NO TO GMO BANANAS

Protect Indigenous Biodiversity and Knowledge

NAVDANYA

SECTION ONE

Iron Deficiency: A Public Health Emergency

It is estimated that 2 billion people worldwide are iron deficient, including 1 billion people who have iron deficiency anemia (IDA) In India75% of the children <5 y old and 60% of young women have anemia.

Recommended Daily Dietary Allowance for Iron		
Men	Adult	8 mg
Women	Adult (age 50 on)	8 mg
	Adult (ages 19 to 50)	18 mg
	Pregnant	27 mg
	Lactating	9 mg to 10 mg
Adolescents (ages 9 to 18)	Girls	8 mg to 15 mg
	Boys	8 mg to 11 mg
Children (birth to age 8)	Ages 4 to 8	10 mg
	Ages 1 to 3	7 mg
	Infants (7 months to 1 year)	11 mg
	Infants (birth to 6 months	0.27 mg

www.bcguidelines.ca/pdf/iron_deficiency.pdf

Iron is necessary for many vital functions in the body including formation of haemoglobin, brain development and function, regulation of body temperature, muscle activity, and catecholamine metabolism. Lack of iron directly affects the immune system- diminishes the number of T-cells and the production of antibodies. Deficiency of iron in diet leads to Iron deficiency anemia. Iron deficiency in pregnant women is a major cause of maternal mortality and childbirth deaths.

Incidence of Anemia in India				
India	69.5	55.3	57.8	24.2
Andhra Pradesh	70.8	62.9	56.4	23.3
ArunachalPradesh	56.9	50.6	49.2	28
Assam	69.6	69.5	72	39.6
Bihar	78	67.4	60.2	34.3
Chhattisgarh	71.2	57.5	63.1	27
Goa	38.2	38	36.9	10.4
Gujarat	67.7	55.3	60.8	22.2
Haryana	72.3	56.1	69.7	19.2
Himachal Pradesh	54.7	43.3	37	18.9
Jammu & Kashmir	58.6	53.1	54	19.5
Jharkhand	70.3	69.5	68.4	36.5
Karnataka	70.4	51.5	59.5	19.1
Kerala	44.5	32.8	33.1	8
Madhya Pradesh	74.1	56	57.9	25.6
Maharashtra	63.4	48.4	57.8	16.8
Manipur	41.1	35.7	36.4	11.4
Meghalaya	64.4	47.2	56.1	36.7
Mizoram	44.2	38.6	49.3	19.4
Nagaland	“	“	“	“
Orissa	65	61.2	68.1	33.9
Punjab	66.4	38	41.6	13.6
Rajasthan	69.7	53.1	61.2	23.6
Sikkim	59.2	60	53.1	25
Tamil Nadu	64.2	53.2	53.3	16.5
Tripura	62.9	65.1	57.6	35.5

Uttar Pradesh	73.9	40.9	51.6	24.3
Uttarakhand	61.4	55.2	45.2	29.2
West Bengal	61	63.2	62.6	32.3
A & N Islands	"	"	"	"
Chandigarh	"	"	"	"
D & N Haveli	"	"	"	"
Daman & Diu	"	"	"	"
Delhi	57	44.3	29.9	17.8
Lakshadweep	"	"	"	"
Puducherry	"	"	"	"

1. Percentage of Children of age 6-59 months who are anemic
2. Percentage of ever married woman of age 15-49 years who are anemic
3. Percentage of pregnant woman of age 15-49 years who are anemic
4. Percentage of ever married men of age 15-49 years who are anemic

Source: http://www.medindia.net/health_statistics/diseases/Anaemia.asp

SECTION TWO

Destruction of Biodiversity and iron deficiency

Nature has given us a cornucopia of biodiversity, rich in nutrients. Malnutrition and nutrient deficiency results from destroying biodiversity, and with it rich sources of nutrition.

Our indigenous biodiversity offers rich sources of iron. Amaranth has 11.0 mg per 100gm of food,Moringa (Sahjan or drumstick) 28.26, buckwheat has 15.5,neem has 25.3,bajra has 8.0,rice bran 35.0,rice flakes 20.0bengal gram roasted 9.5,Bengal gram leaves 23.8, cowpea 8.6,horse gram6.77, amaranth greens have 38.5,karonda 39.1,lotus stem 60.6, coconut meal 69.4,niger seeds 56.7,cloves 11.7,cumin seeds 11.7.mace 12.3,mango powder (amchur) 45.2,pippali 62.1,poppy seeds 15.9,tamarind pulp 17.0,turmeric 67.8,raisins 7.7……..

Iron absorbtion is increased with vitC, that is why we have always eaten chutneys with our meals.

Cooking in iron vessels increases the iron content of food.

The Green Revolution has spread monocultures of chemical rice and wheat, driving out biodiversity from our farms and diets.

And what survived as spontaneous crops like the amaranth greens and chenopodium (bathua) which are rich in iron were sprayed with poisons and herbicides. Instead of being seen as iron rich and vitamin rich gifts,they were treated as “weeds”. A Monsanto representative once said that Genetically Engineered crops resistant to their propriety herbicide Roundup killed the weeds that “steal the Sunshine”. And their RoundUp Ads in India tell women “Liberate yourself, use Roundup”. This is not a recipe for liberation, but being trapped in malnutrition.

As the “Monoculture of the Mind” took over, biodiversity disappeared from our farms and our food. The destruction of biodiverse rich cultivation and diets has given us the malnutrition crisis, with 75% women now suffering from iron deficiency. Many of our iron rich foods are becoming Forgotten Foods.

SECTION THREE

Banana: The Kalpatharu, the Food of the Wise

(Musa X paradisiacal var. sapientum L. Family Musaceae)

India is considered as one of the centres of diversity and origin of the banana. Its scientific name is Musasapientum (means: food of the wise) since many sages lived on a diet of the banana. Alexander the Great and his men saw this while camping in India (BC 326) . And it was through Alexander that the banana was introduced to the Western world.

Banana is referred as "Kalpatharu" (The Divine Tree of Life or Wish Fulfilling Tree) due to its multifaceted uses in food, medicine, culture…..

Bananas have been grown in India from Vedic times. There are references of this fruit in "Rigveda" and the great epics "Ramayana" and "Mahabharatha". Ancient Roman writers like Pliny referred this fruit as "Pala". Which perhaps derived from the word "Palam", the vernacular name of banana fruit in south Indian states like Kerala, Madras and Karnataka

PLANTAIN OR EDIBLE BANANA (MUSA X PARADISICA
VAR – SAPIEMTUM) SOME LESSER KNOWN FOLK USES IN INDIA
P. PUSHPANGADAN, JEET KAUR & JYOTI SHARMA.
Ancient Science of Life, Vol. IX, No.1, July 1989, Pages 20-24

India is the largest producer of banana in the world and also in Asia, and contributes 22.15 percent to global production from 7.4 % area (2009)

Banana Plants are used to adorn all social and religious functions. And all auspices occasions involve the giving of banana as a sacred food.

There is no part of the banana that is not used.

The banana leaf plate is India's answer to plastics and Styrofoam.

The fibre is used to make fabrics, now even saris.

Banana flowers are one of the most important forage for Bees. Indigenous bee colonies thrive and develop on Banana crop. The main advantage is that the banana crop is a continuous process and there are always flowers that support bees, even during monsoons. However, the modern varieties like cavendish that are grown on mono cultures for

which they destroy the flowers to get higher size and yield of Banana, that is dangerous to bees.

Like GM crops that have posed dangers to bees, the GM Banana would be causing double damage to the bees in India as they are the major food source. What kind of impact the GM banana will have on bee biology and what kind of traces will be found in honey is a matter of great concern that has greater impact on ecology, biodiversity and human health.

The Bee is a indicator of diversity and GM banana can lead to destruction of honey bees. Already 75% honey bees have disappeared. Einstein had warned that when the last bee disappears, humans will disappear.

More than 200 varieties are conserved in the National Banana Research Centre

National Research Centre for Banana, Trichy, Tamil Nadu (www.nrcb.res.in)

Bananas are eaten both as fruit (dessert bananas) and as vegetables (cooking bananas).

International trade in banana is only based on two varieties, the Dwarf Cavendish and Robusta.

Most Indian bananas are eaten locally, hence the diversity. For domestic trade the four most popular varieties are 'Poovan' Syn. Champa (West Bengal), Lal Velchi (Maharashtra), Karpura Chakkarakeli (Andhra), Palayankodan (Kerala) Dora Vazhai (Nilgiris), Kadali (Tirunelveli and Madurai), Bangalowvazhai (Madras) and 'Fill Basket' or 'Mysore' (Trinidad) 'Rasthali' (Tamil Nadu) Syn. 'Mutheli' (Maharashtra), 'Malbhog' (Bihar), 'Amruthapani' (Andhra), 'Rasa Bale' (Mysore), 'Poovan' (Kerala) and 'Silk Fig' (Trinidad), Vrupakshi, and Chakkarakeli. Bontha 'Monthan' (Tamil Nadu), 'KanchKela' (West Bengal), 'Madhuranga Bale' (Mysore), 'Khasdi', 'Bankel' (Bombay), 'Bainsa' (Bihar), 'Monthan' (Kerala), 'Manga Kai, 'Aunda Bale' (South Kanara), 'Thezhuthan' (Wyanad), 'PisangNanka' (Malaya), 'Batisa' (Orissa), 'Bluggoe' (Trinidad Other popular varieties are Kadali, Namarai, Matti, Red Banana, Karpuravalli, Peyan, Amritsagar, Pacha Nadan.

The most important cooking bananas are Monthan, Ney Vannan, Nendran,

Source: Madhava Rao, V.N. (1984). Banana. Publications and Information Division, ICAR, New Delhi

National Research Centre for Banana, Trichy, Tamil Nadu (www.nrcb.res.in)

Important banana varieties cultivated in different states of India

State	Varieties grown
Andhra Pradesh	Dwarf Cavendish, Robusta, Rasthali, Amritpant, Thellachakrakeli, Karpoora Poovan, Chakrakeli, Monthan and YenaguBontha
Assam	Jahaji (Dwarf Cavendish), ChiniChampa, Malbhog, Borjahaji (Robusta), Honda, Manjahaji, Chinia (Manohar), Kanchkol, Bhimkol, Jatikol, Digjowa, Kulpait, Bharat Moni
Bihar	Dwarf Cavendish, Alpon, Chinia, ChiniChampa, Malbhig, Muthia, Kothia, Gauria
Gujarat	Dwarf Cavendish, Lacatan, Harichal (Lokhandi), Gandevi Selection, Basrai, Robusta, G-9, Harichal, Shrimati
Jharkhand	Basrai, Singapuri
Karnataka	Dwarf Cavendish, Robusta, Rasthali, Poovan, Monthan, Elakkibale
Kerala	Nendran (Plantain), Palayankodan (Poovan), Rasthali, Monthan, Red Banana, Robusta
Madhya Pradesh	Basrai
Maharashtra	Dwarf Cavendish, Basrai, Robusta, Lal Velchi, Safed Velchi, Rajeli Nendran, Grand Naine, Shreemanti, Red Banana
Orissa	Dwarf Cavendish, Robusta, Champa, Patkapura (Rasthali)
Tamil Nadu	Virupakshi, Robusta, Rad Banana, Poovan, Rasthali, Nendran, Monthan, Karpuravalli, Sakkai, Peyan, Matti
West Bengal	Champa, Mortman, Dwarf Cavendish, Giant Governor, Kanthali, Singapuri

Source: Banana clones of India Madhava Rao, V.N. (1984). Banana. Publications and Information Division, ICAR, New Delhi

Considering the nutritive value and fruit value of bananas, it is the cheapest among all other fruits in the country. Banana is the most important fruit crop in India and accounts for 31.7 per cent of the total fruit production

Health benefits of banana (without genetic engineering)

- Bananas are rich source of energy since it contains sugars such as fructose, glucose and sucrose.
- Because of its fiber (pectin) content it relieves constipation and diarrhoea. Banana with Curd is recommended for Diarrhea because it provides energy, has Kaolin Pectin, while curd has natural Lactobacillus, both acting synergistically It maintains electrolyte balance of the body because of its content of potassium.
- It is found from research that bananas can prevent age related loss of sight to a certain degree.
- Bananas help absorption of calcium from the gut thereby preventing osteoporosis.
- They maintain kidney health and help in prevention of cancer of the kidney.
- Bananas control hyper acidity and heart burn.

Source Uses of Banana

Mohapatra, D., Mishra, S. and Sutar, N. 2010. Banana and its by-products utilizastion: an overview. Journal of Scientific and Industrial Research, 69: 323-329.

SECTION FOUR

GMO bananas are a waste of time and money

There has been a mediablitz, about Bill Gates funding Dr Dale of Queensland University with $15 million to develop GMO bananas for saving Indian women from childbirth death due to iron deficiency. An ABC interview with Dr Dale had the caption The iron-rich bananas will help prevent childbirth deaths in India.

The Indian Department of Biotechnology has signed an agreement with the University of Queensland to do similar research/field trials over the next 4-5 years and launch the GM bananas within 6 to 10 years in India.

Partners for the GM banana project will also include Australia's National Agri-Food Biotechnology Institute, India's National Research Centre for Bananas, the Indian Institute of Horticulture Research, the Bhabha Atomic Research Centre and Tamil Nadu Agricultural University.

India's Biotechnology Industry Research Assistance Council (BIRAC) will provide AUD$1.4 million (US$1.44 million) towards the QUT component of the project and INR80 million (US$1.43 million) towards the cost of the Indian component.

One rich man, Bill Gates, financing one Australian scientist, Dale, who knows a few aspects of one crop, the banana, are trying to impose inefficient and hazardous GM bananas on millions of people in India who have grown hundreds of banana varieties in additional to thousands of other nutritionally rich crops over thousands of years.

Dr Dale does not have a single paper related to iron fortification of bananas. This work has been done by the Bhabha Atomic Research Team.

(Gujulla B Sunil Kumar & Lingam Srinivas & Thumballi Ramabhatta Ganapathi
Iron Fortification of Banana by the Expression of Soybean Ferritin
Biol Trace Elem Res (2011) 142:232–241 DOI 10.1007/s12011-010-8754-6)

So the research on GM banana is Indian, the finance comes from India, yet Dr Dale and Bill Gates strut around the world as if their research, their brains and their money is making a Technology transfer of GM bananas possible to India to save Indian Women.

And poor Prof Dale is nutritionally illiterate of the rich plant biodiversity we eat in India which provides iron and also helps its absorbtion. For example, the vit C in amla helps

absorb iron. That is why we eat amla chutney, and amla pickle with our meals. At a time when the world is becoming aware of the virtues of a biodiverse vegetarian diet, this is what Dale says "The reason that we're targeting iron is that much of the Indian population has a high level of iron-deficiency anaemia because many of them arevegetarians and it's very difficult from a vegetarian diet to get enough iron." (ABC Radio March 10th 2013)

> GMO bananas are a waste of time and money an unnecessary risk and a strategy to take control of the banana in its centre of diversity and in the region with highest production and consumption

Bananas are rich in nutrition but have only 0.44mg of iron per 100 grams of edible portion. All the effort to increase iron content of bananas will fall short the iron content of our indigenous biodiversity. According to the BARC scientists, they can achieve a 6 fold increase in iron content in GMO bananas. This makes it 2.6mg, which is 3000% less than iron in turmeric, or niger, or lotus stem, 2000% less than Amchur (mango powder). The safe, biodiverse alternatives are multifold.

Given the public health emergency of iron deficiency,and the inefficacy of the GM banana in providing adequate iron compared to indigenousbiodiverse alternatives,the GMO banana project is an irresponsible waste of money, and a waste of time. It will take 10 years and millions of dollars to complete the research to not reach anywhere close to the options biodiversity gives us today. But meantime, governments,research agencies, scientists will be diverted from biodiversity based, women centred,low cost, safe, time tested, democratic alternatives. The National Banana Research Centre has already put GM bananas in its 2030 vision!

While the GM banana brings no benefits, it does bring numerous risks and costs.

First, the GM banana, if adopted, will be grown as large monocultures, like GM Bt cotton, and the banana plantations in the banana republics of Central America. Since government and Aid agencies will push this false solution, as has happened with every "miracle" in agriculture, our biodiversity of iron rich foods will disappear. This will further destroy biodiversity, and further aggravate malnutrition of different kinds.

The idea of "nutrient farming" of a few nutrients in monocultures of a few crops has already started to be pushed at the policy level. The finance Minister announced aRs 200 crore project for "nutri farms" in his 2013 budget speech.

Humans need a biodiversity of nutrients, including a full range of micronutrients and trace elements from a biodiversity of crops and foods. These come from healthy soils and

biodiversity based farming systems. For this we need biodiverse organic agriculture based on principles of agro ecology.

Second, our native banana varieties will be displaced, and contaminated.

There is a perverse urge among the biotechnology brigade to declare war against biodiversity in its centre of origin. An attempt was made to introduce Bt brinjal into India which is the centre of diversity for Brinjal. GM corn is being introduced in Mexico, the centre of diversity of corn. The GM banana is being introduced to the two countries where banana is a significant crop and has large diversity. One is India, the other is Uganda, the only country where banana is a staple.

Third, even Harvest Plus,the corporate alliance pushing Biofortification,has had to recognize what all nutrition experts know-there could be insurmountable problems with the biofortification of nutrients in foods as they: "... may deliver toxic amounts of nutrients to an individual and also cause its associated side effects (and) the potential that the fortified products will still not be a solution to nutrient deficiencies amongst low income populations who may not be able to afford the new product and children who may not be able to consume adequate amounts."

(Quoted in Food Biofortification: no answer to ill-health, starvation or malnutrition
By Bob Phelps http://www.freshfruitportal.com/opinion-biofortification-is-an-obstacle-to-food-justice)

Fourth,Australian scientists are using a virus that infects the banana as a promoter. This could spread through horizontal gene transfer. All genetic engineering uses genes from bacteria and viruses. Independent studies have shown that there are health risks associated with GM foods.

Fifth,Scientists like Dale already hold many patents on banana transformation. Just as Monsanto controls our cotton seed supply through IPRsby adding a toxic gene to cotton, Dale and MNC's will start owning our banana through patents linked to genetic engineering. In fact that seems to be the main aim of the GMO banana project. That is why it has been started in India, the world's biggest banana producer, and Uganda, where banana is the staple crop. The Global Citizen's Seed Freedom report (available on www.seedfreedom.in and www.navdanya.org) has documented the concentrated control over our seed and plant genetic resources in the hands of a few Biotechnology giants like Monsanto. That is why we have started a Glabal Seed Freedom campaign.

There is no need for introducing genetically engineeredbanana, which is a sacred plant and sacred food in India,,when banana brings us many health benefits and we have so many affordable, accessible, safe and diverse options for meeting our nutritional needs of iron.

We have to grow nutrition by growing biodiversity, not industrially "fortify" nutritionally empty food at high cost, or put one or two nutrients into genetically engineered crops.

As the Navdanya report Health per Acre shows When an acre of farmland is used for organic mixed cropping in place of conventional mono cropping, 39 g of extra iron is produced. This

amount is sufficient to nourish 16,250 lactating mothers with iron for a day. On a national scale, the extra amount of iron produced organically would be sufficient to meet the requirement of 20 billion hypothetical lactating mothers. Even if only part of this iron is absorbed, biodiversity offers us the potential of ending iron deficiency anemia,not just in India, but across the world.

There need be no iron deficiency if we intensify biodiversity in our farms and gardens and food.

We don't need irresponsible and wasteful experiments like GMO bananas,imposed by powerful men in distant places, who are totally ignorant of the biodiversity in our fields and thalis, and who never bear the consequences of their destructive power by creating new threats to our biodiversity, our seed sovereignty, knowledge sovereignty, and our health, We need to put food security in women's hands so that the last woman and the last child can share in nature's gifts of biodiversity.

This is why Navdanya/Mahila Anna Swaraj/Diverse Women for Diversity/Initiative for Health& Equity in Society/ Guild of Services/CISSA/AzadiBachaoAndolan/Appiko/Save Honey Bees Campaign/ Gene Ethics, Australia, are launching the campaign to promote indigenous biodiversity and knowledge, and say "No to GMO bananas".

"Stop the Waste, of money, of time, of knowledge, of biodiversity"

"Know your food, Respect your food"

Join the movement

www.navdanya.org www.seedfreedom.in

Contact: Navdanya@gmail.com

Vandana.shiva@gmail.com

Actions for "No to GMO Bananas" Campaign to Protect our Biodiversity and indigenous Knowledge

1. Sign the petition to stop the diversion of our tax money to the GMO banana project, and to instead support biodiverse kitchen gardens and community gardens in women's hands.

   www.navdanya.orgwww.seedfreedom.in

2. Eat biodiversity,eatorganic,"Know your Farmer,Know your Food" You can buy organic at Navdanya outlets in Delhi, Dehra Dun and Mumbai

3. Start "Seeds of Freedom,Gardens of Hope" to grow GMO free,iron rich, nutrient rich food in school gardens, community gardens, kitchen gardens,balconies, rooftops and on farms You can get open pollinated seeds from Navdanya.

4. Start a "Know your Food, Respect your Food" group with friends and neighbours to spread food and nutritional literacy about the nutritional benefits of our indigenous biodiversity and knowledge, the hazards of chemicals and GMOs.

No to GMO bananas

No to a waste of public money, time and resources

Dear Mr Prime Minister,

Your Government is wasting millions of Rupees of our public money on inefficient, useless, but hazardous experiments like the GMO Banana .

Ignoring the many existing alternatives our indigenous biodiversity and knowledge offers to address the public health emergency of iron deficiency, India's Biotechnology Industry Research Assistance Council (BIRAC) has signed an agreement with Queensland University to provide AUD$1.4 million (US$1.44 million) and INR80 million (US$1.43 million) towards the cost of the Indian component to increase the iron content in banana through genetic engineering.

Dr Dale of Queensland University who will receive this generosity from your government, and has already received $15 million from the Gates Foundation, does not have a single paper related to iron fortification of bananas . This work has been done by the Bhabha Atomic Research Team. Why is our tax money being wasted on this project?

Bananas are rich in nutrition but have only 0.44mg of iron per 100 grams of edible portion. All the effort to increase iron content of bananas will fall short the iron content of our indigenous biodiversity. According to the BARC scientists, they can achieve a 6 fold increase in iron content in GMO bananas.This makes it 2.6mg, which is 3000% less than iron in turmeric, or niger, or lotus stem, 2000% less than Amchur (mango powder). The safe, biodiverse alternatives are multifold.

Our indigenous biodiversity offers rich sources of iron. Amaranth has 11.0 mg per 100gm of food, Moringa (Sahjan or drumstick) 28.26, buckwheat has 15.5, neem has 25.3, bajra has 8.0, rice bran 35.0, rice flakes 20.0bengal gram roasted 9.5, Bengal gram leaves 23.8, cowpea 8.6, horse gram6.77, amaranth greens have 38.5, karonda 39.1, lotus stem 60.6, coconut meal 69.4, niger seeds 56.7, cloves 11.7, cumin seeds 11.7.mace 12.3, mango powder (amchur) 45.2, pippali 62.1, poppy seeds 15.9, tamarind pulp 17.0, turmeric 67.8, raisins 7.7……..

You have a duty to protect our biodiversity and knowledge heritage. You have a duty to respond to the public health emergency of iron deficiency in urgent, effective, safeand democratic ways. You owe it to the women of India to recognize their knowledge and empower them to use it to get rid of iron deficiency anaemia and malnutrition.

We urge you to cancel the project and the agreement between the Department of Biotechnology and the University of Queensland in Australia, and instead use the money to support a national movement of community gardens and kitchen gardens in women's hands so that the last child, the last woman, the last person has access to the rich biodiversity that can remove all forms of malnutrition.

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