholder of huge companies specialized in bakery for example. And last but not least, it is starting GMO tests in France, but also in the USA and in India. The financial weight Limagrain got through its domination of the market offers it a political impact. It is developing partnerships with the public sector to lead research on bio-technologies and promote GMOs in France, as well as all around the world. (Abatzian et al, 2009, p.13) Policies are not representing citizens' choices anymore, but the interest of few big companies, more interested in getting the advantages over their American competitors and making profits.

A WORRYING PRESENT

If the strict regulation of the seed sector is worrying, a certain freedom has been left to farmers. The State used to tolerate peasants' practices, while developing seed regulation. This is how the practices of some "irreducible Gaullois" continued peasant breeding, la selection paysanne, and the culture of ancient varieties. As mentioned, farmers could sow their own seed, illegally, but without repression from the State. Tolerance preserved peasant autonomy. But the situation threatens to get worse. Nowadays, farmers must face many new challenges that put at stake their remaining freedom.

The law on PVRs from December 2011

A bill passed in December 2011 in France confirmed the will to dissuade farmers from re-sowing their own seeds. Farmers would be authorized to sow saved-farm seeds of 21 species (tender wheat has been under this legislation since 2001), in exchange of the payment of a tax to seed companies, who created the variety. It is actually the reform of the French law of 1970 according to the regulation of the UPPV of 1991. This new law concerning the Plant Variety Right (PVR) represents an attempt to farmers' privilege, its right to re-sow its own seeds. Till now, half of cereals were obtained from saved-farm seeds, illegally, but with justice's tolerance. With this law, control would be strengthened and the obligation to pay the use of saved-farm seeds applied. It is thus a real tax, but presented as a contribution to private research financing. However, the way to implement it is still debated. This is why until now, no decree confirmed the application of the law. Different taxing methods are explored. For most of the 21 species, the Compulsory Voluntary Contribution would be selected. However, this taxing method is complicated and hard to foresee. As a start, what does "compulsory voluntary" mean? With its very name it is hard to believe this 'contribution' is respectful towards farmers. Indeed, it is voluntary for the inter-profession which negotiated it, and compulsory for peasants.

Since it was created, the PVR has been promoted as an alternative to the patent, but this bill comes erases an important distinction between both of them: the obligation to pay royalties. Plus, with the rising cost of seeds, the threat on farmers' autonomy becomes stronger. Unfortunately, or fortunately, this raises the issues of intellectual property rights, financial speculation, and farmers' rights in public debates.

The GMO threat

France was well-known for its resistance to GMOs crops in its fields. The culture of GMOs is not allowed in France, despite the European welcome of transgenic crops. The GMO Mon810 is very indicative of this French attitude of precaution concerning GMOs. In 1998, the European Union accepted the culture of GMO maize seeds Mon810. However, France decided on a moratorium to suspend this authorization, until proof is given that these GMOs are harmless. Even though it is not a strict interdiction, France showed its preference for precaution. However, the resistance to GMOs crops in France was at stake again last winter 2011. The Conseil d'Etat (the highest administrative jurisdiction in France, advising the Government as well as the Parlement on bills and laws) assessed there was not enough proof of the risks of GMOs Mon810 and decided to cancel the moratorium of 2008. The GMO threat was coming back. It was a first success for big seed companies in getting the authorization to create and sell GMO seeds. Besides, the same day, in the afternoon of the 28th of November 2011, the bill on Plant Varieties Rights was passed in the Assemblée Nationale. The French seed companies Union (with Bayer, Limagrain, Monsanto, Pioneer, Vilmorin, or Syngenta) had managed to defend their need to get more financial resources for their research through a "fair" return on their creation: the compulsory voluntary contribution. Companies promoting GMOs and companies defending the PVR were the same. It is so easy to believe that farmers were supposed to participate "compulsory voluntary" to the promotion of GMOs in our French fields. Fortunately, the opposition of the civil society and the precaution of French politics enabled the reinstitution of the moratorium. However, a moratorium is only a suspension of right. The complete interdiction to cultivate the genetically modified crops Mon810 is still expected.

Besides, even though GMO crops in France are not cultivated, apart from tests, their consumption is authorized. The problem is the definition of genetically modified crops to determine what can be sold and what cannot be sold. If this regulation needs to improved, new arrangements of the law widened the information to give to consumers. For example, meat from animals fed without GMO grains can get the "without GMO" label since the 1st of July 2012. Despite these precisions, it remains important continuing the identification and the fight against GMOs.

Organic farmers: first victims of the regulation system.

Another problem, more permanent, is the legislation on organic farmers. The strict regulation of organic agriculture is hard to handle for farmers, especially concerning their use of seeds. Indeed, organic farmers would be the first to be interested in traditional seeds, adapted to local environment. In fact, they require strong plants that can resist climatic conditions and predators. Since peasant seeds, cultivated for many years on a peculiar soil, develop a resilience capacity, they meet the criteria of organic agriculture. On the other hand, commercialized seeds are conceived to be cultivated in any environment homogenized with chemical inputs. Commercialized seeds are much more sensitive, and do not fit organic agriculture conditions. Nevertheless, organic farmers are also the one who face the strictest control. In fact, to get the recognition of their organic practices (with the label AB, Organic Agriculture, for example), they have to justify the origin of the inputs, such as the seeds, that they are using. Since 1995, seeds destined to organic agriculture must be produced without GMOs and within the organic agriculture conditions. It is necessary to certify the use of those seeds, proving they are from organic origin (only some crops not much in demand are not available on the organic seeds market. Farmers can ask for derogation and buy conventional seeds for those crops). Since farmers are so obliged to communicate the origin of their seeds, and cannot take the risk to use illegal seeds, organic farmers cannot benefit from the tolerance of the law concerning saved-farm seeds. It is a very important issue in the debate about the regulation of the seed sector. Plus, a growing number of farmers are converting to organic agriculture in France. Thus, this critical situation affects more and more peasants.

It is when the situation progressively worsens that problems start worrying the population. In these times, when things are difficult, we need to explore alternatives. This is what reality confirms. Since a few years, farmers and citizens have started to challenge the threats against biodiversity and farmers' rights. Protesting and creating alternatives, they bring some optimism for the future of seed in France.

LET'S SOW OUR FREEDOM!

The reinforcement of the European regulation concerning organic seeds in 2002 created in France a large movement of protest that arose on the issue of free seeds. Meetings were organized in February 2003 between peasants, researchers, sociologists, etc., to defend farmer's seed breeding. The event gave birth to the "Semences Paysannes", "peasant seeds". The Peasant Seed Network, le Réseau Semences Paysannes, was also created. The objective is to bring together organizations working for the promotion of "free seeds".

The Peasant Seeds Network is today composed of some sixty organizations and individual farmers. It helps its members present their points of view, their experiences, to share seeds, and to organize common trainings. These activities provide the movement with a platform that enables peasant seeds to be seriously considered. Organizations divide themselves into working groups according to geographic areas, species, and everyone's needs. They then work on bringing back specific species, or simply on traditional varieties that could interest local farmers, and promote their culture.

Public seed banks.

Farmers can get traditional varieties from old peasants' granary, or from public seed banks. Indeed, public research realized the importance of biodiversity conservation as a genetic patrimony. Some systems to preserve this vegetable richness have been implemented since the 1960's. For example, the most important French seed bank was created within the National Institute for Agronomical Research of Clermont-Ferrand. More than 10,000 different varieties of wheat, of which 4000 are from France are preserved there. However, the lack of financial resources and of a real political will to preserve seed biodiversity make those preservation programs imperfect. To stock and to ensure seed quality is very costly. This is why a selection is made between those traditional varieties. Recently, about 700 oat varieties have been thrown away, after having been judged without interest. Even though public seed banks can send seeds to gardeners that ask for them, they do not participate in the promotion of a dynamic management of the varieties. Their aim is to preserve varieties in the form they have been discovered, stocking them in freezers, and cultivating them every few years, so that they keep their fertility. Plants do not adapt to the evolution of climate and agricultural practices.

Fortunately, the public sector also helps the preservation of traditional seeds through the Regions. Regional nature parks launch local biodiversity research and promotion programs. For example, the Regional nature park of Queyras, in south-east France is famous for its involvement in the Réseau Semences Paysannes. Also, in the northern region Nord-Pas-de-Calais, the Regional Genetic Resources Center (CRRG) works on finding back ancient local varieties, often after having been contacted by farmers. This Center leads bibliographic research and field tests to define the characteristics of the variety. When the CRRG assesses that the variety is of interest concerning its yields, its quality, and should find a demand on the market, it can help farmers financially and legally to get their varieties registered and have legal access to the market. These public organizations work on the construction of a seed bank and on the promotion of local varieties. They are invested in conservation projects that are much more dynamic.

All those public initiatives that are developing are essential. However, in their framework, French farmers' autonomy stays limited.

Our peasant seed banks

This is why, the "Maisons de la semence", Houses of the Seed, have been emerging over the last few years. They are seed banks managed by farmers themselves, in partnership with researchers, and the support of citizens who are sensitive to this new peasant dynamic.

Till now, saved farm seeds and traditional seeds were exchanged in an informal way between neighbors, or even between farmers from different regions of France. However, they lacked a real space where to gather, stock and test the varieties bred, cultivated, and improved by farmers. More than a space, these "maisons de la semence" are a concept. They represent all the human interactions involved in seed conservation. They create social links, nourish everybody's motivation and support exchanges and the enrichment of the savoir-faire.

Participative breeding in France

Many foundations are developing for a more participative research and a more democratic science. One of the issues they focus on is peasant seeds. The Citizen Sciences Foundation for example works at enlarging the access to science and defends farmers' participation in seeds and plants breeding. The idea is to think of farmers as scientists who can participate in research program because they have another very rewarding knowledge about farming. Moreover, public research is evolving towards widening its experimentation fields and its contributors. A number of researchers in the National Institute for Agronomic Research are now working on a peasant breeding project, in partnership with farmers, sociologists, economists, and citizens. This is participative breeding. A few programs have been implemented within this new scientific framework. For example, the INRA and the members of Triptolème, an organization of the Réseau Semences Paysannes, gathered within the PaysBlé project. The aim of this project is to « experiment, maintain and promote the diversity of wheat varieties cultivated on soils of Bretagne with organic agriculture ». With public financing, farmers and bakers work together with scientists and integrate sciences and seed breeding. They bring back local varieties, cultivate them in small quantities to multiply them and to adapt them to the environment. Finally, they define precisely the characteristics of the varieties. In the Pays de Redon, in south Bretagne, a collection of 330 wheat varieties is conserved in a dynamic way in the baker-farmers' fields of the area. Contrary to the simple use and reproduction of peasant seeds, the Paysblé project involves peasants in a real research activity, successfully. It is very notable proof that a more democratic research is possible!

Demonstrations and petitions to defend peasant initiatives.

In parallel, many demonstrations and petitions are taking place since the 2000's to support the semences paysannes. In 2004, a petition campaign launched by the Réseau Semences Paysannes demanded the State to facilitate the commercialization of organic and conservation seeds. The seed issue is thus progressively being integrated into the public sphere of debate. A new campaign « let's sow biodiversity »,has recently begun for the signing of a petition concerning the law on PVR of December 2011. This cyber-action gathered a little less than 20,000 signatures, showing citizens' sensibility to the issue. Even though the bill was voted, the strong mobilization of farmers and of the civil society seems to be delaying its application. Mobilizations are extremely important to show the concern of citizens about seed issues. Seeds are not reserved for scientists. They are political issues that must enter the spheres of public mobilization and debate. We can hope this new awareness movement and the alternatives it encourages will spread in the next few years.

PROGRESS?

All these initiatives are creating a positive dynamic among farmers and citizens involved in these movements promoting peasant autonomy. However, their development remains limited by the legal framework that does not recognize the extraordinary value of peasant seeds. The regulation system needs to be reformed. Indeed, the actual evolution of the law to meet alternative peasant practices is not satisfying. The orientation it takes does not support farmers' autonomy as it should do.

The evolution of French regulation.

Mobilizations and alternatives in favor of seed freedom and seed diversity supported the government to adapt the law to the new needs of farmers, consumers and of the environment. Consequently, French regulation has tried to evolve. Unfortunately, the reform of the French law concerning seeds may prevent varieties from disappearing, but it doesn't support farmers' rights.

Recently, seed regulation evolved to inscribe ancient and local varieties in the Catalog.

In 1997, the Official Catalog opened a register for « ancient varieties for amateur gardeners ». An order of 1997 authorized famous varieties to be commercialized to amateurs who will cultivate them for their own consumption only. But have we forgotten what « amateur » originally means? It is "the one who loves", and farmers do love their plants, as much as gardeners.

A few years later, in 2008, the European directive which established a register for « conservation varieties » was transposed in French legislation. Disappearing varieties could be registered in the Catalog for a much lower cost than for conventional varieties and with less strict criteria. But their diffusion remained limited to the original region of the variety. In 2010, the French register for conservation varieties was improved. It is now divided in two: a list of conservation varieties and a list of varieties without intrinsic value. The subscription criteria are widened and adapted to new agricultural practices, including organic agriculture. But many problems remain. The diffusion of conservation varieties is still very limited. It meets only the conditions for the commercialization of one variety, whereas farmers exchange a lot of their seeds among themselves. Finally, it concerns only vegetable varieties, since the National Inter-Professional Association for Seeds and Plants assesses the demand of ancient and/or local varieties is not important enough to start reforming cereal seeds' regulation. Yet, some associations such as Triptolème work on preserving, cultivating and adapting peasant wheat varieties to their needs and to their soils, sometimes fighting law barriers.

These few reforms undertaken by the government are indicative of the possibility to change laws and the system whenever citizens, organizations demand for it. However, the measures mentioned cannot give peasants any satisfaction. The Catalog is not adapted to peasant seeds, based on their continuous evolution (and not their stability) with rich interactions among famers. What is necessary is a new conception of the Catalog that would exclude peasant seeds. Free seeds need their own regulation that protect and promote their development.

Baumaux vs Kokopelli: the seed freedom condemned.

Unfortunately, the legal issue of Baumaux Company versus Kokopelli is indicative of the deadlocked position of the legal system. Whereas the trial enhanced the interest of peasant seeds at the European level, the European Court of Justice condemned seed freedom.

Kokopelli is an association created in 1999 in France. It focuses on seed and humus liberation as well as the protection of food biodiversity. In total, more than 2200 varieties are conserved and cultivated by Kokopelli. Among them, 1700 varieties are destined to commercialization, with the majority produced by organic French farmers. However, most of them are sold illegally. In fact, they do not meet Distinction, Homogeneity and Stability criteria and/or the organization do not have the necessary financing to register them in the Catalog. But these statutory bolts did not dissuade Kokopelli, more focused on farmers' rights, to give access to most of its saved seeds. Consequently, the commercialization of illegal seeds conduced Kokopelli in front of the Nancy Court of big authority in 2005, after Baumaux Company and the Repression of the Fraudes (State) complained. They accused Kokopelli with unfair competition and commercialization of non-authorized seeds. The organization refused its condemnation to pay a 10 000€ fine and appealed to the Court of Justice of the European Union, to question the constitutionality of the French legislation. Last January 2012, the ECJ communicated its opinion on the issue. According to the general lawyer of the ECJ in charge of the case, the condemnation did not respect the principles of proportionality, freedom of company and free circulation for Community goods. These principles seem to be more legal tools used in fact to support farmers' freedom to choose their own seeds, and to benefit a large choice of healthy seeds. These conclusions brought hope for peasants and organizations that encourage continuing defending "free seeds", even facing legally the French State.

However, on the 12th of July 2012 the situation reversed. The ECJ explained in its decision that the interdiction to commercialize diversified seeds does not conform to the objectives of the European law. According to the judges, peasant and traditional varieties do not meet the objectives of agricultural productivity, and could be registered in the Catalog for conservation varieties. But their arguments forget the specificity of peasant seeds. They are not simple goods. They are the diversity of the living and their intrinsic value need a specific regulation system. This legal affair could have demonstrated the limits of the regulation system, but the European judges decided it wouldn't be so. The seed market won again.

There is an obvious empty legal space concerning peasant seeds and it would be logical that the tolerance of the law prevail in this space to help peasant seeds to spread, without legal limits. Farmers have rights and they should benefit theirs rights to save their seeds, exchange among them this patrimony and enrich biodiversity. Progress is lacking but is feasible. It is our responsibility of all of us now to lead them.

Conclusion

There was a time in France when farmers used to sow their own seeds, adapting them to their environment and enriching local biodiversity. There was a time when farmers were autonomous, and when they controlled their activity.

There was a time farmers lost their seeds and the knowledge to save their seeds, to breed them and to produce them. They lost their autonomy, to the benefit of big private companies.

It is the time now for farmers, researchers and citizens to create alternatives to recover their autonomy and to preserve seed biodiversity and seed freedom.

This story of seed in France makes us realize that everything is possible if we fight for it!

The seed issue concerns us all. It is about our food sovereignty, about our freedom, about our environment. For Guy Kastler, seeds spokesperson of Confederation Paysanne, « if today we are prevented from re-sowing our own seeds, tomorrow we will be prevented from giving birth » (Conference of 2nd of February 2012 at the Nationale Assemblée). The seed issue is a society debate, a debate that is deeply political and must involve us all.

In 2002, a campaign organized by Friends of the Earth gathered farmers unions and students organizations with this slogan: « Students, support farmers from the world ». Ten years later, it is as a student that I am supporting farmers, seed biodiversity and seed freedom.

Now, let's all give an echo to our citizen voices!

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KOKOPELLI ASSOCIATION VERSUS GRAINES BAUMAUX COMPANY

Blanche MAGARINOS-REY*

Association Kokopelli is a non-profit organisation based in France. Founded in 1999, the organisation has been involved in the preservation and distribution of organic, open-pollinated seeds of heirloom varieties. However, the activities of Association faced serious threats from other market competitors who used European Union Directive on Marketing of seeds to hamper the free exchange of endangered seeds.

In the year 2005, the seed company Graines Baumaux, issued a writ against the association Kokopelli at the civil court of Nancy, France on the basis of 'unfair competition'. Both Graines Baumaux and Association of Kokopelli were operating in the sector of old or collectors' seed varieties. Of the products which they were marketing, 233 were identical or similar, and that they were supplying the same customers (amateur gardeners) and were therefore competitors. It is, therefore, considered that Kokopelli was engaging in acts of unfair competition by selling vegetable seed which was neither in the French catalogue nor in the common catalogue of varieties of vegetable species. This is against the European Union Marketing Directive, which insists that the vegetable seeds must be listed in the official catalogues for the member states before it is marketed.

According to the European Union directive, a seed variety should be accepted and included in the official catalogue of the one or more Member States prior to its marketing. A variety is, moreover, accepted for inclusion in the official catalogues of the Member States only if it is distinct, stable and sufficiently uniform. This directive hugely restricts the marketing of old or collectors seed varieties within the Member States.

By filing the case against Kokopelli, Graines Baumaux – a company with an annual turnover of 14 million Euros - was claiming that the activity of the Kokopelli is harming the latter's sales by causing prejudice. The company thus demanded for a compensation of 50,000 Euros even though any evidence for the loss caused by 'prejudice' was not produced in the court. However, the tribunal granted a compensation of 10,000 Euros to Graines Baumaux on 14 January 2008.

Association Kokopelli decided to appeal against this judgment. At first Kokopelli fought the lawsuit against the accusation of 'prejudice' and the compensation Baumaux was claiming. However, after much deliberation, the organisation decided to question the validity of the European Marketing Directives which curtailed the right to trade seeds freely.

The Court of the European Union (or the Court of Justice) is the only legal body empowered to invalidate the text of European Marketing Directives. In order for the case to reach the Court of European Union, the Appellate Court of Nancy had to accept that the validity of this legislation was subject to doubt. Kokpelli presented several arguments to convince the Appellate Court of Nancy. The organisation pointed out that the freedom to produce and distribute seed is denied by the present system which insists that all seed distribution must be submitted to prior authorization for marketing. It initiated an expensive and time consuming procedure. In fact, this procedure will not ensure any benefits in terms of health or environment. Instead, it ensures that only a limited number of big companies have the access to market.

Such a system is totally inappropriate to achieve the stated objectives, ie, ensuring fairness in commercial exchanges and quality of the seeds. A procedure asking for a prior declaration, followed with a posteriori control, or even simple sanctioning measures in case of obvious deceits regarding the commodity, would meet the objective. This would also be in line with the Principle of Proportionality which states that "the charges imposed on economic operators do not go beyond what is strictly necessary to achieve the objectives that the authority is bound to fulfill".

Kokopelli also argued that the recent directive (No 2009/145, 26th November 2009) regarding varieties “which are threatened of genetic erosion”, violates the principle of equality which demands that “different situations be treated differently”. In fact, this directive which aims to favoure the production of endangered seeds, considerably limits their sale through geographical and quality restrictions, so that these seeds were unable compete in market with the modern seeds. Thus the directive contradicted the principle of equality and condemned these endangered varieties to disappearance. Moreover, the ban on cultivation and distribution of endangered seeds beyond their “region of origin” contradict the principle of free circulation of seeds within the European Union territory.

Through an order, dated 4th February 2011, the Appellate Court of Nancy acceded the submission of the case to the Court of European Union. The arguments presented before the Court of European Union by Kokopelli were similar to those presented before the Appellate Court. On the 19th January 2012, the Advocate General of the Court of European Union, Ms Julianne Kokott, accepted the arguments of Kokopelli.

In fact, the magistrate arrived at the conclusion that the ban on marketing of seeds belonging to a variety which is not registered in the official catalogue, imposed by European legislation as well as by the French regulation, violated the principle of proportionality, free enterprise, free movement of goods as well as the principle of non-discrimination. Moreover, the Advocate General affirmed that the rules regarding the inclusion of seeds into the official catalogue have “ no bearing whatsoever with the health of the plants” and “ it is up to farmers to decide which varieties they will cultivate“. She also agreed that the legislation excessively curtails the choice of consumers who have “no access to food items or other products coming from varieties which do not conform to the criteria for inclusion, nor the possibility of themselves to cultivate these varieties, for example in their own garden.” The Advocate General also reminded “that if the farmers have access only to a limited number of varieties, it will gradually cause the reduction of genetic diversity on European fields.”

However, in its verdict on 12 th July 2012, the Court of Justice of the European Union rejected Kokopelli’s arguments and upheld the European Legislation regarding the marketing of seeds. The Court justified the ban on the marketing of ancient varieties of seeds on the basis that it ensured “increased agricultural production”. This expression, which is used 15 times in the Court’s decision, affirmed the powerful influence of yield driven cultivation models.

The Court, in its verdict, has mentioned the regulations introduced through the 2009/145 directive regarding “conservation varieties”. However, the judges failed to notice that the conditions for registration of conservation varieties in official catalogue remain all most identical to those for the normal seeds. The homogeneity(or uniformity) criterion, a prior condition for the inclusion in the official catalogue, is particularly problematic for ancient varieties.

The Court also mentioned that the legislation will stop “the planting of seeds which are potentially harmful”. This remark is totally wrong as, the Advocate General rightly pointed out, the registration to the Catalogue will not ensure the protection of the consumers against potential health or environmental risks. The remark is also shocking considering the fact that the seeds in the Catalogue- coated with pesticides like Cruiser and Gaucho or accompanied by kits of deadly chemicals - have been poisoning the people and environment for more than fifty years.

Misuse of the brand name “Kokopelli tomatoes” by Graines Baumaux

Apart from the above mentioned case, Graines Baumaux has violated the right of the Association by misusing its brand name. On page 490 of its Spring Catalogue-2010, Graines Baumaux listed 15 tomato varieties under the brand name ‘Kokopelli Tomato’. This move by Graines created confusion among members, clients and sympathizers of Kokopelli Association. According to information obtained from the National Institute of Intellectual Property Rights, the registration of the brand “Tomato Kokopelli” by Baumaux dates back to 31st October 2007. Since ‘Kokopelli’ is a well established brand name, this registration could constitute to an act of counterfeit, which is a penal crime punishable with four years imprisonment and a fine of 400,000 Euros.

Conclusion

The Association of Kokopelli, which has been passionately trying to preserve the European seed heritage for the past two decades, might not be able to continue its activities in the existing situation. In this context, Kokopelli appeals to the European governments to implement the following change in the legislation regarding the marketing of seeds.

‘The present Official Catalogue is exclusively designed for varieties protected by Intellectual Property Rights. The Association Kokopelli demands that the heirloom and cultivar seeds, which belong to the public domain, should be excluded from the European Union Marketing Directive which makes the acceptance of seed to the Official Catalogue mandatory prior to the marketisation.’

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Details of EU verdict

The Court finds that the primary objective of the European Union Directive on Marketing of seeds is the improvement of productivity of the vegetable cultivation in EU. As a means of guaranteeing increased productivity in cultivation, the establishment of a common catalogue of vegetable varieties on national basis is necessary.

Such an acceptance regime, which requires the seed of vegetable varieties to be distinct, stable and uniform, allows appropriate seed to be used and, consequently, agricultural productivity to be increased, on the basis of the reliability of the characteristics of the seed. Furthermore, the acceptance regime contributes to the attainment of the second objective, which is to establish the internal market for vegetable seed by ensuring its free movement within the EU.

Such a regime ensures that seed marketed in the various Member States will satisfy the same requirements. In addition, the derogating acceptance regime implemented for 'conservation varieties' and 'varieties developed for growing under particular conditions' is capable of guaranteeing the conservation of plant genetic resources – the third objective covered by EU law.

Thus, the Court rules that the acceptance regime for vegetable seed does not go beyond what is necessary to achieve those objectives. The requirement of listing in the official catalogues and the related acceptance criteria ensure that seed of a given variety has the qualities necessary to ensure a high level of agricultural production that is of good quality, reliable and maintained over time. In those circumstances, and particularly in light of the broad discretion which the EU legislature has in the area of the common agricultural policy, it could legitimately take the view that other measures, such as labeling, would not enable the same result to be achieved. A less restrictive measure, such as labeling, would not be as effective, since it would allow the sale and, therefore, the sowing of seed that is potentially harmful or not conducive to optimum agricultural production. Therefore, the principle of proportionality has not been breached.

Next, the Court observes that the directives at issue take into account the economic interests of traders, such as Kokopelli, who offer for sale 'old varieties' that do not satisfy the conditions for inclusion in the official catalogues, in that those directives do not rule out the marketing of such varieties. Admittedly, geographical, quantitative and packaging restrictions with regard to seed of conservation varieties and of varieties developed for growing under particular conditions, but those restrictions nevertheless fall within the scope of the conservation of plant genetic resources. The Court observes that the EU legislature was not pursuing the liberalisation of the market for seed of 'old varieties' but was seeking to ease the rules of acceptance while preventing the emergence of a parallel market for such seed, which was likely to constitute an impediment to the internal market for seed of vegetable varieties.

(Source: http://curia.europa.eu/jcms/upload/docs/application/pdf/2012-07/cp120097en.pdf)

Impact of the ruling

Current seed regulation has meant that many once freely available varieties have disappeared along with the useful traits that breeders and growers may wish to utilise in the future. The decision to rule against marketing these seeds mean that once again many varieties will not be available and many more will be at risk. "The EU seed legislation still handicaps the marketing of traditional varieties that could be grown on European fields and favours homogeneity and large scale breeding. The European Court of Justice has failed to respond to the concerns of seed savers across the EU." Says Antje Kölling, policy manager of IFOAM EU Group

"A diversity of domestic plants is the basis for our long-term food security. Climate change, emerging plant pests or even new allergies may require us in the future to use plant varieties that we do not necessarily consider important today, due to their specific genetic characteristics", adds Antje Kölling. "The FAO estimates that 75 percent of domestic plant varieties globally have been lost in the last 100 years. This trend must be urgently be reversed."

The EU is currently revising its seed marketing legislation - it must finally facilitate market access for traditional varieties and farm bred varieties. Moreover, the EU needs to set a framework for the marketing of open-pollinating varieties with a broader intra-varietal genetic diversity that is professionally bred. These are varieties with increased resilience to changing environmental conditions, which many organic farmers and farmers producing special qualities want to use and which all farmers may need in the future to address specific local conditions.

(Source: http://www.ifoam.org/about_ifoam/around_world/eu_group-new/news/pdf/120712-IFOAMEUPR-seed-laws.pdf)

COLLECTIVE FOR ALTERNATIVES TO BIOPIRACY

France Libertes and Réseau Semences Paysannes*

Biopiracy - everybody is concerned

Biopiracy is a reality for numerous women and men around the world. When a French peasant is forced to pay royalties to Monsanto in order to be allowed to sow from his own harvest, when a South African healer is no longer allowed to sell from his stall his locally produced cough syrup, made with a family recipe, when an Amazonian shaman witnesses the plunder of his people's ancestral knowledge by a pharmaceutical firm, biopiracy is the issue. International firms privatize and monopolize peoples' knowledge and nature's resources, preventing local and reasoned management of resources (in order to fulfil their objectives of profit).

There is an urgent need to fight against biopiracy, where it generates deep inequalities, in our countries and in the Southern countries. The Collective for alternatives to biopiracy, founded in 2008 by France Libertés, Paroles de Nature and ICRA (International Commission for the Rights of Aboriginal people), is building an international network of mobilisation against the privatisation of seeds, plants and traditional knowledge. The coordination of our activities as a collective at the international level is fundamental to identify cases of biopiracy in the country where the resource and knowledge originate, but also in order to lobby against firms in countries where their headquarters are located. This is the core objective of our network. (www.biopiraterie.org)- synthesis documents in four languages French, Spanish, English, Portuguese are available).

Action fields

Awareness

The Collective heads an important communication and advocacy activity to make known the issue of biopiracy in the public space and to increase the mobilisation of civil society on this topic. Its members take part regularly in conferences and round tables at a European and national level with the objective to share information and discuss this still much neglected theme. It is essential to bring this issue into the public sphere and to create spaces for open discussion.

The Collective organises international public events (notably during the World Social Forum) to spread awareness about the need and knowledge of the rights of local communities on their resources and traditional knowledge and the illegitimate appropriation of natural and traditional resources. An international symposium was held in 2009 under the aegis of the Collective, gathering witnesses of biopiracy; its conclusions were published "Proceedings of the First International Meetings against Biopiracy". The Collective presented a workshop on biopiracy at the People's Summit in Rio de Janeiro in June 2012, during which participants spoke on the stakes of biopiracy with concrete examples (Peru, Brazil, and India).

Looking for alternatives

The Collective also works for the promotion and emergence of alternatives that are linked to people and local communities. To that end, the work done by associations or States is highlighted, above all their innovative initiatives on the protection of traditional knowledge.

For example:

The Indian authorities launched in 2001 a project on a vast scale: the Traditional Knowledge Digital Library, which aims at gathering the whole knowledge and traditional use of biological resources in India.

In Brazil, the Aldeias Vigilantes project ("Vigilant Communities") coming from the Amazonlink NGO aims at reinforcing capacities of indigenous communities regarding the protection of biological resources and traditional knowledge via participative workshops.

The South-African NGO Natural Justice brings a legal help to communities in order to defend their own rights.

The Ando-Amazonian Initiative of Prevention against Biopiracy leads important researches on cases of biopiracy in Peru.

The Articulation Pacari network tries to promote the medicinal knowledge on plants from the Cerrado region to allow its management by and for the Brazilian communities.

Judiciary actions

The Collective aims at denouncing and following cases of biopiracy, with possible judiciary actions against perpetrators, with a double objective: first to suppress patents, which means to obtain the suppression of illegal and illegitimate patents, and then to prevent new patents against the people's rights. To that end, the presence of lawyers in the Collective allows the Collective to treat cases of biopiracy in France, whereas our local partners give us the necessary information in order to lead an action against the concerned firm.

To denounce a patent, the first step is to underline the elements which make it illegal. In most of the cases, the goal is to show that the patent is neither new nor inventive, since it is copied from traditional knowledge.

The first action on a large scale led in France, resulting from a collaboration between the Peruvian Commission against Biopiracy and the French Collective for alternatives to Biopiracy, led to the cancellation of a patent issued by a French firm Greentech on the Sacha Inchi for default of inventiveness. This Amazonian plant which produces almonds very concentrated on fatty acid has been cultivated for 3.000 years by the native population, notably in Peru. A patent was delivered in 2006 by the French firm to elaborate creams for skin care and hair, without taking into account the anteriority of traditional uses of Sacha Inchi extracts by numerous Amazonian people for cosmetic, food and therapeutic applications. Following this mobilisation of the Peruvian Commission and the Collective Biopiracy and the media coverage by the Collective in France, the Greentech firm withdrew its patent in 2009.

Networking development

We are continuously seeking to reinforce our network of partners in the field of biopiracy and to exchange skills and knowledge with more local actors (elected representatives, indigenous people, NGOs, etc.). Notably, on the occasion of the biopiracy workshop organised by the Collective at the People's Summit in Rio in June 2012, numerous organisations and scholars showed their interest for the questions linked to the appropriation of life. The participation of the Collective in various conferences and debates allows it to enlarge its network at the European and international level, defend and promote traditional knowledge and to bring the actors together in order to fight against the appropriation of this "common patrimony of humanity".

Our collaboration with the Réseau Semences Paysannes (Farmers' Seeds Network) and the association Combat Monsanto (Monsanto Fight) pursues this logic of enlarging our network to all the different fields linked to biopiracy. Semences Paysannes is also involved in the fight against illegitimate appropriation of biological resources and traditional knowledge in the domain of seeds. The intellectual property system allows the food-processing firms to hold a monopoly over so-called "innovative" products, taken from biodiversity hotspots.

STOP BIOPIRACY OF SEEDS IN FRANCE!

A view from the Réseau Semences Paysannes, a farmers' seeds network

In the middle of the last century, tens of thousands of different plant varieties were grown each year in France. These seeds, bred by farmers themselves, were used again and exchanged with respect for collective rights established by local communities themselves in order to guarantee the renewal, but also the quality and the sanitary safety of the corn stocks. These seeds were the result of a permanent co-evolution between cultivated plants and farmers' work. They re-adapted themselves year by year to the diversity and to the variability of the soil of each territory, the climates, the agricultural techniques and the human needs. They were all part of very rich « populations varieties » regarding their diversity and internal variability.

In less than half a century, the seeds disappeared from the fields and were locked into germplasm banks. Thus the industry could continue to draw heavily on this huge pool of plant genetic resources to breed hundreds of homogenous varieties cultivated every year, which the industry keeps as exclusive property. Its first plant varieties were simply a copy of the plants which were first "discovered" in farmers' fields. Then the industry standardized them after some multiplications and eradication of "off-type" emerging in each generation. The most modern plant varieties underwent huge genetic changes resulting from controlled cross breeding or from aggressive genetic manipulation technologies such as chemical stress mutagenesis or mutagenesis after irradiation or transgenic and now the first steps of synthetic biology.

But these industrial seeds are unable to meet the challenges of today: to decrease chemicals inputs, to preserve nutritional quality of food, and to keep adapting to climate change and economic instability. Farmers' seeds can answer these new challenges. But if we lock them up in germplasm banks, they are not able to adapt to the current conditions and farmers are losing their knowledge of selection and management of their seeds in a dynamic way. There are more and more victims of this technological and chemical « progress », leading many to bankruptcy.

This blatant biopiracy is a result of the takeover of the collective rights of farmers over their own seeds by individual property rights held by industry, meticulously organized with the permanent complicity of academic researchers and the state. Every government from the beginning of the second world war and then during the green revolution of the US Marshall plan has improved its legal framework year after year, first at a national level, then at the European level and finally at the international level. With the UPOV Convention (International Union for the Protection of New Varieties of Plants), the UPOV model now spans over the rest of the world, robbing the last of farmers' seeds by allowing both plant breeder's right (PBR) on a plant variety and a patent on each commercialized seeds.

The first stage of this kind of biopiracy is the creation of the official common catalogue of varieties (list of varieties) which bans the commercialisation of farmers' seeds. Only standardized varieties (distinctive, uniform and stable) appear on this list with authorization to be sold. This standardization is the result of adaptation of varieties to the same "technology package" designed to homogenize agricultural conditions and crops: fertilizers, chemical inputs and pesticides, heavy machinery and often unrestricted irrigation. Hence, farmers' seed, alive and rich in diversity and variability no longer have access to the market.

The second stage is the creation of industrial property right on uniform and stable varieties: the plant breeder right (PBR) which bans farmers from using their own seeds. While patents require a new invention, the PBR authorizes the appropriation of a « discovered » variety... in a farmer's field. In 1961, the PBR only gave to the breeder the exclusive right to sell seeds of protected variety, though the purpose was not to regulate farm seeds. Since 1970 in France, and since 1994 in Europe, it prohibits farmers from using seeds from their own crops or, only for some agricultural species, it is authorized only in exchange for the payment of royalties.

The third step is the "common goods of humanity" trick: farmers' seeds which have disappeared from fields and locked up into germplasm banks are now freely available only for research and breeding industry. They remain inaccessible for farmers who simply want to grow them and they no longer have the right to sell or to exchange them. In 1992, the Convention on Biological Diversity (CBD) delegated to the states the sovereignty over their biological resources in return for recognition of patents on living species. To overcome this limitation of access to industry resources, the ITPGRFA (International Treaty on Plant Genetic Resources for Food and Agriculture) quickly reconstituted the "global commons of seed" with its multilateral system of exchange.

The CBD has also established the principle of benefit sharing which should require industry to pay farmers who lend their resources. The "research/breeder exception", allowing a breeder to freely use a variety covered by a PBR to select another variety, is a pretext to UPOV to escape sharing any benefits with farmers. France and Europe go one step further by legalizing benefit sharing in reverse: the industry does not pay anything to use freely all the seed bred by farmers, but now farmers must pay royalties to use again their own seeds, if this inalienable right is not yet simply prohibited.

Industry, however, encounters great difficulties in proving that farmers are reproducing protected varieties (by PBR) in order to assert its ownership rights. Anticipating the conclusions of an ongoing European reform, a French law was passed in late 2011 that forces farmers who produce their own seeds to declare to the official organization their activities and the name of the varieties used. But the European Parliament rejected early July 2012 the ACTA treaty (Anti-Counterfeiting Trade Agreement), which would have allowed the industry to require States to submit this kind of information. To overcome this opposition, the industry now hopes to find an interesting tool in the use of new molecular markings of patented genetic traits which are easily identifiable, from farmer's fields to the consumer's plate. The new varieties registered in the catalogue contain more and more of these patented traits that add a second and more efficient intellectual property right to the initial PBR. In recent years, these patented genes will inevitably contaminate farmers' seeds which were free of intellectual property up until now. The industry hopes to confiscate farmers' seeds that are not under control.

In a recent reform proposal, the European Commission raised the possibility of authorizing the marketing of seed of non homogeneous varieties. Such permission would be a new step for the legalization of biopiracy if nothing is done to safeguard against patents. It would be unconscionable if the possibility of marketing were to be limited only to old varieties as they were a century ago, and not to the modern varieties bred by farmers. These varieties must be able to adapt to present conditions of culture. But its openness to modern varieties could also accelerate the marketing of varieties destabilized by the introduction of genetic technologies patented traits and, worse, open the market to new patented varieties. Indeed, Europe bans patents only on uniform and stable varieties which can be protected by a PBR, but not on non-homogeneous or not stable varieties.

The total ban of all patents on living species, the return to the original PBR, the opening of the catalogue to the "population" varieties and the limitation of its scope to commercial seeds, are the only ways to stop biopiracy and to recognize collective rights of farmers to use, share and protect their seeds, which is the first step towards food sovereignty.

**The Collective for an alternative to Biopiracy is aimed at improving recognition of and respect for traditional knowledge based on biodiversity. www.biopiraterie.org/en*

The France Libertés Foundation was established in 1986 by Danielle Mitterrand (First Lady of France, 1981-1995). The Foundation's objective is to advance the cause of human rights in an international framework. www.france-libertes.org/

Réseau Semences Paysannes is a French network of some sixty organizations all working for the promotion and defense of biodiversity. www.semencespaysannes.org

SPAIN

The Seed Network "Resowing and Exchanging"

Red de Semillas "Resembrando e Intercambiando"

Red de Semillas "Resembrando e Intercambiando", (The Seed Network "Resowing and Exchanging"), is a decentralized organization that is technical, social and political in nature and which has worked for over ten years to unite efforts around the use and conservation of agricultural biodiversity in a local, state and international context. Its primary objective is to facilitate and promote the use, production, maintenance and preservation of agricultural biodiversity on farmers' lands and on consumer's plates, given the serious loss of genetic resources which is deeply impacting agriculture and livestock rearing and which according to FAO statistics amounts to more than 75% loss in the last century.

The real wealth of the *Red de Semillas* lies in the diversity of people and groups who form the network. Farmers, technicians, consumers, rural catalyzers and facilitators and people affiliated to universities and research etc. all participate in the network. However, the real sustenance and strength of the *Red de Semillas* is found in the local seed networks scattered throughout the whole country which manage the use and conservation of agricultural biodiversity at a local level, thereby favoring the work of recovering, conserving, improving and using traditional varieties.

The national *Red de Semillas* "Resembrando e Intercambiando" is a country-wide coordinating organisation which brings together the following regional bodies: *Centro Zahoz* (together with its entities the *Red de Guardianes de Semillas* and the *Asociación para el Desarrollo y Estudio de la Agroecología)* (Castilla León), *CIFAES-Universidad Paulo Freire Tierra de Campos* (Castilla León), *Red Canaria de Semillas* and *Red de Semillas de Gran Canaria* (Canarias), *Xarxa Catalana de Graners* (Catalunya), *Gaiadea - Les Refardes* (Catalunya), *Esporus – L 'Era* (Catalunya), *Ecollavors* (Catalunya), *Triticatum* (Catalunya), *Llavors d Ací* (Pais Valencià), *Asociación Albar* (Pais Valencià), *Associació de Varietats Locals de les Illes Balears* (Illes Balears), *Asociación APAEM – Banc de Llavors de Menorca* (Illes Balears), *Red de Semillas de La Rioja* (La Rioja), *Red Extremeña de Semillas* (Extremadura), *Red de Semillas de Cantabria* (Cantabria), *Rede Sementes Galega* (Galicia), *Red Andaluza de Semillas "Cultivando Biodiversidad"* (Andalucía), *Red de Semillas de Aragón* (Aragón), *Nafarroako Hazien Sarea - Red de Semillas de Navarra* (Navarra), *Red Murciana de Semillas* (Región de Murcia), *Red de Agroecología y Ecodesarrollo de la Región de Murcia* (Región de Murcia) and *Euskal Erico Hazien Sarea - Red de*

Semillas de Euskadi (Euskadi). The Spanish Context

Traditional varieties contribute organoleptic quality, not just visually, but also by filling our food with flavours and aromas, and they are an inseparable part of our intangible cultural heritage (the Mediterranean diet). They also contribute towards food security and sovereignty by lessening the risk of massive loss of harvests, as their intrinsic diversity favours agro-ecological management of our fields through facilitating the cultivation of many different plant species and varieties, a practice which creates more stability in adverse situations. Traditional varieties symbolize certain ethical values, as they are the expression of food sovereignty and have not yet been totally misappropriated through the rights abuses by intellectual property and patents. They symbolize the cultivated biodiversity that has been developed by the farmers (Red de Semillas, 2011[1]).

However farmers, together with the *Red de Semillas* (Seed Network), are deeply worried about the imminent future of our seeds, and are working to influence the Spanish goverment to change the agricultural model towards one more supportive of food sovereignty and protection of agricultural biodiversity (Red de Semillas, 2010[2]).

On the one hand, the Spanish goverment recognises the rights of farmers as demonstrated in the "Law of seeds, seedlings and phytogenetic resources" ("Ley *de semillas, plantas de vivero y recursos fitogenéticos*"[3]) which is ratified in "Tratado internacional de recursos fitogenéticos para la agricultura y la alimentación"[4], as regards the establishment of mechanisms to facilitate the conservation, use and commercialization of seeds and seedlings preserved on their farms; the protection, conservation and development of traditional knowledge of interest relating to phytogenetic resources for food, agriculture; and the right to participation in the adoption of decisions, at a state level, on matters pertinent to the conservation and sustainable use of these phytogenetic resources.

However, on the other hand, no strategy has been put in place which implements these rights, as is reflected in the "Report on the state of phytogenetic resources in Spain" ("Informe *sobre el estado de los recursos fitogenéticos en España",* INIA, 2010[5]). This situation highlights the lack of politcal will that the Spanish government has concerning this topic.

As well as doing little or nothing towards the conservation, promotion, use and exchange of agricultural biodiversity, and unconditionally supporting transgenic crops (Red de Semillas, 2011[6]) in spite of the rejection of public opinion and going against the common interest, the Government continues with its inexplicable policy in favour of genetically modified crops. This behaviour increases the loss of agricultural biodiversity as confirmed in the case of organic maize production in Aragón and Cataluña. (Assamblea Pagesa de Cataluña, Greenpeace y Plataforma Transgènics Fora!, 2006[7]).

In addition, in the last year the the situation has worsened and we have been coming face to face with a new accomplice against agricultural biodiversity, in this case the European Justice system. It has dashed the hopes of the seed networks, farmers and people who have spent years asking for the creation of mechanisms which enforce the rights of farmers to sell their own traditional seed varieties, as well as establishing mechanisms which facilitate the conservation, use and commercialization of seeds saved on their farms, the protection, conservation and development of traditional knowledge, and the right to participate in the adoption of decisions on matters relating to traditional varieties. An increase in genetic erosion in European fields can be expected following the sentence of the Court (Red de Semillas, 2012[8]).

Genetic erosion in Spain

In Spain, no study has been carried out on the state of phytogenetic resources for agriculture and food, nor are there any plans to carry out studies on the state of phytogenetic resources for agriculture and food, nor is it even planned to take steps to control and measure genetic erosion (Red de Semillas, 2010[9]).

With regard to data on loss of agricultural biodiversity in Spain, we are in a situation which is the same, or possibly worse than in 1996 (FAO, 1996[10]). Some examples of aggravating factors are (Red de Semillas, 2008[11]):

a) Maize: due to numerous cases of contamination with transgenic varieties.

b) Cereal: through the requirement to use certified seeds in order to receive CAP grants, as in the case of durum wheat.

c) Organic agriculture: obligatory use of certified organic seeds.

After studies and projects carried out by the *Red de Semillas* it has been found that some local varieties which were still being cultivated in 1996 are no longer preserved, which indicates that the number of varieties which have been lost in these ten years or so, could be very high.

Examples include *pipa de trigo* melons (Tentudía, Extremadura), some tomato varieties in the north of Cáceres and a number of peppers (bell peppers, traditional pimentón (paprika), chillies etc.). With regard to cereal species, amongst others, cultivation of vetches, grass peas, rye and bristle oat is being abandoned.

The Campaign "Cultiva diversidad. Siembra tus derechos"

Cultiva diversidad
Siembra tus derechos

The campaign "Cultivate diversity. Sow your rights" is being promoted by the national coordinating body *Red de Semillas "Resembrando e Intercambiando"* and the twenty local networks of which it is composed[12]. The campaign aims to promote organic and rural farming, the use of traditional varieties, the recovery of farming knowledge and local gastronomic culture, to fight against an agriculture of patents and transgenic varieties and organisms, to call for a legal framework which permits farmers to produce and sell their own seeds and to gain strong support from public governing bodies for the task of recovering our cultivated genetic heritage.

Through the campaign "Cultiva *diversidad. Siembra tus derechos"* we urge the Spanish Government to put in place policies necessary for implementing the rights of farmers to conserve, use and commercialize traditional varieties. It should be possible for these agricultural genetic resources to be a part of their livelihoods.

We aim to bring about a change in legal regulations and in government policies that we consider unjust in light of the principles that govern our social life and the constitutional foundation of a democratic state.

Therefore, we promote the sale of seeds by the farmers themselves as a public act, non-violent, conscious and political, against the law, and carried out with the purpose of bringing about change in government legislation and behavior. Through acting in this way, we appeal to the sense of justice of the majority of the community, and declare that in our opinion the values of social cooperation between people who make entitlement to food possible, are not being respected through prohibiting farmers from selling seeds, given that traditional varieties are an essential resource for obtaining healthy foods, for respecting the environment through the appropriate use of natural resources and for potentiating rural culture, ethical values and quality of life (Red de Semillas, 2012[13]).

Achievements in recent years

With regard to the most successful outcomes achieved by the Red de Semillas in recent years, the following can be considered:

- Developing the campaign "Derecho *de los agricultores al Uso y Conservación de la Biodiversidad*" ("Rights of farmers to the use and preservation of biodiversity") and "Cultiva *diversidad. Siembra tus derechos*" ("Cultivate diversity. Sow your rights").
- Increase in the number of local seed networks and groups linked to the *Red de Semillas.*
- Consolidation of the Agricultural Biodiversity Fair and Conference for Reflections.

- Strengthening of a stable organizational coordination with territorial representation which is managed through working groups.

- Publishing the informative newsletter *Cultivar Local*.
- Developing an Action Plan for Seeds and Agricultural Biodiversity.
- Becoming recognized as an expert group in the field of cultivated biodiversity in many aspects: investigation, characterization, promotion, knowledge recovery, analyzing regulations which affect agricultural biodiversity, etc.
- Establishing a higher number of relationships with networks and groups at the state, European and international level.

In a more general context the following has been achieved:
Greater sensitivity from some regional governments and local entities around these topics.
Consumer concern about the effects of transgenic plants and animals.

Proposals for initiating a sustainable system for use, exchange and conservation of agricultural biodiversity

Nowadays, farmers face numerous legislative barriers that impact biodiversity management on their farm and which have led to the situation where present loss of biodiversity is a documented and referenced fact in numerous reports and studies at the European and international level. These barriers, in the form of convoluted texts, have caused problems related to:

- Appropriate use of biodiversity and phytogenetic resources.
- Developing an improvement system for local varieties.
- Access to phytogenetic resources.
- Organic seed use by farmers.
- The appropriation of information and intellectual property systems.
- The effect of transgenic varieties and organisms and terminator technology on biodiversity.

A series of problems and premises that the administration, within the framework of its powers, should take into account are grouped together below (Red de Semillas, 2008[14]):

I. Problems which affect the correct usage of biodiversity and phytogenetic resources in organic agriculture

1. EU regulations on organic farming do not reflect the standardized use of local varieties.
2. There is no monitoring of the evolution of agricultural biodiversity in use through plant propagating material for organic agriculture.
3. Absence of local varieties in the commercial varieties register.
4. Bringing out varieties of interest to organic farming, which lie forgotten in arboretums and living collections.
5. Sharing information about local varieties and promoting their exchange.
6. Increasing the level of knowledge that farmers and consumers have concerning the importance of diversity for the sustainable production of food.
7. Achieving more involvement from the local social fabric in the preservation and use of agricultural biodiversity.

II. Problems which inhibit the development of an improvement system for varieties suitable for organic agriculture

8. Recover knowledge about farmers' methods for selection and improvement.
9. Start participative systems for selection and improvement of varieties for organic agriculture.
10. Farmers developing improvement trials on the farm.
11. Lack of integration between the needs of organic farmers and public research centers.
12. Better understanding of the specific needs for improvement for organic farming. 13. Varieties obtained though techniques of dubious compatibility with organic agriculture regulations. 14. Transgenic contamination of organic production.

III. Problems which affect access to phytogenetic resources

15. Facilitating access to commercial varieties which are completing their period of protection. 16. Facilitating exchange of varieties between farmers within the legal framework. 17. Facilitating access for farmers to funds for collections.

IV. Problems which inhibit the use of organic plant material by farmers

18. Increasing the autonomy of farmers with regard to the choice of plant material.
19. Control and certification of plant propagating material by the farmer on his own farm.
20. Control and certification of seedlings and rootstocks exchanged by farmers.
21. Appropriate adaptation of regulations to facilitate production of seedlings in small companies.
22. Facilitating farmers' access to information about the supply of organic plants.
23. Extending the debate on organic plant propagation material to the entire sector.
24. Improving knowledge about the demand for organic plants.
25. Improving training for farmers in topics related to the vegetative propagation of fruit trees, grafting and obtaining seedlings.
26. Promoting the creation of small and medium-sized entities for plant production 27. Facilitating access to organic plants for gardeners.

V. Problems related to the appropriation of information and intellectual property systems which interfere with the development of organic agriculture

28. Preventing the appropriation of the public heritage of phytogenetic resources by private individuals.
29. Preventing the private appropriation of local plant material.
30. Establishing fee payments for commercializing plants improved by using local plant material.
31. Preventing biopiracy and illicit traffic of genetic resources at a global level.
32. Reestablishing the right of the farmer to propagate all species on her/his farm.
33. Preventing the use of patents on living things in sustainable agriculture.
34. Assuring social representation in decision-making forums on ownership of genetic resources and living beings.

Footnotes

[1]http://www.redandaluzadesemillas.org/IMG/pdf/Manual_VVLL_RAS_2011_10_preguntas.pdf

[2]http://www.redsemillas.info/?p=916

[3]Ley 30/2006, de 26 de julio, de semillas y plantas de vivero y de recursos fitogenéticos. BOE núm. 178, de 27-07-2006 http://www.boe.es/boe/dias/2006/07/27/pdfs/A28165-28178.pdf

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SEED SOVEREIGNTY IN ITALY

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In recent decades, and in the Italian context also, the advent of a model of "industrial" agriculture characterized by hyper-productivity has resulted in the loss of biodiversity and native seeds: the increasingly mass-use of "commercial" seed varieties quickly supplanted the "old" local varieties and, in the early '900, Italy as well as Europe, has lost 75 percent of the genetic diversity of agricultural products.

The seed legislation has greatly facilitated this process. In Italy and in the EU's context, seeds are in fact subject to a special system which in Italy is dictated by the so-called "seed law" (L. 25 November 1971, n.1096 and subsequent amendments). The Act establishes, among other things, the National Register of Varieties which, at the Community level, flows into the Community Catalogue of Vegetable Varieties. The basic mechanism for seed activity of the European Community is homogeneous in all member countries, that is to say that the seed of a variety may not be commercialized if the same variety has not been registered in the National Register or in the Community Catalogue of Vegetable Varieties.

The varieties for which registration is sought must have some very specific characteristics: they must be distinct, stable, sufficiently homogeneous and must have a satisfactory agronomic value or use. The local varieties cannot have, by their nature, all these characteristics simultaneously. In fact, a definition of local varieties states that they have "... a large genetic basis, are difficult to improve, in terms of agronomic value, in the respective zones of adaptation, as they are the result of a sort of recurrent simple selection, implemented by the farmers for a long period of time". Thus it is mainly because of the regulations in force that the local varieties are likely to disappear and be completely supplanted by other commercial varieties.

With this regulatory framework small seed companies as well as whole national seed collections and institutions of the sector have been purchased at comparatively modest prices by large agrochemical corporations. For these corporations the seeds are just one of the items of their sales package of materials for agriculture and chemistry, and is another strategy of vertical integration of the global market for agricultural goods of mass consumption for food or other uses.

Public funding for development and conservation of seeds has steadily declined and has now reached levels so low that even the largest collections of seeds are in danger and are increasingly dependent on the so-called public-private partnerships. These partnerships allow private companies that sell seeds to further expand their control of world stocks of seeds on the base of their patents. While public seed collecting institutions are compelled to put their seeds for disposal for free, private companies are free to choose not to participate in this free trade system and abuse it for their own interests. In addition, each new step taken towards the concentration of seed stocks in the hands of private firms leads to a reduction of seed varieties and to a reduction in the number of breeders and scientists who maintain these stocks.

As this strategy on seeds to support a model of industrial agriculture was gaining momentum also in Italy, strong counter tendencies have simultaneously developed in the agricultural and food sector. In fact, the characteristics of the Italian territory, which are mainly hilly and mountainous, and especially the choice of enhancing local agro alimentary products and their bond with the territory, have favored, since the late 90's, the development of diverse farming models at the regional level, based on the protection of biodiversity where local varieties and seeds are not only a collective heritage, but also a real point of reference for cultural, social and agricultural identity of the country, and have an economic value and are fundamental for safe and healthy food.

For this reason Italy led the way in establishing regulations based on the Convention on Biodiversity after it was ratified in 1992 and the International Treaty on Plant Genetic Resources for Food and Agriculture (2001). Tuscany was the first region to legislate in this area, in 1997, enacting a law to protect indigenous genetic resources (LR n. 50/97), and was also the first region in Italy that, based on the precautionary principle, legislated in 2000 to ban the cultivation of GM crops in its territory contributing substantially to the foundation of the European Network of GMO-free Regions.

In 2003, in line with its commitment on sustainable food and agriculture issues, the Region of Tuscany, at the initiative of Governor Claudio Martini, hosted in Florence the constitutive meeting of the "International Commission on food and agriculture" chaired by Vandana Shiva and composed of some of the leading experts in the world of alternative food systems. The Commission, with support from the Region of Tuscany, elaborated and disseminated proposals for an alternative to the current food system based on diversity, locality and sustainability which first resulted in the "Florence Declaration" and subsequently was the basis of the Commission's first "Manifesto on the Future of Food" , followed by the "Manifesto on the Future of Seeds."

The Region of Tuscany committed to fulfilling the principles contained in these two documents, and among the first initiatives approved a regional law LR No. 64/2004, which allows the circulation of seeds at the local level and identifies even more effective tools for the conservation and enhancement of local varieties. This law has a symbolic economic value well beyond the regional level. Indeed, it may be the first brick of a system of rules that, while accepting the principle of the European single market and free trade, introduces mechanisms to protect rural communities and their intellectual property against the aggression of large companies, today widely favored by the mechanisms of standardization at the national and supranational level and by the current regimes of intellectual property protection.

Based on its experience of the previous regional law (1977) and on principles contained in the most important international documents, the Regional Law L.R.n. 64/2004 has as its main objectives:

- *The protection of its heritage of landraces and local varieties* not only from an economic and scientific perspective but also a cultural one. The extinction of a part of indigenous genetic resources would be a loss not only of a unique and unrepeatable heritage, but it would undoubtedly affect the culture and traditions of a population, linked also to its rural and agricultural traditions. In addition, the conservation of biodiversity in the agricultural and the zootechnical fields is strictly linked to policies to enhance quality and typicality of the agro-food productions.
- *The landraces and local varieties belong to the natural heritage of farming zootechnical and forestry interest of Tuscany,* being part of the natural elements that characterize its territory and certainly constitute certainly an asset. The landraces and local varieties are therefore a natural heritage of Tuscany and as such the region **guarantees the collective use** through the tools provided. Thus this system has basically a two-pronged approach, one of which addresses the protection and the other the enhancement of the local genetic heritage.

This same regional law contains other closely linked tools for the protection and defense of landraces and local varieties. These are:

- *The Regional Directories (Repertori Regionali).* These consist of a database of local Tuscan varieties and landraces. The local varieties and landraces listed and described in the repertories have been entered by universities, research institutes, farmers associations, individual citizens (currently the local varieties registered are about 750, of which over 600 are at risk of extinction). The inclusion of a local variety or landrace in the Directory is subordinate to the presence of the characterization of the same, both from a morphological point of view (sometimes genetic), and from the point of view of the link with the rural culture and with the agricultural and zootechnical local tradition.
- *The Regional Germplasm Bank* for the ex situ conservation of local varieties at risk of extinction of the regional repertory.
- *The Farmer's Custodians,* farmers implementing in situ conservation in the areas of origin of the varieties listed in the repertories.
- *The conservation and security network,* created to *include* in the network the Regional Germplasm Bank , the Farmers Custodians and other entities who may be interested for various reasons in the conservation of a particular local variety threatened with extinction. The *other entities* in the network can have motives other than purely scientific ones, such as cultural, gastronomic or linked to the boosting of tourism for the development of a depressed area.

The network is, above all, a *place* where one can try to implement all the actions aimed at ensuring **"sustainable use"** of agricultural, zootechnical and forestry resources. The participants in the network - Farmer Custodians, Sections of the Bank and others – undertake activities of conservation, both *in situ* and ex *situ*, of local endangered varieties and put them back in *circulation* within the network itself. The importance of *circulation and exchange* *of seeds* among farmers is essential for the conservation of biodiversity and the preservation of local varieties from extinction. In this regard, in accordance with the law on seeds, non-profit *circulation and exchange of seeds* are allowed inside the network, in "small amounts", and in well-defined geographic areas in order to **maintain and reproduce**.

- The tag which stipulates *"Made from local variety / landrace - Tuscan Regional Law 64/2004* and that can be affixed to the label of a product as is or transformed, actually obtained from local varieties or landraces at risk of extinction. Its purpose is the protection of the right to information and consumer choice whereby the consumer knows that purchasing the product contributes to the protection of biodiversity values.

This is how Tuscany has protected local varieties from patents of multinational corporations and has sanctioned, for the first time on a legal level, collective ownership of local varieties and in fact also the principle of seeds as a common good.

This major work of recovery of varieties and local seeds has also provided an innovative path for scientific research methods through a participatory approach to open collaboration among farmers, local communities and researchers and is fertile ground for practicing a new system of knowledge for addressing the ongoing environmental and climate crisis, based on integration between scientific and traditional knowledge and investment of public resources to support a new research system capable of producing innovation for the common good.

The conservation of local varieties has also offered a real opportunity for small farmers to boost local circuits of production and consumption through direct sales, even with innovative organizational forms of short chain, such as markets, shops and purchasing groups in solidarity, supported at Regional level and by local institutions. These initiatives provide both sources of income for small farmers and opportunities for citizen-consumers to rediscover the traditions and local knowledge. But above all this innovative ruling, has reaffirmed mass selection conducted over the centuries by farmers and the value of the work of those (old and new farmers) that have not surrendered to industrial agriculture and, with their passion and dedication, have maintained, especially in mountainous and disadvantaged areas where intensive agriculture was almost impossible to set, a reservoir of biodiversity that is now a heritage of the whole community.

Other Italian regions have taken up the example of Tuscany's experience with the L.R 64/04, pending national legislation that would give full effect to the principles of the FAO's Convention on Biodiversity and International Treaty on Plant Genetic Resources for Food and Agriculture. Six other regions besides Tuscany have legislated on agro-biodiversity: Lazio in 2000, Umbria in 2001, Friuli Venezia Giulia in 2002, Marche in 2003, Emilia Romagna and Basilicata in 2008. Many regions that had not yet passed laws, however, work with specific programs and projects on agro-biodiversity. Almost all regional laws provide tools such as: directories / regional registers of local landraces and varieties; regional banks of germplasm; growers / farmer custodians; the storage and security network (bank of germplasm- Farmers Custodians), the enhancement of local landraces and varieties (seeds, products.....)

There are many bodies, including research Institutions working on agro-biodiversity and preserving a priceless heritage of varieties and local seeds. In particular: the Network of Research Facilities of the Council for Agricultural Research (CRA) under the Ministry of Agriculture (from the data presented to the National Conference on Biodiversity in Florence in 2010, there are numerous accessions: 8,380 varieties of fruit, 5,202 of vineyards, 15,970 forest species, 16,410 of cereals, 110 of vegetables, etc..), the network of facilities of the National Research Council (Consiglio Nazionale della Ricerca - CNR) headed by the Ministry of University and Scientific Research (data indicates 80,000 varieties in the seed bank, 1,860 variety of fruit, 2,500 olive trees, etc..); finally, many universities and other research institutions, at the national and local level, work on varieties and local seed in relation with the regions and local authorities.

Unfortunately most of these research institutions suffer from a chronic lack of public funding that is seriously putting at risk a priceless heritage of local seed varieties and the work of many researchers over the years have ensured the recovery and maintenance of such assets.

In the wake of the legislation of the regions that in recent years have worked on varieties and local seeds, there have been novel changes at both national and community level regarding the marketing of seeds of conservation varieties. In 2007 the Italian seed law was modified with the introduction of innovative concepts and tools to enable the marketing of conservation varieties in Italy, in the absence of clearer rules at the community level.

Subsequently the European Commission, after years of intense debate, finally pronounced on the marketing of the seeds of conservation varieties of agricultural species (or open field) and of the tuber potato seed (blocked since 1995) and further regulatory changes are under consideration. It is clear that the regulation of conservation varieties puts into question the entire regulation of the production and distribution of seeds, with the aim of strengthening the rights of farmers, preventing the formation of monopolies and strengthening the capacity of local communities to conserve and enhance biodiversity through social interaction.

Of recent note at the national level, at the initiative of Hon. Susanna Cenni, is the bill for the protection and enhancement of agricultural and natural biodiversity, presented to the House of Representatives some two years ago and which brings to the national level the labor and the tools implemented by the regions in recent years. It provides, among other things, for the protection of intellectual property of local varieties and the possibility of movement and exchange of seeds. The law has now been approved unanimously by the House's Agriculture Committee in May 2012 and is currently waiting to conclude the parliamentary process.

But one of the most valuable results, partly as a consequence of these innovative regulatory instruments is that, beginning with Tuscany, the experiences of farmer guardians spread like wildfire; the "Fierucola" of the seeds and the Association of Farmers Custodians (Associazione Agricoltori Custodi) were the first networks of local seeds and custodian farmers and today they are flourishing, even at a national level, with important experiences in this direction such as, among others, the Network of Rural Seeds (Rete dei Semi Rurali) and the Association of the "Women in the Field" (Donne in Campo).

In all these years an enormous heritage of varieties and local seeds has thus been accumulated in our country, thanks, firstly, to the commitment of the farmers guardians that, together with researchers, technicians and local communities, who found in Local Authorities and Regions in particular the basic support to implement activities and tools that can now be available to all farmers and to the society as a whole.

This heritage is now a fundamental value for the future of agriculture and food. The current crisis is making unequivocally clear the failure of the industrial model of agriculture pursued in all these years by the multinational agribusiness. Indeed, today the companies most affected by the crisis are the monocultural industrial companies, while those more resilient are the diversified and multifunctional organic farms based on biodiversity and local markets and for which varieties and local seeds are the fundamental basis for their work and to produce safe and healthy food for all. It is therefore necessary that all those who have worked in recent years to preserve and maintain the local seeds are able to form an alliance to integrate their work, making it known to all citizens and to find innovative and creative solutions to make local seeds available for everybody. For all the farmers who want to plant them, for the many urban and peri-urban gardens that are spreading in many cities, for school gardens, for family gardens and for all the people who, even simply with a jar, want to contribute to help save native seeds.

This is why the Alliance to promote the global campaign "Save our seeds" and to declare seeds as common goods, promoted by Vandana Shiva, can be an extraordinary opportunity to give strength to the work that we have conducted together in these years and to create a more extensive solidarity network to save, preserve and disseminate varieties and local seeds also in our country.

**Maria Grazia Mammuccini, former director of ARSIA, Tuscany's Regional Agency for Development and innovation in farming and forestry from1995 to 2010. She is coordinator of the Scientific Committee of the Italian Foundation for Research in organic and biodynamic agriculture (FIRAB) and Vice- president of Navdanya International in Florence. www.navdanyainternational.it*

LEGISLATING FOR SEED FREEDOM

Susanna Cenni*
Member of the Italian Parliament

"To Susanna, with love, because together we will save the seeds."

This is the dedication that Vandana wrote to me a few years ago on the cover of one of her books, not long after our magical meeting. Yes, it was magical, because only those who have met Vandana, who believe in the power of gender differences, can understand what can arise from the encounter of profoundly different women and from the collaboration and sharing of a great project. To me Vandana's dedication has represented a commitment. A commitment that in these last years, first as the head of the Department of Agriculture in Tuscany and then as an Italian parliamentarian, has defined my progress as a woman and as a... "politician."

Safeguarding seeds and their extraordinary patrimony, sustaining promotion actions, supporting the economic systems that can grow around them, sustaining good agriculture and the production of food, being respectful of the land – with all this in mind I participated in the creation of the Rete delle donne per la biodiversità ("Women's Network for Biodiversity"), conceived and launched in Tuscany a few years ago together with Vandana and Grazia Mammuccini. With an equal mindset I participated in the numerous initiatives generated by female creativity that still today operate thanks to the passionate work of businesswomen and custodians of the earth who reclaim species and products, giving back to them their history and profitability. The same objectives pushed me to write a national bill (pdl 2744 "Disposizioni per la tutela e la valorizzazione della biodiversità agraria e naturale" - "Regulations for the Protection and Promotion of Agrarian and Natural Biodiversity"). The bill was discussed extensively for two years by the Commission for Agriculture of the Chamber of Deputies, it was opposed, then finally approved unanimously by the Commission in May 2012, but unfortunately its legislative process is at a standstill.

Laws are not everything, but they are important, also because they force people to talk, think and discuss.

Currently, even in Italy the seed market, and oddly enough that of pesticides, is in the hands of very few companies (there are 5 worldwide). De facto, even though there are EU norms that protect the intellectual property of varieties, there is the risk, even here in Italy, that those who dedicate a large part of their lives to the recovery of seeds or animal species will find that somebody else has bypassed them, registering the intellectual property of those very seeds and animals in Italy or in other EU countries.

The bill I proposed establishes a registry of plant varieties; it acknowledges the farmer-custodian figure; it includes norms and actions for the conservation and promotion of biodiversity (of seeds and species); it talks of a food Community, of the recovery of traditions, of education; it suggests biodiversity itineraries; it includes norms for the protection of the intellectual property of this extraordinary genetic patrimony.

I've often been asked the following question: "How come in a time like this you're preoccupied with biodiversity and not with competitiveness?" I am preoccupied with biodiversity because I am convinced that such a preoccupation also means investing in the competitiveness of local agriculture and of products that are unique because rooted in a specific territory. These products have a history; the wisdom and effort of generations of farmers have safeguarded and passed on fruits, tubers, grains, animals... who developed their identity because of the territory they grew in. Is there anything more exclusive or more precious? Therefore, why not work so that all this is properly valued, also economically? Why not educate those who choose a product, making them aware that their choice doesn't only mean wholesomeness and food safety, but it also means investing in a territory, repaying hard work, giving a helping hand to a farmer?

Up to the 20th century there were 400 varieties of wheat in Italy, while in the 1990s, just 8 varieties were used over 80% of wheat farming land.

During the auditions in the Commission for Agriculture we listened to producers, to farmer-custodians, to experts, and some of these experts told us about the difference between the properties of the ancient wheat varieties and the much poorer properties of the ones grown and marketed today.

These days, Italy is experiencing a period of drought, and entire crops are compromised.

For years now, the effect of neonicotinoids used on maize have damaged bee populations.

And then there are allergies, food intolerances, loss of profits for our farmers.

What else do we need to convince ourselves that we're on the edge of the abyss and that, as Giampaolo Fabris masterfully wrote, "the cheerful Apocalypse" that the world is living... is no longer so cheerful?

I am convinced that today, during the maximum economic difficulty experienced by Italy and Europe since World War Two, while our days and our lives seem marked by the fluctuations of government bonds that generate anxiety, fear, uncertainty, depression, it makes even more sense to bring back to centre stage the land and the production of food.

It makes more sense because it's time to change the paradigm that has characterized the development of the Western World and has produced this crisis.

It makes more sense because a system based on obsessive consumption has led states and families to have unprecedented debts.

It makes more sense because the crisis we are going through is economic, financial, social and environmental.

It makes more sense because it's time to stop and ponder on what we eat, on the origin and wholesomeness of our foods, and it's time to rediscover the bond between food and its source, between consumption and identity, bringing to centre stage the people, their real needs and the environment in which we live.

These are not empty words, because the processes of change are in motion right now. I am currently subscribing to an initiative of a farm in Tuscany for the adoption of a beehive. It's a farm born out of a G.A.T. ("gruppo di acquisto della terra" – and ethical purchasing group). It is run by young people, women, and others who made the life decision of returning to the land and of looking at the world with fresh eyes.

Fabris also wrote that "the future cannot be understood with the interpretative framework of the past." I believe this to be true.

We are facing a huge public debt and new poverty; access to food for millions of women and men runs the risk of becoming a daunting chimera, an ever-receding goal.

The crisis is forcing even those who never ask themselves questions, to inquire about the meaning of products, of consumption, and of food consumption in particular.

Yes. It makes sense to be preoccupied with seeds and biodiversity, because the change is happening but the direction is not foregone, and because saving the seeds can help change the world... and I write this while my hands touch a beautiful "designer" necklace... seeds of freedom, also a daughter of a path of women, seeds, networks.

**Susanna Cenni, Member of the Italian Parliament, former Minister for Agriculture of the Region of Tuscany, promoter of national bill 2744 ""Regulations for the Protection and Promotion of Agrarian and Natural Biodiversity".*

BIODIVERSITY IN THE REGION OF TUSCANY

Gianni Salvadori*
Minister for Agriculture of the Regional Council of Tuscany

The protection of plant and animal biodiversity for food and agriculture is one of the planet's most urgent needs. The rapid disappearance all over the world of numerous plant varieties and animal breeds has made evident in the public eye the importance of the protection of biological diversity for the healthy perpetuation of life on Earth.

Biodiversity is the foundation of food safety, it is the basis for quality agriculture, and it is an important resource for environmental balance because the cultivation of the local, native varieties – hence adapted to the environmental conditions of a specific territory – allows for a strong reduction of the use of external inputs (pesticides, fertilizers, herbicides, excessive irrigation, etc. …) and therefore allows an effective protection of the soil, the water supplies, the ecosystem and, as a consequence, human health.

Biodiversity is the best form of natural insurance for society's future adaptation and evolution. The increase of genetic and cultural diversity of the food systems and the maintenance of the biodiversity of common goods are essential strategies to meet the challenges of the future and of the huge, ongoing changes.

For the Tuscany Region the local breeds and varieties represent a common patrimony, but also a trait of cultural and social identity and the basis of the great wealth of our local traditional food products, fundamental for food health and safety and for the economy of our region.

Indeed, we believe that the future of agriculture and the future of food are linked to a model of sustainable agriculture based on the products' quality, on the enhancement of the environment and the landscape, on the protection of biodiversity, on the diversity of knowledge, on multifunctional farms spread out over the territory and on a new relationship between producers and consumers.

In recent years, in line with these principles, the Regional Government has aided the evolution of Tuscan agriculture by issuing specific regulations and supporting financially the investments needed for a transition towards quality-oriented agricultural systems, for the location of productions and consumptions, for the respect of food sovereignty and the enhancement of biodiversity.

As a consequence of such fundamental choices, Tuscany was the first Italian Region to pass a law that prohibits the cultivation of GMOs on its territory, and it was also the first Italian Region to legislate on the protection of local genetic resources with the L.R. 50/97 ("Tutela delle risorse genetiche autoctone" - "Protection of Local Genetic Resources"), now replaced by the L.R. 64/04 "Tutela del patrimonio di razze e varietà locali di interesse agrario, zootecnico e forestale" ("Protection of the Patrimony of Local Breeds and Varieties of Interest for Agriculture, Zoo-technics and Forestry") which contains innovative elements of great value such as the protection from patents of local varieties, the establishment of a preservation and safety network for the conservation "ex situ" in the regional germoplasm Bank and "in situ" by the "Farmers Custodians," and the possibility of exchanging seeds between farmers. This last legislation represents one of the basic tools for a model of sustainable agriculture, where food sovereignty and biodiversity are protected, and where the rights of farmers to save, share, use and improve seeds is safeguarded.

Through this law, Tuscany has protected local varieties from the patents of multinational corporations and has been the first to sanction by law the collective ownership of local varieties.

Furthermore, thanks to the experience gained since 1997 in the recovery of local breeds and varieties, the Tuscany Region has actively contributed, together with the other Italian regions, to the definition of the Piano Nazionale sulla Biodiversità di interesse Agrario (National Plan for Biodiversity of Agricultural Interest), approved by the

State-Regions Conference on the 14th February 2008. Its first implementation has led to the definition of the Linee guida nazionali per la conservazione in situ, on farm ed ex situ, della biodiversità vegetale, animale e microbica di interesse agrario (National Guidelines for the In Situ Conservation, On farm and Ex Situ, of Plant, Animal and Microbial Biodiversity of Agricultural Interest) adopted by the Ministerial Decree of the 6th July 2012 (G.U. No 171 of the 24th July 2012), also useful for the implementation of the next rural Development Programme for the conservation of genetic resources in agriculture.

The intention is to create a sustainable system that, under the coordination of the public body, allows the natural preservation of local varieties, according to seasonal and territorial peculiarities, with a careful protection of the environment, a careful management of the land, water supplies and agro-environmental systems. Furthermore, this model must be able to guarantee the farmer's income, thus allowing to maintain a territorial presence even in the more "disadvantaged" areas.

In fact, the system developed in Tuscany works on several levels, from the protection to the enhancement of the local genetic heritage. In reality, the enhancement of these products seems the only true way to prevent a genetic resource from disappearing completely, because it allows in a natural way, and not constantly supported by public funding, the circulation of its own propagating material, favouring the preservation of its own genetic variability and therefore the concrete possibility of a certain "durable conservation" for future generations.

The policies for biodiversity of the Tuscany Region are an example for the whole world, so much that in 2009, in Hamburg, Tuscany was awarded the World Future Award "Future Policy Award" by the World Future Council, an international forum that includes prominent cultural, scientific and political figures from all continents that has the aim of raising awareness among political leaders and the public opinion on the "good practices" and promoting their spreading for the benefit of future generations.

Just in order to encourage a more effective implementation of these policies, the Tuscany Region believes that these concepts should be divulged globally as widely as possible: for this reason it is engaged in international activities such as the support of the Slow Food Foundation for biodiversity and the signing of the Memorandum of Understanding with Navdanya International headed by Vandana Shiva whose support for the Global Seed Report and the global campaign to save local seeds represent the first major initiatives for the start of this new collaboration.

Gianni Salvadori, Minister for Agriculture and Forestry, Fishing and Hunting of the Regional Council of Tuscany.*

URBAN GARDENS IN THE GLOBAL METROPOLIS

Gianluca Peciola*
Province of Rome

The urban gardens are contagious. In Rome they have become communities in several neighborhoods, including Garbatella. In this area, Legambiente, the Casetta Rossa Spa and the Coordination of urban gardens, retrieved an unused space abandoned by the Municipality of Rome and created an urban garden in the heart of the city, a few dozen yards from the Region of Lazio. Fourteen families, together with the collective promoters of the initiative, drew up a regulation and started this little green revolution where the public administration forgets its duties.

A few weeks later, in the wake of community gardens of Garbatella, Eut-orto was born. This is the community garden of the former workers of Eutelia. While preparing another event to support their case, they projected a subversive agricultural communitarian plan and launched the challenge of urban gardens. The Province of Rome, also for the gardens of Garbatella, supports the project.

Twenty laid-off workers launched the new company at the Agricultural Technical Institute Garibaldi in Via Ardeatina. The first vegetables were planted among the residential buildings of Vigna Murata, Roma 70 and Fonte Meravigliosa, in an area of two acres owned by the Province of Rome.

In this area, an example of integrated community planning was born: former workers, the community of urban gardens of Garbatella, the School, the City Hall of Rome XI, joined a network to implement a project with a strong symbolic and social meaning. With crops, the dismissed workers will save money, but they can also sell the vegetables in the 'farmer's market' of the Province of Rome which is hosted by the agricultural college during the weekend.

Rome arrives late to the awareness of the multiplicity of values and meanings related to urban gardens. Urban gardens started in the twenties in Europe and now, in countries like the Netherlands, are part of the activities under the management of large parks. In Paris, London and New York, the "horticultural revolution" is already defining its organizational aspects and its "ideological" contents. In several European countries, associations and communities of urban farmers claim, since long time, the social, economic and even the solidarity values of urban community gardens.

As far as the objectives are concerned, they are not always economic or "productive". Rather, an essential element binds to these aspects: promoting interaction among people around the care of the environment, of the lands, of a garden or of a park. It is the return of the place consciousness, not only through generic claims or through the affirmation of an identity, but through the actual work, by taking charge of the environment. The urban garden has, then, an educational value in adults (knowing how it is grown and what goes into the pot) and children (it can become "educational" as it already happens in many schools and even in the gardens of Garbatella). In the metropolises, characterized by the supremacy of the hypermarket and the physical and sensorial detachment from

Photo Courtesy: Maura Crudelli

Dr. Vandana Shiva with Gianluca Peciola at the Urban Gardens in Rome, 2012

the products of land, urban gardens carry the added value of the rediscovery of nature's cycles and seasons.

Given the expansion of these collective experiences, now the institutions have the task of enhancing them and asking for their creation and development. The task of urban farmers is to network and develop strategies to invade the city. Participating and sharing with local communities, they can gain ground in the parks, they can "attack" places at risk of "cementification", and they can express themselves creatively in the most unusual interstices of the cities. They can even claim a position of authority in defining the zoning of the city, or more generally in the planning policies of local authorities.

In the meanwhile, according to the latest census of the group Zappata Romana, there are already over 100 green spaces shared between gardens (51), farms (29) and 'garden spot' (26) run by citizens and associations who are committing against the deterioration of urban green areas in Rome. The map, online on the website of the association (www.zappataromana.net), is constantly updated.

The way to go is long and even more difficult in cities where the profit unscrupulously directs the planning. But how many battles that have made history have been launched in such a difficult way?

It is battle that can now count on a prestigious new ally that gives strength and enthusiasm to a very ambitious movement: the Indian scientist and leader of the international organic movement, Vandana Shiva visited the urban gardens of Rome on June 9. A meeting that was written in the fate of urban gardens considering their participatory and inclusive character and their vocation to rediscover the "green heart" of our modern cities. A local commitment that finds immediate echo in the global commitment of Vandana Shiva who has been fighting for over 25 years, with her association, to defend the rights of peasants in front of the overwhelming power and interests of agribusiness industry.

The convergence of ideas and motivations could not be more "natural". The Roman movement immediately espoused the cause of Vandana Shiva for the food sovereignty of peoples that must necessarily start from the defense and preservation of seeds. Without availability of seeds there are in fact no plants, there are no farmers, there are no gardens, and there is not decent work. In a word, there can be no that idea of "Green City" for which the Province of Rome and its current president and next candidate for mayor of Rome, Nicola Zingaretti, are struggling. We cannot allow that the "green future" of our cities depends on the will of a group of businessmen headed to the big corporations that govern, or attempt to govern, the sector in a despotic and anti-participative way. To ensure that this happens, the entire production chain must remain under public control and, primarily, under the supervision of the workers of the sector. The seed is the beginning and the end of this chain that defining "vital", especially in this particular historical moment, is not misplaced.

At the end of her visit to Rome, Vandana Shiva asked the workers of urban gardens to join the international alliance for the conservation of seeds. In short, we have to intend urban gardens not only as places of vegetable production but also places for conservation and for public and free exchange of old peasant wisdom, the wisdom of the seeds. The next battle of the Roman urban gardens has been already outlined.

**Gianluca Peciola, Vice President of the Environment Commission of the Province of Rome*

WOMEN IN THE FIELD

The Association Donne in Campo, Italy

The Association Donne in Campo is a member of the Italian Confederation of Farmers.

In line with the European directives, the Association is convinced that the integration of gender dimensions in the rural sector is a key strategy for economic growth and sustainable rural development.

The Association promotes female entrepreneurship, supports business networks for women, assists and shapes models or alliances of entrepreneurs and elaborates initiatives aimed at improving the skills and capabilities of women in rural areas as well as promoting their inclusion in governing bodies of enterprises and associations.

The Association is also committed to keep rural traditions alive, preserve the land, environment, and biodiversity anddevelop social services in rural areas. It organizes meetings, markets, fairs, seminars, training courses and other public initiatives.

The Association has a logo, a statute and its leading bodies at national, regional and provincial levels.

The representatives of the various local Associations, but also of the National Association, are for the most part agricultural entrepreneurs.

Donne in Campo, is based in Rome in Via Mariano Fortuny 20; the regional associations are based at the headquarters of the Confederation.

E-mail: donneincampo@cia.it • Website: www.donneincampo.it

Barbara Gobbi: Azienda agrituristica Valdifiori

Mother's dough

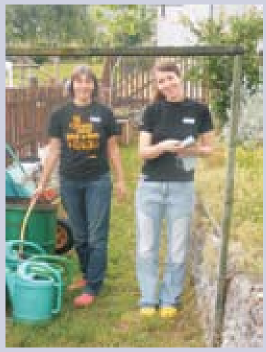
Bread, the basis of our diet and a source of life, is for the majority of people a totally industrialized food, produced with a purely chemical yeast. Many can't imagine the simplicity of making it yourself at home, in a natural manner using a mother yeast. I was lucky to inherit from the women of my family a mother yeast that had been handed down from generation to generation, and that is by now more than 150 years old. When this yeast – which was born in Italy, moved to Spain and eventually returned to Italy – was entrusted to me, it was in the shape of a loaf of soft wheat. In the course of my experience and research, I changed it from a solid mother yeast to a liquid culture, from soft wheat to rye; I chose rye because I believe that its flour can easily adapt to all sorts of flours. I really wanted this yeast and I cherished it and made it my own. I made all sorts of bread with it, I made focaccias and panettones, and one of my greatest prides is the dough I gave to my daughter's nursery school, which was used to make small Christmas panettones that each child brought home. At the end I arrived here in the Marche region, in the agritourism Valfiori.

From the very beginning I wanted to make bread not just for my family, but also for my guests, motivated even more by the presence of a wonderful wood-fired oven.

And here I came across some "Saragolla" wheat seeds, a kind of ancient wheat, considered to be the Italian kamut and very common in regions such as Apulia and Basilicata. We found these seeds a bit by chance, during our research to improve the quality of the diet of the calves of our farm.

We met a neighbour who owned this kind of grain but who was in no way interested in making bread. I insisted, and at the end we obtained from it a partially whole-grain flour. I so fell in love with it that I decided to divide my yeast converting part of it in "Saragolla" wheat yeast. This produces a relatively flat bread, but which is very fragrant and remains fresh for almost a week. We serve this bread to all our guests and it really sells like hot cakes.

Barbara Castellani – Frutti di Bosco Farm



Barbara Castellani Az.Agr. Frutti di Bosco

With love and dedication, I grow a wide variety of strictly organic products, especially small fruit: raspberries, blackberries, currants, strawberries and cherries. In a small orchard I have some old varieties of fruit, vegetables and medicinal plants that also nourish some bee families, which then delight us with their honey.

Unfortunately I don't have any special seeds to save.

I even tried a few years ago with the seed saver association "Civiltà Contadina" ("Rural Culture"), but unfortunately the seeds that I received did not take root in my farm.

In 2010 at Terra Madre, where I also met Vandana, I received as a present 2 purple potatoes that in 2011 become 8, but in 2012 only 3 plants grew. I still don't know how many purple potatoes I will have.

It's not easy to save seeds.

This year I received from a Iasma professional a handful of beans native of Trentino, I planted them and they are growing, but they are not yet ripe.

And here ends my experience on the subject.

LAURA FAROLFI

My name is Laura Farolfi and I am the owner of the farm I COLORI DELLA FRUTTA (THE COLOUR OF FRUIT) in Brisighella (Ravenna). The farm has an area of 3 hectares, and we grow a bit of everything.

The farm was set up in the 70s as a small producer of grapes; it then grew with the addition of peach and later apricot trees. It belonged to my grandfather, then it was passed on to my mother. In 2000, after I was fired from a ceramics factory, I began to look after the farm together with my mother. In 2001, I came up with the idea of making jams, which arose from a personal passion for sweet and especially healthy things. I personally take care both of the farming and of the preparation of the jams which I make with blackberries, strawberries, cherries, peaches, apricots, quinces, figs, watermelons and yellow pumpkins. The watermelons and the yellow pumpkins are old varieties, and we've been passing on their seeds for dozens of years.

I set up my laboratory inside my house, and here I prepare approximately 25 different types of jams, giving preference to wild and unusual fruit, such as pomegranates, "volpine" pears (pyrus communis volpino), corniole, green tomatoes, pumpkins and watermelons, etc. etc.. All jams are made only with fruit ripened on the plant and sugar, without preservatives, colourings and gelling agents.

The showpiece of the "collection" is the SAVO'R: a jam without sugar with SABA (cooked must), quinces, apples, pears, prunes, figs and lemons, a recipe that I learned from my grandmother and that meets quite a lot of success.

Winter Watermelon

It has the same structure and it is farmed in the same way as the summer one. The winter watermelon, though, has a light green rind, the flesh has a decisively yellow colour and it's not as rich in water, even if it's equally sugary.

It is eaten almost exclusively in the form of jam, flavoured by thin lemon slices.

Pumpkin

In Romagna the oldest and best known pumpkin is the yellow crookneck squash; it can have different shades of orange, and it has a firm flesh with only an extremity containing the seeds. In the C. moscata, the fruit (pepo, the pumpkin that we harvest) has a long shape; in the C. maxima the fruit is more or less round and spherical, it's relatively easy to farm and to preserve. It is used both for savoury foods (sauses to put on toasted bread, filling for tortelli and cappellaci, savoury pies...) and sweet foods (pies, biscuits...), including jams seasoned with cardamom or anise or simply with lemon rind and juice, ideal for jam tarts or to be served with cheeses.

Lia Zanotelli - Az. Agr. Savinelli

"Waxed Beans"

We are a family farm dedicated to working with fruit and vegetables "as they once were ", to preserve them in time, keeping the genuine taste and quality. We also produce jams, apple juice, dried apples, apples "as they were once", or small fruits, apple vinegar. Here follows my brief and simple experience:

I am a women who likes to produce in my own garden seeds of different vegetables, flowers etc.

I follow the teachings of my grandmother and mother by keeping the seed crops which now are indigenous of the village in which i live from birth.

From the experience handed down I use plants and flowers for eating and healing. I wish everyone the experience of the thrill of maintaining and using self-made seeds. I have a variety of beans, which we call "waxed" for the yellow gloss appearance. They are plants that grow strong, accustomed to any weather conditions. I have been observing them for some years now and am amazed that they are never unhealthy.

I make sure to put aside, without picking anything, plants that are heavy with beans so that in the autumn I pick the dry bacilli/seeds which I save for the following year.

Lia Zanotelli Livo – Trento
Imprenditrice Liliana Pedrelli
Az. Agricola BIOFRUTTA – Via Montilgallo n. 330
47039 Savignano sul Rubicone (Forlì/Cesena)

Roberta Maccioni - Antico Colle Fiorito Farm

"Fagiolina" or black-eyed bean

I found them a long time ago in the attic, inside a flask. They belonged to my grandfather... I didn't know if they would germinate or if it was too late for that. I tried planting them and they came back to life. It was a beautiful experience, it was as if I had received a present.

The black-eyed bean, or "fagiolina," is not really a bean, but a pea. The thin but resistent skin, makes this bean an excellent product: in fact, compared to other peas, it causes less stomach bloating and it cooks quicker. It has an excellent content of vegetable proteins (around 25%) and far fewer fats and sugars than other legumes. Hence, it is the most suitable bean for low-calorie diets. Because of its characteristics, it's also a food suitable for those who suffer from gout and must reduce animal proteins, and especially meat.

Even if nowadays the black-eyed bean has become almost a rarity, due to a greater difficulty in harvesting it and a lesser agricultural yield compared to other beans, yet it can be said that it is the only native "bean" of our region: the borlotti beans and all red beans that we usually eat were brought over from America by Christopher Colombus.

The taste of this bean is delicate and sweet. It is excellent simply boiled and dressed with oil, or used for soups.

Like for other kinds of beans, it's advisable to leave the black-eyed beans to soak in water for one night, then cook them first in unsalted water, and then to finish cooking them in new water or broth: this decreases the stomach bloating effect.

Azienda agricola Antico Colle Fiorito

Angela Tommasi

My name is Angela Tommasi. For the past fifty years, I've been living and working in Versilia, where I farm and raise animals. Particularly, in the last few years, I've been dedicating myself to the farming of partially free-range dairy cattle for the production of a high quality milk, which is sold in an automatic milk dispenser some 3 km from my farm. Both for my crops and animals I use integrated farming methods, reducing to a minimum chemical fertilizers in favor of the natural manure produced by my cows, and limiting as much as possible synthetic products.

The area where I work was, and still is, the object of an extremely strong population pressure and of enormous property speculations that have drastically reduced the area of farmable land.

Regardless, I decided to pursue this difficult activity with the help of my whole family, aware that I'm defending the land and the local traditions.

It's because of this that, apart from traditional produce, I wanted to rediscover some endangered varieties strongly connected to age-old local customs.

Among the products I rescued is the Fagiolo Schiaccione di Pietrasanta ("schiaccione" bean of Pietrasanta). Its seed is white, approximately 2.5 cm long, and has a long, flattened shape. It has a sweetish taste and it's very tender.

The "schiaccione" bean is produced between August and October, grown on a 3000 m2 area of the farm. The farm seeds of the previous year are sowed. The soil is milled and furrows are dug every 60 cm. We then lightly fertilize the land, plant the seedlings (at a distance of 35-40 cm from each other), and eventually we proceed with the weeding. As the plants grow, we firm the soil around their base and fight possible parasites and diseases. Then we fertilize a second time (only broadcast fertilization). The harvesting is done manually. The pods are placed on cotton cloths and left to dry in the sun for 15-20 days to be then shelled by hand. Finally they are packaged in 500 g bags.

The product is special because of its local origin and because of its characteristic shape and taste. The soil of this area is particularly suitable for the production of legumes because it was an old riverbed and it is cool even in summer, which plays a decisive role in the growth and quality of the final product. All stages of production still follow traditional methods. The product is typically eaten together with pork cold cuts.

Apart from the "schiaccione" bean, my farm produces the Mais Maranino ("Maranino" maize).

It's an old product that is very suitable for food preparations and was used in great quantities up until the late 1940s and early 1950s. With the gradual disappearance of the polenta as an everyday dish, the product went through a deep crisis that worsened dramatically with the advent of hybrid maize varieties that, although of a lesser quality, give much greater yields. The plant is of average size, between 1.8 and 2 metres tall, with many leaves and a considerable resistance to wind. It usually has two cobs and their grains are rounded and closely packed, of a beautiful red-orange color. They produce an excellent and plentiful flour with an above-average percentage of proteins. The "maranino" maize is a precocious variety, meaning that its growing cycle, from germination to harvest, is 90 days long. The yield varies between 2000 and 2500 kg per hectare, against the 7000-8000 kg of the hybrid maize.

The grains of this maize are rich in gluten, unlike other common maize varieties that have a higher starch content, and so they produce an ideal flour for making polenta, giving it an intense yellow color with brown specs, and an unmistakable, most pleasant taste.

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Alba Gasparet

"Tongue of fire" borlotti beans

Small aubergines

Alba Gasparet was born in Liguria, in a family that had no connection with the rural world. In 1991 she moved to Tuscany where she fell in love with its land, so much as to realize the dream of her life: buying a rural house (which she did in 1999) and farming the land. Many years have passed since then, which she has spent growing both in her agricultural profession and personally.

The farm is called Podere Alba , and it is situated on the hills of Livorno, between the towns of Gabbro and Castelnuovo della Misericordia. It has an area of 52,000 m2, of which approximately 23,000 are dedicated to the cultivation of olives, vegetables, trees of ancient fruits, which are all rigorously organically farmed. The remaining area is covered by coppice and Mediterranean maquis.

All the fruit and olive trees were planted by Alba, paying particular attention to their zoning.

Since the very beginning, Alba Gasparet has tried to gain professional knowledge and capacities through her work in the field, but also by participating in various courses ("the rural entrepreneur," "medicinal plants, fibres and natural dyes," "local produce and traditions") and by taking part in a 100-hour training course held in a vegetable nursery. She attended courses on the pruning of olive trees and participated in a course on olive oil tasting.

The farm self-produces organically the seeds and some vegetable plants grown in a small greenhouse next to the house. It is part of the "Rete Semi Rurali" (Rural Seeds Network) for the preservation of endangered species.

In a previous course, she won, presenting the most innovative entrepreneurial idea, a tutorial in her farm by an expert in the self-production of vegetable seeds.

She is currently engaged in making vegetables in oil, using products from her vegetable garden such as the small aubergines from Genoa, a typical plant grown with self-produced seeds, native of Liguria, the region where Alba was born. Eggplant

Furthermore, she produces and sells seeds of some legumes such as the "tongue of fire" borlotti beans.

Elena Spinsanti

Chilli Pepper

Me with the seed of 2011 and with the first chilli peppers picked in 2012

My farm is a small family business, located in the Valle del Musone, devoted to the cultivation and direct sale of seasonal vegetables. We currently cultivate as many as 26 different species of vegetables, spread out over the course of the year. In my small farm we can truly say that the women are the "custodians" of the seeds. In fact, among the 26 species of farmed vegetables, there is one whose seed has been jealously guarded for many, many years!

I'm talking about the chilli pepper. The seed is never ever bought – woe betide if it was! - but rather, every year it is obtained from the previous year's crop.

The "ancestor" of this chilli pepper grown on my farm is lost in time. In fact, the "original" seed belonged to my grandmother who began growing it when she was young – therefore, it can be estimated that it has been replanted for more than 70 years! Also, over time, some "blends" occurred with other types of seeds; in fact, over the years, it has often happened that some clients or acquaintances, intrigued that there was quite a substantial cultivation of chilli peppers in the area, brought to my grandmother or to my mother seeds of chilli peppers grown in their own vegetable gardens. Therefore, over time, after countless sowings, some crossbreeding happened spontaneously which led to us having various types of chilli peppers. This passion for cultivating the chilli pepper has been handed down through time, so much that I currently grow it on the farm, obviously more extensively and a bit more professionally if compared to my grandmother, but with a production and a re-use of the seed which is practically identical to what she and my mother did for such a long time. Every year, I enjoy planting the seeds produced by the previous year's crop and, as they grow, I like seeing how the spontaneous crossbreeds that occurred the previous year produce chilli peppers with the strangest shapes and colours, and, obviously, various degrees of "hotness."

Often, while looking at the plants in the field, I am struck by how bizarre the spontaneous exchanges in nature of genetic material can be!!! Then, if there is something that arouses my curiosity and that I particularly like, I try to isolate it in order to grow it as "purely" as possible and to pass it on to the following year. I can say that the farming of chilli peppers is indeed one peculiarity of my farm, much appreciated and sought after by my clients. It is a splendid example of giving value to local production and to the guarding of personalized and inimitable seeds. These seeds contain the love that several generations of women have given to this very specific crop, and I hope it can continue to be passed on!

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The chilli peppers of 2011 from which I obtained the seed for 2012

Valeria Reggiani

My name is Valeria Reggiani, and I became a woman of the land through marriage. For a few years I continued teaching while at the same time I gained experience of the countryside, of crops and of livestock farming. Then I began an agritouristic activity, providing food and accommodation, and I started a teaching farm.

At the moment I dedicate myself mainly to the growing of a vegetable garden that contains several wild, edible plants and to the farming of farmyard animals.

"Virgilian" SALAD (I am the one who named it, because it reminded me of my uncle Virgilio who grew it, and because of the place where it is farmed, that is, the Virgilian land of Mantua where the Latin poet Virgil was born.)

It has been farmed in the family vegetable garden for at least 70 years, having records of this dating back to the late 1930s.

We sow at the end of winter for the spring harvest and in September for the autumn harvest which continues up until the first frost.

Every year I harvest twice and I produce seeds with the plants sowed in autumn.

It's a rustic salad, resistant to cold, with a strong taste and consistency.

It has a white seed, shaped like an elongated spindle.

It forms an open, relatively small head; its leaves are of an intense green, with quite thick middle stalks, a wrinkled inner edge, and sometimes coloured with soft shades of red.

Valeria Reggiani
via Rodoni 13/4 - 46037 RONCOFERRARO MN

Liliana Pedrelli

Nectarine of the "Guerriera" Variety

Native of America. Farmed extensively in Emilia Romagna.
It is harvested around the 18th - 20th of July.
Very juicy, sweet, with an intense red-orange colour.
It is ideal for making juices, purees, jams.
Each plant produces between 30 and 50 kg of nectarines.
It is quite difficult to farm organically because it is often attacked by "grey mould".

Liliana Pedrelli
Az. Agricola BIOFRUTTA – Via Montilgallo n. 330
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In our farm we have about 350 "Guerriera" trees.

RURAL SEEDS NETWORK
Rete Semi Rurali, Italy

To each seed its soil. To each soil its seed.

The Rete Semi Rurali (RSR) is a non-profit national association with two headquarters, one in Scandicci (FI) in Via di Casignano 25 and the other at the Biocentro-Villa Pertusati in Rosignano Marittimo (LI). Its 19 members are: Associazione Lavoratori per l'Agroalimentare (ALPA), Associazione Rurale Italiana (ARI), Associazione per la Solidarietà della Campagna Italiana (ASCI), Archeologia Arborea, Associazione Italiana per l'Agricoltura Biologica (AIAB), Associazione Veneta Produttori Biologici e Biodinamici (A.Ve.Pro.Bi), Civiltà Contadina, Consorzio della Quarantina, Coordinamento Toscano Produttori Biologici (CTPB), World Wide Opportunities on Organic Farms (WWOOF-Italia), Parco Nazionale del Gran Sasso e dei Monti della Laga, the small seed company Arcoiris, Zolle s.r.l., the non-governmental organizations MAIS and Centro Internazionale Crocevia (CIC), Associazione per la Diffusione di Piante fra Amatori (A.Di.P.A.), the Distretto di Economia Solidale della Brianza (Des.Bri), the association La Fierucola of Florence and the cultural association "La Casa del Cibo" of Rome.

The Rete Semi Rurali, informally since 2001 and then from 2007 as a formal association, supports, facilitates and promotes the contact, communication, exchange and sharing of information and initiatives among those who stand for the values of agricultural biodiversity, for the productive and housing reclamation and preservation of the land, for the knowledge, production, exchange and sale of products obtained from local varieties and species, for the use, conservation and implementation of mechanisms that facilitate the dynamic management of agro-biodiversity allowing for the continuous implementation of the adaptabilities of the agricultural varieties and breeds to the various territorial contexts through the restoration of those seed networks and systems that in the literature are defined as "informal."

The activities

Specifically, the activities of the RSR have always focused on the analysis and monitoring of the legal issues that impact positively and negatively on the use of agricultural biodiversity, on their spreading and, where possible, on the intervention in those fields; on the cataloging and dissemination and networking of experiences already in place, the study and spreading of the technical aspects pertaining to the breeding in the field, the enhancement and dynamic management of agricultural varieties and breeds; on the analysis and promotion of the implementation of farmers' rights set out in Article 9 of the FAO Treaty and of the policies of sustainable use (environmental, economic and social) of plant genetic resources for food and agriculture (Art. 6 of the FAO Treaty); on the investigation in the field on the use of local varieties, the information, active involvement and training of farmers and technicians; on the continuous dialogue with national and international public entities (regions, provinces, EU/DG Sanco, MiPAAF, FAO, universities) responsible for the implementation of research and development programs and agricultural policies.

The RSR has been collaborating since 2008 with the MiPAAF for the implementation of the "Programmi per la conservazione, caratterizzazione, uso e valorizzazione delle risorse genetiche vegetali per l'alimentazione e l'agricoltura" ("Programmes for the Conservation, Characterization, Use and Enhancement of Plant Genetic Resources for Food and Agriculture"), which fall within the national implementation programme of the FAO Treaty ratified with the L.N. No. 101 of 6 April 2004. Since 2009, the RSR is collaborating with the Province of Livorno for the execution of the project "Coltiviamo il Parco: Centro per la custodia della biodiversità alimentare presso Villa Pertusati-Rosignano Marittimo (LI)" ("Let's Cultivate the Park: Centre for the Preservation of Food Biodiversity at Villa-Pertusati Rosignano Marittimo (LI)"). Particularly significant in these last few years of activity were the European seminars "Liberiamo la diversità" ("Let's Liberate Diversity"). The 4th seminar, held in Ascoli Piceno, was organized in 2008 by RSR, with the support of the Province of Ascoli, the ARSIAL, the MiPAAF, and other associations. The meeting had about 150 visitors – farmers, researchers, technicians and national and international political entities. Other activities of the Network are: the annual training course with an average of 60 participants (farmers and technicians), the production of data sheets, which have been reprinted three times, on political-legal and technical aspects relating to agricultural biodiversity, the event for the exchange of seeds known as "Marzuolo."

The RSR is member of the European Coordination "Let's Liberate Diversity", together with its French and Spanish counterparts (Réseau Semences Paysannes and Red de Semillas Resembrando e Intercambiando), Pro Specie Rara (Switzerland), Scottish Crofter Foundation (Scotland) and Arche Noah (Switzerland).

Case Studies

Abruzzo – Consorzio Produttori Solina d'Abruzzo, Sulmona (AQ)
http://www.facebook.com/ConsorzioProduttoriDellaSolinaDAbruzzo

The establishment of the Consortium "Solina d'Abruzzo" was the answer to the need, felt by all farmers in the mountain area, to give voice and space to their produce, which is often still based on old local varieties, painstakingly maintained despite the dominant clichés of extreme productivism. The native varieties that the Consortium currently farms are mainly cereals and legumes, while the expansion of the production base for vegetables and fruit is currently underway. Among the cereals being produced are the "Solina" common wheat, the "Ruscìa" durum wheat (a Sicilian ecotype introduced in the mountainous areas of Abruzzo over fifty years ago), the "dicocco" spelt of Abruzzo, a central Italian ecotype reclaimed in 1985. Among the legumes, the Consortium is launching the production of different types of grass peas, chickpeas and beans, all from the ARSSA's germplasm collection of Abruzzo.

Campania – Az. Agricola Giovanni di Genua, Montella (AV)

It is an organic farm, member of AIAB. Giovanni Di Genua, who runs it, is a member of Civiltà Contadina and participates as a spokesperson to the Campagna Popolare per l'Agricoltura Contadina (Popular Campaign for Peasant Agriculture) also in the name of Ragnatela. He became a farmer in 2000. His farm makes very little use of external inputs, also when it comes to seeds since it produces the seeds it uses. He produces vegetables, fruit and chestnuts. He also cultivates ancient wheat and processes it in the farm using a stone mill. Therefore, his care for local varieties goes from cereals to vegetables, including several ancient varieties of fruit trees that he cultivates. His experience gave rise to the project Terra e Libertà (Earth and Freedom), aimed at the environmental sustainability of agriculture and tourism. The project has allowed the spread of the agro-ecological approach integrated with the development of local varieties and breeds.

Emilia Romagna – Az. Agraria Sperimentale Stuard, San Pancrazio (PM)
http://www.stuard.it

The farm was born in the 70s with the aim of supporting universities and technical high schools for the subjects connected with agriculture. Its present name was given in 1993. It currently preserves and reproduces on the field collections of trees, vegetables and cereals, and it farms some local bird breeds. The farm normally carries out 70-80 experimental tests every year on 20-25 agricultural species, cultivating each year approximately 3000 experimental parcels. The farm works with public and private bodies on the main species of interest for the territory of Parma. The farm is a member, together with some 100 other farms of Emilia Romagna, of the Associazione Agricoltori e Allevatori Custodi di Parma (Association of Custodian Farmers and Breeders of Parma). The farm is in the list of the Aziende Sperimentali della Regione Emilia Romagna (LR 28/98) (Experimental Farms of the Emilia Romagna Region) ,and it is the seat of the body that holds them together, the Aziende Sperimentali Associate (Associated Experimental Farms). It has ongoing collaborations with schools and universities, and it grants scholarships.

Emilia Romagna – Az. Agricola Ca' del Santo Alberto Olivucci, San Leo (RN)
http://www.cadelsanto.org/

The farm is located in San Leo, on the hills behind Rimini and the Republic of San Marino. Organic since 1990, it is run by Alberto Olivucci, who is passionate about the conservation of old varieties, and who, for a few years, was president of Civiltà Contadina, an association dedicated to the preservation of rural biodiversity. Ca 'del Santo is also a place of culture, a centre for courses and meetings on issues regarding natural life and seed breeding. The farm reproduces several local varieties or vegetables at risk of genetic erosion. It reproduces seeds for Arcoiris, a small seed company that supports organic and biodynamic farming, and it hosts experimental tests on tomatos of the European project of the 7th SOLIBAM Framework Programme on experimentation strategies of Participatory Plant Breeding.

Friuli Venezia Giulia – Az. Agricola Andrea Pitton, Teor (UD)

The farm of Andrea and Paola Pitton is in the land of Rivarotta, generated by the river Stella. Indeed, the river's name (Stella = Star) inspired the farmers of Veneto and Friuli, who collaborated in the breeding on site of the chicory of Verona. In fact, in 2009, the Pitton farm reproduced the first generation of chicory of Verona born in Friuli, naming it Stella chicory. This is just one example of the attention that this company has for the organic seeds it farms and exhibits, looking for collaboration and inspiration in the experiences of other farmers. Thanks to the encouragement received from visitors and from European experiences organized by the Rete Semi Rurali, a process of reconstruction of the local cereal production chain, mainly aimed at the making of bread and flour for polenta, has been launched in collaboration with other farms from Friuli who are members of AIAB. Consequently, some varieties of wheat, barley and maize, either local or collected from other farmers or from repositories, were experimentally grown. The farm hosts some experimental tests of the European 7th SOLIBAM Framework Programme oriented towards the Participatory Plant Breeding. The meeting days between farmers organized by AIAB in the context of the project have received a lot of interest here, and other farmers have shown interest in planting very variable populations with the aim of having a starting point for experimenting selective evolution.

Lazio – Cooperativa Agricola Caramadre, Fiumicino (RM)

http://www.biocaramadre.it/

The company is located in the Agro Romano, completely inserted in the Riserva Statale del Litorale (National Coastal Reserve), near the natural WWF Oasis of Macchia Grande. It covers an area of 20 hectares divided into two different localities. Following the precepts of organic farming, the main production is of vegetables. Minimal and superficial tillage is used to reduce the impoverishment of the soil, which is revitalized only with natural fertilizers (manure, minerals, compost). For years, the Cooperativa Caramadre, has been searching for and cultivating local varieties that have disappeared from large retailers and supermarkets. The company is very active in the search for new ways of selling its products, from direct sales to home deliveries. It participates in the delivery system of Zolle in the city of Rome.

Liguria – La Collezione di Patate del (The Potato Collection of the) Consorzio Quarantina (GE)

http://www.quarantina.it/

The Consorzio della Quarantina that was born in 2000 to save, preserve and enhance two varieties of Genoese potatoes. It now has hundreds of members and works for the protection of agricultural biodiversity of the mountains of Genoa. Since its inception, it has operated without the use of public funding. Since 2008, after the success of the exhibition of potatoes from around the world organized in Torriglia for the International Year of the Potato, the Consorzio, with the support of the Parco dell'Aveto, has set up two conservative fields within the park for the breeding of the exhibited varieties. The cultivated collection, which is one of a kind in Italy, is enriched every year with new specimens. Thanks largely to the work of Fabrizio Bottari, which is responsible for the breeding of tubers, there are more than 200 different varieties of planted potatoes from South America, Italy, France, Germany, England, Switzerland and many other countries. Particular emphasis is given to the "Quarantina Bianca" and other traditional varieties still present on the mountains of Genoa: "Prugnona," "Cannellina Nera," "Morella," "Giana Riunda" and "Cabannese." The collection is used during the year for promotional and educational meetings, organized by the Consorzio della Quarantina and by the Rete Semi Rurali. The collaboration with farmers from other places, especially in high ground areas that are suitable for the breeding of seeds, is seen as an opportunity and a guarantee for any possible problems related to the breeding of the tubers of the collection and of the ones suitable for production.

Lombardy – Progetto Spiga & Madia (MB)

http://des.desbri.org/spigamadia/progetto-spiga-e-madia

Spiga & Madia ("madia" is a term from Lombardy and Piedmont for a wooden piece of furniture in which to place objects and food, especially bread) was founded in 2007 with the aim of verifying the possibility of rebuilding a production chain of organic bread entirely managed in a territory (the Brianza around Monza) with a radius of approximately 50 km. For the past five years, a promoted group of 600 families (within the wider process of the district of solidarity economy of Brianza- Des.Bri.) is engaged in the production of bread (from sowing to baking) within an area characterized by record-breaking rates of urbanization. Since 2007, this group of people has worked hard to find agricultural areas (24 hectares); it has found organic farmers, seeds (in the absence of seeds ideal for making bread, they also have recently obtained some "ancient" seed varieties with the support of the Rete Semi Rurali) and the last traditional mill that could do a staggered production of 21,000 kg of flour; it has trained bakers to make quality bread (using mother yeast) on a weekly basis. This "virtuous" process, which grants fair returns to all partakers in the production chain (for example, after a costs breakdown, the producer receives 45 euros per 100 kg of grain), produces organic bread at €3.40 per kg compared to an average of €4 per kg of the bread sold in Milan. The project has reproduced its own seeds of "Frassineto" common wheat, and of a population obtained from France, starting with just a few grams.

Marche – The collection of traditional wheat of Oriana Porfiri

For the Rete Semi Rurali, Oriana Porfiri cares for a collection of wheat, received in early 2008, at her farm in the vicinities of Urbisaglia in the province of Macerata. Part of the accessions comes from Germany where, in 2007, began the tests with transgenic wheat. These tests raised fears of a possible contamination of the varieties preserved in the near Gatersleben bank, so the farmers signed an agreement which allowed them to "take on" the seeds. Since the bank had some wheat varieties of Italian origin, bags containing 15-20 g per variety were sent to Italy. The varieties that are sown in spring and autumn were planted, classified and made available to farmers who wanted to take them on. To the 11 accessions of Gatersleben were added accessions from individual farmers or associations afferent to the Rete Semi Rurali, such as the spelt from the Instituto di Martonvasar, the "Tosella," the "Villa Glori," the "Gentil rosso," the "Gentil bianco," the "Canove," the "Sieve" and the "Solina." There is a total of 18 collected varieties. They are made available to the Rete Semi Rurali, and they are mostly traditional varieties.

Molise – Az. Agricola Rocco Marta, Ferrazzano (CB) and Arca Sannita
http://www.arcasannita.it

Since 2010, the Rocco Marta farm houses the historic nursery of seeds and ancient plants of the Sannio. The collection includes more than 180 different local varieties of fruit (apples, pears, cherries, figs, mulberries, plums, "lecine" prunes, prunes, clingstone peaches, "libergina" apricots, sorb apples, walnuts, hazelnuts, almonds, olives, grapes ("Tintilia" of Ferrazzano, Muscat of Montagano, "Campanino"); cereals ("Agostanello Giallo" maize of Molise, black maize,"Senatore Cappelli" durum wheat, "Saragolla" durum wheat, "Virginia"common wheat); vegetables and legumes (the tomatoes of Montagano, the "Reginalla" tomatoes of Campobasso, the "tortarella", the "turchesca" potatoes and legumes). The farm is among the producer members of the association Arca Sannita, born in 2009 in Molise with the aim of protecting and promoting the agricultural and breeding traditions of Molise. The association is very active in the preservation on the farm of local fruit plants and in the protection and promotion of the "Agostanello Giallo" maize of Molise.

Piedmont – Cooperativa Valli Unite, Costa Vescovato (AL)
http://www.valliunite.com/

The Valli Unite cooperative was founded in 1981 by three youngsters of the Curone Valley, determined to give continuity to their parents' farms. Today it employs 15 full-time farmers, who are also members of the cooperative, and an equal number of seasonal workers. The farm began with farming cattle, the production of cereals, forage and wine, and today it processes the majority of its field and barn production, selling directly through the company store, the markets, the cooperative's own agritourism and the solidarity purchasing groups.

Starting in 1990, it participated in the project of restoration and enhancement of the "Timorasso" vine, a vine that can be very productive on high grounds, and that has an excellent resistance against diseases. In recent years it took part in experimental projects on cereal farming in collaboration with the Centro di Riferimento per L'Agricoltura Biologica (Reference Centre for Organic Agriculture). The Valli Unite Cooperative is an example of farming that is integrated in the local social fabric. The care for agro-biodiversity is a logical consequence of a complex approach to agricultural production in the name of environmental, economic and social sustainability.

Apulia – Az. Agricola Campolisio, Sarruni (LE)
http://www.campolisio.it

Campolisio is a family-run farm with very diversified activities. It offers agritourism services, ranging from catering to agri-camping. It organizes cultural and recreational events, and it is very active in the promotion of local plant and animal agricultural biodiversity. It produces vegetables, olive oil, wine, conserves, baked goods, cheeses and meats. It farms the Ionic goat, a breed selected in this area with its particular environmental conditions. The company is a member of Wwoof Italia, of Civiltà Contadina and it supports the Rete Semi Rurali.

Sardinia – Az. Agricola Marco Maxia, Selargius (CA)
http://www.ilcapperoselargino.it/

The work of Marco Maxia of Selargius has allowed the recovery of the production of the "Selargino" caper, a tasty and delicate local variety, so good as to attract the attention of Slow Food Sardegna and of more than one regional agency for the protection of local products. The traditional harvesting of capers – is tapparas in Sardinian – was disappearing locally, but thanks to the dedication of Marco Maxia it was not lost, and, in addition, also the history of the "Selargino" has been recovered. The recovered plants are distributed on several small plots, some of which are rented. The parcels were the caper plants grow (some of them being hundreds of years old) are scattered in the area around Selargius: some in the very town, some in industrial areas, some in areas that have maintained their agricultural vocation. Marco Maxia is also one of the main experts on local bean varieties, as his work with AGRIS, the Sardinian experimental centre for agriculture based in Uta (CA), deals with taking care of the Sardinian bean collection, which is the result of a recent regional survey.

Sicily – Az. Agricola Terre Frumentarie, Raddusa (CT)
http://www.terrefrumentarie.it/

The Terre Frumentarie farm is located in Raddusa ("Città del Grano" – City of Wheat) between the provinces of Enna and Catania, an area with a strong vocation for cereals. It covers 210 hectares (of utilizable agricultural area), all dedicated to organic farming of ancient Sicilian grains sown each year on about 100 hectares.

The parcels at rest are either farmed with legumes on green manure or left for pasture on the basis of agreements with neighboring farmers. In addition, there are 5 hectares of Indian fig opuntia, and 2 hectares of olive trees.

The farm specializes in cereals and its distinctive trait is the use of varieties of Sicilian durum wheat, already classified by De Cillis (De Cillis, 1942): "Margherito" (also "Bidì"), "Timilìa" with black and white spikelets, "Senatore Cappelli," long spelt or "Strazzavisazz" and the "Maiorca" common wheat (muticate, autumnal and of medium precocity).

Since 2004, the farm hosts an experimental field catalogue of 5000 square metres, set up and managed by the Stazione Consorziale Sperimentale di Granicoltura per la Sicilia di Caltagirone, in which are kept and studied between 40 and 50 varieties of native grains, with 250 accessions, and some control plots of modern grains. Half of the experimental field contains legume accessions.

The field catalogue is a place where cereal farmers meet, and it hosts experimental parcels of the project Participatory Plant Breeding SOLIBAM.

Tuscany – Az. Agricola Floriddia, Peccioli (SI)
http://www.ilmulinoapietra.it/

The organic farm Floriddia is situated in Tuscany, between the Pisan hills of Valdera, 150 meters above sea level, and it covers approximately 300 hectares of land. It was founded in the 1960s, and in 1987 it converted to organic agriculture. Starting in 2006, it introduced the cultivation and sowing of old grain varieties.

The introduction process is carried out in cooperation with research activities of the Universities of Florence and of Pisa and in collaboration with the Rete Semi Rurali. Since 2009, it only cultivates ancient cereals, alternating them with legumes – small local Chickpea, "Sulla," Field Bean, Clover.

In 2007 the first handmade stone mill was activated. In 2010-11 the overall stone grinding mechanism was finalized, with a cutting-edge system for selecting and cleaning cereals. At the same time, the traditional pasta factory and a wood-fired oven were set up for the production of organic pasta using wheat germ, of bread and other baked goods both sweet and savory.

Due to the cutting-edge choices and the willingness to cooperate with researchers and farmers, the farm is a reference point for the reconstruction process of the supply chain of grain in Italy and Europe. Thanks to research projects and the activities of the Rete Semi Rurali, the farm has received frequent visits of other Italian and European farmers and has been the site of participated activities in the field. The farm currently collaborates in the Participatory Plant Breeding SOLIBAM project.

Tuscany II – Az. Agricola Radici, Loro Ciuffenna (AR)
http://www.radici.info/

The organic farm Radici is a reference point in Tuscany for the sustainable use of agro-biodiversity. For years, working as a farmer custodian, it reproduces local varieties at risk of extinction recorded in the regional registers. Thanks to its work of transformation and direct sale, it has ensured the development of several local Tuscan varieties. The diversified work on vegetables, fruits, berries and chestnuts has been made possible also because the fields belonging to the farm are spread out on a terrain that goes from 300 to 1,300 metres above sea level. The main local varieties that are farmed are the Giant Tuscan Basil, the d'Argentuil Asparagus, the "Violetta Fiorentina" Eggplant, the "Lungo Fiorentino" Zucchini, the "Ottobrino" Cauliflower, the Tuscan Red Onion, the "Piccino" chickpea of Chianti, the "Cannellino" Bean of S. Ginese, the "Zolfino" Bean, the "Nesta" apple (used for making jam), the "Costoluto" and "Canestrino" Tomatoes. A special mention goes to the "Zolfino" Bean; the farm true breeds a large number of its varietal clones. For this work, in the last year, Radici has began collaborating with other Tuscan farms that, like Radici, are also members of organizations such as the Coordinamento Toscano Produttori Biologici and the Associazione La Fierucola.

Umbria – Archeologia Arborea, Città di Castello (PG)
http://www.archeologiaarborea.org/it/

The San Lorenzo farm of Lerchi (PG) holds the Archeologia Arborea ("Arboreal Archeology") collection, gathered in about thirty years of research of fruit trees in the area of the Upper Tiber Valley, an ancient crossroad of various regions: Emilia Romagna, Tuscany, Umbria and Marche. The work that has been done over these past decades by Isabella Dalla Ragione and by her father was full of discoveries and findings. At the same time, this work has pointed out the inexorable process of biodiversity erosion of fruit trees. Also in order to strengthen the opposite process of recovery and dynamic conservation of biodiversity of fruit trees, the Archeologia Arborea association has began a process of transformation to become a Foundation, which has gained widespread approval and support. The orchard of the San Lorenzo farm of Lerchi will be its permanent laboratory.

Veneto – Az. Agricola Madre Terra (VE) and the Scuola Esperenziale Itinerante di Agricoltura Biologica
http://www.scuolaesperienziale.it/

Andrea Giubilato and Valentino Mattiuzzo run the organic farm "Madre Terra" Caltana di S. Maria di Sala (VE), located in S. Maria di Sala (VE). The farm is a partner of and works closely with the AIAB scientific committee. Each year they farm about thirty vegetable varieties, grown both in open fields and in polytunnels. For various crops they practice the self-production of seeds, especially of some populations of radicchio. In fact, the work of selection and improvement is carried out paying the utmost attention to adaptation. Recently, practical tests of participated selection of radicchio have been initiated during hands-on workshops connected to the educational activities on vegetable seed breeding.

The farm participates in the network that gave birth to the Scuola Esperienzale Itinerante di Agricoltura Biologica (Itinerant Experiential School of Organic Farming). More than a physical place, the Scuola Esperienzale wants to be a method for teaching organic agriculture based on field experience and on the guidance of people who have been working in this field for years. In the Scuola Esperienzale, theory and practice, which have long been separate, finally come together and the resulting knowledge helps the students to work in a conscious and autonomous manner.

Veneto II – Consorzio di Tutela Mais Marano
http://www.maismarano.it

The Consorzio di Tutela was founded in 1999 in Schio, with the aim of preserving the the "Marano Maize," a typical variety of maize in danger of extinction selected by Cav. Fioretti in 1890 in Marano Vicentino, and of promoting the flour it produces. The production area covers the foothills of the province of Vicenza and the Val Leogra. The producers form a cooperative, and they receive the seed from the consortium that, according to its charter, can sell only to its members. The organic farmer Giandomenico Cortiana, who was the first president of the consortium, described the importance of the consortium as follows: "maize is one of the many local products of Italy and as members of the consortium we are fully aware of the importance of protecting this variety, both for the organoleptic and flavour qualities of the flour produced and for our firm conviction that biodiversity is of paramount importance. All this can provide interesting opportunities for local agriculture."

MICHELE TANNO*

Michele was born in San Biase Tanno (CB) and lives in Campobasso, Molise Region)

After his degree in Agricultural Science from the University of Bologna has practiced the profession in Emilia Romagna and Campania for 18 years. Back in his region, in 1988 he was hired by the Molise Regional Consortium of Defense where he served until 2003. In particular, he supervised the cultivation method according to the principles of organic farming following EU Regulation, and collaborating with the Regional Department of Agriculture for the preparation and updating of the production rules in the Regional Rural Development Programme.

It was at that time that he became interested in monitoring, restoring, conserving and utilizing species and varieties of native fruit and vine of Molise in different niches: the various apecies and varieties were also grown on his property at 850 m/asl according to the criteria of organic farming.

He was the first to aplly organic farming on local apple trees, grains, legumes and vegetables grown in Molise; further more he saved the old vine of Molise Tintilia and started vine production.

Since 1998 he transformed his farm into a farm holidays and educational farm by engaging in the promotion, exhibition, tasting of typical products both at his premises or participating in events, demonstrations, conferences, roundtable discussions on rural culture and cuisine of Molise in Italy and abroad.

In July 2006, having reached the minimum retirement age, he sold the farm business and dedicated himself to agricultural research and to the promotion, environmental and food and wine of Molise.

He has published several books, essays and articles on the history of rural, agricultural crops and the produce of Molise. He has held numerous meetings, workshops, educational programs for young farmers, students and graduates of technical schools and agricultural professionals in the field of organic farming, plant pest control, pruning and grafting practice, recognition of weeds, biodiversity and school the farm.

In 2005 the Ministry of Agriculture and Forestry appointed him as acting member of the Appeal Committee for the organoleptic examination of wines DOC and DOCG of central Italy.

In 2009, with three other professional fans, he founded the Association Arca Sannita (www.arcasannita.it) in order to extend and improve the activity of recovery, safeguarding and development of seeds, fruits, plants and animal species threatened with extinction in Sannio and in Molise.

Since its establishment the association has collected and grafted in the nursery and select a collection of 250 ancient varieties of Molise, including 51 apple cultivars, 48 pear, 25 cherry, 24 plum, 29 fig in addition to different plants, trees (rowan, mulberry, quince, walnut, almond, hazelnut, chestnut, dogwood and other fruit trees and forest). The recovery work has been extended to cereal grains, legumes, vegetables and other herbaceous species formerly cultivated and wild in our area.

In 2010, during the International Year of Biodiversity, Arca Sannita, has been awarded the national "Green Flag" award for his work in the region – an award given to only 8 associations in Italy. At present the association continues the research on plant germplasm organizing visits and technical meetings with farmers and amateurs for the planting and cultivation of these plants in gardens and orchards in order to establish family and orchards for commercial production locally and abroad.

*Profile facilitated by Dr. Salvatore Cecarelli

ASSOCIAZIONE "LA FIERUCOLA", ITALY

The La Fierucola association was set up in Florence in 1984 with the aim of supporting ecologically respectful initiatives that would not survive in a market economy, and to promote the research and development of simple technologies for small scale and low energy consuming agricultural economies. It helps a subsistence economy that is nature-friendly and that tends to reject consumerism, wage labour and every form of moral and material pollution. It also promotes exhibitions, fairs and especially the Fierucola del Pane (The Small Fair of Bread), where the non-industrial agricultural products and homemade handicraft, together with the techniques to produce them, are learned and divulged. In this context, it actively commits, through farmers' markets and exchange programmes, to protect and spread the re-discovery of local and wild plants and food, and the farming of traditional farmyard animals.

Among these, the "Progetto scambio semi" ("Seed Exchange Project") represents the effort of various farmers to create a "patrimony" of exchangeable quality organic seeds.

The aim of the project is to regain possession, as much as possible, of a collective seed self-production, where this self-production is made with organic methods. The aim is to have the availability of some good seeds of ancient varieties but also of more recent and widespread ones.

Similar projects are currently being developed all over Italy by various associations; these will rely on the Rete Semi Rurali (Rural Seeds Network) for the creation of a seeds database, both for vegetables and cereals. The La Fierucola is one of these associations, and it plans to work closely with all available individuals and associations.

The Fierucola, which has always promoted the self-production of seeds and the exchanges among producers, has set up an annual event in February at the "Fierucolina dei semi" (Little Fair of Seeds) that, thanks to this project, has grown and spread, leading to a greater exchange of seeds, information and to an ever-increasing awareness.

The various farmers-producers who are taking part in this project have been given a form to fill in that asks for:

-name of variety (botanical)
-origin
-place of production and soil characteristics
-main characteristics of the variety and cultivation specifications
-method of preservation selection used
-any treatments used on the plant and the seed
-place and method of seed preservation

All filled in forms can be consulted on the website:
www.lafierucola.org

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BIODIVERSITY PROTECTION IN THE PROVINCE OF REGGIO EMILIA, ITALY

Roberta Rivi*

For a very long time the province of Reggio Emilia has been concerned with the preservation of local agro-biodiversity, and it is engaged in favoring specific actions for the protection and development of the provincial animal and plant patrimony. The aim is to promote the vocational nature of the territory and the quality of our natural environments, to develop a network for the provincial environmental protection, with agreements and initiatives shared by authorities, universities, public bodies and farms in order to promote the effective collaboration between all public and private workers involved.

Territorial investigations and bibliographical researches were carried out in collaboration with the Regione Emilia-Romagna and various research institutes. This led to a first census of local animal and plant biodiversity. Subsequently, a provincial two-year project was laun hed, co-financed by the regional Programma di Sviluppo Rurale (Rural Development Programme), aimed at the protection of the province's most characteristic animal species and plant varieties.

The ongoing preservation actions for plans are the following:

Ancient grapevines: in the past few years the Province and the Consorzio Vini Reggiani (Wines Cooperative of Reggio Emilia) worked for the recovery of ancient varieties and the development of ancient grapevines such as the "Spergola," which can be currently used for the production of wine. In addition, there is the ongoing reorganization and expansion of the collection field of ancient grapevines at the Istituto Tecnico Agrario (Agrarian Technical High School) "A.Zanelli" of Reggio Emilia, a collection field with more than 30 ancient grape varieties.

Ancient fruits: our interest currently focuses on finding, classifying and preserving in-situ various specimens of pears and apples of the medium altitude areas of the Reggio Apennines, as well as on finding, classifying and preserving in-situ varieties of lesser fruits, such as the "Zucchella" prune, the "Lentigione" melon, the Pomegranate, the Quince, the "Corbella", the Azarole and possible other fruits of ancient settlement and use on the Reggio territory.

Arable land: the aim is the classification, recovery and preservation of ancient arable lands, especially of Cucurbitaceae, Liliaceae, Cereal Grains, (Wheat and Maize and also Watermelon, Melon, Pumpkin, Onion, Garlic, Shallot, that have a local tradition).

Olives: there are certain local ancient varieties that presented elements of significance and/or historical links with the provincial territory. We will proceed with the morphological characterization and the identification of their germplasms and we will proceed with a first multiplication of the material for the preservation in ex-situ collection fields.

The ongoing actions regarding animals are the following:

The Reggiana cow: in the context of provincial animal biodiversity, the Reggiana cow is the perfect success story of recovery and development of an ancient species that, still today, can boast a good numerical growth and the excellent commercial development of the Parmiggiano Reggiano cheese (Parmesan), produced exclusively with the milk of Reggiana cows.

The Ventasso horse: it is also a symbol of the Reggio biodiversity, famous for having excellent characteristics suitable for trekking and horse holidays. Its populations have always lived concentrated in the Reggio Apennines. It is bred in small, amateur farms, and it has been actively supported by the Province, the Associazione Cavallo del Ventasso

(Ventasso Horse Association), the Comunità Montana (Italian territorial association of a mountainous region) and the Corpo Forestale dello Stato (Italian State Forestry Corps) with its mounted police patrols.

The Cornella White: an ancient sheep species, it was considered almost extinct due to its huge population drop over the past few decades. Once it was a common sheep, especially on the Reggio mountains but also in the provinces of Modena and Bologna, and it is now regaining strength. Its recovery is linked to the promotion and development of the sheep cheese of the Reggio Apennines and of the re-discovery of local sheep meat dishes ("barzigole," "violino" hams and cured sheep meats).

The Reggianino pigeon: small-sized ancient Italian species native of Reggio Emilia, known for its smallness and gracefulness. It is bred locally, but also abroad for the simple pleasure of maintaining, preserving, improving and spreading this species.

The scientific initiatives are then closely linked with promotional actions, such as the creation of internet websites (Ventasso horse), the publication of a **catalogue** with fact sheets and wonderful pictures of some fifty Reggio species and varieties, the organization of conferences and guided tours.

Of relevance is the recent creation of the **Albo dei Custodi dell'Agrobiodiversità** (the Register of Agro-biodiversity Custodians) of the Province of Reggio Emilia. It has its own disciplinary commission, and numerous members among farmers and passionate growers. It was created to value the custodians of the biodiversity of local communities that are traditionally engaged in the preservation of genetic resources.

*__Roberta Rivi__ – Minister of Agriculture, Reggio Emilia, (l'Assessore Agricoltura, Promozione Territoriale, Tutela dei Consumatori, Benessere Animale)

SEED CUSTODIANS IN PROVINCE OF REGGIO EMILIA

Enzo Maioli
Via Castello Salvaterra, 5, 42013 Salvaterra (RE)
Cultivated area of 12 hectares with plants and fruits greenhouse
Reproduces walnut and local hazel seeds

Federico Salavolti
Via Valdenza Sud, 42026 Canossa (RE)
Cultivated area of 10 hectares with cereals and vineyard
Reproduces seeds of "Farro Dicocco and Monococco", Bolero Wheat, Bear, "Senatore Capelli"

Pietro Codeluppi
Via Strada Statale 63 Cispadana Guastalla, 42016 Guastalla (RE)
Cultivated area of 8 hectares with a greenhouse and horticulture
Reproduces seeds of pumpkins which is sold to other farmers.

Istituto d'Istruzione Superiore "Antonio Zanelli"
Via F.lli Rosselli 41, 42123 Reggio Emilia, Contact: Mirco Marconi
Cultivated area of 19 hectares with vineyards, orchards, vegetables, fodder and cereals
Reproduces seeds of old varieties of soft wheat "Tenero Poular di Ciano", Risciola, Terminillo, Gentilrosso, the Miracle Wheat, Leo Aristato, Pumpkins, Watermelons, Melons, Onions Borrettane

La Collina Società Cooperativa Agricola
Via C. Teneggi, Reggio Emilia, Referente: Enea Burani
Cultivated area of 75 hectares with Vineyards, vegetables, fruit, fodder and cereals
Reproduces seeds of old varieties of soft wheat Northern Italy area and Farro

Cucchi Alfredo
Via D. Pasquino Borghi 31 Praticello of Gattatico, 42043 Gattatico (RE)
Cultivated area of 22 hectares with vineyards, wheat, corn, protein peas, tomato.
Reproduces seeds of corn, polenta corn, tomato

GENUINO CLANDESTINO, ITALY

Hundreds of farmers, breeders, shepherds and artisans have joined together in the attack on the economic logic and rules of the market modelled on agribusiness, in order to defend free processing of products, peasant agriculture, and the immense wealth of knowledge and tastes of the earth. This experience led to the campaign Genuino Clandestino (Genuine Clandestine) in 2010, with women and men from every part of Italy organizing themselves into new forms of peasant resistance. While the bureaucracy bans thousands of small producers from the market, the consumer continues to suffer, often unconsciously, where production models are totally inadequate to ensure authenticity and reliability of the food.

Genuino Clandestino supports a model of food production with a view to give back to each area and bioregion their food sovereignty, with the development of an agriculture less dependent on oil and chemicals, to a supply system less dependent on imported goods, and in harmony with the local seasonal products. In the name of the small peasant agriculture, the campaign Genuino Clandestino shuns the intensive industrial model for agriculture making the family farm model ecologically, socially and ethically possible. Genuino Clandestino argues that a genuine solution to give sustainability to the local agriculture is to create stronger links between the different districts of the Social Economy and the farmers and rural realities.

It seems a paradox, but there exists genuine food which is considered to be illegal, thanks to the bureaucracy and the strict regulations that protect only the agro-industry: this is why the peasant agriculture is in a state of being "clandestine". Genuino Clandestino is a campaign that supports farmers claiming the ability to sell products freely in the squares, allow human relationships between the consumer and those who cultivate the land producing healthy food through a system of participatory certification as an alternative to the usual certification process, promotes free the exchange of knowledge and seeds, contrasts hardly the sale of public lands conducted by the governments through new practices of resistance.

The campaign protects and promotes the exchange, storage and reproduction of seeds within the network, through the free distribution among the peasants. It is necessary that all farmers have their seeds which they can rotate freely, especially among the young farmers who are forced, without a free exchange system, to be bound to the multinationals and consequently to GMOs.

Genuino Clandestino carries out periodic seminars on seed multiplication for the affirmation of food sovereignty. The aim is also to make a mapping throughout Italy of varieties with interesting and useful characteristics for the farmers to preserve the genetic heritage of Life.

The next appointment is in Milan on 5-6 and 7 October 2012 where we will continue to discuss access to land, auto participative certifications, protection of seeds and the free processing of farmers' products. In this occasion there will be a big square market with resistant farmers from all over Italy.

www.genuinoclandestinonoblogs.org
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Cesare, "Il Corniolo" Farm

Photo Courtesy: Manlio Masucci

I have been working on the problem of seeds for many years now, and I have always tried to share my interest on the subject with others, since only exchanging and sharing can lead to a growing awareness of the fundamental importance of biodiversity and to the promotion of appropriate behaviors. Over the last few years, together with the Terra Terra group and with the Italian network of Genuino Clandestino, some progress has been made. A first meeting on seeds was held in Bologna with a lot of people discussing and bringing together experiences and difficulties on the subject. A second meeting was held in Bari. The topic was "how to create a mapping of who owns what and in what quantities." I believe that it is important for the network's work to emerge.

I am a farmer located in the countryside of northern Lazio, in the province of Viterbo. I was born in the countryside; as a child I left it because of family problems, but I always carried with me the need to go back, and just past 40 I returned, buying a piece of land. From the very beginning I started looking close and far for vegetable seeds. I got several friends involved in the search, and they all helped me get them. By now, after 15 years, I have a seed bank that I try to protect and share with other farmers. I still dedicate time to research and training both inside and outside the farm. I try to make everybody realize the importance of preserving experiences and knowledge in an informal manner.

Photo Courtesy: Manlio Masucci

http://www.ilcorniolo.com/

THE BARI GENEBANK AT VERY HIGH RISK

Dr. Pietro Perrino*

The Genebank of the National Research Council (CNR) of Bari, founded in 1970, is in a state of high risk. It is the only one in Italy, the second in Europe and among the top ten in the world out of a total of 1750. It conserves 84,000 accessions (samples) of germplasm, from more than 60 genera and over 600 species of cultivated plants and wild relatives, threatened by genetic erosion and/or extinction. The purpose of this short note is to make known that this Genebank is at very high risk.

Background

The plant germplasm stored in Genebanks mainly consists of seeds of old varieties of cereals, legumes, vegetables, fodder and medicinal plants. This genetic patrimony has been found worldwide, mostly in the centers of origin of cultivated plants because threatened by genetic erosion and/or extinction. Old varieties, in fact, are populations (genetically diverse individuals of the same species), which are considered not very productive, but which exhibit a broad genetic base, which since the Green Revolution (in the forties and fifties) have been replaced by modern varieties (consisting of genetically very similar individuals), which are considered more productive, but characterized by a very narrow genetic base and designed for industrial agricultural systems, high impact and/or high energy input (deep plowing and excessive use of chemical fertilizers, pesticides, herbicides, irrigation, hormones and other pollutants, use of monoculture, etc..). With the Green Revolution agricultural systems industry began to take precedence over traditional systems now renamed environmentally friendly or sustainable, low environmental impact and/or low energy input (plowing shallow, moderate use of irrigation, use of natural fertilizers, pest plant parasites and weed control with natural methods, use of products little or no pollutants, practice of polyculture, etc..). The Green Revolution swept away a host of old varieties and replaced them with a few modern varieties, resulting in a significant loss of agrobiodiversity. It is estimated that, especially in the Countries most affected by the Green Revolution, from 60 to 90% of the old varieties of the most common crop plants have disappeared forever.

Farmers, for millennia, from the origin of agriculture (10,000 years ago), through selection (evolution under domestication), have created thousands of varieties suited to farming systems with low environmental impact, that is to say have increased agro-biodiversity and created a reservoir of plant genetic resources, which, as previously mentioned, the Green Revolution has drastically depleted and which, without safeguards of Gene banks, would have been completely eroded. The Green Revolution, responsible for the development of industrial agricultural systems with high environmental impacts and based on monocultures (cultivation of a single species and a unique variety of plants on larger farms) and the use of very homogeneous varieties, represents a continuing threat for agro-biodiversity, both *ex situ* (in genebanks) and for *in situ* (area of "origin). This is why almost all genebanks were created in the sixties and seventies, that is to say immediately after international organizations such as the FAO, and scientists from all over the world began to notice and reveal the high genetic erosion caused by the Green Revolution.

The genetic diversity contained in the old varieties preserved in genebanks is a resource of inestimable value. It is the raw material from which to select or develop varieties in eco-compatible agricultural systems, resistant to disease, to adverse environmental and climate change, including desertification, drought or water scarcity, today a global problem. This genetic diversity, in the fifties and sixties, as soon as it was noticed that the Green Revolution was causing loss of agrobiodiversity, was partly retrieved and stored in gene banks in order to save it from further genetic erosion or extinction, and to be able to use it as raw material to continue the ongoing genetic improvement of crop plants. Participatory plant breeding today has begun to be undertaken with the participation of farmers and consumers. Gene banks, more than ever, should also participate, providing the resources necessary to attain the objectives.

Gene banks have made a significant and important contribution to reducing the loss of biodiversity of the main crops which occurred mainly in the industrialized countries and most affected by the phenomenon of the Green Revolution.

Threats to biodiversity have increased with the advent of the second Green Revolution (in the nineties), that is genetically engineered or transgenic, or genetically modified organisms (GMOs). The lobby of multinationals sees genetic diversity in general, and especially that preserved in gene banks, as an obstacle to the spread and/or introduction of transgenic plant varieties. Varieties that are even more homogeneous than those produced by the first Green Revolution and therefore by definition more vulnerable to disease, climate change and less suited to environmentally friendly agricultural systems.

All this explains why, in general, the 1750 Gene Banks of the world suffer from lack of political and scientific support, and therefore funding necessary for the maintenance and enhancement of genetic diversity conserved in gene banks. Exceptions are 11 of the 15 centers of the CGIAR (Consultative Group on International Agricultural Research), which are real gene banks (retaining approx. 650,000 accessions of crop plants, forage and forestry). They are international centers funded by developed countries and therefore privileged compared to national gene banks. Another exception is the recent Gene Bank of Svalbard (Svalbard Global Seed Vault, located on the Norwegian island of Spitsbergen, and officially opened on February 26, 2008), being financed, so it is said, by large companies. The bank has proposed to many countries holders of plant genetic resources (in practice countries with gene banks) to keep a sample of their resources in the bank of Svalbard (also called the Ark of Agriculture). It is yet another strategy to continue to drain resources from less developed countries (but rich in resource) to more developed countries, already debtors (ecologically speaking) in respect to less developed countries. But it is also a strategy to transfer control of the germplasm of all gene banks to multinational companies.

Why the Gene Bank of Bari is at risk

In 2002, the restructuring of the CNR (National Research Council - Italian Legislative Decree 30 January 1999, n. 19, published in the Official Gazette no. 29 of February 5th 1999), unexpectedly put at risk the germplasm of the Bari Gene bank. Thanks to the intervention of the Public Ministry (PM) dr. Dinapoli of the Public Prosecutor's Office of Bari, the germplasm survived from 2004 to 2009. The PM had ascertained, through its Technical Consultant (CT) Prof. Andrea Filippetti, that the germplasm collection, as a result of poor management of the Gene bank by the National Research Council, had suffered considerable damage, amounting to a significant and irreversible reduction of the germination of a high percentage of seeds. That is, the death of a high number of seeds of individual samples of all collections as well as significant aging of many still living seeds which could still be recovered through regeneration. Thus, in the PM's confiscation decree of October 26th 2009, the most urgent requirement was the immediate regeneration of all the collections.

Unfortunately, The New PM Dr. Pasquale Drago and His Judge for Preliminary Investigations (GIP) Dr. Antonio Lovecchio archived the criminal proceedings on the hypothetical damage to seeds, filed by his predecessor, concluding that there was no fraud (Art. 635 of the Criminal Code) and there was no damage (Art. 452 of the Criminal Code), defeating thus the work done by the Technical Consultant on the assessment of damage. Moreover, the revoking of the judicial custody of the "seed samples stored for reference", that is, the proof of the crime, removed any possibility of confirming or denying the results of the Technical Consultancy. In short, the seeds are dying, there is an emergency, but everything is archived and all evidence of the crime is removed. Thus also erasing all the work done by the previous judicial authorities.

It is significant that the GIP and the PM, as regards the damage and on the basis of Article. 452 of the Criminal Code, conclude that one cannot speak of damage because the germplasm is not comparable to a medicinal product. Therefore, for these courts, if we destroyed (with or without intent) all the seeds of all collections (more than seven million of accessions) stored in all gene banks in the world we would not be committing any harm and therefore any crime.

Again, this means that the Law of April 6, 2004, no. 101 "Ratification and implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture" of the Convention on Biological Diversity of Rio, (1993), for the Court of Bari would be optional. The Invested billions to create public gene banks and salaries paid to researchers and technical personnel for the maintenance and use of germplasm would have been spent in vain. The above mentioned Law no. 101, instead, stresses the importance of gene banks and germplasm.

It began with the restructuring of the National Research Council (CNR) in 1999, followed by the merging of the Institute of Germplasm or Gene bank of Bari in 2002 with four other small CNR centers, located in Portici (NA), Palermo, Florence and Perugia, not interested in the conservation of germplasm, but in gene sequencing, molecular genetics, genetic engineering and production of transgenic plants. This merging not surprisingly unleashed a series of problems at the Gene bank, which then saw the involvement of politicians, Italian and foreign scientists, including some international organizations (FAO) and some associations. Unfortunately, their involvement led nowhere. In fact the merging went ahead and the result was that on November 1st 2009 the Genebank, after 5 years of seizure (dedicated to the repairing and maintenance of the cooling system of the storage chambers and assessment of the damage to the seed collections), was returned to the CNR, ie to who had put it at risk in the first place. Hard to believe…

The decree of release from seizure contains a number of stringent requirements that the CNR is ignoring. Among other things, the former Prosecutor points out that "The management of germplasm jure privatorum is now unthinkable, in the light of international law, national and regional", alluding to the FAO International Treaty, the Italian Law 6 April 2004, n. 101, the regional bill on the protection of genetic resources and the fact that the ownership of germplasm is who has the ability and desire to preserve and enhance it. So germplasm is not necessarily owned by the CNR, given the mismanagement. In other words, seeds, unique and rare, preserved in 1750 gene banks around the world are the heritage of humanity.

Unfortunately, the technical committee on the issue of Gene bank, commissioned by the President of the Puglia Region, Nichi Vendola, in 2008, because of the many commitments relating to the closure and reopening of the legislature of 2010 has not arrived at anything. In fact, the regional bill on the protection of genetic resources has not been translated into law and the interest of the region to save the Gene bank, through a new GERMPLASM PROJECT, proposed by the Region, with the involvement of other local institutions concerned, has not materialized. This also because, the CNR, instead of submitting to the Region credible proposals to that effect, asked only for funds, thus ignoring the will repeatedly expressed by Governor Vendola.

Conclusions

Given the importance of plant germplasm for agriculture, food and the environment, and the fact that billions of seeds of 84,000 samples, belonging to several crops, collected from all over the world are dying but can still be saved with immediate regeneration, the Puglia Region and other public and private institutions, directly and indirectly interested in food, environment, economy, society, politics and morality, should take action and get involved.

**Dr. Pietro Perrino - Research Manager of CNR, former Director of the Bari Genebank and legal guardian during seizure of the germplasm. E-mail: pietro.perrino4@gmail.com*

Ode to Maize

PABLO NERUDA

America, from a grain
of maize you grew
to crown
with spacious lands
the ocean foam.
A grain of maize was your geography.
From the grain
a green lance rose,
was covered with gold,
to grace the heights
of Peru with its yellow tassels.

But, poet, let
history rest in its shroud;
praise with your lyre
the grain in its granaries:
sing to the simple maize in the kitchen.

First, a fine beard
fluttered in the field
above the tender teeth
of the young ear.
Then the husks parted
and fruitfulness burst its veils
of pale papyrus
that grains of laughter
might fall upon the earth.
To the stone,
in your journey,
you returned.
Not to the terrible stone,
the bloody
triangle of Mexican death,
but to the grinding stone,
sacred
stone of your kitchens.
There, milk and matter,
strength-giving, nutritious
cornmeal pulp,
you were worked and patted
by the wondrous hands
of dark-skinned women.

Wherever you fall, maize,
whether into the
splendid pot of partridge, or among
country beans, you light up
the meal and lend it
your virginal flavor.

Oh, to bite into
the steaming ear beside the sea
of distant song and deepest waltz.
To boil you
as your aroma
spreads through
blue sierras.

But is there
no end
to your treasure?

In chalky, barren lands
bordered
by the sea, along
the rocky Chilean coast,
at times
only your radiance
reaches the empty
table of the miner.

Your light, your cornmeal, your hope
pervades America's solitudes,
and to hunger
your lances
are enemy legions.

Within your husks,
like gentle kernels,
our sober provincial
children's hearts were nurtured,
until life began
to shuck us from the ear.

DECLARATION ON SEED FREEDOM

- Seed is the source of life, it is the self urge of life to express itself, to renew itself, to multiply, to evolve in perpetuity in freedom.
- Seed is the embodiment of bio-cultural diversity. It contains millions of years of biological and cultural evolution of the past, and the potential of millennia of a future unfolding.
- Seed Freedom is the birth right of every form of life and is the basis for the protection of biodiversity.
- Seed Freedom is the birth right of every farmer and food producer. Farmers rights to save, exchange, evolve, breed, sell seed is at the heart of Seed Freedom. When this freedom is taken away farmers get trapped in debt and in extreme cases commit suicide.
- Seed Freedom is the basis of Food Freedom, since seed is the first link in the food chain.
- Seed Freedom is threatened by patents on seed, which create seed monopolies and make it illegal for farmers to save and exchange seed. Patents on seed are ethically and ecologically unjustified because patents are exclusive rights granted for an invention. Seed is not an invention. Life is not an invention.
- Seed Freedom of diverse cultures is threatened by Biopiracy and the patenting of indigenous knowledge and biodiversity. Biopiracy is not innovation – it is theft.
- Seed Freedom is threatened by genetically engineered seeds, which are contaminating our farms, thus closing the option for GMO-free food for all. Seed Freedom of farmers is threatened when after contaminating our crops, corporations sue farmer for "stealing their property".
- Seed Freedom is threatened by the deliberate transformation of the seed from a renewable self generative resource to a non renewable patented commodity. The most extreme case of non renewable seed is the "Terminator Technology" developed with aim to create sterile seed.
- We commit ourselves to defending seed freedom as the freedom of diverse species to evolve; as the freedom of human communities to reclaim open source seed as a commons.

To this end, we will save seed.

We will create community seed banks and seed libraries.

We will not recognize any law that illegitimately makes seed the private property of corporations.

We will stop the patents on seed.

NAVDANYA

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