Chronica Horticulturae

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Horticultural Highlights

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CHRONICA HORTICULTURAE

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Cover photograph: Rainbow Roses, multi-colored horticultural wonder, see p. 16.

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Erratum

In the paper entitled "Watermelons: New Choices, New Trends" that appeared in *Chronica Horticulturae* 47(4):26-29 an error crept into Table 1. The crop area of watermelon in Turkey should be 137,000 ha not 2,137,000 ha. The correct table is listed below.

Table 1. Principal watermelon producing countries, 2005. Source: FAOSTAT.

Country	Production (Mt)	Crop area (1,000 ha)	Average yield (kg/ha)
China	69,315	2,221	31,203
Turkey	3,800	137	27,737
Iran	2,150	100	21,500
United States	1,669	55	31,139
Egypt	1,500	62	24,193

Climate Change and Horticulture

Ian J. Warrington

Ian J. Warrington, ISHS Vice President

Climate change has undoubtedly resulted in greater public involvement with a scientific subject than with any other topic in the history of modern science, with the possible exception of a preoccupation with the threat of nuclear war in the 1960s. What might have been the domain of "green" policies over the past decade has now become main-stream for politicians of all parties and the subject of many commentaries on television and in the press.

Although the cause of climate change has been questioned by some, very few any longer question that it is occurring. Global warming has already encroached on most of our lives by exposing us directly to either record seasonal extremes in temperature and drought or to major climatic events that have led, for example, to unseasonable and major flooding events. All of these have impacted in one way or another on the security of food supply and the price of basic foodstuffs that are purchased in the marketplace. Climate change is now impacting on each and every one of us.

Horticultural production and horticultural science are both intimately involved with the debate and the policy shifts that are occurring around the factors that are closely associated with climate change. The most public of such debates is probably the emergence of "food miles" as a means to allow some, especially United Kingdom and European, supermarkets to alert consumers about the "carbon footprint" that some imported and air-freighted fresh fruit and vegetable products might be making on the planet. Many of these claims have now been shown to be highly suspect as analysts are able to show that, in fact, such footprints are very low because most of the products involved are transported by highly efficient sea freight methods. In fact, road freight across Europe can leave a greater "footprint" than does sea freight.

Ironically, while a carbon conscious Europe may promote "food miles" as being undesirable (and perhaps as a means to evoke various trade restrictions in favour of local suppliers), consumers in Asia typically regard air-freighted food products, such as fruit and vegetables, as being highly desirable because they are recently harvested and therefore of higher nutritional value because they are fresh. Given the choice, will southern hemisphere producers give priority to Asian markets and deprive European consumers of some of their basic foodstuffs? This may well be a likely outcome of the current promotional campaigns, with resultant rapid price escalations in European food outlets in response to the consequent shortage in supply.

Regardless of the motives behind the food miles debate, the discussions in the media and amongst politicians frequently confirm that most of the urban-based populations in almost all countries around the world have very little awareness about how modern food is produced or where it comes from. "Exotic" crops such as bananas, pineapples, oranges and even mangoes, are now available in modern supermarkets in many countries year-round. Similarly, crops such as strawberries and lettuces, are also available every day of the year. It is a fact that "grow local" campaigns in their various forms simply cannot deliver supply of such products year-round at affordable prices – these have to come from supply elsewhere if modern consumers are to maintain the range of fruit, vegetable and even cut flower products that they've come to expect. There is no doubt that counter-hemisphere supply arrangements can lead to efficiencies in food supply and food security and such arrangements may well become strategically very important in the future. Such arrangements may also help to alleviate consumer concerns about the high energy costs that are associated with the long-term storage of many of our fruit products in particular. Such expectations will, no doubt, influence the agenda for post-harvest research in the years ahead. There is no doubt that food will continue to be freighted over long distances if consumers are to be afforded continuing choices over what they eat. Nonetheless, pressures will increase to try and ensure that production, transport and storage methods for all food products are safe and as "environmentally sustainable" as possible. The reality is that the urban-based population is increasingly determining the rural agenda.

Horticultural scientists have a number of roles to play in the whole climate change phenomenon. These include educating the public, including politicians, about the current methods of production and the global patterns of food distribution. There are already policy makers talking about food security in some countries and such discussions need to be well informed. While unlikely to secure research grants, such information needs to be provided in popular articles and in discussions where the whole status of horticulture can't help but be enhanced through improved provision of good information.

What might help to drive new research grants is the whole area of environmental physiology and the development of improved information about the consequences of increases in temperature and carbon dioxide concentrations on crop growth and development. The time has come where the funding emphasis must shift from data analysis of past meteorological records, and their consequent modeling, to developing a better understanding of how plants are responding to environmental change. The shift away from such research in the 1980s and 1990s in favour of plant molecular biology has not served mankind well when it comes to forecasting and managing the changes in crop growth rates and accelerated generation intervals that are already becoming apparent. For example, it has been observed that the French grape harvest can be 3 to 4 weeks earlier than it was 50 years ago but why should we be surprised when the evidence is clear that higher temperatures will accelerate crop development? What is surprising is that we haven't done the research to define the relevant temperature response curves, to define how temperature alters maturity indices such as the sugar:acid balance (and hence berry and wine quality), or to show how yields are likely to be inversely related to the faster development rates. Therein lies some fascinating and challenging research topics that are overdue for attention.

Aside from greenhouse crops, where knowledge about plant responses to environmental factors are generally well defined, our knowledge about the responses of field crops in general and perennial crops in particular is very poorly developed. Improved understanding of the consequences of inadequate winter chilling, and the means to counter that, are critical to the continued growth and survival of many temperate perennial crops – and yet our current

knowledge is quite inadequate to deal with the changes that are occurring. The same can be said for knowledge about climatic factors and the development of maturity of different fruit crops. In tropical crops, even the common ones such as pineapple and banana, our knowledge is even more deficient. The challenges of providing such quantitative and descriptive data are, in fact, quite daunting.

The whole issue of water supply and availability for horticultural production is another daunting question for horticultural science. In several regions of the world, water is now a "rationed" resource either because natural rainfall is dramatically less than in earlier decades or because availability from irrigation schemes has been restricted. Again, from the standpoint of horticultural research, the challenges are very interesting and developing solutions to such shortages will be very rewarding both to the individual scientists involved and to the industries served. Nonetheless, we have not been good at training young scientists over the past 30 or more years to truly have a chance to tackle such a massive topic, which not only demands a sound understanding of plant physiology and crop growth but also of soil science and atmospheric physics! The need to revisit the provision of such core subjects in horticultural science degrees is urgent.

Other topics that are intimately associated with climate change range from "sustainable" production methods to the displacement of horticultural crop production by crops being grown for bio-fuels. However this complexity is viewed, the horticultural graduates of tomorrow are going to need to be trained to cope with and understand topics that are going to be highly complex to solve, and which will have a greater sense of urgency around the need to find solutions than ever before. Indeed, a career in horticultural science in the future will be very interesting and immensely challenging!

Embrapa and ISHS Sign Memorandum of Understanding

Norman E. Looney

The mission of the Brazilian Agricultural Research Corporation, Empresa Brasileira de Pesquisa Agropecuária (Embrapa), is to provide practical solutions for the sustainable development of Brazilian agribusiness through knowledge and technology generation and transfer. Embrapa is organized as a large network, composed of 41 decentralized Centers, and is present in almost all the states of the Union, each with its own ecological conditions. These Centers are classified as Service Centers, Product Research Centers, Basic Themes Research Centers and Agro Forestry Research Centers or Centers for Agricultural Research in Brazilian Ecological Regions.

The organization counts 8,619 employees of which 2,221 are researchers, 45% with master's degrees and 53% with doctoral degrees. Embrapa coordinates the National Agricultural Research System, which includes most public and private entities involved in agricultural research in the country.

EMBRAPA'S OUTREACH

Founded in 1973, Embrapa has over the years generated and recommended more than 9000 new technologies for Brazilian agriculture. These technologies have reduced production costs and increased food production while, at the same time, conserving natural resources

On October 21, 2007 at Florianopolis, Brazil, Embrapa Executive Director Dr. José Geraldo Eugênio de França, representing Director-President, Dr. Silvio Crestana, and Dr. Norman E. Looney, President of ISHS, signed an important Memorandum of Understanding.

and the environment. Embrapa activities have diminished Brazil's reliance on external technologies, basic products and genetic materials.

With important hubs in other regions of the world, the organization coordinates projects in International Cooperation in order to improve its knowledge of technical and scientific activities abroad or to share Brazilian knowledge and technology with other countries. In the area of international cooperation, Embrapa holds 68 bilateral agreements for technical cooperation with 37 countries and 64 institutions, as well as multilateral agreements with 20 international organizations, mainly involving research partnerships. For this purpose, Embrapa installed, with World Bank support, high tech research laboratories in the United States and France. These laboratories are located with USDA in Washington D.C., and with Agrópolis, Montpellier, France. They provide researchers with access to the highest technology in areas such as natural resources management, biotechnology, and information technology. Recently, Embrapa established a similar facility in Wageningen in the Netherlands. The office of Embrapa Africa, based in Ghana, has as its main purpose sharing scientific and technological knowledge for the whole continent. It thus contributes to sustainable development, both social and economic, and food security in Africa. Embrapa Africa activities focus on technology transfer and emphasize the specific needs of each partner country for projects for agricultural development. Moreover, it develops actions of technical assistance and opportunities for training and development of human resources as well as the exploration of opportunities for Brazilian agribusiness.

THE AGREEMENT

In view of the growing interest of ISHS in applying its products, services, and the talents of its members to the international development agenda and the parallel wish of Embrapa to extend its research activities into the international arena to the benefit of both Brazilian horticulture and international capacity building, ISHS and Embrapa have elected to enter into a partnership formalized with a Memorandum of Understanding.

This agreement aims to provide enhanced access for Embrapa staff members to ISHS events, services, and its extensive database of knowledge about horticultural science. It is the desire of both organizations to promote individual membership in ISHS as a way to connect Embrapa scientists to the activities of ISHS Sections, Commissions and Working Groups where discussions can be initiated and developed about future ISHS symposia at Embrapa research centers located in Brazil and abroad and to ensure that international horticultural science and industry are aware of Embrapa's innovative research. The elements and outcomes of this Partnership will be communicated regularly to ISHS members and Embrapa staff with articles in *Chronica Horticulturae* and through Embrapa publications. More information about Embrapa can be found at www.embrapa.br

Letter to the Editor

Arcimboldo's Summer

Dear Editor,

I greatly enjoyed the article "History and Iconography of Eggplant" by Marie-Christine Daunay and Jules Janick which appeared in *Chronica Horticulturae* 47(3):16-22. However, I noticed that in Fig. 13, the marvelous painting "Summer" by G. Arcimboldo, the caption lists 1563 as the date, while 1573 appears on the sleeve along with the painter's name on the collar. In the List of Paintings the date 1563 is repeated. Can you explain this discrepancy?

Donald Maynard, Sarasota, Florida, USA

AUTHORS' REPLY

We thank Dr. Maynard for pointing out our error. It turns out that there are at least four versions of "Summer" painted by Arcimboldo. The earliest, painted in 1563, is in the Kunsthistorisches Museum, Vienna while the 1573 version hangs in the Louvre, Paris. We inadvertently included the wrong picture. On the right we include both paintings; note the dates on the shoulders.

Marie-Christine Daunay and Jules Janick

Summer 1563.

Summer 1573.

Project-Based Learning in Horticulture: Composting in Egypt

Geoffrey R. Dixon and Abdelal Hegazi Hassan

Applying composting as a vehicle, the Project-Based Learning approach was used in the education of Egyptian undergraduate students of horticulture at Mansoura University. Students in this Project became the agents for change to improve crop husbandry by extending information on recycling previously reject organic matter converting it into valuable soil conditioning fertiliser that increased the productivity and quality of tree fruits and field vegetables grown in the Nile Delta area. An additional benefit of this work was to obviate the need for the incineration of reject rice straw, which improved air quality with consequent favourable impact on the respiratory health of local communities.

Mansoura University campus.

Composting is a natural process whereby valueless reject vegetable and animal matter is converted into valuable, nutritionally fertile, organic fertiliser using aerobic enzymic decomposition (also termed humification), by microbial action with bacteria, fungi and actinomycetes. As a result organic reject material of nil or negative financial value accrues significant horticultural and economical capital. Composting techniques have been refined by horticulturists over many centuries. In the 19th and early 20th century beds of compost producing heat and releasing carbon dioxide during decomposition were utilised in greenhouses and under glass frames thereby allowing the highly sophisticated cultivation of warm temperate and semi tropical crops such as grapes, melons and pineapples in northern Europe. Compost science and technology has been brought to its most efficient and effective by the 20th century mushroom industry. Cereal straw is composted with animal waste, most frequently from horses and poultry, into substrates suitable for the intensive culture of *Agaricus bisporus* (common commercial mushroom and other basidiomycetes) in 7 to 10 days. This is achieved by frequent mixing, turning, wetting and restacking of the decomposing compost to encourage aeration and with the addition of calcium compounds providing alkaline pH and of highly nitrogenous soluble accelerators. Less intensive composting systems requiring longer periods of time to achieve humification are nonetheless very effective means of converting organic waste into valuable substrates for plant culture (Verdonck, 1998). The key requirement is that the initial microbially driven degradative phase should heat the organic matter to at least 60°C and preferably nearer to 80°C to achieve Pasteurisation, which kills potentially harmful organisms such as crop, animal or human pathogens. Afterwards the compost is conditioned at around 40°C and matures at 20°C. Composting is also now the option of choice for disposing of household domestic organic waste as opposed to burying in land-fill operations, dumping at sea or incineration (Lamont, 1998). Composting can be achieved successfully in a wide range of geographical locations and differing social circumstances with a variety of goals. A project to investigate the composting techniques needed to remove crop residues and animal waste, improve soil fertility and increase farm income was carried out with university undergraduate students reading horticulture as advocates to farmers, growers and related businesses in the Lower Nile Delta.

Certificate awarded jointly by Mansoura University and the British Council attesting to student participation in the Compost Advocate Programme.


BRITISH COUNCIL

Certificate

Name : (Mr./Miss) .....

Participated in the training course of composting rice straw and farm residues conducted by the British Council and Mansoura University June 2003

Principal Investigator Dean

THE PROBLEM

Estimates suggest that the Egyptian population will reach 110 million persons by 2025 with a density of about 1,300/km^2 in the Nile Valley. Bridging the food gap and moving towards greater sufficiency are urgent priorities for scientists and politicians alike. Current land reclamation programmes aim to develop an additional 1.2 million hectares of agricultural

Prof. Hassan with student compost advocates and growers standing on top of a compost heap.

land (El-Beltagy et al., 1997). Increasing crop production brings with it additional problems not least the generation of by-products for which there are no immediately obvious uses or markets. For example, Egyptian farmers produce approximately 1 million tonnes of rice straw per annum mostly in late August and early September during the grain harvest. There are only a few limited and local uses for modest quantities of this rice straw as animal bedding and other applications. Incineration is the most frequent and simplest means of straw disposal. The result of this practice is considerable air pollution that damages the respiratory health of those living in and around the farms. Members of the community already suffering from respiratory ailments such as asthma are further disadvantaged and can be placed at substantial risk.

These farms also accumulate significant quantities of animal waste mainly derived from bovines, equines and poultry. This poses substantial additional pollution risks to waterways around villages and townships and opportunities for the spread of zoonotic pathogens. The wealth and welfare of the rural communities could be improved substantially by eliminating both these forms of waste. Combining rice straw and animal manure by composting processes offers opportunities to develop a valuable local source of nutritious soil amendment capable of increasing the fertility and water retentive properties of the indigenous sandy soils. Soil amendments derived from composting have an additional advantage as sources of natural suppression of soil borne pathogens (Dixon and Walsh, 1998).

Student compost advocate demonstrates compost quality to growers.

MANSOURA UNIVERSITY AND THE BRITISH COUNCIL

Mansoura University is a science and technology-based institution located in the Delta region of the Lower Nile approximately 100 km north of Cairo. This University has a well established reputation in teaching horticulture and conducting applied research with particular specialities in fruit and vegetable culture. There are close ties between faculty members and local farmers and growers. Students studying horticulture tend to be drawn from the immediate locality and hence also enjoy family and domestic bonds with the producers surrounding the City.

The United Kingdom government supported this initiative through the British Council's Higher Education Links Programme. This encourages sustainable development by enhancing the research and training capacities of partner institutions (Anon., 2004).

THE PROJECT AND ITS OUTCOMES

A combined educational and knowledge transfer project was formulated that encouraged locally effective composting of rice straw and animal wastes and achieved the following outcomes:

1. Teaching staff (pomologists, agronomists and microbiologists) at Mansoura University developed specialist modules for their undergraduate students providing knowledge of the principles and practices of composting science and technology. Staff were invited to attend courses in the United Kingdom that acquainted them with recent advances in compost science and technology at: East Malling Research, Elm Farm Research Centre, Imperial College at Wye, The Royal Botanic Garden Kew, The University of Strathclyde, Glasgow and Warwick University Horticulture Research International;
2. Demonstrations of composting techniques were mounted for students in the Horticultural Experimental Garden on Mansoura University Campus, using compost prepared by the Garden staff with guidance from faculty members;
3. Students formed collaborative working groups delivering information to farmers, growers and related small businesses in the area in order to maximise their effectiveness as "Composting Advocates". Support was provided to improve their communication skills and members of faculty staff and UK participants also visited the clients in order to gauge the effectiveness of knowledge transfer. More than 50 farmers and growers produced compost as a direct result of contact with the "Compost Advocates," creating a ripple-effect to spread the technology to others;
4. Faculty staff, members of the British Council in Egypt and UK participants met farmers, growers and local business owners at symposia on "Organic Farming and Compost Making" arranged at the University. This permitted an exchange of new information concerning composting methods, dialogue on the usefulness of the programme and means by which improvements might be made. During these meetings the undergraduate "Composting Advocates" were awarded 'Special Certificates' recording their successful participation in this programme;
5. Farm plots demonstrating the usefulness of compost for the culture of date palm, "Thomson Seedless" ("Sultanina") table grape, guava, olive and pomegranate were established at an out-station of Mansoura University;
6. Awareness workshops were arranged at a farm using organic methods in the Sadat Area under the auspices of the Horticultural Export Improvement Association (HEIA) of Egypt;
7. Pilot composting sites were used to alert and attract the owners of small, local

Prof. Hassan examines compost quality (his hands).

Female student compost advocates.

businesses into purchasing modern equipment with which to compost rice straw and animal residues;

8. Wider awareness of this programme was achieved by faculty staff visiting and lecturing at other Egyptian universities, the Horticulture Research Institution in Cairo and at the International Scientific Congress for the Environment held at South Valley University, Qena (Hegazi, 2006).

This horticultural and educational Links initiative ran for five years (1988 to 2004). During this period there was a substantial increase in the composting of rice straw with animal manure in the El-Mansoura area and use of the product as a soil conditioning agent. The fertiliser value of the compost reduced expenditure on soluble fertilisers. The productivity and quality of tree fruit and field vegetables such as peppers and green broccoli were increased substantially. Research has been stimulated at Mansoura that examines the possibilities of composting water hyacinth (*Eichhornia crassipes*) residues.

Most importantly use of a Project-Based Learning approach for this initiative proved to be highly successful. More than 30 students joined this project of whom 50% were female. These students gained the science needed to underpin their field activities more thoroughly since their knowledge was challenged by client farmers, growers and small business owners. As a result students realised that they needed to be well equipped with knowledge in order to cope successfully with a real advisory situation. Female undergraduate students were particularly effective "Compost Advocates" since they were able to reach directly those members of farmers' and growers' families intimately concerned with compost preparation. The students developed confidence in their abilities to translate science into business practice. The initiative was welcomed by both faculty staff and students. Faculty staff benefitted from opportunities to have face to face discussions with research leaders and practitioners in the United Kingdom. Reciprocal visits to Egypt provided knowledge of the practical issues relating to local practices and processes. Publicity in Egypt stimulated further interest and the search for more opportunities to use project-based learning for other purposes.

Date palm trees grown with compost soil amendment as demonstration plots at the Mansoura University Field Station.

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Caldo Verde: A Story of Portuguese Brassicas

António A. Monteiro and Eduardo Rosa

Caldo verde, translated as "green broth," is a classic Portuguese soup that combines simplicity of preparation with an elegant taste (Fig. 1). Its creative amalgam of basic available ingredients produces a healthy and nutritive soup that has been a staple food for generations of workers and farmers living in the northwest of Portugal, but also consumed by the upper classes as a distinctive symbol of regional cooking. Caldo verde is part of the Portuguese heritage: delicious, of high nutritional value, and more important, evolved and adapted to a modern life style.

THE SOUP

Portuguese Caldo Verde

To prepare caldo verde start with a boiling broth of potatoes and onions, add fresh fine shredded leaves of Galega kale, boil for an extra 2-3 minutes and top generously with cold-pressed extra-virgin olive oil. Typically, this soup is served in a bowl, added with a slice of chorizo rich in red pepper, and eaten with a piece of maize bread.

Figure 1. Caldo verde served in a traditional clay bowl accompanied by a piece of maize bread.

Soups have been a basic component of Portuguese cuisine for generations. Brassica vegetables had been one of the most popular ingredients in soups because of their adaptability to the local climate and agricultural systems, and availability during the winter before greenhouse-grown and imported vegetables were available. In fact, the consumption of brassicas in soups was responsible for their high annual consumption in Portugal, which reached 60 kg/capita in the 1970s, but declined to one third nowadays due to diet diversification.

Caldo verde is a nutritionally well balanced soup because it is rich in carbohydrates, protein, vitamins and minerals, and retains the leachate of components into the broth. Additional benefits are due to the polyunsaturated fatty acids of the olive oil, the antioxidants of the onion, and the glucosinolates of kale, particularly the indole compounds, which after enzymatic hydrolysis give rise to cancer protectant compounds such as indole-3-carbinol (Rosa et al., 1997). The chorizo (spicy pork sausage) adds protein as well as flavour, and its red pepper and garlic add vitamins and antioxidants as a bonus. The cooking procedure is just perfect for health since the olive oil and the shredded kale are submitted to a quick gentle boiling, which reduces the exposure of the beneficial components to leaching and thermoliability.

This soup is strictly linked to Couve Galega, a kale grown – usually organic – in Portugal, year round, in traditional vegetable gardens to produce fresh leaves, thus always available when the soup is to be prepared. Typically, Galega kale is seen surrounding patches of other vegetables such as potatoes, and in many rural areas is the only vegetable available during the winter. The Portuguese, who live in urban areas, lacking home gardens, can now find Galega leaves in the food stores as a fresh-cut product. The leaves are now produced by specialised growers, and transformed by processors where they are washed, chopped, packed and delivered to the supermarkets in Portugal and in other European countries with Portuguese communities (Fig. 2). This makes it possible for any Portuguese, at home or abroad, to partake of a delicious and nourishing caldo verde.

GALEGA KALE

Galega kale is winter-hardy and although resistant to the hot dry summers requires irrigation to keep the dark green, petiolated leaves tender and shiny. It tolerates granite acid soils and soil water logging in winter. As in many other brassicas, flower differentiation of the apical meristem is induced by low temperature during winter and bolting occurs the following spring when the temperature rises. However some Galega genotypes may have a very long juvenile phase and go throughout winter chilling without reaching maturity and therefore do not bolt the following spring. When planted in spring they can continuously produce leaves for almost two years, when they finally bolt. These giant kales, which can reach above 2 m high, are an extravaganza displayed by those growers that carefully select for non-bolting (Fig. 3). It is the combination of culinary features, plant morphology, easy growing methods and particularly the extremely productive soil and climate that has led to the tradition of caldo verde as a beloved staple in the Portuguese diet.

Figure 2. Fresh-cut Galega leaves for caldo verde.

The nutrient composition of Couve Galega compares favourably with the most popular consumed brassicas (Table 1). It contains a high content of protein, fiber, calcium and sulphur even when compared to broccoli, the reference within *Brassica* vegetables. For many years Galega kale, based on the levels of protein and calcium, was assumed to be a substitute of milk in the poorest rural areas where the peasants could not afford to buy milk or even raise cows. The levels of glucosinolates are relatively low throughout the year except during the summer when they can reach a total of 1526.9 µmoles/100 g DW, of which 33.8 and 12.3% are from 3-methylsulphinylpropyl (glucoiberin) and indol-3-ylmethyl (glucobrassicin) respectively and 14.2% from 2-propenyl (sinigrin) responsible for the bitter taste. Galega might be too bitter during summer-time but after slicing of the leaves, most of these glucosinolates are lost due to enzymatic hydrolysis. During the

Figure 3. The size of Galega kales may vary from the relatively short biannual plants to the extreme long late-bolting ones.

Table 1. Composition of Galega kale and Tronchuda cabbage in comparison with white cabbage and broccoli (major and total glucosinolates, protein and minerals).

Compound	Galega kale [1] (Leaves)	Tronchuda cabbage [1] (Heads)	White cabbage [3,5] (Head)	Broccoli [2,4] (Primary inflorescences)
Glucosinolates (avg levels) (μM 100 g^{-1} dry wt)				
Glucoiberin (3-methylsulphinylpropyl)	516.6	539.2	523.4	–
Progoitrin (2-hydroxy-but-3-enyl)	26.3	40.5	30.6	9.5
Sinigrin (2-propenyl)	248.5	663.2	262.8	–
Glucobrassicin (indol-3-ylmethyl)	187.5	328.7	515.2	557.3
Glucoraphanin (4-methylsulphinylbutyl)	–	–	–	1092.5
4-Metoxy-glucobrassicin (4-methoxy-indol-3-ylmethyl)	79.3	225.6	245.4	139.6
Neoglucobrassicin (1-methoxy-indol-3-ylmethyl)	16.6	118.7	17.5	247.3
Other glucosinolates	3.8	3.6	18.5	4.7
Total glucosinolates	1078.6	1919.5	1599.6	2064.7
Protein and Minerals (g kg^{-1} dry weight)				
Protein	266.5	200.0	164.1	33.0
Calcium	32.2	5.7	5.3	1.05
Magnesium	2.1	1.4	1.5	0.24
Phosphorous	4.6	5.6	4.7	0.8
Potassium	20.7	25.3	24.1	3.73
Sulphur	8.5	7.1	69.5	–
Iron	0.1	0.1	0.05	0.01
Zinc	0.1	0.05	0.03	0.01

Source: [1]Rosa and Heaney, 1996. [2]Rodrigues and Rosa, 1999. [3]Rodrigues, 1999. [4]Souci et al., 1994. [5]Almeida and Rosa, 1996.

winter, freezing temperatures, which might occur for a short period, also induce a natural enzymatic degradation of the glucosinolates leading to a loss of bitterness and giving rise to sugars, which are attached to the glucosinolate molecules. It is during the winter that Galega kale and other leafy brassicas reach their best taste and softer texture.

PORTUGUESE LANDRACES

Portuguese traditional coles include numerous landraces according to their morphological resemblance and growing region. They are grouped into: (1) Tronchuda cabbages, *Brassica oleracea* var. *costata* DC. syn. *B. oleracea* var. *tronchuda* Bailey, the "Couves Tronchudas" and (2) Galega kales, *B. oleracea* var. *acephala* DC., the "Couves Galegas." Tronchudas are short and similar to spring cabbage with a loose head. Galega kales have a long upright stem and large horizontal leaves with long petioles.

Taxonomical studies using morphological characters, isozymes and RFLPs provide a good understanding of the origin of Portuguese cultivated brassicas and the relationship between the various landraces (Dias and Monteiro, 1994). Galega kales are the most similar to wild brassicas and are believed to have been already cultivated by the Kelts when they settled in the present-day Portugal around 700 BCE. Tronchuda cabbages and Galega kales have evolved from a common kale-like ancestor in different regions under relative geographic isolation. In each region farmers selected coles for two main uses: cabbages for human consumption and kales for multiple purposes including

Figure 4. Morphological diversity among Tronchuda landraces: A. 'Penca de Chaves'; B. 'Couve de Valhascos'; C. 'Penca da Póvoa'; D. 'Penca de Mirandela'; E. 'Couve Portuguesa'; F. 'Couve de Castelo Viegas; G. 'Couve de Corte'; H. 'Couve Murciana'.

animal feed. Similar farming systems and needs in the various regions resulted in independent parallel selection of Tronchuda landraces. To identify their selections farmers gave particular attention to specific morphological traits and thus contributed to the remarkable visual diversity among Portuguese Tronchuda cabbages (Fig. 4).

The rudimentary process of seed production used by the farmers and the intercrossing between kales and cabbages grown in the same area contributed to their genetic resemblance as shown by molecular taxonomy using RFLPs markers, which clustered Galega and Tronchuda accessions from the same geographic origin despite their morphological distinctiveness. The few different genes between the two cole types are enough to induce completely distinct phenotypes having different uses and cultivation methods.

The genetic diversity within Portuguese brassicas has been searched for characters of interest to brassica breeding such as of sources of resistance to diseases (Monteiro and Williams, 1989). The most interesting is the resistance to downy mildew in adult plants, which is controlled by a single dominant locus and is about to be mapped in the brassica genome.

Similar kales and cabbages can be found in the neighbouring region of Galicia, in the Northwest of Spain. Tronchuda and Galega were disseminated by the Portuguese in Africa and South America and can be considered a footprint of the Portuguese emigration in various regions of the world. For instance the Brazilians eat the leaves of Couve Mineira, a type of kale very similar to Galega, thin chopped (again to reduce the bitter taste due to the enzymatic hydrolysis of glucosinolates) as an important ingredient of their national dish "Feijoada à Brasileira".

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Fiddlehead Fronds: Nutrient Rich Delicacy

John M. DeLong and Robert K. Prange

Of the few fern species that are edible, the fiddlehead of the ostrich fern (*Matteuccia struthiopteris* (L.) Todaro) is one of the most globally consumed, particularly in North America and Japan. The curled fiddlehead fronds that emerge in late April or May in the northern hemisphere herald the end of winter and in many areas are the first fresh spring vegetable. Growing in the moist soil-beds adjacent to rivers and streams, picking fiddleheads is a rite of Spring for many Maritime Canadians and New Englanders, which dates back to the very first days of European colonization. Previous to this, native peoples savoured the fiddlehead since time immemorial. The ostrich fern fiddlehead is harvested today much like it has been for over 200 years: by people meandering to known patches and hand-picking emerging fronds, enjoying the walk in the woods and the warm Spring sun on their shoulders. The annual commercial harvest is essentially a cottage industry, is short-lived and labour-intensive, does not factor large in national farm-gate economics, nor are harvest, sales or consumption data generally recorded in yearly agricultural census records. Nonetheless, the fiddlehead green is a remarkable vegetable nutritionally and has the potential to add nutritive substance to many processed products. The incessant quest to discover and develop under-utilized native flora to expand commercial horticultural options may see the moisture-loving ostrich fern a viable consideration for plantation management. This article is a means to that end.

Figure 1. Worldwide distribution map of the ostrich fern, *Matteuccia struthiopteris.* (Taken from von Aderkas, 1984).

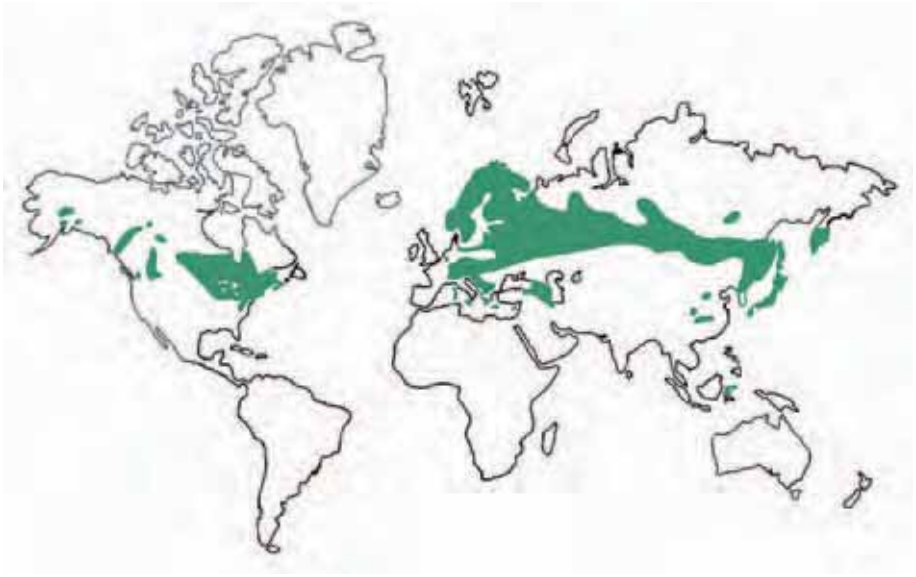

Figure 2. Newly emerging curled fiddlehead fronds. At this point, the crop is not ready for harvest.

Figure 3. Fiddlehead fronds ready for harvest.

DISTRIBUTION

Matteuccia struthiopteris is found worldwide as native or naturalized flora throughout the north temperate sub-boreal zone of the northern hemisphere in particular (Fig. 1). It has been identified in North America, Europe, China, Japan, Iran, and Russia. In eastern, central and southern Europe, it has been located in Belgium, France, Austria, Switzerland, Germany, Hungary, Poland, the Czech Republic, Slovakia, Yugoslavia, Romania, and Italy (von Aderkas, 1984; Prange and von Aderkas, 1985; GRIN Taxonomy, 2007). In the USA, it grows mainly in the north central and eastern states, including Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Virginia, West Virginia, the District of Columbia, Delaware, Maryland, North Carolina, Ohio, Indiana, Illinois, Iowa, Missouri, Wisconsin, Michigan, Minnesota, North Dakota, South Dakota and Alaska (von Aderkas, 1984; Prange and von Aderkas, 1985; GRIN Taxonomy, 2007). In Canada, it is found in all ten provinces but is most abundant in New Brunswick, southern Quebec and southern Ontario (von Aderkas, 1984; Prange and von Aderkas, 1985; GRIN Taxonomy, 2007).

BOTANY

Matteuccia struthiopteris is taxonomically classified in the Division Pteridophyta (fern), Class Filicopsida, Order Polypodiales, Family Dryopter-

Figure 4. Maturing ostrich ferns.

idaceae (Wood fern), Genus *Matteuccia* and Species *struthiopteris* (L.) Todaro (GRIN Taxonomy, 2007; NRCS, 2007); The genus name *Matteuccia* is derived from the Italian electro-physiologist and national politician, Carlo Matteucci (1811-1868), while the species name, *struthiopteris*, is descriptive of the frond: strutheios (of an ostrich) and pteris (feather). The common name, ostrich fern, thus originates from the specific epithet.

The ostrich fern life-cycle consists of a sporophyte and a gametophyte stage. The former is represented by the crosiers (curled immature frond) and the subsequent large leafy frond, which is recognizable as a typical fern leaf (Figs. 2-6). At this stage, the chromosome number is 2*n*=40. As spores are shed from the fertile frond, small heart-shaped gametophytes (prothalli) grow producing male and female organs, which in turn, produce the 1n egg and spermatozoids. Following fertilization, the 2n zygote eventually develops into the recognizable sporophyte fern plant. Within a local population, propagation of new plants is largely vegetative from stolons and rhizomes; the development of young plants from gametophytes in nature is not well studied (Prange and von Aderkas, 1985).

The ostrich fern has dimorphic leaves, with the larger, sterile frond being produced in the early season (Fig. 5) and the smaller, fertile frond appearing in the later season (Fig. 6). A third type of leaf structure called scale or cataphyll leaves, is present on underground stolons, which arise from rhizomes.

Figure 5. Fully expanded ostrich ferns.

The curled fiddlehead fronds (Fig. 3) begin to swell towards the end of April in Nova Scotia and eastern Canada and will appear above the crown by mid-May. During this time, commercial harvest commences. By mid-June, the sterile frond is fully extended (Fig. 5) with smaller fertile fronds appearing from late June until Autumn (Fig. 6). With the first frosts, the sterile fronds become brown and die, but do not readily abscise and stay attached to the crown (Prange and von Aderkas, 1985).

Figure 6. Fertile spore-bearing frond.

HISTORICAL USAGE

In North America, many eastern native peoples have historically consumed the ostrich fern. The Malecite Indians of the St. John river valley used fiddlehead greens as a Spring tonic (Smith, 1957), while the Abenaki of New England roasted the entire crown over a bed of hot stones, covering it with branches (Blake, 1942; von Aderkas, 1984). The Passamoquoddy and Penobscot Indians of Maine also harvested, consumed and sold ostrich fern greens (von Aderkas, 1984).

Although the ostrich fern is native to Eurasia and North America, the first record of Europeans consuming fiddleheads occurred in the 1780s following emigration to the New World. The American Revolution had forced pro-British citizens to seek refuge in other colonies. Some of these New England Loyalists, who moved from New England to Eastern Canada (New Brunswick) in the late 1700s, were so ill-prepared for winter that by the time Spring arrived they consumed leaves and grapes (dried remnants) and fiddleheads. The latter became regular Spring fare (Fisher, 1825; von Aderkas, 1984). The colonists continued the tradition of eating the fiddlehead as a Spring delicacy and often fried them in animal fat prior to consumption. For over 200 years, their descendants still consume the fiddlehead greens as the first fresh vegetable of the new growing season.

In Europe, the Norwegians used the ostrich fern for making beer (Gams, 1938), while the Russians used it as a tonic for intestinal worms (Komarov, 1934). In eastern Canada and New England in particular, fiddlehead greens are presently consumed as a spring vegetable.

NATURALIZATION AND CULTIVATION

Matteuccia struthiopteris naturally thrives on alluvial floodplains, where receding river waters deposit nutrient-rich sediments each Spring. In these regions with high water tables and high moisture availability, the ostrich fern flourishes. Consequently, these plants are frequently found close to the water's edge in river and stream ecosystems. These areas also tend to moderate climatic extremes of air movement, temperature, wind and humidity (Prange and von Aderkas, 1985), which are necessary for good fern establishment. Although these areas are often shaded, *M. struthiopteris* can tolerate full sunlight, provided that soil moisture is abundant. Soil pH does not appear to be a limiting factor for fern viability. Prange (1980) found that plant growth and development was similar in soils ranging from pH 5.1 to 7. However, highly acidic soils are to be avoided as Mn (and perhaps other micronutrient) toxicity can occur (Hou, 1950). Interestingly, the ostrich fern appears to be a silicon accumulator (Höhne and Richter, 1981).

There have been research and development efforts to establish the ostrich fern as a horticulturally-managed commodity. Research trials have evaluated naturally-occurring clones collected from a variety of geographical locations within Atlantic Canada and high-yielding clones for commercial plantations have been identified. Horticulture management techniques were also devised. However, this effort has not resulted in new plantations because access to wild populations at no cost to the harvesters remains more economical than incurring the expense of establishing new plantations and waiting 4 to 5 years before the first harvest. Nonetheless, Norcliff Farms, Inc., Ontario, is presently experimenting with a levee-type system for controlled swamp cultivation of fiddleheads near Port Colborne, Ontario, and has planted about 160,000 crowns in the last two years (Nick Secord, 2007, pers. comm.). This represents what is likely the only recent attempt in North America to cultivate and control fiddlehead production.

Ostrich ferns are easily propagated with tissue culture techniques. Viable explant material is excised from meristematic tissue on the rhizomes (Dykeman and Cumming, 1985; Thakur et al., 1998). The plantlet is then required to develop sufficient crown biomass before it is used as a commercial source of harvestable fronds (about 4-5 years after plantlet establishment). If horticultural plantations are desirable for this crop, tissue culture propagation

will likely play an important role in providing a large population of healthy, disease-free plants.

THE FIDDLEHEAD INDUSTRY

Reliable North American statistics are not presently available for fiddlehead harvest, sales or consumption. However, from the late 1950s until the mid 1990s, McCain Foods (Canada) of Florenceville, New Brunswick, Canada (the largest former fiddlehead processor worldwide) froze and distributed fiddleheads to the Canadian and American markets, handling about 113,000 kg annually, which had an estimated net worth of over CAN$1.4 million dollars (Tom Davidson, 2007, McCain Foods (Canada), pers. comm.). Presently, Norcliff Farms is the largest distributor of fiddleheads in North America and has recently handled about 27,000 kg of newly harvested fiddlehead greens in their best single day of harvest (Nick Secord, 2007, Norcliff Farms, pers. comm.). Based on 2007 supermarket prices of CAN$8.80 / kg fresh, revenue from that single day would be approximately CAN$238,000 (see Fig. 7a for a frozen product example). The W.S. Wells & Sons cannery, Inc. in Wilton, Maine, has been canning 'Belle of Maine Brand' New England fiddleheads for over 40 years (Fig. 7b). Recent 2007 volume estimates of canned product are approximately 4 t, which represents about US$10,000 (Adrian Wells Jr., 2007, pers. comm.). Loblaw's Companies Ltd. and Sobeys Inc. supermarkets (largest grocery chain stores in Atlantic Canada) both carry fresh fiddleheads in season and in 2007 collectively handled about 105,850 kg, which equates to an estimated CAN$684,000 (Kris Kemp, 2007; Crystal Cottrill, 2007, pers. comm.). A 2001 estimation on sales of fiddlehead greens in New Brunswick, Canada, indicates annual sales of CAN$1.2 million (Jamieson, 2001). By extrapolating these revenue values to other fiddlehead-producing areas like Nova Scotia, Quebec and Ontario in Canada and Maine, Vermont and New Hampshire in the United States, it is likely that present fiddlehead sales are in the $7-10 million dollar range in North America. In Japan, the edible green of *Matteuccia struthiopteris* (known as kogomi) is a popular wild-harvest crop, but harvest, sales or consumption estimates are currently unavailable.

Figure 7. Processed ostrich fern fiddleheads, as: a) Norcliff Farms frozen fiddlehead greens; and b) Belle of Maine canned product.

CULINARY USAGE

The perennial popularity of the fiddlehead lies with its delicate, unique taste, which has been likened to the quality of asparagus and artichoke, with some of broccoli's brute strength (Blake, 1942). Fortunately, it does not have the asparagus tendency towards mushy texture after cooking. The basic rule-of-thumb in preparation is to ensure that the greens are boiled for the correct length of time until tender with a fork (about 15 minutes).

Tasty recipes, that range from backwoods or family farm kitchens to creations in gourmet restaurants, are readily available through the Internet (Fiddlehead Recipes, 2007). Many enthusiasts (including the authors) would likely agree that the best and most straight-forward way to enjoy this Spring vegetable is to slather boiled fiddlehead greens in butter (or its equivalent) with a dash of vinegar, slightly salt and pepper, and then serve with trout or Atlantic salmon. Many soup and quiche recipes feature the ostrich fern fiddlehead as the unique ingredient (see above internet reference). In general, fiddleheads can be used in recipes as one would use asparagus or broccoli.

NUTRITIONAL COMPOSITION

Although little published data exist on the nutrition-related composition of fiddleheads, what does exist indicates that the greens are nutritious. Based on a 100 g fresh wet sample, they provide 71, 46, 25, 13, and 2% of the recommended dietary allowance (RDA) for vitamin A, vitamin C, niacin, riboflavin and thiamine, respectively. A 100 g wet sample also supplies 13, 13, 10, 5.5 and 4% of the RDA for phosphorus, iron, magnesium, zinc and calcium, respectively. Fiddleheads are low in salt and high in fibre content. In general, they are comparable to spinach and other vegetables in nutritional quality (Bushway et al., 1982, 1985; Prange and von Aderkas, 1985). Interestingly, more recent data has shown that the curled fronds are comparable to blueberries in phenolic compound content and possess an omega-6 to omega-3 fatty acid ratio of 4.0 or less (J. DeLong et al., 2007, unpublished data). Western diets are typically low in omega-3 fatty acids, so daily intake ratios of omega-6 to omega-3 species of 10:1 to 4:1 or lower are recommended in order to boost omega-3 ingestion, thus ensuring a dietary balance of both types (FAO, 1994; Simopolous, 1999). Hence, the fiddlehead fern appears to be a good, non-marine source of omega-3 fatty acids in addition to other nutrients.

TOXICITY

Although some fern species can be toxic or carcinogenic, *Matteuccia struthiopteris* is thought to be safe in the human diet (Newberne, 1976). Ostrich fern greens have been eaten both raw and cooked without incident. Periodically however, gastrointestinal illness is reported following fiddlehead consumption. In nearly every case, inadequate preparation technique has been the root cause of the problem. For example, studies by Health Canada, which were prompted by an illness outbreak in Quebec in 1999, concluded that a heat-labile toxin (unidentified) may have been responsible for the problem as the researchers could not identify a known pathogenic organism(s) (CCDR, 2000). Aside from the toxin possibility, the illness was thought to occur due to inadequate cooking technique (the greens were pan-fried for a only few minutes). Ostrich fern fiddleheads need to be boiled for 10-15 minutes in order to kill any illness-promoting pathogens resident within the tightly curled fronds. (The flood plain environments in which the ostrich fern thrives can be prone to water-vectored pathogen infestation in the fronds). If a heat labile toxin is present, it appears that boiling prior to consumption deactivates its toxic properties. Apart from the toxicity issue, enthusiastic consumption of fiddlehead greens may have a laxative effect (MMWR, 1994).

FIDDLEHEAD FUTURE

This seasonal delicacy will remain popular for those who love its unique taste and its ability to complement fish and meat dishes with an asparagus-like quality. In Atlantic Canada, Ontario, Quebec and New England, the fiddlehead green is prized not only for its taste but as the first local "bit of green" following long and often hard winters. Wild harvest will likely remain the main means of procuring the Spring crop, but plantations may increasingly contribute to harvest tonnage. With the present emphasis on prospecting plants for their bioactive compounds, the demand for ostrich fern biomass could increase as they are nutrient dense, are rich in polyphenolic compounds and activity, and have a high titre of omega-3 fatty acids. Thus, health-promoting, plant-based products with fiddlehead tissue as an integral component, could be a marketplace reality in the not-too-distant future. In the meanwhile, those Maritimers and New Englanders who look forward to Spring to have their 'mess of fiddleheads' must presently practice much wintered patience or settle for frozen product from Springs past.

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Gilding the Lilies: Rainbow Roses and Confetti Poinsettias

António A. Monteiro, Roberto Lopez and Jules Janick

RAINBOW ROSES

The colorful roses known as Rainbow Roses shown on the cover of this issue of *Chronica Horticulturae* and in Fig. 1 were displayed in several booths of Hortifair, a large flower show held in Amsterdam, The Netherlands on October 9-12, 2007. Visitors were awestruck by the spectacular color combination and many could not explain how they were achieved.

Staining roses with dyes is a common practice to obtain flower colors that are not available in nature, as in the case of blue roses, the most common and first color to be used. However Rainbow Roses are most unusual because the petals of the same flower display various colors. Combinations include "Ocean" roses with blue and yellow petals, and "Tropical" roses with yellow, orange and red petals.

The technique for producing Rainbow Roses was developed by Peter van de Werken from River Roses®, a flower company located in Holland. It is an elegant application of basic knowledge of plant anatomy. However, the practical use of the method requires specific know-how in order to get an even distribution of the dye over the petal surface, avoiding color stains or the accumulation of the dye in the petal margins.

The different colors between petals are a consequence of phyllotaxy e.g. the form by which leaves (or nodes in general) are arranged on the stem. In the case of roses the leaves are arranged in a five-ranked spiral, which means that when an imaginary line connects the various leaves a spiral is formed so that after two full rotations leaf number 6 is on the same vertical plan as leaf number 1. Petals are modified leaves and follow the same arrangement.

To obtain a flower with petals stained in different colors the stem is vertically cut into four equal parts and each quarter dipped in a different dye. The dye moves upwards through the xylem to the petals, which get a different color depending on their position in the spiral.

CONFETTI POINSETTIAS

The Confetti Poinsettia pictured in Fig. 2, was externally dyed. Over the past three years, the Fred C. Gloeckner and Co. has revived the poinsettia market in the United States with its Fantasy Colors™ dyes and glitters. A combination of colors can be applied to poinsettia bracts by using a dropper or flexible plastic bottle with an extremely small opening from approximately 1 m from above the plant to

Figure 1. Rainbow Roses.

Figure 2. Confetti Poinsettia.

create a confetti splashing effect. Wholesale and retail growers can now add value from U.S. $2.00 to $7.00 depending on what segment of the market they are participating, to a floriculture crop that had become commoditized and a promotional item for national retailers. While the poinsettia is considered a Christmas potted flowering plant, with the array of available colors and effects, retailers can market other holidays and events throughout the year. According to Andrew Lee, Vice President of Sales and Marketing with Gloeckner, the painted poinsettia concept is most compelling to the 15 to 45 age group. Ten dyes, 18 glitter colors, and various shimmer powders plus your imagination can give a poinsettia crop an extreme makeover!

GILDING THE LILY?

Some argue that dyed flowers are bizarre and unnatural and should not be used to replace natural colors. At least William Shakespeare thought so:

To gild refined gold, to paint the lily,
To throw a perfume on the violet,
To smooth the ice, or add another hue
Unto the rainbow, ...
Is wasteful and ridiculous excess...

(King John IV, 2)

Others equally passionate say that artificial coloring creates new opportunities for decoration using natural flowers. However, proponents and adversaries of this process both agree on the importance and enjoyment of cut flowers and potted plants. Clearly, creating diversity must be considered a strength of horticultural science.

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The Founding and Founders of the Royal Horticultural Society

Jules Janick

All horticultural societies including the International Society for Horticultural Science are related to the Royal Horticultural Society (RHS). The origins of the RHS are contained in a letter dated June 29, 1801, by John Wedgwood to William Forsyth, gardener to King George III:

I have been turning my attention to the formation of a Horticultural Society and have drawn up such heads as have appeared to me necessary for the first formation of the Society. It would be proper to add a preamble, just stating the ideas of the first founders of the Society, and intimating that we wish to clash with no society at present instituted whose plans are different from ours. By this means we shall give no offence to any party. By not binding ourselves to publish annually we shall not be obliged to expose ourselves to the world in an imperfect state by publishing papers not worth making public.

In a postscript Wedgwood requested Forsyth to contact Sir Joseph Banks for his opinion of the plan, detailed in an enclosure (see Box), for the development of a Horticultural Society, and to seek his patronage. Banks, President of the Royal Society and Royal Adviser to the Gardens at Kew was a shaker and a mover; he approved of the plan in a letter and indicated he would be honored to be an original member. His interest led to an inauguration meeting in Piccadilly, London, on March 7, 1804 with the attendance of seven remarkable and colorful personages: Wedgwood, Banks, Forsyth, Charles Greville, Richard Antony Salisbury, James Dickson, and William Townsend Aiton (Fig. 1). Five of these men now have genera named in their honor (Fig. 2). This meeting is considered the origin of the Horticultural Society (later the Horticultural Society of London) and when it received Royal patronage, the Royal Horticultural Society. The history of the Society is detailed in a book authored by Harold R. Fletcher, entitled *The Story of the Royal Horticultural Society 1803-1968* and published in 1969 by the Oxford University Press, and is the source of the present sketch.

THE EXTRAORDINARY SEVEN FOUNDERS

John Wedgwood (1766-1844) was a hobby horticulturist from a famous family. His father Josiah Wedgwood was the great English potter, and his sister Susannah, wife of Robert Darwin, son of the botanist Erasmus Darwin, was the mother of Charles Darwin. Wedgwood grew many of the seedlings of fruit trees bred by Thomas Andrew Knight (1759-1838), who served as the President of the Society from 1811-1837.

Sir Joseph Banks (1743-1820), a wealthy landowner, served as President of the Royal Society of London for 42 years where he was known as the "Dictator of British Botany." He collected plants in Newfoundland and Labrador and then sailed with Captain Cook on the Endeavour at the age of 25 and explored Brazil, New Zealand, and Australia. He returning after three years with a vast collection of plant specimens. He was named Director of Kew Gardens in 1772 by George III and encouraged many expeditions to bring back new plants for the garden and the herbarium. The genus *Banksia* was named in his honor.

William Forsyth (1737-1804), gardener to King George II at Kensington and St. James, started his career under Philip Miller, the great gardener-botanist in charge of the Apothecaries Garden at Chelsea and author of the *Gardeners*

Figure 1. The seven founders of the Royal Horticulture Society.

John Wedgwood | **Sir Joseph Banks** | **William Forsyth** | **Charles Francis Greville** | **Richard Antony Salisbury** | **James Dickson** | **William Townsend Aiton**

Figure 2. Five genera bearing name of the founders of the Royal Horticultural Society.

Banksia ericifolia | ***Forsythia* x *intermedia*** | ***Grevillea banksia*** | ***Salisburia adiantifolia* = *Gingko biloba*** | ***Dicksonia antartica*** **(Australian tree fern)**

Dictionary (1731). Forsyth was known for the development of a "plaster" to cover pruning wounds (much criticized by Knight) and wrote a treatise on fruit trees. The genus *Forsythia* bears his name.

Charles Francis Greville (1749-1809), dashing dilettante, and collector of minerals and gems, developed a famous private garden where many new plants were grown and illustrated. Greville was to be long time treasurer of the new Society. His name is enshrined in the genus *Grevillea*. His beautiful mistress, Emma Hart, became a *cause celebre* in British history, first as the model for a series of portraits by George Romney and others. When Greville considered marriage he passed the beautiful Emma accompanied by her mother to his widowed uncle, Sir William Hamilton, envoy to the Kingdom of the Two Sicilies, who became enamored of the young beauty and married her (!). Lady Hamilton was to become a close confident of Queen Maria-Caroline's husband Ferdinand IV and drew the eye of the famous British naval

Figure 3. Thomas Andrew Knight, father of horticultural science, and *Knightia excelsa* named in his honor.

Figure 4. Exhibition Extraordinary in the Horticultural Room, a caricature of a meeting of the Horticultural Society in 1825 by George Cruikshank. The etching illustrates the Great Room at the back of the headquarters of the Society in Lower Regent Street. All the personages are caricatures of members of the society and have been identified by Harold Fletcher in Chapter 7 of his history of the society.

hero Admiral Horatio Nelson, who visited Naples after the battle of the Nile in 1798. He too succumbed to her charms. The scandalous ménage á trois between Emma, Lord Nelson, and Ambassador Hamilton, served as the source of a famous movie (*That Hamilton Woman* with Vivian Leigh and Lawrence Oliver, 1941, reputed to be the favorite movie of Winston Churchill) and was chronicled in a romance by Susan Sontag entitled *The Volcano Lover*.

Richard Antony Salisbury (1761-1829), botanist, amateur gardener, and great plant collector and cataloger of plants, was an inveterate proposer of new names for plants, when he thought the original inappropriate. The maidenhair tree *Salisburia adiantifolia* is named in his honor, a tree that unfortunately for him had been previously named *Ginkgo biloba* by Linnaeus in 1791.

James Dickson (1738-1922), nurseryman and seedsman, a friend of both Banks and Forsyth, was also a founder of the Linnean society. Dickson served as gardener to many clients including the British Museum and became known for studies on mosses, fungi, and grasses and later authored two large botanical works. His memory is preserved in the genus *Dicksonia*, a genus of tree ferns.

William Townsend Aiton (1766-1849), botanist and gardener to George III at Kew, was the publisher of a much enlarged edition (11,013 species) of *Hortrus Kewensis* written by his father.

THE EARLY SOCIETY

In 1895, Banks invited his friend Thomas Andrew Knight (Fig. 3), a famous horticultural and botanical researcher who had written the first paper on gravitational biology and a member of the Royal Society of London, to write a Prospectus, which became an important document in the history of the Society. Knight divided horticulture into two branches, the ornamental and the useful, and strove to put research on the forefront of the emerging Society. Knight is now considered the father of Horticultural Science, and the RHS issues the Knightian medal in his honor.

The early society formed a pattern of eight meetings a year in which society business was conducted and papers were read, many, if not most, on fruits and vegetables. Important papers were subsequently published in the Society's *Transactions*, which first appeared in 1807, and included hand colored plates, now considered some of the finest in horticultural literature. Other early activities included the development of medals, a library, and gardens. By 1825, the activities of the Society were well known enough to be spoofed by the famed caricaturist George Cruikshank, who parodied many of the members of the society in a famous engraving (Fig. 4), and a source of whimsy to this day.

ENCLOSURE IN THE ORIGINAL LETTER OF JOHN WEDGWOOD TO W. FORSYTH, JUNE 29, 1801

That a Society be formed to be called 'The Horticultural Society'.

That the object of the Society shall be to collect every infomation respecting the culture and treatment of all plants and trees, as well culinary as ornamental.

That every new member shall be balloted after a Society of original members has been formed, and that every such member at his admission shall pay one guinea besides his annual subscription.

That a certain number of honorary members may be elected, who shall be admitted to the sittings of the Society without paying any subscriptions; that two black balls be sufficient to reject such honorary members.

That the Society shall from time to time publish a volume of papers of the same size and form as the Transactions of the Adelphi Society [now Royal Society of Arts] and that each member shall be entitled to a copy, but no honorary member unless he has furnished a paper judged worthy of publication.

That the Society shall annually choose a President, four Vice-Presidents, a Committee of Inspection, and a Secretary.

That the Committee shall have the power of selecting the papers for publication, and that no paper shall be published before it has been read as a sitting of the Society.

That no paper shall be published which does not treat of horticultural subjects.

That it shall be considered within the intention of the Society to give premiums for improvements in horticulture, whenever it shall be judged expedient to do.

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Traditional Vegetables of Sicily

Ferdinando Branca and Giuseppe La Malfa

Increasing attention is now being paid to diversity in horticulture in order to understand and chronicle food crop variation and to safeguard and conserve valuable genetic material. This is particularly true for vegetables for their implications on agrosystems and growing techniques, on the exploitation of niche environments, on social systems, and on culinary history. Here we briefly review some traditional vegetable crops grown in home gardens and peri-urban farms in East Sicily, and especially the Catania province, which are the expression of the particular environmental conditions and of the ancient history of the island.

Map of Sicily showing Catania Province and Mt Etna.

Sicily is the largest Italian region with 25,000 km² of surface (15% in plain, 60% hilly and 25% mountainous) and about 5 millions inhabitants, which represent about 10% of Italian people. The population is concentrated mainly along the coastal areas, such as in the cities of Agrigento, Catania, Messina, Palermo, Siracusa and Trapani, which were the first ones to be colonised. The history of the island, traversed in turn by Phoenicians, Greeks, Carthaginians, Arabs, Normans, Spaniards and French, is reflected in its traditions and horticultural diversity. As a result of Sicily's ancient past and its particular geographic location there are a great number of vegetables grown under different environmental, agronomical and social contexts including home gardens and peri-urban farms. Some vegetables make up a prominent part of the well known Sicilian cuisine, which remains linked with traditional local events and customs, many of which are related to particular sites. Catania province and the slopes of Mount Etna (37°N) is one of these special sites based on a combination of specific soils and temperature conditions as well as on its history. In this context, vegetables show particular traits and characteristics to fulfill the demand for produce for special culinary uses. The climate conditions along this part of the east coast of Sicily are characterised by high temperature and radiation value but with great fluctuation, both during the year and within a single day. The great diversity of vegetables utilised in Siciliy represents a special genetic patrimony and a world resource (Viani, 1929; La Malfa and Bianco, 2006; Tribulato et al., 2007).

There are also many wild species in Sicily, often representing crop relatives which are either gathered or occasionally cultivated, that make up the rich vegetable resources of this magical Mediterranean island (Branca, 1992a,b, 2000a). Typical examples include *Cynara cardunculus*, Asteraceae, a relative of the cultivated artichoke, of which the small and thorny capitula are gathered and sometimes sold in local markets; the shoots and seeds of wild fennel (*Foeniculum vulgare* ssp. *vulgare* var. *dulce*, Umbelliferae), which are gathered and used to prepare and flavour typical dishes; the bulbs of *Leopoldia comosa*, which are appreciated in the pickling industry; and various species of *Asparagus* (*A. acutifolius, A. albus*, and *A. stipularis*), whose bitter spears are often more appreciated than the cultivated one (*A. officinalis*). Other wild species occasionally cultivated are borage (*Borago officinalis*, Boraginaceae), whose boiled leaves are used in soups; and caper (*Capparis rupestris*, Capparidaceae), in which the flower buds, vegetative apices, and young fruits are preserved in salt or oil and used as a condiment (Bianco, 1989; Branca, 2000a).

A rather particular contribution of Sicilian vegetable biodiversity is represented by varietal groups that are characterised by qualitative traits appreciated by local consumers. These include landraces of brassicas such as violet and green curded cauliflower, sprouting broccoli, red kohlrabi, and leafy kale (Branca and Iapichino, 1997; Branca, 2006). There are several cucurbits, including bottle gourds (*Lagenaria siceraria*), which are still eaten in Sicily, winter melons (*Cucumis melo* var. *inodorus*), long light-green pumpkins (*Cucurbita pepo*) and solanaceous fruits, including the small long shelf-life tomatoes and the light violet and/or white aubergines (Branca, 1999a, b; Argento et al., 2006).

Some of these vegetables are more and more grown in Sicily on small surface areas but remain in high local demand. The supply of these products is steadily diminishing due to the modification of the traditional agro-economical and social contexts in which they were grown,

Peri-urban horticulture.

particularly peri-urban farms and home gardens. In these agrosystems, which are based on many species and landraces, there is the risk of loss and of genetic drift caused by outcrossing with commercial cultivars. Peri-urban vegetable crops are also steadily declining as a result of competition from specialised intensive crop growers and the enlargement of the town, which increases land value within or near urban areas. In Catania, for example, the once important peri-urban vegetable farms belt is now reduced to few hectares (La Malfa and Branca, 2001).

Despite this trend there is currently renewed interest because consumers are increasingly interested in products that evoke the idea of genuine and typical food (Branca et al., 2002). Clearly, the problem of loss of diversity needs to be faced and conservation activities implemented. For some of them *ex situ* conservation may be required where for others *in situ* or even on farm conservation strategies would seem more appropriate (Negri et al., 2007).

We have actively evaluated vegetable biodiversity since 1970. In the following summary we provide examples of some of the unique vegetables considered traditional, since they have a long history and are produced in restricted geographic areas.

Home garden.

LILIACEAE

Allium cepa var. *aggregatum* (Cipudda agghiarola)

Information on the cultivation of this unusual allium is scarce but the history of the crop would seem similar, at least in part, to that of the onion to which it is related. It is common only in home gardens along the Ionian coast, where the leaves and the false stem are used to flavour some dishes, salads in particular.

The plant is characterised by continuous growth; it does not enter quiescence during the summer if irrigated and continuously produces shoots. A few months after sowing the plant becomes cespitous, forming matted tufts. The plant does not normally produce floral scapes and propagates by division; its difficulties in sexual reproduction resemble garlic.

Experimental data show a rapid growth of cipudda agghiarola; in comparison to the common onion cultivars, such as 'Dorata di Parma' and 'Texas Grano', shoots weighed about four times more at the end of the growing cycle. The rapid growth of the plant and its delicate aroma support its cultivation, although consumption is rather limited. Sale of the fresh plant is sporadic and limited to local markets.

Asparagus spp. (Wild asparagus)

Wild asparagus (*A. acutifolius*) is well known and utilised along with the cultivated types (*A. officinalis*), which are only recently cultivated by F_1 hybrids. The wild asparagus is widespread mainly in rocky and in sandy soil from the coast to the mountains, *Asparagus albus* is found mainly in clay soil in the plain or on hillsides, and *A. stipularis* is found in sandy soil along the coast and in the plain (Branca, 1992b). The spears of wild asparagus are harvested during spring and autumn seasons and are characterised by a bitter taste. The produce is usually boiled and dressed with olive oil or used to prepare delicious omelettes. The spears of wild asparagus are thinner than those of cultivated species and are occasionally grown in home garden. Recently several peri-urban farms are interested in introducing them to cultivation to respond to increased demand.

Leopoldia comosa (Cipuddazzu)

This species, another member of the lily family, is widespread in several habitats characterised by sandy soils from the plain to the mountains. The bulbs are characterised by bitterness, which is removed partially by boiling. Bulbs are preserved under olive oil and/or vinegar and utilised as starter or as a condiment. There is great interest for their cultivation but at the moment the bulbs are only collected in the countryside.

Wild asparagus (*Asparagus albus*).

Sicilian cauliflower diversity.

Ciuretto.

The flowering plant is very attractive as an ornamental.

BRASSICACEAE

***Brassica oleracea* var. *botrytis* (Ciuretto)**

This violet cauliflower is considered a culton, that is, a plant group that has originated from previous cultivars. The "ciuretto" – literally small flower – is commonplace but cultivated almost exclusively in home gardens and peri-urban farms. The small size and the dark violet colour of the curd represent the characteristics that distinguish it from the more common and widespread violet cauliflower landraces. The inflorescences are particularly appreciated in typical dishes and meet the demands of different markets.

The plant is rather vigorous and the leaves normally have entire margins, rarely lobate. Removal of the curd, as with the cauliflower, does not induce branching. The inflorescence is smaller in size than in the common violet cauliflower that it would appear to have originated from, and the curd is rather rough on the surface because all the flower buds evolve into fertile flowers like broccoli. On the basis of preliminary genetic studies, other characterisitics of this type are intermediate between those of the two putative relatives, cauliflower and broccoli.

The available genetic variability is rather broad based on both the plant's vegetative phase, as well as the size, structure, flower bud size, and colour of the curd (Branca, 1998, 2000b, 2008; Negri et al., 2007). The specific activities of collection, characterization, and conservation underway have up to now avoided genetic pollution and the risk of genetic erosion due to the widespread presence of new F_1 hybrids of cauliflower, characterised by short cycle and smaller sized plants.

Cipudda agghiarola (*Allium cepa* var. *aggregatum*).

Wild plant (photo by Avner Cohen) **and bulbs of *Leopoldia comosa* (*Muscari comosum*).**

CUCURBITACEAE

***Lagenaria siceraria* (Cucuzza longa, Bottle gourd, Calabash gourd)**

Bottle gourd is an ancient cucurbit that was referred to by Columella and Pliny. The plant has white flowers and fruit size and shape can be very variable; many have a very long neck. The mature fruits have thick woody rinds and have been used as vessels, floats, and many other uses. There are two common types: a short necked ornamental type, var. *a fiasco*, and a long edible type, var. *longissima*. The long fruits harvested at immature green stage were a popular vegetable in antiquity (*cucuzza longa*) but they were replaced by various immature fruits of *Cucurbita pepo* from the New World where various types are known as zucchini. However, the cucuzza longa is still a common vegetable in Sicily and is largely grown in home gardens and in peri-urban farms both for fruit and shoot production. The shoots, called *tenerumi*, are very appreciated in Sicily and they are very popular in summer season in local markets. Young shoots have a low sugar content and are boiled and eaten by diabetics. The immature fruits, undeveloped with small seeds, are usually sliced, after removing the epicarp, and boiled to make soup with onion

Cucuzza longa or bottle gourd (*Lagenaria siceraria*) on trellesis.

and tomato or mixed in pasta dishes with chopped potatoes. In the past fruit slices were dried and rehydrated during the winter season and then boiled. Some farmers have selected types characterised by long, thin shape and light green colour (Iapichino et al., 2006). Recently the crop has been introduced in protected cultivation mainly for fruit production that is geared to local markets during the winter (Lipari, 1994; Iapichino et al., 2003).

Cucumis melo var. *flexuosus* (Cucummuru, Citrangolo, Snake melon)

In Sicily, the snake melon or *cucummuru* is cultivated in specific locations on the Ionian coast and particularly in the province of Catania, from the coast up to 600 m above sea level. It is widespread in peri-urban farms where different growing cycles take place during the spring-summer seasons. Young, immature fruits are used in salads and are preferred to cucumber for its more delicate and pleasant aroma, for its greater digestibility, and for the absence of bitterness.

Different types with hairy fruits are grown in Puglia (e.g. Tortarello) and with smooth ones in coastal areas of some North African countries.

Cucummuru or snake melon (*Cucumis melo* var. *flexuosus*).

Cucuzza di sette anni or figleaf gourd (*Cucurbita ficifolia*).

The stem is rather thin so the plant should be supported on trellises. The fruits are quite long, slender, and twisted, with a more or less strong green exocarp (rind) and longitudinal grooves, sometimes lighter, with a slightly hairy surface. The fruit is yellow at maturity and gives off the typical melon aroma.

In local trials the plant appears to be adapted to greenhouse cultivation, and yield is comparable to F_1 cucumber hybrids (Noto and Branca, 1993; La Malfa et al., 1996) even though genetic improvement of the plant has been neglected. The plant is somewhat sensitive to the main Cucurbitaceae viruses and to powdery mildew.

Cucurbita ficifolia (Cucuzza di sette anni, Figleaf gourd, Malabar gourd)

The area of cultivation for this gourd is the coastal citrus area in eastern Sicily where it is common in home gardens where only few plants are usually grown in relation to the large area it dominates. Specimens can be also found up to 600-700 m above sea level on the slopes of Mount Etna. It has special temperature requirements and grows successfully in irrigated lemon groves. The growth rate is rapid, and biomass production is high due to the numerous basal branches, some of which exceed 10 m. Plant growth and development occur during summer season and the fruit reaches commercial size during autumn. The productivity is high; each plant produces about 20 fruits of about 1 kg each. The plant is perennial but it can die with hard frosts and acts as an annual. Usually, the above ground part desiccates in winter and produces shoots at the base of the plant during spring. The plant is recognizable for the classic lobed form of the leaf, similar to that of the fig (hence its English name, figleaf gourd). The plant is monoecious with staminate and pistillate flowers. In Sicily the plant flowers and fruits at the end of August to October.

The fruit is boiled in the early developmental phase when the rind, which must be eliminated before use, is still tender and seeds are small. The fruits in Sicily are light green and white spotted; other rind colours reported in literature are not common in Sicily. The plant does not suffer any particular disease problems and the fruits are appreciated as an "organic" product. Recently some genotypes are utilised as rootstock for the main cucurbitaceous vegetable species.

Sechium edule (Zucca centenaria, Cucuzza spinusa, Chayote)

The plant has been introduced since the 18th century in Europe from Mexico, but there are no

Zucca centenaria or chayote (*Sechium edule*).

Flowers and tubers of patacca or Jerusalem artichoke (*Helianthus tuberosus*).

details on its arrival in Italy or Sicily. Individual plants or groups can be found along the eastern coast of Sicily. The plant has intense growth and it is often supported by stakes or trellises or shaded pergolas well appreciated in summertime. The plant is perennial and produces shoots from the base of the stem but it desiccates completely in autumn and winter.

Propagation is usually by the recalcitrant seed, which is strictly related to the fruit. Fruiting is abundant and flowers are regularly visited by bees and other insects. The green fruits, often in groups of two or more at the same node, are usually spiny, although there are plants with smooth fruits.

The peeled immature fruits are sliced and boiled like greens or fried; taste is sweet and sour. Occasionally, young shoots are collected, cooked and used in the same way as cucuzza longa (see above). The use of this vegetable is increasing.

ASTERACEAE

Helianthus tuberosus L. (Patacca, Topinambur, Jerusalem artichoke)

Topinambur or Jerusalem artichoke, an early import from the New World, is occasionally found in home gardens where it is used both as an ornamental and as a food crop; the tubers are used in preparing a number of local dishes. It is a hardy plant that colonizes larger and larger areas through its numerous tubers. Tubers are 3-5 cm in diameter, with a creamy white or reddish-wine surface colour with white or yellowish pulp. In the Sicilian climatic and growing conditions, the plant propagates vegetatively from tubers. Tuberization takes place from the end of summer to autumn; harvesting may start in autumn and is carried out before the above-ground part is completely desiccated and can overcome the whole winter. The tubers, only about 20% dry matter, easily lose water and deteriorate. Most of the dry matter consists of inulin, a polysaccharide that hydrolyzes and turns into fructose, and that is better tolerated by diabetics. The flavour resembles that of the artichoke. Genetic variability is very limited in Sicily, and tuber production is decreasing.

The tubers are cooked for human consumption and fed raw to animals. There is some information on its use to produce syrups and alcohol. The nutritive value is inferior to potato tubers.

FABACEAE (LEGUMINOSAE)

Vigna unguiculata (Fasulina, Blackeyed pea, Cowpea, Yardlong bean)

Of central African origin, blackeyed pea was used by the ancient Greeks, Romans, and Arabs. The crop is particularly important in some tropical and subtropical countries, such as Nigeria and Brazil. In Sicily it is mainly widespread in coastal areas where it is traditionally grown in summer.

The plant is annual, with a straight-standing, twining stem with both dwarf and crawling forms. Leaves are alternating and formed by three triangular and rounded leaflets at the base. Flower colour varies from white to rose and lilac, grouped in two or three on long pedicels. The cyclindrical pods are often curved, 20-35 cm long and pale green. The seeds are oval, kidney-shaped, yellowish-white with a black hilum. Local cultivars that were well-known in eastern Sicily are increasingly rare in cultivation.

Fasulina or blackeyed pea (*Vigna unguiculata*).

Some types belonging to the subspecies *sesquipedalis*, with pods 70-80 cm long, are better known and particularly appreciated.

Immature pods and seeds are consumed and have become part of the traditional cuisine of Catania province in numerous locations. They are used in soups with tomato sauce or just boiled and dressed with salt and olive oil.

Baciricò or basil (*Ocimum basilicum*).

LAMIACEAE

***Ocimum basilicum* (Baciricò, Bacilicò, Basil)**

Originating in subtropical Africa and in central Asia, basil was well known during Greek and Roman ages. The plant is widespread in all Mediterranean countries in home gardens where it is well appreciated for its aromatic and ornamental characteristics. In many countries basil is a symbolic plant utilised for specific events such as for the engagement day, wedding day, or St. John's day. For these events the plants are usually grown in small pots and exchanged as gifts and are very popular in balconies and terraces along the coasts. Basil can be considered a pioneer plant for pot cultiva tion. In Italy, basil is a traditional crop for its aromatic characteristics widely used in typical dishes. It is, with parsley, the most utilised flavour in the Mediterranean region. In Sicily, the traditionally grown types have a dwarf habit and small leaves (var. *minimum*) but during the last decades types with large leaves (var. *maximum* and var. *bullatum*) have increased and are especially utilised in the northern Italian regions to prepare *pesto* sauce as a condiment for pasta. Basil is an important ingredient for local dishes associated with tomato and/or eggplant (aubergine). The crop surface is increasing both in open air and in protected cultivation as a consequence of the great request both for fresh and processed products. In order to satisfy the continuous demand for leaves the plant is now grown in greenhouse. In a monitored Catania peri-urban farm we recorded 21 growing cycles, providing year round product.

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About the Authors

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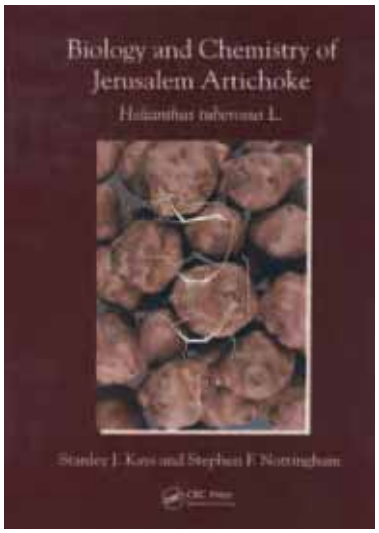
New Books, Websites

The books listed here are non-ISHS-publications. For ISHS publications covering these or other subjects, visit the ISHS website www.ishs.org or the Acta Horticulturae website www.actahort.org

BOOK REVIEWS

Biology and Chemistry of Jerusalem Artichoke: *Helianthus tuberosus* L. Stanley J. Kays and Stephen F. Nottingham. 2008. CRC Press, Talyor & Francis Group, Boca Raton, Florida, USA. 478p. ISBN 1420044948. US$139.95 / £79.99.

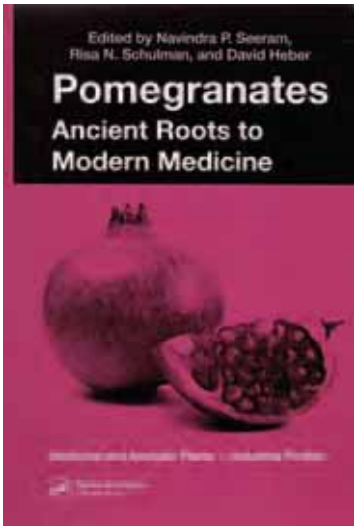


The Jerusalem artichoke or topinambour among its many names (over 250 are listed in the book) is one of the few crop plants native to the United States of America. It is typically grown for its tubers, which are unusual in that the principal storage carbohydrate is inulin (50% dry weight), which yields fructose upon hydrolysis. It has been grown all over the world but despite many advocates and colorful history has never really made it as an important crop plant notwithstanding its many virtues and impressive yields, as high as 15 tonnes (dry weight of tubers)/ha. Its lack of success has not been for lack of trying and there is an extensive scientific literature on the crop. However, the tubers do not store well, and it appears that some find it difficult to digest, although it has been touted as a food for diabetics. Recently interest has surfaced with renewed interest in energy crops.

The authors of this well written book have gathered a wealth of information about *Helianthus tuberosus* that will be a valuable resource for those interested in this species. There is detailed information with extensive literature citations on botany and biology, composition and inulin chemistry, uses, and horticulture (genetic resources and breeding, propagation, and cultural practices). The appendix includes a list of patents concerned with medical and veterinary applications, food, feed, and nonfeed uses, and biotechnology. This is an impressive work.

Reviewed by Jules Janick, Purdue University, USA

Pomegranates: Ancient Roots to Modern Medicine. Edited by Navindra P. Seeram, Risa N. Schulman and David Heber. 2006. CRC Press, Talor & Francis Group. Series: Medicinal and Aromatic Plants - Industrial Profiles. Volume 43. 244p. ISBN 978-0-8493-9812-4. $129.95.



The pomegranate tree was recognized as an important plant for centuries in ancient societies both for its value as fruit and for its medical usage. The authors of this book pay homage to the ancient knowledge concerning the curative properties of pomegranate by revealing recent data from modern medical science, which corroborates the reputation of the pomegranate plant as a rich source for health promoting phytochemicals. Pioneering scientists in the fields of human nutrition, medicine, and biochemistry reviewed the most current scientific knowledge of pomegranate regarding a wide range of human health aspects. These include the physiological effects of pomegranate juice and phytochemicals on two major chronic diseases of aging - heart disease and cancer, and as antimicrobial agents against bacteria, fungi and viruses. The book begins with a broad overview of pomegranate phytochemicals, their chemical nature and the pomegranate tissues that produce them. The fascinating biochemistry of the pomegranate tree, which produces several classes of bioactive compounds including anthocyanins, hydrolyzable tannins, flavonols, catechins, procyanidins, and fatty acids, is thoroughly discussed particularly in the first chapter by Seeram Navindra et al. and the bioavailability chapter by Franscisco Tomas-Barberan. Later on, the book focuses on the pioneering work of Michael Aviram, which reveals the role of polyphenols and their antioxidant activities in reducing lipid peroxidation and progression of atherosclerosis in animal models. This work proceeded with human patients and evidence is presented for improved cardiac muscle perfusion in a group of patients with heart diseases. A large proportion of the book is devoted to clinical research on cancer done either in laboratory models of cultured cancer cells, other animal models or with human patients. Evidence is presented that pomegranate juice is active against common forms of cancer cells including colon cancer, prostate cancer and head and neck cancer. Ellagitanins were shown to inhibit proliferation and kappa-B factor activation in colon cancer cells expressing cyclo-oxygenase 2 enzyme. The initial research described by Shishir Shishoida suggests that pomegranate fruit and its associated antioxidants may possess a strong potential for development as a chemopreventive and possibly as a therapeutic agent against cancers of the skin, lung and prostate. In this context the chapter on bioavailability of pomegranate polyphenols is of particular relevance because, as stated by Tomas-Barberan, the biological activity and physiological effects of pomegranate polyphenols have to be consistent with their bioavailability and metabolism. Pomegranate bioactive compounds such as punicalagin and ellagic acid are probably much more relevant in terms of activity in the gastrointestinal tract where they are present at significant concentrations. Perhaps one of the most encouraging datum concerning cancer research is the one described by Allan Pantuck where pomegranate juice reduced the rate of risk of prostate specific antigen (PSA) by 50% over a 1-year period in human patients with advanced prostate cancer. The place of pomegranate activities against microbes was not neglected in this book. Jayaprakasha Krishanareddy lists the antibacterial and antifungal activities from pomegranate fruit parts against different microorganisms and states that the active phytochemicals in pomegranates are found to be tannins and alkaloids.

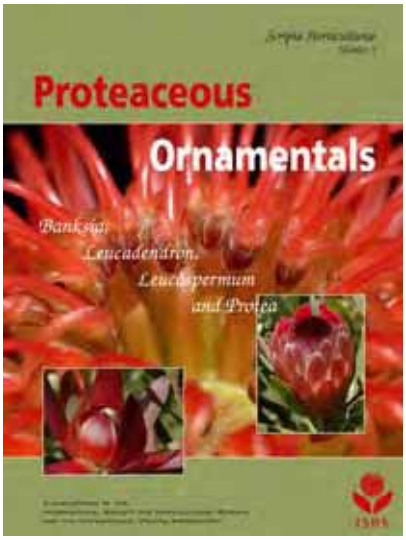
Despite the advance in understanding the chemical nature of pomegranate bioactive chemical compounds very little is known about the

biochemical processes that are responsible for their production. The absence of these aspects from the book reflects the absence of published experiments on these topics in the literature. Three chapters of the book are devoted to commercialization, plant growth and improvement and post harvest technology. These chapters are a bit apart from the main theme of the book, which is more oriented towards aspects of human health and pomegranate bioactive phytochemicals.

Postharvest technology is gaining increased importance as the demand for pomegranates is increased all year round and pomegranates are mobilized from very distant regions. The various techniques for preserving the fruit and its nutritional qualities are described by Adel Kader. Currently, pomegranates can be preserved under special conditions for up to five months. Much more work will be required to study how these conditions will affect the nutritional and health benefit qualities of the fruit. Another post-harvest aspect of pomegranates described by Adel Kader is marketing ready to eat arils. Research on such new products with respect to food safety and nutritional quality are of special importance as ready to eat arils may increase pomegranate fruit consumption. The botanical perspective on pomegranate is described by David Still who stresses the point that despite pomegranate's wide geographic distribution very little information is available concerning the origin, genetic diversity, centers of diversity and breeding of pomegranate. Scientists that work on various aspects of pomegranate biology will have to face the challenge of absence of data bases concerning molecular markers, sequenced genes, and other molecular tools that are essential for modern science.

Reviewed by Doron Holland, Newe Ya'ar Research Center, Agricultural Research Organization, Israel

Proteaceous Ornamentals: *Banksia, Leucadendron, Leucospermum* and *Protea*. Edited by Jules Janick. 2007. *Scripta Horticulturae* 5. International Society for Horticultural Science. 161p. ISBN 978 90 6605 446 2. € 60. Available from the ISHS Secretary.



Volume 5 of *Scripta Horticulturae* sponsored by the International Protea Association contains four articles reprinted from *Horticultural Reviews* on important species of the Proteaceae. The articles include: *Banksia*: New Proteaceous Cut Flower Crop by Margaret Sedgley (volume 22); *Leucospermum*: Botany and Horticulture by Richard A. Criley (volume 22); *Protea*: A Floricultural Crop from the Cape Floristic Kingdom by J.H. Coetzee and G.M. Littlejohn (volume 26); and *Leucadendron*: A Major Proteaceous Floricultural Crop by Jaacov Ben-Jaacov and Avner Silber (volume 32). There is a preface by Richard A. Criley. The articles were originally edited by Jules Janick.

NEW TITLES

Heinrichs, Florian (ed.). 2007. International Statistics Flowers and Plants 2007. Volume 55. International Association for Horticultural Producers (AIPH), Zoetermeer, The Netherlands. 127p. ISBN 90-74486-16-3. € 110. www.aiph.org

Verheij, Ed and Waaijenberg, Henk. 2008. Agrodok 9 - The Home Garden in the Tropics. Agromisa Foundation / Centre Technologique Agricole, Wageningen, The Netherlands. 88p. ISBN Agromisa 978-90-8573-087-3. Price € 9.

Courses and Meetings

The following are non-ISHS events. Make sure to check out the Calendar of ISHS Events for an extensive listing of all ISHS meetings. For updated information log on to www.ishs.org/calendar

5th International Course on Greenhouse Horticulture / V Curso Internacional de Actualización en Horticultura Protegida, 1-5 September 2008, Oaxaca City, Mexico. Info: Instituto Tecnológico del Valle de Oaxaca (ITVO), Apartado Postal 273, 68000 Oaxaca de Juárez, Oaxaca, México, Phone and Fax: (951) 501-2413, email: hidroponica2008@global-agronomics.com, web: www.global-agronomics.com

IV World Congress of Professionals in Agronomy, 28-31 October 2008, Madrid, Spain. Info: Phone: +34 91 457 48 91, Fax: + 34 91 458 10 88, email: congreso2008@agronomoscentro.org, web: www.congresomundialagronom2008.org

Foundation Degree (FdA) Garden Design, University of Cumbria, United Kingdom. Info: www.cumbria.ac.uk

Section Nuts and Mediterranean Climate Fruits

Int'l Workshop on Chestnut Management in Mediterranean Countries: Problems and Prospects

Participants of the Workshop.

The Mediterranean countries have one of the richest sources of European chestnut (*Castanea sativa* Mill.) germplasm in the world. Since many centuries the species plays an important role for the survival of the rural people in the mountainous areas of the European countries.

However, some critical problems affect the culture both for nut and timber production. First of all the chestnut canker blight (*Cryphonectria parasitica*) in the last fifty-sixty years has damaged the chestnut groves in many of the European countries and other diseases like ink disease (*Phytophthora cambivora*) and pests have harmful effects on the chestnut trees. For this reason many agroforestry problems have to be solved.

Excursion to chestnut rejuvenation area in the forest.

The purpose of the International Workshop on Chestnut Management in Mediterranean Countries, recently held in Turkey, was to present the state of the art of the researches carried out in the Mediterranean countries concerning many aspects of chestnut culture and to discuss them in order to achieve some useful information to be applied. We hope that the dissemination of this information may be useful for the scientific community and for technicians and growers in the chestnut growing countries.

The topics discussed during the workshop concerned: pests and diseases, selection of cultivars, breeding, silvicultural and forestry problems, grafting and budding propagation, tissue culture, utilization and chemical composition of chestnuts, processed and semi processed products, physiological aspects.

The workshop was held in Bursa (Turkey) from 23 to 25 October 2007, in the beautiful building of Uludag Exporters Unions. In total about 120 people attended the meeting, and 60 reports (30 oral and 30 poster) have been presented.

View from the session of the oral presentations.

This interesting international workshop gave the participants the opportunity to discuss the results obtained from the researches recently carried out on the culture.

The workshop was organized by Uludag University, Faculty of Agriculture, Department of Horticulture, under the auspices of ISHS and was supported by civilian and political institutions, firms and foundations. Among these: TUBITAK (The Scientific and Technological Research Council of Turkey), the Governor of the City, Metropolitan Municipality of the City, Municipality of Yıldırım County, Foundation of Ali Nihat Gökyiğit (ANG), Uludag Exporters Union, and KAFKAS (main sponsor). The social and logistic events of the meeting were organized by Plaza Tourism.

Arif Soylu

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First Balkan Symposium on Fruit Growing

Section Nuts and Mediterranean Climate Fruits - Section Pome and Stone Fruits - Section Vine and Berry Fruits

Participants of the Symposium.

The First Balkan Symposium on Fruit Growing held from 15 to 17 November 2007 in Plovdiv, Bulgaria, set the beginning of a new series of regional scientific forums aiming at promoting the development and modernization of fruit growing science and practice in the countries of the Balkan region and Eastern Europe. Establishing closer contacts among scientists and research institutions from the Balkan countries, as well as their future participation in joint regional and European projects, are of great importance.

The Symposium was organized thanks to the initiative of the research staff of the Fruit Growing Institute - Plovdiv, which celebrated its 55th Anniversary in 2007, and was supported by Dr. Damiano Avanzato, Chair of the ISHS Section Nuts and Mediterranean Climate Fruits.

The Fruit Growing Institute - Plovdiv is a permanent and basic scientific unit of the National Centre for Agricultural Sciences at the Ministry of Agriculture and Food Supply and is nationally representative in the field of fruit science in Bulgaria. The research activity is aimed at the collection, preservation, study and management of the genetic resources of fruit plants; the genetic, breeding, immunological and biotechnological investigations for creating new cultivars and rootstocks for fruit growing; the development and introduction of scientifically-based technologies for growing fruit crops in accordance with the principles of sustainable agriculture and ecological fruit production.

Drs. Damiano Avanzato and Ben Ami Bravdo handing out the ISHS certificate to Dr. Zhivondov.

The necessity of such a forum was confirmed by the interest displayed by the researchers from all the Balkan and other European countries. Over 90 participants from 14 countries (Bulgaria, Croatia, Cyprus, Greece, Czech Rep., FYROM, Hungary, Israel, Italy, Lithuania, Romania, Serbia, Turkey and USA) contributed with 30 papers and 70 posters in the three working groups of the Symposium.

The Symposium was also attended by two representatives of ISHS - Prof. Damiano Avanzato, Italy, and Prof. Ben Ami Bravdo, Israel, who presented respectively the lectures "An overview of the World's nut production" and "Advanced approaches of irrigation and fertilization of fruit trees". Among the invited readers were leading researchers in the area of fruit growing. In a very inspiring lecture entitled "New challenges in fruit industry from breeding and biotechnology advancements" Prof. Silviero Sansavini from the University of Bologna, Italy summarized the main goals and achievements of the fruit breeding programs in the EU. The keynote lecture "Stone rootstock breeding and evaluation in Hungary", which was given by

Prof. Karoly Hrotko from Cornivus University, Budapest (Hungary), gave an overview on the progress and challenges in the rootstock research. Some results from evaluation of genetic resources and main characteristics of new apple and pear cultivars and promising selections in the Balkan countries were presented by Prof. Vassiliy Djouvinov from the Fruit Growing Institute, Plovdiv, Bulgaria, in his lecture "Review of pome fruit breeding programs in some Balkan countries". The plenary paper summarizing the problems and achievements of biotechnologies and genetic engineering of agricultural crops was delivered by academician Atanas Atanasov (Bulgaria) from AgroBioInstitute Sofia, Bulgaria.

GENETIC RESOURCES, BREEDING AND BIOTECHNOLOGY

The discussions were focused on evaluation and preservation of the genetic resources of apple, pear, sour cherry, plum, small fruit crops, hazelnut, chestnut, Cornelian cherry, olive etc. as donors of resistance to frosts, pests and diseases.

Special attention was paid to the comparison of new fruit cultivars (apple, sweet cherry, apricot, raspberry, and hazelnut), grafted on various rootstocks and grown under different environmental conditions, as well as their resistance to the major pests and diseases.

The results of the apple, peach, nectarine, sour cherry and walnut breeding programs in the different Balkan and European countries were reported and some promising selections were demonstrated.

Some very interesting findings were presented on the results of the selection of new generative rootstocks for peach, apricot and plum and on the evaluation of rootstocks in intensive cherry orchards.

The reports aimed at improving the in vitro propagation of stone and pome fruit rootstocks and small fruits, discussing the evaluation of different media and growth conditions, container type, acclimatization and development of micropropagated plants in vivo.

Fruit Growing Institute at Plovdiv.

Experimental cherry orchard at the Fruit Growing Institute - Plovdiv.

The reports on the molecular characteristics and on phenological, morphological and physiological traits of a transsexual form of *Pistacia terebinthus* genotypes found in Bulgaria, were of special interest for all the participants.

Development and application of markers for resistance to diseases, fruit-quality markers, marker assisted selection (MAS) and other molecular biology techniques in the breeding programs were discussed as tools to reduce time and work loads and to achieve new breeding goals.

SUSTAINABLE AND ENVIRONMENT FRIENDLY FRUIT PRODUCTION

The investigations reported were focused on the improvement of the existing and developing new elements of the conventional, integrated and organic farming systems. Cultivar and rootstock evaluation of apple, plum, cherry, peach, walnut, hazelnut, raspberry and kiwi was carried out with regards to the soil, physical and chemical properties, climatic conditions, growth vigor, pest and disease tolerance.

Management practices related to plant protection, irrigation and mineral nutrition were considered in the light of the economic efficiency, soil and water conservation and environmental protection.

Approaches for using pheromone traps and prediction models for control of pest development, developing biological methods for plant protection and using micro-irrigation systems for application of fertilizers and herbicides (chemigation) were highly appreciated.

POST-HARVEST PHYSIOLOGY AND PROCESSING

Additional cultivar evaluation was carried out in relation to the storage abilities. A new light was thrown on the role of pre-harvest factors on pome fruit storability and especially on the bitter pit susceptibility. The relationship between cultivars and the quality of the fruit-processed products, as well as the methods of quality control were discussed too.

At the final discussion the ISHS representatives - Prof. Damiano Avanzato and Prof. Ben Ami Bravdo, as well as all the other participants expressed their appreciation for the good organization, the useful scientific discussions and the contacts established.

Dr. Mihai Coman submitted the application of the Research Institute for Fruit Growing, Pitesti-Maricineni, Romania to host the Second Balkan Symposium on Fruit Growing in 2010, which was unanimously accepted by all the participants.

On the last day of the forum the participants visited natural and historical places of interest in the vicinity of the city of Plovdiv - the medieval Assen's fortress and Bachkovo monastery. Picturesquely situated at the foot of the Rhodopes, they leave unforgettable memories to the visitors by combining the past and present.

Argir Zhivondov

CONTACT

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Int'l Conference on Quality Management in Supply Chains of Ornamentals

Section Ornamental Plants - Commission Quality and Post Harvest Horticulture

Conference Invited Speakers.

The International Conference on Quality Management in Supply Chains of Ornamentals (QMSCO2007), held in Thailand on December 3-6, 2007 at the Radisson Hotel, Bangkok, was organized by the Division of Postharvest Technology, King Mongkut's University of Technology Thonburi (KMUTT) under the auspices of the ISHS Section Ornamental Plants, Commission Quality and Post Harvest Horticulture and Working Group on Quality of Ornamentals.

The focus of the conference was on the quality management of ornamentals, but there were also presentations that reported on new varieties, cultivation techniques, state of the art production systems for the ornamentals industry, and pre- and postharvest physiology, and molecular and genetic approaches to improve quality. The range of research presented at the conference emphasizes the dynamic approaches researchers are using in the study of ornamental crops, and raised awareness of the ongoing need for research on quality management of ornamentals.

Dr. T.A. Nell at the Welcome Ceremony.

Thai dance.

At the opening ceremony, Assoc. Prof. Dr. Kraiwood Kiatikomol, President of King Mongkut's University of Technology Thonburi (KMUTT) welcomed 154 participants from more than 25 countries to the conference. Prof. Dr. T.A. Nell, Chair of the ISHS Working Group on Quality of Ornamentals, gave an update of ISHS activities. In the first keynote presentation, Prof. Dr. T.A. Nell delivered his experience on Floriculture Research in the 21st Century: "It's More than Just Science". The conference brought together many eminent researchers and industry experts from several disciplines to discuss the development and innovations in quality management with the goal to supply quality ornamentals in an affordable and sustainable manner to consumers in the future global economy.

The first three days of the conference were devoted to 24 keynote and invited speakers, 14 oral and 44 poster presentations on a diversity of topics including molecular genetics, plant propagation, innovative cultivation techniques, quality management in handling systems, treatments to extend shelf life and marketing and distribution systems.

There was considerable discussion among the conference delegates on the trend for research needs in finding new varieties and cultivation techniques as well as postharvest systems that are more effective than existing ones. These were also discussions on quality improvement of cut flowers and potted plants. Dr. David Clark, University of Florida, USA presented his keynote address on 'Bridging the Gap between

T.A. Nell and Thai miniature puppet at the Dinner Reception.

'The Angkor Wat' pre-conference tour.

Science and Consumer Preferences for Fragrance of Fresh Cut Flowers'. There was also consideration given to the potential of molecular approaches to modify flower colour, and genetic/breeding approaches to improve postharvest quality.

The final day of the conference comprised a study tour of Thailand's orchid industry, and a tour of nurseries that produce leafy ornamentals on the outskirts of Bangkok.

Participants and accompanying persons were entertained at a welcome reception featuring a wide variety of wonderful Thai foods and Thai entertainment including Thai puppet, and classical music and dance performed by Thai students of Division of Postharvest Technology.

This International Conference on Quality Management in Supply Chains of Ornamentals was highly valued as exemplified by the internationally recognized scientists from many countries. This conference emphasizes the need for quality management throughout the supply chain, and participants recognized the need for a conference of this sort focused on ornamentals. The proceedings of the conference were published in *Acta Horticulturae* 755, and copies of the proceedings were available to the conference attendees during the conference and are also available from ISHS.

Sirichai Kanlayanarat and Jocelyn Eason

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Section Pome and Stone Fruits - Commission Plant Protection

Eleventh Int'l Workshop on Fire Blight

Attendees of the 11th International Workshop on Fire Blight with Mt. Hood in the background.

The 11th International Workshop on Fire Blight was held in Portland, Oregon, USA from 12th to 17th August 2007. The workshop was attended by 106 people from 18 countries. The opening ceremony included welcoming comments from Dr. Stella Coakley, Associate Dean, College of Agricultural Sciences of Oregon State University, Corvallis, Oregon, USA; conveners Virginia Stockwell and Kenneth Johnson,

Oregon State University; and Dr. Chris Hale, who gave a presentation about ISHS and the Working Group on Fire Blight.

The popular mid-workshop tour included a visit to the Oregon State University Mid-Columbia Agriculture Research and Extension Center in Hood River, and nearby commercial pear orchards. The mature orchards had some trees with symptoms of fire blight, providing an opportunity to see the disease in a commercial setting. The tour concluded with a visit to Mt. Hood, a dormant 3,429 meter volcano, and dinner at Timberline lodge.

For the scientific program, there were a total of 99 papers, of which 53 were oral presentations and 46 posters. The meeting was organized in six main sessions.

PATHOGEN BIOLOGY

This session was chaired by Brion Duffy (Agroscope *FAW*, Wädenswill, Switzerland) and Joel Vanneste, (Horticulture and Food Research Institute of New Zealand Limited, Ruakura Research Centre, Hamilton, NZ). The session consisted of two parts: a) Epiphytic and endophytic biology and b) Diversity within and among *Erwinia* spp. Papers in the first part of the session discussed the fitness and stress-tolerance of the pathogen, impact of environmental factors and age of host tissues on growth, survival and infection, sources of inoculum of the pathogen, and endophytic behavior of the pathogen. The second part of the session examined genetic diversity of the pathogen, including molecular based comparisons between *Erwinia amylovora* and related species.

Visit to a pear orchard in Hood River.

ERWINIA GENOMICS

This is the first time the fire blight workshop has had a session devoted to genomics. A highlight of this session, chaired by George Sundin (Michigan State University, USA) and Marie-Anne Barny (INRA/INAPG/UPVI, Paris, France) was an invited lecture by Dr. Ian Toth (SCRI, Scotland) entitled "What will a genome sequence do for fire blight research?: *Pectobacterium atrosepticum* and potato – a case study", which laid a foundation for attendees to understand advances in genomic research. Papers presented in this session included an update on the genome sequence of *E. amylovora*, comparative proteome analyses, and the description of molecular tools to advance studies of gene function and signal transduction in the fire blight pathogen.

Fire blight infection of pear blossom cluster.

HOST-PATHOGEN INTERACTIONS

This session was chaired by Marie-Anne Barny (INRA/INAPG/UPVI, Paris, France) and George Sundin (Michigan State University, USA). A highlight of this session was the invited lecture by Dr. Dave Coplin (The Ohio State University, USA) entitled "The WtsE virulence effector from *Pantoea stewartii*, a plant signal mimic?" in which he shared interesting research on host-pathogen interactions and the symbiotic relationship between *P. stewartii* and corn flea beetles. The papers in this session covered the mechanisms of pathogenesis with a focus on Type III secretion and pathogenicity genes in *E. amylovora* and *Erwinia pyrifoliae*, host responses and the genes involved in resistance, and the role of genes associated with bacterial cell-to-cell communication.

DISEASE CONTROL: MANAGEMENT OF HOST SUSCEPTIBILITY

Jay Norelli, (USDA/ARS Appalachian Fruit Research Station, West Virginia, USA) chaired this session. The presentations in this session

focused on increasing host resistance to fire blight by conventional breeding and transgenic methods, identifying novel resistance in rootstocks, mapping resistance genes, studying the influence of tree physiology and pruning practices on the endophytic behavior of *E. amylovora*, and the effect and mechanism of prohexadione-calcium for control of shoot blight.

DISEASE CONTROL: SUPPRESSION OF INFECTION

The session chaired by Larry Pusey (USDA/ARS Tree Fruit Research Laboratory, Washington, USA) and Antonet Svircev (Agriculture and Agri-Food Canada, Ontario, Canada) focused on disease risk modeling, evaluation and use of biological control agents (both experimental and commercialized), the mechanisms of biological control, the efficacy of chemical controls and resistance to antibiotics, and the integration of biological control agents with chemicals.

PATHOGEN DETECTION

The session chaired by Won-Sik Kim (Agriculture and Agri-Food Canada, Ontario, Canada) and Maria M. López (IVIA, Valencia, Spain) covered the rapidly developing new technologies for detection of *E. amylovora*. Evaluations included the use of immunochromatography strips and several molecular assays including loop-mediated isothermal amplification, PCR-assays with various targets, real-time PCR, Bio-PCR, direct real-time PCR, and surface plasmon resonance. Some of the techniques were also used as a multiplex system to quantify simultaneously populations of different bacterial species on tissues.

Fire blight canker margin on pear.

SUMMARY SESSION

Chairpersons presented summaries of key topics of each session, led discussion among participants, and proposed areas of future research. Generally, people were seeing more connections between the sessions of the workshop than in previous workshops.

- Rapid progress on genomic studies of bacteria and plants was noted by several session chairs. It is anticipated that this area may identify targets of *E. amylovora* effectors in plants. Genomic studies may also result in development of new primers for detection of the pathogen. It was noted that more strains of *E. amylovora* should be sequenced to examine diversity of the pathogen. Furthermore, it is important to explain the significant advances in fire blight due to genomic research to stakeholders, so that they understand the benefits of this research to their industry and science.
- Additional adaptation of models to examine the influence of cool weather conditions on fire blight risk. Shoot blight and endophytic biology of *E. amylovora* continues to be an area needing additional research. It was recommended that a group should develop an extension publication on fire blight targeted to plant nurseries.
- The new tools for detection and quantification of the fire blight pathogen should be subjected to a ring test. Evaluation of each method for cost verses throughput verses speed verses sensitivity should be included. The outstanding question for this rapidly changing technology is "What is an adequate sample size for detection of the pathogen in environmental samples?"
- Disease control methods are progressing especially with the integration of biological control agents with chemicals. Additional research though is needed to diversify the tools available for disease control, understand their implementation, and to increase the efficacy of control, especially for regions where use of antibiotics is prohibited.

BUSINESS MEETING

- At the Fire Blight Working Group business meeting, Drs. Virginia Stockwell and Kenneth Johnson, Oregon State University, Corvallis, USA, were elected as the new Chairs of the working group.
- Dr. Wolfgang Zeller presented an overview of the new book entitled "Fire blight: History, Biology, and Control Management" by Tom van der Zwet, Noemi Orolaza-Halbrendt, and Wolfgang Zeller, which will be published soon by APS Press, St. Paul Minnesota.

Blighted pear with bacterial ooze.

- Dr. Piotr Sobiczewski was elected as the Convener of the 12th International Workshop on Fire Blight to be held in 2010 in Warsaw, Poland.

The workshop was very successful. It was an opportunity for participants to rekindle common interests, integrate new members into the fire blight community, and allow for the exchange of knowledge and development of plans for future collaborations. The Local Organizing Committee would like to thank the Downtown Embassy Suites for their hospitality and others who contributed to the success of the workshop, particularly those involved in administration and sponsorship.

Virginia O. Stockwell and Kenneth Johnson

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Int'l Conference on Ripening Regulation and Postharvest Fruit Quality

Weingarten conference participants photographed at the entrance to the Weingarten Basilica.

Under the EU COST Action924 framework (Workgroup Postharvest Physiology) and in association with ISHS a 2-day meeting was organised on the topic of ripening regulation and postharvest fruit quality at Weingarten-Ravensburg, in Southern Germany, 12 & 13 November 2007. Attending the meeting were 82 participants from 23 countries and 44 oral and poster presentations were given. The meeting was convened by Dr. Josef Streif and jointly organised by the Kompetenzzentrum für Obstbau Bodensee (KOB), Ravensburg-Bavendorf, Germany and the Forschungsanstalt Agroscope Changins-Wädenswill (ACW), Switzerland.

Klaus Altherr leading conference participants through the BayWa apple packhouse and CA storage complex.

COST (Communication Of Science and Technology) is a EU structure to enhance science and technology, where working groups are formed and the members then develop specific work and action plans to progress understanding in their specific area. Dr. Josef Streif as a member of the COST 924 Action (for the Enhancement and Preservation of Quality and Health Promoting Components in Fresh Fruit and Vegetables) convened the Weingarten meeting as part of the COST924 work programme. It was decided to publish the proceedings under ISHS to take advantage of the ISHS resources and to help ensure access and availability of the meeting proceedings to a wider audience.

This meeting discussed the recent innovations in controlled atmosphere technology and/or the use of chemical ethylene inhibitors as new tools for the enhancement and preservation of quality and health promoting components in climacteric fruit. The postharvest technologist can use these new technologies for slowing the deterioration in fresh produce, however, there remain many questions over how best to apply these developments to better meet consumer requirements.

In a short introductory session, Dr. Streif clarified the terms maturation, ripening, and optimal harvest date and then introduced the topics for the meeting as four sessions: hormonal and molecular basis of fruiting and ripening (with 2 orals and 2 posters); regulation of fruit ripening by ethylene inhibitors (3 orals and 7 posters); postharvest ripening regulation during storage and shelf-life (4 orals and 10 posters) and fruit quality, quality assessment and consumer expectations (4 orals and 12 posters).

Prof. Fritz Bangerth spoke on the hormonal aspects of fruit development related to ripening processes, stressing the role of calcium and the complexity of cross-talk regulatory interactions taking place in fruit.

Prof. Susan Lurie reviewed the ethylene inhibitors AVG and 1-MCP. Both are very powerful inhibitors of ethylene biosynthesis and action respectively but she also observed that in some specific instances a strong inhibition of ethylene is not always required or desired. Susan

suggested that the presence of multi-gene enzymes for many of the key regulatory steps in both ethylene biosynthesis and action could potentially make it possible to modify or reduce the ethylene inhibitory effects for some particular fruit crop applications, once more is learnt about the actual mechanisms involved.

Dr. Greg Venburg from Valent Biosciences Corp., spoke about new applications for AVG (ReTain®) in flowering and fruit set regulation while Dr. Hans de Wild from AgroFresh Inc., outlined recent developments with Harvista™ harvest management technology, the pre-harvest use of 1-MCP.

In a key note presentation Prof. Chris Watkins reviewed and contrasted the new storage technology options of DCA (Dynamic Controlled Atmosphere storage) with 1-MCP for the post-harvest operator.

The field excursion allowed conference participants to visit the KOB fruit research orchard and laboratory, the site of Germany's first CA storage facility and working environment of the past 35 years for Dr. Streif with the University of Hohenheim. The group tour then travelled to the beautiful historic town of Lindau situated on a small island in Lake Constance and then onto the large modern packhouse with CA storage facilities of the BayWa group, located at Kressbronn. The conference dinner followed in a nearby local restaurant, with typical regional 'Swabian' cuisine.

Field visit to the KOB research orchard.

Dr. Josef Streif explaining the KOB laboratory facilities.

The poster session on Tuesday morning consisted of 31 3-minute long oral summaries. This kind of poster presentation was a new experience for us, but it successfully allowed each poster presentation to be introduced to the whole plenum. In the storage regulation session Dr. David Johnson, Dr. Franz Gasser, and Dr. Angelo Zanella then presented more detailed practical reviews of various aspects of 1-MCP and DCA storage. Before the final session conference participants could visit the adjacent Basilica and hear a short but stunning demonstration of the baroque organ – one of the world's largest with some 6666 individual pipes! The conference closed after the final session, effect of storage conditions on fruit quality and consumer expectations with: Prof. Bart Nicolaï describing some new and exciting methods to explore and view fruit tissue in situ; Dr. Ernst Höhn on consumer expectations; Dr. Jamil Harb on aroma volatiles; and Dr. Jeannette Nuessli on sensory aspects of fruit freshness.

Roy McCormick and Josef Streif

Contact

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Sixth Int'l Pineapple Symposium

Participants of the Symposium.

The VI International Pineapple Symposium was held in João Pessoa, capital of the State of Paraíba, in the Northeast region of Brazil, on November 18-23, 2007. The Symposium was organized by the Brazilian Agricultural Research Corporation (EMBRAPA) through its National Research Center on Cassava and Tropical Fruits (Embrapa Cassava & Tropical Fruits), located in Cruz das Almas, Bahia, and the Secretary for the Development of Agriculture, Livestock and Fishery (SEDAP) of the Paraiba State Government, under the auspices of the International Society for Horticultural Sciences (ISHS).

About 220 participants from 30 countries representing all five continents and eighteen Brazilian States provided an exceptional audience with active participation during the Symposium held at the convention center of the Tropical Tambaú Hotel, located at the famous beach of Tambaú.

The central theme of the event was Pineapple - Diversity and Sustainability. The genetic and botanical diversity of this species was shown in several talks and posters, addressing from the evolution of the genus *Ananas* and the domestication of pineapple to the rich composition of many germplasm banks, as for example the one kept by Embrapa Cassava & Tropical Fruits with about 700 accessions of the genus *Ananas* and other Bromeliaceae, representing the diversity existing in Brazil, the country of origin of the pineapple plant.

Diversity of uses of the pineapple plant was also pointed out in a special session. Very recent and already rather successful research efforts carried out in Australia and Brazil are exploiting the ornamental potential of this plant. Embrapa's research team intelligently used the presence of people from so many different countries and cultural backgrounds to make a survey on consumer preference of ornamental pineapples. In addition was shown the work done in Brazil on the "carauá" (*Ananas comosus* var. *erectifolius*), a hygrophilous species from the Amazon region, which has been classified as a newcomer fiber for industrial applications.

Crop management diversity, although rather natural and common due to many factors, was shown to be very evident in Brazil. The strong regional characteristics of pineapple production practices, from planting to harvest, could be seen during two full day field trips carried out during the Symposium. In the first one all participants could see and discuss in four sequential stations the main aspects of 'Pérola' pineapple cultivation under family agriculture conditions, whereas in the second one a smaller group of about 70 people observed the pineapple growing practices on a larger farm with higher investment capabilities.

Sustainability of pineapple production and business was addressed in several sessions of the Symposium. Concerns on the reduction of negative environmental impacts of the activity, together with the improvement of all aspects of fruit quality, with emphasis on its healthiness, could be observed as the main background of many papers presented by scientists coming from different countries and continents. New production systems were shown that may minimize or even totally avoid the application of synthetic pesticides, as for example the integrated pineapple production system being developed in some Brazilian States, such as Tocantins, Paraiba and Bahia, carried out under the auspices of the Ministry of Agriculture, Livestock and Food Supply, or the South African and French strategies towards the production of organic pineapples or "zero pesticide" pineapples. A major help for reaching these goals could be the use of natural plant extracts, such as tannins and other substances, instead of synthetic products in the control of pests and diseases, as those mentioned in some studies on fusariosis and black rot diseases, as well as the development of new cultivars with genetic resistance or tolerance to important pests and diseases, as for example the new Brazilian cultivars 'Imperial' and 'Vitória', which are resistant to fusariosis. In addition was emphasized the need of non-chemical prophylactic measures for reduction of risks of nematode incidence and of losses due to mealybug and viruses associated wilt incidence.

Important advances have been obtained by biotechnological studies and approaches towards a

Ornamental pineapple evaluation.

'Pérola' pineapple cultivation under family agriculture conditions - Station Diseases.

better knowledge on some of the most common problems faced by pineapple growers all over the world, such as natural and irregular flowering and the mealybug wilt associated viruses. Fortunately it seems that those long-term research efforts have opened the perspectives for a much more effective control of those problems in the future. In this context has also been proposed a new interesting strategy to control plant parasitic nematodes using host delivered RNAi.

In the post-harvest management session were shown the new challenges in production and maintenance of quality offered by the introduction of low acid types of pineapples in the fresh fruit markets of USA, Japan and Europe, as well as the main results already obtained to make adjustments in the pre- and post-harvest management practices of those fruits. And the last technical session of the Symposium brought interesting information on general aspects of the Brazilian pineapple agribusiness, traditional and new marketing strategies and on the trends and perspectives of pineapple processing.

The ISHS Working Group on Pineapple held its traditional meeting during the Symposium, with the presence of Dr. Jack Ganry, Chair of the ISHS Section Tropical and Subtropical Fruits. Obeying the criteria of rotation among countries and continents, Johor Bahru in South Malaysia was approved as the venue for the VII International Pineapple Symposium in 2010 to be organized by the Malaysian Pineapple Industry Board (MPIB) and the Malaysian Agricultural Research and Development Institute (MARDI) and supported by the Ministry of Agriculture and Agro-based Industry Malaysia (MOA).

Domingo Haroldo Reinhardt and
Getúlio Augusto Pinto da Cunha

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Second Int'l Symposium on Tomato Diseases

Participants of the Symposium.

The 2nd International Symposium on Tomato Diseases was held at PineBay Resort Hotel in Kusadasi, Turkey, on October 8-12, 2007. The Symposium was organized under the auspices of the ISHS, in cooperation with Agriculture Faculty and Seed Technology Center of Ege University, the University of Florida and Turkish Scientific and Technical Research Council (TUBİTAK). The symposium was co-sponsored by several companies from different sectors related with tomato in Turkey and other countries as well.

Prof. Dr. Hikmet Saygili, Symposium Convener, during the Opening Ceremony.

Tomato is one of the most produced vegetables in the world with an estimated annual production of 125 million tonnes. Most of the production is used in industry such as tomato paste, ketchup, peeled and dried tomatoes. However, diseases caused by fungi, bacteria and viruses, nematodes and weeds are major limiting factors in yield and quality of the tomato. Due to increasing international commerce, the pathogens can be distributed around the world. Many researchers have been studying tomato diseases in several countries throughout the world. The purpose of the meeting was to gather these researchers to exchange their ideas, to share their findings and to meet each other during the Symposium.

Approximately 180 participants from 27 different countries attended the symposium and a total of 64 oral and 56 poster presentations were performed at the following 7 sections: Tomato Industry, Tomato Fungal Diseases, Seed Pathology, Organic Tomatoes, Tomato Virus Diseases, Tomato Bacterial Diseases, and Tomato Diseases Management. Each session was introduced by a lecture with a keynote speaker.

Keynote speakers Dr. Salim Erbas - Agromar Seed (left) and Dr. Hasan Bolkan - Campbell's Seed, USA (center) and Chairman Dr. Duncan Blake - President of Turkish Tomato Paste Exporters and Producers Association, SIID (right) at the Industry Section.

As it was mentioned above, the majority of the world tomato production is used in industry. Turkey is one of the important tomato producers with about 10% of the world production and ranks first for dried tomato production in the world. Tomato industry is developed in Turkey, therefore, an Industry Session was organized to discuss latest developments and improve collaboration. In the Industry Session, the president of AMITOM (Mediterranean International Association of the Processing Tomato) and representatives of the Seed Sector from Turkey and USA participated.

As social activities, a welcome cocktail sponsored by Turkish Tomato Paste Exporters and Producers Association (SIID) was given at the Hotel on October 8, 2007. A one day excursion tour to Virgin Mary House, the ancient city of Ephesus and a Train Museum Park was organized by the Organizing Committee on October 10, 2007, as well as a farewell dinner to all participants at the Panorama Restaurant of the Hotel.

During the Symposium, young researchers and participants from different sectors had the opportunity to meet with well-known scientists and professional people working in the tomato business. So, they discussed possible collaboration including joint projects in the future. Participants indicated positive impressions during and after the symposium, such as Jaacov Katan, one of the scientists, who sent the email below on October 30, 2007.

Excursion to Ephesus.

Dear Hikmet,

It was a great pleasure to attend the meeting that you organized. Many thanks for your efforts. I enjoyed every minute. Bravo!

All the best.
Jaacov Katan
Israel

Hikmet Saygili

Contact

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Commission Economics and Management

Int'l Symposium on Improving the Performance of Supply Chains in the Transitional Economies

Organised by Associate Professor Peter J. Batt from Curtin University in Perth, Western Australia and Associate Professor Tran Duc Vien from Hanoi Agricultural University, the second International Symposium on Improving the Performance of Supply Chains in the Transitional Economies attracted some 62 delegates from over 20 countries. Conducted over 5 days from September 23 to 27 in Hanoi, Vietnam, a total of 46 papers were presented dealing with such diverse topics as purchasing and marketing, grower cooperatives and strategic alliances, and food safety and quality assurance systems.

In his opening address, Professor David Hughes, Professor of Food Marketing, Imperial College, London, eloquently demonstrated how the world's 6 billion plus consumers are not the same. Not only is there a significant difference in the type of food consumed, the amount of food consumed and the proportion of household income that consumers need to spend to purchase food, in the world's most developed economies, shoppers have the income to demand everything: products that taste better, are more convenient, more healthy, better for the environment and better for food producers. Responding to the perceived consumer demands, the world's major retailers are in turn increasingly using credence attributes to position themselves as the "greenest" and, thereby, to provide a sustainable competitive advantage. However, for suppliers, this presents numerous challenges, especially for smallholder producers in the transitional economies. Poor market infrastructure, high post-harvest losses, little price transparency and the lack of incentives present significant obstacles to their participation in modern value chains. With modern value chains moving rapidly towards centralised procurement, specialised wholesalers and logis-

Conference delegates being entertained during the conference dinner.

Conference delegates being briefed by the leader of the Van Noi vegetable commune.

The hazards associated with chemical application in Vietnam.

tics companies, preferred suppliers and private standards, there is a critical need for producers to form horizontal marketing organisations.

With the scene set, the majority of papers continued to explore the various means by which producers could collaborate through the formation of agricultural cooperatives and clusters, and with the support of private enterprise, to engage in contract farming. While many spoke about the benefits to the farmers and their communities, others addressed the major impediments including the lack of capital, the lack of knowledge, land tenure and inappropriate government policy. However, the key message to emerge from the many papers presented was the importance of trust and social capital to the long-term success of collaborative marketing groups. The extent to which members shared common values and norms and the strength of the group leadership was the critical factor influencing the extent to which growers chose to act opportunistically.

Protected vegetable production in Van Noi.

Even so, collaborative marketing groups would not succeed unless the group could generate returns that were at least equivalent to if not better than those which growers could obtain from the existing marketing channels. In most instances, as the existing marketing channels were unable to reward growers for producing superior quality and there was too much inertia to achieve any significant improvements in efficiency, new and improved supply chains were emerging that ran parallel with the existing systems, thus providing farmers with choice.

Not unexpectedly, quality was the other major theme to pervade the symposium. While several papers sought to define the construct both from the consumer's perspective and from the needs of the market intermediaries, others sought to discuss the various means by which quality could be improved in the supply chain. There was, without exception, a universal acknowledgement that quality cannot be improved without a holistic all-of-supply-chain approach. While most take it for granted that quality begins at the farm, it is necessary to go even further back and to investigate the quality of the seeds and the source of the chemicals and the fertilisers that farmers apply. This becomes all the more important in the transitional economies where many banned chemicals are still widely used. Without adequate training, farmers are unsure of the quantities that should be applied, the withholding periods and indeed, many fail to take adequate precautions to protect themselves. For many of the conference delegates, this was vividly illustrated during the field tour when a farmer was observed preparing a knapsack of chemical before applying it to the vegetable crops he was cultivating.

For many of the delegates, as this was their first visit to Vietnam, delegates spent a day in the field visiting two farmer cooperatives in Van Noi and Song Phuong, two modern retail stores (Metro and Big C) and a traditional market at Cau Giay. The visits to the farms provided useful insights into the constraints impacting upon the production and the quality of the vegetable crops grown in Hanoi. Subsequent discussions with traders and consolidators in the field and buyers in the retail stores reinforced the need for farmers to form collaborative marketing groups and to implement quality assurance systems if they were to participate in the modern retail market.

Despite the low number of delegates, there is an apparent and on-going demand for symposia of this nature. As a result, the next symposium will be held in Malaysia in 2010, co-hosted by Curtin University and Universiti Putra Malaysia.

Peter J. Batt

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Fifth Int'l Symposium on the Taxonomy of Cultivated Plants

Symposium participants.

Some 60 participants from 15 countries gathered in Wageningen, The Netherlands, from 15 to 19 October 2007, to present papers and posters, and conduct discussions on issues related to the taxonomy of cultivated plants. These issues covered a wide range of subjects, from establishing the relationships between crop plants and their wild ancestors to problems in rendering Chinese, Japanese and Russian cultivar epithets in Roman script. The symposium continued a series of meetings started in 1985 (also in Wageningen) and was organized this time by the Biosystematics Group of Wageningen University and the Botanical Garden of the same institute, assisted by representatives of the Netherlands Inspection Service for Horticulture (NAK-Tuinbouw) and the Royal Botanic Garden of Edinburgh.

Visit to the orchid collection in Luttelgeest.

Compared to the earlier symposia the utilization of molecular data to solve questions both on reconstructing the ancestry of important crops and the distinction of morphologically similar cultivars was far more prominent. Another striking development is the emergence of many extremely useful databases, that – ideally – should be linked to each other to provide the user with the enormous wealth of information available. In order to ensure easy access to this information the efforts towards a 'consensus taxonomy' of cultivated plants should be enthusiastically embraced. This ideal might not be in easy reach as the very definition of cultivated plants is considered by some to be problematic and a proposal was put forward to use cultigen, a term that earlier has been used to indicate taxa (usually species) that consist exclusively of cultivated material, as a better term. Also the question whether the domains of evolution and domestication are so different that the nature of the units applied for the classification and nomenclature of these domains are fundamentally different as well, is still contested.

It was also emphasized that the field of cultivated plant taxonomy should become more future-orientated and prepare to design means to deal with the cultivated plants of the future (products of genetic engineering, plant groups that might be of extreme importance in future food production like algae, and fungi that are not plants at all but will present the same problems in the naming and classification of their 'strains').

Although the area of cultivated plant taxonomy is a scientific discipline in its own right, it is clear that it interacts intensively with society. Issues connected with the legal protection of cultivars and the possible confusion of cultivar names with trade marks and trade designations have important consequences for the users of taxonomic information. The attendance and input

of representatives of the International Union for the Protection of New Varieties of Plants (UPOV) and the Community Plant Variety Office (CPVO) provided an opportunity to exchange views on these matters. The ensuing discussions were taken up during the session that was organized to prepare the next edition of the International Code of Nomenclature for Cultivated Plants (ICNCP). Many proposals to amend the 2004 issue were submitted in the months before the symposium, and the International Union of Biological Sciences (IUBS) commission met immediately after the symposium to decide on the many issues raised. The new ICNCP should appear in the course of 2008.

Finally, progress was made towards a more formal organization dealing with the field of cultivated plant taxonomy by the launch of the International Association for Cultivated Plant Taxonomy (IACPT), which aims to promote the exchange of knowledge on research in cultivated plant taxonomy and bridge the gap between producers and users of taxonomic information.

One day of the meeting was devoted to the Dutch Experience, visiting a feat of horticultural entrepreneurship (the impressive collection of cultivated orchids in Luttelgeest), followed by a boat trip around and through Giethoorn, emphasizing the intimate relationship between the Dutch and water, and concluded with a pancake meal accompanied by Dutch medieval music.

R.G. van den Berg

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From the Secretariat

New ISHS Members

ISHS is pleased to welcome the following new members:

NEW INDIVIDUAL MEMBERS:

Algeria: Mr. Said Zafer; **Argentina:** Ir. Ricardo Andreau, Mr. Adri Botman, Juan Jose Iuorno, Dr. Valeria Sigal Escalada; **Australia:** Mr. Tyson Bennett, Mr. Cameron Esslemont, Ms. Kay Frith, Mr. Dale Jackson, Rachael McClintock, Pauline Ms. McPherson, Mr. Ken Myers, John Oates, Mr. Ivan Peppe, Otto Saeck; **Austria:** Dr. Samuel Okoli, Mr. Dejene Tezera; **Belgium:** Prof. Dr. Pol Coppin, Mr. Jean Francois Desaedeleer; **Brazil:** Dr. Clori Basso, Rodrigo Ismael, Dr. Rosa Sanhueza; **Cameroon:** Mr. Serge Simon; **Canada:** Ms. Susan Blackwood, Mr. Simon Charbonneau, Rejean Demers, Ms. Andrée Deschênes, Mahmoud Elzeftawi, Mr. Louis Gosselin, Melanie Kalischuk, Ms. Betty Lemay, David Lemire, Mr. Richard Méthot, Ms. Ruth Roberts; **Cape Verde:** Ms. Maria Luisa Lobo Lima; **Chile:** Ms. Alicia Araos, Mr. Victor Bustos, Mr. Christopher Nanjari, Christian Peereboom Voller S., Nicholas Rohm, Cristian Vera, Mr. Cristian Vera; **China:** Yu Juan Long; **Colombia:** Mauricio Escobar, Mr. Victor Toro; **Croatia:** Mr. Romeo Brzic, Rajko Jambrosic, Mr. Marko Petek, Prof. Dr. Marijan Seruga; **Czech Republic:** Dr. Milos Faltus; **Denmark:** Klaus Sall; **Egypt:** Dr. Kelly Max Harrison; **Estonia:** Dr. Ave Kikas; **Finland:** Mr. Albert Grotenfelt, Ms. Taina Laaksoharju, Ms. Katriina Mouhu; **France:** Mr. Olivier Lespine, Ms. Aude Lusetti, Dr. Christophe Paulo, Dr. Alain Soler; **Germany:** Koraljka Paskas, Udo Pollmer; **Greece:** Mr. Georgios Bitsakos; **India:** Dr. Indrabrata Bhattacharya, Dr. A. Chappuis, Assist. Prof. Ashaq Pandit, Dr. Akali Sema, Mr. Vivek Shah, Mr. Bhupendranarain Sinha Sinha, Mr. Kamal Zunzunwala; **Indonesia:** Dr. Sobir Ridwani; **Iran:** Dr. Gholam Hossein Davarynejad, Dr. Alidad Varshochi; **Ireland:** Ms. Nicola Darrell, Dr. Richard Hackett; **Israel:** Ronen Biton, Beth Loberant, Mr. Yehonatan Oserovitz; **Italy:** Dr. Nicola Accordi, Dr. Stefano Bardi, Gianluca Baruzzi, Dr. Carla Benelli, Dr. Simona Botti, Prof. Dario Salvatore Caccamisi, Gregorio Cameli, Dr. Anna De Carlo, Ms. Petra Engel, Dr. Luigi Ledda, Mr. Pierluigi Lucchi, Dr. Matteo Meli, Dr. Leonardo Placchi, Mr. Marcello Sbrighi, Dr. Francesco Scocozza, Josef Wallnöfer, Mr. Giacomo Zuffi; **Japan:** Dr. Shoko Hikosaka, Dr. Takashi Ikeda, Dr. Katsuhiko Inamoto, Dr. Katsumi Ohyama, Mr. Kenji Oide, Takayuki Yamaguchi; **Korea (Republic of):** Dr. Yoon Hi Choy, Sung Kyoem Kim, Assist. Prof. Ki-Byung Lim, Dr. Gil-Ho Shin; **Kuwait:** Dr. Sudhersan Chellan; **Latvia:** Dr. Antra Balode; **Mauritius:** Mr. Mukesh Rughoo; **Mexico:** Dr. Guadalupe Isela Olivas, Dr. Jorge Rodriguez-Alcazar; **Netherlands:** Wim Aalbersberg, Noor Bas, Mr. Richard Corel, Mr. Jos de Wit, Mr. Ron Galiart, Bert Meulenbroek, Marcel Stallen, Mr. Marc Trapman, Mr. Gert-Jan van der Meer, Ms. Ineke van Meggelen-Laagland, Mr. Ferd van Rijckevorsel, Prof. Norma Wester; **New Zealand:** Mr. Timothy Gyoungh Cho, Ms. Louise Carolyn Donnithorne, Mr. Tony Hayward; **Philippines:** Mr. Arnold Andaya, Mr. Nilo Moncayo; **Poland:** Zbigniew Gasiewski; **Portugal:** Mr. Loïc de Oliveira, Assist. Prof. Amílcar Duarte, Luis Sabbo; **Puerto Rico:** Mr. Ignacio Aguilar; **Qatar:** Mr. Samad Dibansa; **Romania:** Ms. Lucica-Alina Mihalte, Adriana Sestras; **Russian Federation:** Mr. Artem Pankin; **Serbia:** Zeljko Mardesic; **Slovenia:** Mr. Gabrijel Seljak; **South Africa:** Dr. John Adam, Mr. Dylan Coleman, Mr. Adriaan Esterhuyse, Dr. Pieter Pieterse; **Spain:** Manuel Cimas González, Dr. Wim Deleu, Mr. Antonio Enamorado, Dr. Pedro Pablo Gallego, Assist. Prof. María Carmen Gomez-Jimenez, Mr. Bent Hansen, Prof. Pedro Palencia-García, Mr. Juan Puchades, Dr. Monica Sabater Vilar; **Sweden:** Assist. Prof. Sophia Ekengren; **Switzerland:** Dr. Vincent Michel; **Tanzania:** Paul Kusolwa, Ms. Shoba Nayar; **Thailand:** Mr. Veeraphon Ubonsacha; **Turkey:** Mr. Erkan Altinsoy, Dr. Kursat Demiryurek, Abdullah Yuceer Gover, Assist. Prof. Zafer Makaraci, Mr. Abdullah Narinc, Dr. Ejder Varol; **United Kingdom:** Mr. Glen Allingham, Mr. Christopher Ashill, Ms. Seema Bhattessa, Dr. Richard Binks, Mr. Carlos Campos, Mr. Matthew Davey, Ms. Juliet Frost, Mr. Mike Goodwin, Mr. David Griffiths, Ms. Valerie Harju, Ms. Kawthar Ismail, Mr. Jeremy Martin, Dr. Wendy Monger, Mr. Philip Priddle, Mr. Nishal Ratanji, Mr. James Smith, Dr. Rana Varshochi, Mr. Adam Whitehouse, Ms. J. Alison Williamson; **United States of America:** Domeneco Abate, Mr. Donald Avery, Elizabeth Bennett-Jarvis, Paul Brumbaugh, Dr. Alexandra Casa, Dr. Diana Chapman, JoAnne Coss, Kyle J. Debruyn, Dr. Joseph DiPaola, Mr. Claudio Donoso, Henry Donselman, Dr. Donald Edgecomb, Steve Edmunds, Mr. Rolando Estrada, Todd Etchandy, Mr. Michael Ferguson, Mr. Douglas Fletcher, Natalie Ford, Anthony Fortier, Bruce Frost, Mr. Bruce Fulford, Mr. Eric Gaarde, Javier Garces, Ms. Stacy Gloss, Mr. Steve Griffiths, Virginia

Grimm, Roberto Gurgel, Mr. David Hammond, Dr. Richard Harrison, Mark Henning, Robert Hensarling, Herbert Hurov, Ms. Kendra Hutchins, Erik Jertberg, Dr. Lauren Johnson, Brian Kidd, Mansun Kong, Karen Lewis, Nanette LoDolce, Ms. Paula Lomba, Marty Madesko, Mr. Mark McCaleb, Mr. Donald McCoy, Mr. Victor Monterroso, Dr. Rejah Muhyi, Mark Murai, Dr. Natalia Neerdaels, Penny Nguyen, Frederick A. Norton, Mr. Nathan Nourse, Mr. Jason Osborne, Ms. Zeynep Oz, Mr. Maximo Perena, Prof. Dr. Bobby Phills, Bala Pudota, Ms. Frances D. Pughsley, Ms. Esther Pullen, Rick Racca, Mahar Razak, Bill Reiman, Seth Ristow, Ms. Grace Romero, Dr. Patricia Rorabaugh, Robin Ross, Justine Rushing, James Schindlbeck, Ms. Melanie Shields, Dr. Kent Short, Ross Siragusa, Dr. Patricia Skinkis, Christopher Stone, Mr. William Swanson, Mr. Anbalagan Thiruppathi, Ms. Patricia Thompson, Dr. Rhodes Trussell, Mr. Nicholas Tufaro, Dr. Vijai Tyagi, Sandra E. Vega, Maria Vidauri, Ryan Walker, Mr. Peter M. Waltz, Paula Whiting, Christopher Willis, Matthew Wilson, Dr. Sanford Witherell, Jr., Stuart Yamamoto; **Venezuela:** Ms. Maria Yraci; **Zimbabwe:** Mr. David Kirkman

Calendar of ISHS Events

For updates and more logon to www.ishs.org/calendar. Do always mention your ISHS membership number or attach copy of your ISHS membership card when registering. A reduced ISHS members registration fee applies.

YEAR 2008

- March 3-7, 2008, Huelva (Spain): **VI International Strawberry Symposium.** Info: Dr. José Lopez Medina, Dpto. Ciencias Agroforestales, Escuela Politécnica Superior, Campus La Rabida, Univ.Huelva, 21819 Palos de la Frontera - Huelva, Spain. Phone: (34)959217522, Fax: (34)959350311, E-mail: medina@uhu.es Web: http://www.iss2008spain.com

- March 3-7, 2008, Arusha (Tanzania): **International Symposium on Underutilized Plants for Food, Nutrition, Income and Sustainable Development.** Info: Dr. Hannah Jaenicke, Director, International Centre for Underutilised Crops, PO Box 2075, Colombo, Sri Lanka. Phone: (94)112787404ext3307, Fax: (94)112786854, E-mail: h.jaenicke@cgiar.org or Dr. Irmgard Hoeschle-Zeledon, GFU Underutilized Species, Via dei Tre Denari, 472/a, 00057 Maccarese, Rome, Italy. Phone: (39)06-6118-292, Fax: (39)06-61979661 Web: http://www.icuc-iwmi.org/Symposium2008/

- March 16-19, 2008, Palermo (Italy): **IX International Symposium on Plum and Prune Genetics, Breeding and Pomology.** Info: Prof. Dr. Francesco Sottile, Dipartimento di Colture Arboree, Viale delle Scienze 11, 90128 Palermo, Italy. Phone: (39)0917049000, Fax: (39)0917049025, E-mail: fsottile@unipa.it Web: http://www.unipa.it/plum2008/

- April 3-6, 2008, Beijing (China): **III International Late Blight Conference.** Info: Mr. Greg Forbes, Centro Internacional de la Papa (CIP), Apartado 1558, Lima 12, Peru. Phone: (51)13496017, Fax: (51)13175326, E-mail: g.forbes@cgiar.org Web: http://research.cip.cgiar.org/gilb/registrationgilb/newgilb.php

- April 6-11, 2008, Antalya (Turkey): **International Symposium on Strategies Towards Sustainability of Protected Cultivation in Mild Winter Climate.** Info: Prof. Dr. Yüksel Tüzel, Ege University, Agriculture Faculty, Department of Horticulture, 35100 Bornova Izmir, Turkey. Phone: (90)2323880110ext1398, Fax: (90)2323881865, E-mail: yuksel.tuzel@ege.edu.tr Web: http://www.protectedcultivation2008.com

- April 12-14, 2008, Agadir (Morocco): **ISHS Executive Committee and Council Meeting.** Info: Jozef Van Assche, ISHS, PO Box 500, 3001 Leuven 1, Belgium. Phone: (32)16623326, Fax: (32)16623327, E-mail: jozef@ishs.org

- April 14-18, 2008, Fortaleza (Brazil): **II International Conference on Vegetable Crops - ICV2008.** Info: Dr. Fernando Antoni Souza de Aragão, EMBRAPA CNPAT, Rua Dra. Sara Mesquita 2270, Planalto Pici, Fortaleza CE, Brazil. Phone: (55)32991972, Fax: (55)32991803, E-mail: aragao@cnpat.embrapa.br or Dr. Ricardo Elesbão Alves, Embrapa Agroindústria Tropical - C.P. 3761, Rua Dra Sara Mesquita, 2.270, Planalto Pici, 60.511-110 - Fortaleza, CE, Brazil. Phone: (55)8532991956, Fax: (55)8532991833, E-mail: relesbaoa@yahoo.com.br

- April 20-24, 2008, Lisse (Netherlands): **X International Symposium on Flower Bulbs and Herbaceous Perennials.** Info: Dr. A.T. Krikke, PPO division Flower Bulbs, Professor van Slogterenweg 2, PO Box 85, 2160 AB Lisse, Netherlands. Phone: (31)252462124, Fax: (31)252462100, E-mail: arend.krikke@wur.nl or Dr. Ir. J. Ernst Van Den Ende, Applied Plant Research (PPO), Flowerbulbs, PO Box 85, 2160 AB Lisse, Netherlands. Phone: (31)252-46-2123, Fax: (31)252-46-2100 Web: http://www.isfbp2008.wur.nl/

- April 20-24, 2008, Haarlem (Netherlands): **XII International Symposium on Virus Diseases of Ornamental Plants.** Info: Dr. Ellis Meekes, Sotaweg 25, PO Box 40, 2371 AA Roelofarendsveen, Netherlands. Phone: (31)71-3326236 or Ir. A.F.L.M. Derks, Applied Plant Research, Flower Bulbs and Nursery Stock, Prof. van Slogterenweg 2 (P.O.Box 85), 2160 AB Lisse, Netherlands. E-mail symposium: isvdop12@wur.nl Web: http://www.plantenvirologie.nl/ISVDOP12/

- May 19-21, 2008, Faro (Portugal): **VI International Symposium on Mineral Nutrition of Fruit Crops.** Info: Prof. Dr. Pedro José Correia, Universidade do Algarve, FERN, Campus de Gambelas, 8005-139 Faro, Portugal. Phone: (351)289800900, Fax: (351)289-818419, E-mail: pcorreia@ualg.pt or Maribela Pestana, Universidade do Algarve, FERN,, Campus de Gambelas, 8005-139 Faro, Portugal. Phone: (351)289-800900, Fax: (351)289-818419, E-mail: fpestana@ualg.pt Web: http://eventos.ualg.pt/mnutrition6

- NEW May 26-30, 2008, Pruhonice (Czech Republic): **I International Symposium on Woody Ornamentals of the Temperate Zone.** Info: Dr. Frantisek Sramek, VUKOZ, Res.Inst.Landscape&Ornam.Gardening, Kvetnove Namesti, 25243 Pruhonice, Czech Republic. Phone: (420)296528336, Fax: (420)267750440, E-mail: sramek@vukoz.cz Web: http://www.woodyornamentals.cz

- June 8-11, 2008, Toronto (Canada): **XI International Symposium on the Processing Tomato.** Info: Dr. Jane Graham, Ontario Food Processors Association, c/o Janisse Routledge, 7660 Mill Rd., Guelph, ONT N1H 6J1, Canada. Phone: (1)5197675594, Fax: (1)5197634164 or Mr. John Mumford, Ontario Vegetable Growers Marketing Board, 435 Consortium Court, NGE 258 London, Ontario, Canada. Phone: (1)519-681 1875, Fax: (1)519-685 5719 E-mail symposium: 2008worldcongress@opvg.org Web: http://www.worldtomatocongress.com/

- June 9-11, 2008, Madrid, (Spain): **IV International Symposium on Applications of Modelling as an Innovative Technology in the**

Agri-Food Chain - Model-IT 2008. Info: Prof. Dr. Pilar Barreiro Elorza, c/ Hermosilla 86, 2 E, 28001 Madrid, Spain. Phone: (34)913363260, Fax: (34)913365845, E-mail: pilar.barreiro@upm.es Web: http://www.model-it2008.upm.es

- June 16-20, 2008, Matera (Italy): **XIV International Symposium on Apricot Breeding and Culture.** Info: Prof. Cristos Xiloyannis, Dip. Scienze dei Sistemi Colt., For., Amb., Viale dell'Ateneo Lucano, 10, 85100 Potenza, Italy. Phone: (39)3293606262, Fax: (39)0971205378, E-mail: cristos.xiloyannis@unibas.it E-mail symposium: apricot2008@unibas.it Web: http://www.unibas.it/apricot2008/home.htm

- June 16-17, 2008, Vignola, Modena (Italy): **II ISOFAR Conference on Organic Fruits & 16th IFOAM Organic World Congress.** Info: Dr. Franco Weibel, Res. Institute for Orgnic Farming, FIBL, Ackerstrasse, 5070 Frick, Switzerland. Phone: (41)628657272, Fax: (41)628657273, E-mail: franco.weibel@fibl.ch or Dr. Robert K. Prange, Agriculture and Agri-Food Canada, Atlantic Food and Horticulture Research Centre, 32 Main Street, Kentville, NS B4N 1J5, Canada. Phone: (1)9026795713, Fax: (1)9026792311, E-mail: pranger@agr.gc.ca Web: http://www.isofar.org/modena2008/fruit.html

- June 23-27, 2008, Viterbo (Italy): **VII International Congress on Hazelnut.** Info: Prof. Leonardo Varvaro, Dipartimento di Protezione delle Piante, Università della Tuscia, via San Camillo de Lellis, 01100 Viterbo, Italy. Phone: (39)0761-357461, Fax: (39)0761-357473, E-mail: varvaro@unitus.it Web: http://www.hazelnut2008.it

- July 14-18, 2008, Corvallis, OR (United States of America): **IX International Vaccinium Symposium.** Info: Prof. Dr. Bernadine C. Strik, Department of Horticulture, Ag. & Life Sci. Bldg 4017, Oregon State University, Corvallis, OR 97331-7304, United States of America. Phone: (1)541-737-5434, Fax: (1)541-754-3479, E-mail: strikb@hort.oregonstate.edu or Dr. Chad E. Finn, USDA ARS, Hort. Crops Lab., 3420 NW Orchard Ave., Corvallis, OR 97330, United States of America. Phone: (1)541738-4037, Fax: (1)541738-4025, E-mail: finnc@hort.oregonstate.edu Web: http://oregonstate.edu/conferences/vaccinium2008

- NEW August 4-6, 2008, Bangkok (Thailand): **Asia-Pacific Symposium on Assuring Quality and Safety of Agri-Foods.** Info: Dr. Sirichai Kanlayanarat, King Mongkut's University of Technology, Thonburi, Division of Postharvest Technology, Thungkru, Bangkok 10140, Thailand. Phone: (66)2 470 7720, Fax: (66)2 452 3750, E-mail: sirichai.kan@kmutt.ac.th E-mail symposium: aps2008@kmutt.ac.th Web: http://www.kmutt.ac.th/APS2008/

- NEW August 4-8, 2008, Geneva, NY (United States of America): **IX International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems.** Info: Dr. Terence L. Robinson, Dept. Horticultural Science, 630 W. North Street, Geneva, NY 14456, United States of America. Phone: (1)315-787-2227, Fax: (1)315-787-2216, E-mail: tlr1@cornell.edu Web: http://www.nysaes.cornell.edu/hort/ishs/

- August 11-14, 2008, Aarhus (Denmark): **IX International Symposium on Postharvest Quality of Ornamental Plants.** Info: Dr. Carl-Otto Ottosen, Department of Horticulture, Aarhus University, Kirstinebjergvej 10, 5792 Aarslev, Denmark. Phone: (45)89993313, E-mail: co.ottosen@agrsci.dk Web: http://www.postharvestsymposium.dk

- August 24-28, 2008, Brisbane (Australia): **VI International Symposium on In Vitro Culture and Horticultural Breeding.** Info: Prof. Acram Taji, QLD University of Technology, R Block, Faculty of Science, 2 George Street, GPO Box 2434, Brisbane, QLD 4001, Australia. Phone: (61)731386800, Fax: (61)731381508, E-mail: acram.taji@qut.edu.au Web: http://www.une.edu.au/campus/confco/ivchb2008/

- August 25-28, 2008, Lima (Peru): **International Symposium on Soilless Culture and Hydroponics.** Info: Prof. Alfredo Rodriguez-Delfin, Univ. Nacional Agraria La Molina, Av. La Molina s/n, La Molina, Lima 12, Peru. Phone: (51-1)3495669, Fax: (51-1)3495670, E-mail: delfin@lamolina.edu.pe Web: http://www.lamolina.edu.pe/hidroponia/ISHS_2008/index.html

- August 25-28, 2008, Fuzhou - Fujian Province (China): **III International Symposium on Longan, Lychee and Other Fruit Trees in Sapindaceae Family.** Info: Prof. Dr. Pan Dong-Ming, College of Horticulture, Fujian Agric & Forestry University, Dept. Of Horticulture, Fuzhou, Fujian Province, China. Phone: (86)59183789299, Fax: (86)59183735681, E-mail: pdm666@126.com

- September 1-5, 2008, Dresden, Pillnitz (Germany): **I International Symposium on Biotechnology of Fruit Species.** Info: Dr. Viola Hanke, Baz, Institute for Fruit Breeding, Pillnitzer Platz 3a, 01326 Dresden, Germany. Phone: (49)3512.616.214, Fax: (49)3512.616.213, E-mail: v.hanke@bafz.de Web: http://www.biotechfruit2008.bafz.de

- NEW September 1-5, 2008, Gent (Belgium): **II International Humulus Symposium.** Info: Dr. Denis De Keukeleire, Ghent University, Laboratory of Pharmacognosy and Phytochemistry, Harelbekestraat 72, 9000 Gent, Belgium. Phone: (32)478369850 or 92648055, Fax: (32)92648192, E-mail: denis.dekeukeleire@ugent.be or Dr. Kim Hummer, USDA ARS NCGR, 33447 Peoria Road, Corvallis, OR 97333-2521, United States of America. Phone: (1)541.738.4201, Fax: (1)541.738.4205, E-mail: kim.hummer@ars.usda.gov E-mail symposium: arne.heyerick@ugent.be Web: http://www.ishshumulus2008.ugent.be/

- September 3-6, 2008, Stellenbosch (South Africa): **IX International Protea Research Symposium and XIII International Protea Association Conference.** Info: Mr. Hans Hettasch, Arnelia Farms, P.O. Box 192, 7355 Hopefield, South Africa. Phone: (27)227231022, Fax: (27)227231022, E-mail: arnelia@intekom.co.za or Dr. Retha Venter, International Protea Association, PO Box 5600, Helderberg, Somerset West 7135, South Africa. Phone: (27)218554472, Fax: (27)218552722, E-mail: reventer@netactive.co.za Web: http://www.ipa2008.co.za

- NEW September 8-12, 2008, Lillehammer (Norway): **V International Symposium on Brassicas and XVI Crucifer Genetics Workshop.** Info: Dr Magnor Hansen, Agricultural University of Norway, Dept. of Hort & Crop Science, PO Box 5022, N 1432 Aas, Norway. E-mail: magnor.hansen@umb.no E-mail symposium: brassica2008@umb.no Web: http://www.brassica2008.no/

- September 9-12, 2008, Beijing (China): **IV International Chestnut Symposium.** Info: Prof. Dr. Ling Qin, Beijing Agricultural College, No 7 Beinong Road, Changpin District, Beijing 102206, China. Phone: (86)1080799136 or 1080799126, Fax: (86)1080799004, E-mail: qinlingbac@126.com Web: http://www.chestnut.org.cn

- September 9-12, 2008, Sadovo (Bulgaria): **IV Balkan Symposium on Vegetables and Potatoes.** Info: Prof. Dr. Liliya Krasteva, Institute of Plant Genetic Resources, 2 Drujba Str., 4122 Sadovo, Bulgaria. Phone: (359)32629026, Fax: (359)32629026, E-mail: krasteva.liliya@gmail.com Web: http://www.4bsvp.org/

- September 9-13, 2008, Evora (Portugal): **VI International Symposium on Olive Growing.** Info: Prof. Dr. Anacleto Pinheiro, Universidade de Évora, Departamento de Engenharia Rural, Apartado 94, 7002-554 Évora, Portugal. Phone: (351) 266 760 837, Fax: (351)266 760 911, E-mail: pinheiro@uevora.pt or Dr. Manuel Pedro Fevereiro, ITQB, Quinta do Marques, Apt° 127, 2780 Oeiras, Portugal. Phone: (351)214469447, Fax: (351)214411277, E-mail: psalema@itqb.unl.pt Web: http://olivegrowing.uevora.pt

- NEW September 9-13, 2008, Villa de Leyva (Colombia): **International Symposium on Tomato in the Tropics.** Info: Prof. Dr. Gerhard

Fischer, Universidad Nacional Colombia, Facultad de Agronomia, Apartado Aéreo 14490, Bogota, Colombia. Phone: (57)13165498 or 3165000ext19041, Fax: (57)13165498, E-mail: gerfischer@gmail.com or Dr. Alonso Gonzales-Mejia, CIAT, Dept. Tropical Fruits, recta Cali-Palmira Km. 17, Cali, A.A. 6713, Colombia. Phone: (57)24450000, Fax: (57)24450073 E-mail symposium: soccolhort@gmail.com Web: http://www.soccolhort.com/tomato/

NEW ■ September 21-25, 2008, Baoding (China): **I International Jujube Symposium.** Info: Prof. Dr. Mengjun Liu, Research Center of Chinese Jujube, Agricultural Univesity of Hebei, Baoding, Hebei, 71001, China. Phone: (86)312754342, Fax: (86)3127521251, E-mail: kjliu@hebau.edu.cn E-mail symposium: ijs2008@hebau.edu.cn Web: http://www.ziziphus.net/2008/

■ September 22-25, 2008, Alnarp (Sweden): **IV International Symposium Toward Ecologically Sound Fertilization Strategies for Field Vegetable Production.** Info: Prof. Rolf Larsen, Department of Crop Science, P.O. Box 44, S-230 53 Alnarp, Sweden. Phone: (46)40-415369, Fax: (46)40460441, E-mail: rolf.larsen@vv.slu.se Web: http://ishs2008.slu.se/

■ October 5-8, 2008, Tbilisi (Georgia): **International Symposium on Current and Potential Uses of Nut Trees Wild Relatives.** Info: Dr. Zviad Bobokashvili, Georgian Res. Inst. Of Horticulture, Dept. Fruit &Vine Crop Germplasm Inv., Gelovani Street #6, Tbilisi 0115, Georgia. Phone: (995)93335793, E-mail: bobokashvili@gmail.com or Dr. Maya Marghania, Kostava 41, Tbilisi, Georgia. Phone: (995)99905076 Web: http://www.nutssymposium2008.ge/

NEW ■ October, 5-9, 2008, Mombasa (Kenya): **International Conference Banana and Plantain in Africa. Harnessing International Partnerships to Increase Research Impact.** Info: Thomas Dubois, IITA c/o Lambourn Ltd, Carolyn House, 26 Dingwall Road, Croydon CR9 3EE, United Kingdom. Phone: (256)75 2787808, Fax: (256)41 285079, E-mail: t.dubois@cgiar.org Web: http://www.banana2008.com

NEW ■ October 14-17, 2008, Beijing (China): **II International Symposium on Vegetable Production and Quality and Process Standardization in Chain: a Worldwide Perspective.** Info: Dr. Wei Liu, Beijing Vegetable Research Center, Quality Control, PO Box 2443, Beijing 100097, China. Phone: (86)1051503003, Fax: (86)1088446286, E-mail: liuwei@nercv.com or Prof. Dr. Silvana Nicola, Dipartimento di Agronomia, Selvicoltura e Gestione del Territorio, Via Leonardo Da Vinci 44, 10095 Grugliasco (TO), Italy. Fax: (39)0112368773, E-mail: silvana.nicola@unito.it

NEW ■ October 20-24, 2008, Tucson, AZ (United States of America): **International Workshop on Greenhouse Environmental Control and Crop Production in Semi-Arid Regions.** Info: Prof. Dr. Gene A. Giacomelli, University of Arizona, Controlled Environment Agric. Ctr., CEA Building, 1951 E. Roger Road, Tucson, AZ 85719, United States of America. Phone: (1)5206269566, Fax: (1)5206261700, E-mail: giacomel@ag.arizona.edu Web: http://www.ghworkshoparidregions2008.org/

NEW ■ October 22-24, 2008, Sevilla (Spain): **VII International Workshop on Sap Flow.** Info: Dr. José Enrique Fernandez, Inst. de Rec. Nat.y Agrobiol., Campus de Reina Mercedes, Apartado 1052, 41080 Sevilla, Spain. Phone: (34)954624711, Fax: (34)954624002, E-mail: jefer@irnase.csic.es Web: http://www.7iwsapflow.com/

■ November 3-7, 2008, Bogor (Indonesia): **IV International Symposium on Tropical and Subtropical Fruits.** Info: Dr. Roedhy Poerwanto, Jl. Abiyasa Raya No. 1, Bantarjati, 16143 Bogor, Indonesia. Phone: (62)251328942, Fax: (62)251326881, E-mail: roedhy@indo.net.id Web: http://www.ifs2008.info/

■ November 4-7, 2008, Berlin (Germany): **Postharvest Unlimited 2008.** Info: Dr. Martin Geyer, Inst. für Agrartechnik Bornim, Abteilung Technik im Gartenbau, Max-Eyth-Allee 100, 14469 Potsdam-Bornim, Germany. Phone: (49)3315699610, Fax: (49)3315699849, E-mail: geyer@atb-potsdam.de Web: http://www.atb-potsdam.de/postharvest08

■ November 8-13, 2008, Firenze, Faenza and Caserta (Italy): **IV International Symposium on Persimmon.** Info: Prof. Dr. Elvio Bellini, University of Firenze, Horticultural Department, Viale delle idee 30, 50019 Sesto Fiorentino, Italy. Phone: (39)0554574053, Fax: (39)0554574017, E-mail: elvio.bellini@unifi.it or Dr. Edgardo Giordani, Department of Horticulture, University of Florence, Viale delle Idee 30, 50019 Sesto Fiorentino)FI), Italy. Phone: (39)0 55 4574050, Fax: (39)0 55 4574017, E-mail: edgardo.giordani@unifi.it Web: http://www.4persimmon2008.it

■ November 10-13, 2008, Mérida (Mexico): **II International Symposium on Guava and other Myrtaceae.** Info: Dr. Wolfgang Rohde, MPIZ, Calf-von-Linné-Weg 10, 50829 Koeln, Germany. Phone: (49)2215062101, Fax: (49)2215062113, E-mail: rohde@mpiz-koeln.mpg.de or Dr. Jose Saul Padilla Ramirez, INIFAP-Campo Experimental Pabellon, Km. 32,5 Carr. Aguascalientes-Zacatecas, Apdo Postal No. 20 CP 20660, Pabellon de Arteaga, Aguascalientes, Mexico. Phone: (52)4659580167, Fax: (52)4659580167 Web: http://www.cicy.mx/eventos/guavasymposium2008/index.html

■ December 7-11, 2008, Chiang Mai (Thailand): **XVI International Symposium on Horticultural Economics and Management.** Info: Peter J. Batt, Horticulture, Curtin University of Technology, GPO box U1987, Perth, WA 6845, Australia. Phone: (61)8 9266 7596, Fax: (61)8 9266 3063, E-mail: p.batt@curtin.edu.au or Prof. Dr. Peter P. Oppenheim, Deakin Business School, Deakin University, 336 Glenferrie Road, Malvern, VIC 3144, Australia. Phone: (61)3 9244 5549, Fax: (61)3 9244 5040 Web: http://www.muresk.curtin.edu.au/conference/ishsem

■ December 7-11, 2008, Chiang Mai (Thailand): **V International Symposium on Horticultural Research, Training and Extension.** Info: Peter J. Batt, Horticulture, Curtin University of Technology, GPO box U1987, Perth, WA 6845, Australia. Phone: (61)8 9266 7596, Fax: (61)8 9266 3063, E-mail: p.batt@curtin.edu.au or Associate Professor Dr. David Aldous, University of Melbourne, Burnley College, Swan Street, Richmond VIC 3121, Australia. Phone: (61)0392506800, Fax: (61)0392506885 Web: http://www.muresk.curtin.edu.au/conference/ishset

■ December 8-12, 2008, Bangalore (India): **IV International Symposium on Acclimatization and Establishment of Micropropagated Plants.** Info: Dr. Jitendra Prakash, In Vitro International Pvt. Ltd., #12/44, Rajiv Gandhi Nagar, Bommanahalli, Bangalore 560 068, India. Phone: (91)80 41109273, Fax: (91)80 25727030, E-mail: invitro@bgl.vsnl.net.in Web: http://www.int-tissueculturecconf.org/

■ December 9-12, 2008, Madurai, Tamil Nadu (India): **II International Symposium on Papaya.** Info: Dr. N. Kumar, Department of Fruit Crops, Horticultural College & Research Institute, Priyakulam, 625 604, India. Phone: (91)4546231726, Fax: (91)4546231726, E-mail: kumarhort@yahoo.com Web: http://www.ishs-papaya2008.com/

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■ February 25-27, 2009, Melbourne (Australia): **VI International Walnut Symposium.** Info: Mr. Bryan Goble, Walnut Producer, 222 Kerang-Koondrook Rd, Koondrook, VIC 3580, Australia. E-mail: btgoble@westnet.com.au or Dr. Leigh Titmus, PO Box 417, Devonport, TAS 7310, Australia. Phone: (61)364283539, E-mail: leigh.titmus@websterltd.com.au Web: http://www.walnut.net.au/symposium_2009.htm

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Chronica Horticulturae
Author Information

Chronica Horticulturae is the quarterly publication of the International Society for Horticultural Science (ISHS) and is received by all members of the Society and numerous libraries throughout the world. Members and non-members are urged to contribute articles for consideration. However, it needs to be understood that *Chronica* is not to be construed as a scientific journal that publishes original research. Research articles appropriate for Acta Horticulturae or horticultural science journals are usually inappropriate for *Chronica*. We seek horticultural articles of interest to a broad audience composed of ISHS members and the horticultural, scientific, and academic communities.

Chronica Horticulturae is currently made up of as many as eight sections as follows:

News from the Board. This section is usually confined to editorials from Board Members as well as general announcements of the Society.

Issues. Articles of a broad focus that often involved controversial topics related to horticulture including broad social issues and economic development are appropriate for this section. These articles are intended to stimulate discussion. Often, guest writers are asked to contribute articles, which usually range in size from 1000 to 2000 words.

Horticultural Science Focus. This section is intended for in-depth articles on a topic of horticulture, generally, but not always, scientific in nature. Many articles are mini-reviews, and bring current topics of interest to the horticultural community up to date. Articles may be up to 6000 words. We encourage these articles to be illustrated.

Horticultural Science News. Shorter current articles about particular topics including horticultural commodities and disciplines are welcome. Articles vary from very short notes (about 500 words) to 2000 words.

History. This section includes articles on the history of horticulture, horticultural crops, and ISHS.

The World of Horticulture. This section highlights articles on horticultural industries and research institutions of particular countries or geographic regions throughout the world. They are meant to be profusely illustrated with figures and tables. This section also includes book reviews, which are requested by the Science Editor. Members who wish to recommend a book review should arrange for a copy of the book to reach the Secretariat.

Symposia and Workshops. Meetings under the auspices of ISHS are summarized, usually by a participant of the meeting. These articles are delegated by the symposium organizers.

News from the ISHS Secretariat. This section contains information on membership, memorials for deceased ISHS members, and a calendar of ISHS events. Brief memorials (up to 500 words) should be sent to the Secretariat.

Authors who wish to contribute articles for Chronica should contact headquarters and their request will be transmitted to the Science Editor or another appropriate editor. Authors should be aware that most articles should have a broad international focus. Thus, articles of strictly local interest, are generally unsuited to Chronica. There are no page charges for Chronica Horticulturae. Photographs submitted should be of high resolution. We encourage electronic submission. Send articles or ideas for articles to:

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