

# CHRONICA HORTICULTURAE

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## Horticultural Highlights

IHC2010 and ISHS General Assembly  
Demonization of Science, Sanctification of Poverty • The Global Trade in  
Ornamental Geophytes • Organic Horticulture Expands Globally • Asian  
Vegetables in Australia • Temperate Tree Fruits and Nuts in India

## Symposia and Workshops

Supply Chains in the Transitional Economies • Postharvest Research Education  
and Extension • People Plant • Plum Pox Virus



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**Cover photograph:** One of the new selections of *Hippeastrum* (Amaryllis) from the breeding program in Israel. Courtesy of Dorit Sandler Ziv. See article p. 27.

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## Bringing Science to the People

Kim E. Hummer, ISHS Vice President



Kim E. Hummer

This past August I had the wonderful opportunity, along with more than 3,200 fellow delegates, to enjoy the hospitality of Lisboa. The vibrant and energetic opening drum troupe and the colorful and flavorful welcoming dinner, and the ultimate in pure emotion; the fado finale, was fantastic. However, for me, the thrill was the main event: 9 international scientific colloquia, 18 international scientific symposia, 14 scientific seminars, and 26 international scientific workshops. I was there for the science. I highly compliment co-conveners/co-presidents of the congress, Professor António A. Monteiro and Dr. Víctor Galán Saúco and their organizing and scientific committees for their enormous efforts on behalf of the Society. In these difficult economic times, the success that they achieved for a production of this sort was by no means guaranteed.

The ISHS is an anomaly. Other scientific societies are looking at the increasing membership numbers of ISHS with envy. They wonder, "Why new members are flocking to join ISHS?" and "How can this Society continue this upward membership trend in these very difficult economic times?" Not only have the individual memberships risen (from 6,575 in 2006 to 7,346 in 2009) but the country memberships have increased (from 42 in 2009 to 60 in 2010).

Why are these memberships increasing during this bleak economy? It is because of the continued excellent quality of science and scientific service by our society to our membership.

One of the most important metrics for scientific achievement, our society's cornerstone publication, *Acta Horticulturae*, has increased both in number of pages printed and volumes published annually (15,344 pages published in 33 *Acta* in 2006 compared to 20,107 pages published in 43 *Acta* in 2009). For this accomplishment, we recognize the hard work of the author-participants, the 10 Section and 14 Commission chairs, the editorial review teams, and the conveners involved in each symposium.

Our astute Executive Secretary, Ing. Jozef Van Assche, and his excellent support team in

Leuven have worked to ensure that ISHS articles and associated publications are highly visible to web-based search engines. In the first two months of 2010, the Society welcomed 113,725 downloads. The quality of many articles in *Acta* is now written at the level and with equivalent review of journal publication. These two factors have brought the consultation rate for *Acta* articles to tens of thousands of "reads" for many articles. I urge you to view the ISHS website <http://www.actahort.org/citationstatisticsbookhtm.htm> to see the summary of articles with the greatest number of reads. As I write this, 29 articles have achieved more than 10,000 reads, which translates into a huge number of citations in future scientific publications.

Another emphasis of the ISHS has been to publish and archive scientific information. Our Society has become a coordinating center for the publications of significant horticultural literature and information. Our society has signed agreements with many societies and agencies with horticultural interest around the globe. Click on PubHort and have online access to: Fruits, the Journal of the American Pomological Society, the Journal of Horticultural Science and Biotechnology, the Journal of the International Society for Mushroom Science, and the Proceedings of the International Plant Propagator's Society. This service is of mutual benefit: the other societies have on-line accessibility of their publication for their membership and ISHS members can also access information directly. This collaboration ensures instant accessibility to the latest science, while electronically archiving historical documents. An added bonus is that, through the wonders of Google® technology, rough translation of any of this information is available in 54 languages at the click of a mouse.

The mission of the ISHS includes advancing research and education that contribute to and advocate for horticulture; facilitate global networking; publish, distribute and archive knowledge, and support capacity building for horti-

cultural research and education. While the amazing growth of the society is evident during the past several decades, some regions of the world remain poorly represented within the ranks and subsequently within the leadership of the ISHS. To be truly international, our society needs to close this gap. This gap includes missing memberships from many individual scientists and countries in South America, Africa, Eastern Europe and Central Asia.

Individual members and country membership are each important aspects of the Society's structure. While individual members represent the strength of the Society, country membership has voting privileges through their participation on the Council. The Council elects the board, which oversees the business of the Society. The executive committee initiates the scientific activities of the Society.

In the next four years, diversity and outreach in horticultural development will be highlighted. Representation from emerging and developing countries will be sought. Expansion of ISHS scientific symposia and events encourage development of local horticultural communities and underutilized horticultural crops. This is the best way to promote the continued service of the ISHS to the international horticultural community.

Sound international horticultural science is the driving force behind the success of ISHS. The presentation, reporting and publishing of excellent science, combined with an infusion of the local culture and industry retrospective continues to provide a valued event for horticultural scientists. This system unifies international horticultural scientists in their goals to understand and improve horticultural production. See you at the next ISHS symposium!



Did you renew your ISHS membership?  
Logon to [www.ishs.org/members](http://www.ishs.org/members) and renew online!



# Reflections of the 28th International Horticultural Congress, Lisbon, 2010



Flags at the entrance of the Lisboa Congress Centre (CCL).

The IHC 2010 must be considered a grand success. Besides the high attendance and the excellence of the program, there were innovative activities and a pleasant atmosphere in the Lisboa Congress Centre. The 3186 participants and 248 accompanying persons that attended the Congress will have fond memories of this memorable event.

The Congress was a joint organisation, and the successful culmination of a long collaboration, between the Portuguese Horticultural Association (APH) and the Spanish Society for

Horticultural Sciences (SECH). This important horticultural event, a first in the Iberian Peninsula, was a proud moment for the horticultural scientific community in Spain and Portugal.

*Science and Horticulture for People*, the theme of the Congress, was mirrored by the program. There was an emphasis on horticultural science and how it relates to scientists, producers, consumers, and society at large. The IHC was a forum for those involved with horticulture to get to know each other, to interact, and to

establish relationships. There were many breaks scheduled with sufficient time for poster display and ample occasions for round-table discussion.

The 28th International Horticultural Congress took place at the Lisboa Congress Centre (CCL) located in a prestigious area of the city (Belém historical quarter) overlooking the Tagus River. The CCL had state-of-the-art meeting rooms and exhibition halls and was exclusively devoted to the 28th IHC. Easy interaction was provided among participants in a cosy atmosphere.

The Congress program was rich and varied. Besides the diversity of crops and disciplines that generated numerous scientific sessions, usual in horticultural congresses, the Lisbon IHC included an exhibition, a horticulture brokerage event, e-posters, technical tours, produce tastings, and numerous informal activities. To remember the Congress, 2500 photographs have been posted on the IHC 2010 webpage and can be easily down-loaded.

## PARTICIPANTS

There were 3434 participants and accompanying persons at the Lisboa Congress, the highest number since the 22nd IHC in Davis, California (USA) in 1986. Davis still holds the record for ISHS Congresses, with almost 4,000 participants and accompanying persons.

The top-ten countries with the highest number of participants included four non-European countries and, for the first time, a country from South America (Table 1). There were relatively large delegations from Australia (73), South Korea (63), South Africa (60), and Mexico (35). Participation from 100 countries covering all

The colourful IHC poster decorating the CCL.



Welcome to the IHC Lisbon 2010.



The flags of Spain, Portugal, EU, ISHS, APH and SECH.



**Table 1. Top-ten countries in number of participants.**

Spain	398
Italy	228
Portugal	227
Japan	209
United States of America	182
Brazil	179
China	172
Germany	119
France	98
The Netherlands	92

parts of the world emphasised the global character of the Congress.

As a result of geographic proximity, 54% of participants came from Europe (Table 2). Asia and Oceania come in second with 26% followed by North America (8.4%), South & Central America (7.7%), and Africa (4.0%).

## OPENING SESSION

The opening session was chaired by Jorge Sampaio, a former President of the Republic of Portugal and presently the United Nations High

**Table 2. Distribution of participants among continents.**

Continents	Number of countries represented	Number of participants	Percentage of total participants
Africa	21	126	4.0
Asia and Oceania	28	818	25.7
Central & South America	11	244	7.7
Europe (incl. Russia)	37	1729	54.2
North America	3	269	8.4
<b>Total</b>	<b>100</b>	<b>3186</b>	<b>100.0</b>

Representative for the Alliance of Civilizations. In his lecture entitled "Some reflections on sustainable development, diversity and human

.....  
**Dr. Jorge Sampaio delivered the Opening Address of the Congress.**  
 .....



.....  
**Almost 2000 people attended the Opening Session of the Congress.**  
 .....



.....  
**The Opening Session was chaired by Dr. Jorge Sampaio. From left to right: the Presidents of SECH and APH, the Minister of Agriculture of Portugal, Dr. Jorge Sampaio, the President of ISHS and the two Co-Presidents of the Congress.**  
 .....



.....  
**The ISHS Board members and the chairpersons of the various Congress committees were also on the stage.**  
 .....

dignity," Dr. Sampaio addressed the main challenges confronting sustainable development in the 21st century and stressed the importance of preserving bio-diversity and cultural diversity.

The Congress opening was also an opportunity for relaxing and enjoying a taste of Portugal. There was guitar music typical to Lisbon. At the end of the session the powerful drums of "Toca a Rufar" led the participants to the nearby Burnay Palace Gardens for an "Arraial Alfacinha," a typical open-air Lisbon party. The weather was calm and the temperature just perfect. The music and dances, the barbequed meats, the fruits and salads, the wine and the conviviality, kept the participants in this pleasant atmosphere until late in the evening.

.....  
**Dr. Norman Looney (chair) presented a small gift to Dr. Pere Puigdomenech (left) and Dr. Cary Fowler (right), the two invited speakers of the Opening Colloquium.**  
 .....







Portuguese traditional guitar music was a must during the Opening Session.



The stage of Auditorium I of CCL during the Opening Session.



The colourful and vibrant drum orchestra "Toca a Rufar" closed the Opening Session.



The roasted pig was one of the varied food delicacies served during the Welcome Party.



Participants eating and relaxing in Burnay Garden.



A music band playing traditional Portuguese music during the Welcome Party to illustrate a typical "Arraial Alfacinha".

## SCIENTIFIC PROGRAM

The IHC delivered an extensive scientific program. A total of 4569 presentations by 3186 attendants from 100 countries were distributed in 9 colloquia, 18 symposia, 14 seminars, 17 thematic sessions, and 26 workshops (Table 3), the largest quantitative contribution to any IHC ever held. The 4447 abstracts presented included 171 invited speakers, 773 oral presentations, and 3523 posters from which 806 were short-oral presentations. The 3-minute short oral presentations using e-posters represented a successful innovation that allowed a more active presence of poster authors.

The Scientific Program integrated a large diversity of events and topics. The success of the

scientific program was due to the commitment of a large number of ISHS members.

**Colloquia** consisted of two-hour sessions focusing on cutting-edge topics and allowing open discussion. The Opening Colloquium, chaired by N. Looney, focused on two subjects of general and current concern: conserving diversity (Cary Fowler) and new biological approaches to agriculture (Pere Puigdomenech). Eight more Colloquia were held in two concurrent sessions at the beginning of each of the four days of the Congress with the following topics: (1) Challenges and Opportunities for Horticulture in a Dynamic Global Economy, (2) Nanotechnology: Potential Applications for Horticulture, (3) Plant, People and Places, (4) New Generation Sequencing in Horticultural Research, (5)

Educating the Next Generation of Professional Horticulturists, (6) Technological Innovation in Horticulture, (7) Iberian Encounter with America and Asia: Exchange of Horticultural Plants, and (8) Coping with Reducing Pesticides. The 8 Colloquia were chaired by prestigious and experienced scientists (P. Arús, F. Bliss, I. Crute, G.R. Dixon, E.W. Hewett, J. Janick, J. McFerson, P. Tonutti, and I.J. Warrington) and included 29 topics addressed by renowned invited speakers.

**Symposia** represented the core of the Congress with 98 invited speakers, 488 orals, and 2703 posters, which represented 74% of the total number of abstracts submitted. Symposia varied from 451 abstracts in the four-day Postharvest to 22 in the one-day Protea symposium (Table 4). Symposia such as Berries



**Table 3. Scientific programme at a glance.**

Events (number)	No. oral sessions	No. invited speakers	No. oral presentations	No. short oral presentations	No. posters	Total abstracts
Colloquia (9)	9	29				29
Symposia (18)	138	98	488	548	2155	3289
Seminars (14)	36	31	119	87	230	467
Thematic sessions (17)	42	13	166	171	332	682
Workshops (26)	26	102 oral presentations				
Business meetings (13)	13	Undetermined number of informal presentations				
<b>Total</b>		<b>171</b>	<b>773</b>	<b>806</b>	<b>2717</b>	<b>4467</b>



Reading the IHC programme required some attention and concentration.

**Table 4. Symposium overview.**

Events	No. days	No. oral sessions	No. invited speakers	No. orals	No. short orals	No. posters	Total abstracts	Conveners
S01. Berries	4	10	7	36	40	215	298	Mezzetti / Oliveira
S02. Postharvest	4	14	1	60	87	303	451	Cantwell / Almeida
S03. Greenhouse	3	8	7	20	68	133	228	Castilla / Van Kooten / Sase / Meneses
S04. Genomics	3	8	5	32	29	119	185	Folta / Talón
S05. Hortgen	1	3	4	6	21	31	62	Litz / Pliego
S06. Medfruits and Nuts	3	8	4	33	17	122	176	Battle / Caruso
S07. Emerging Health	3	8	7	28	8	98	141	Desjardins / Tomás-Barberán
S08. Olivetrends	2	5	5	16	27	78	126	Tous / Gucci / Feveiro
S09. Ornamentals	4	11	7	40	48	228	323	Cermeño / Plumer
S10. Horticulture for Development	2	5	4	17	12	26	59	Kahane / Wasilwa / Correia
S11. ISAFRUIT	4	11	12	50	0	104	166	Corelli-Grapadelli / Callesen / Bonany
S12. Genetic Resources	4	11	6	30	73	166	275	Hummer / Díez
S13. Quality-chain Vegetables	3	8	5	24	36	141	206	Rosa / Tavares de Melo
S14. Organic Horticulture	3	8	5	30	40	109	184	Aksoy / Mourao
S15. Climwater	2	5	7	21	3	74	105	Ferreira / Fernández
S16. Vitis&climate	2	6	6	21	12	120	159	Bravdo / Medrano
S17. Protea	1	3	2	11	0	9	22	Hoffman / Leandro
S18. Bananas and other Tropical Fruits	2	6	4	13	27	79	123	Gubbuk / Wünsche / Reinhardt / Staver / van der Berg
<b>Total</b>		<b>138</b>	<b>98</b>	<b>488</b>	<b>548</b>	<b>2155</b>	<b>3289</b>	

Coffee breaks were the time for conviviality.



Participants attending one of the oral sessions.





**Table 5. Seminar overview.**

Events	No. days	No. oral sessions	No. invited speakers	No. orals	No. short orals	No. posters	Total abstracts	Conveners
Sm01. Modelling Perennials	1	1	0	8	0	7	15	Verstraten / Coppin
Sm02. Med Fruit Tree Pests	1	3	5	6	6	23	40	D'Ongnia
Sm03. Portuguese and Spanish Influence on Gardens	1	1	1	4	0	3	8	Groening / Rinaldi
Sm04. Soilless Cultivation	1	3	3	9	8	29	49	Schnitzler / van Os
Sm05. Horticultural Education	1	3	2	12	5	3	22	Hewett / Aldous / Benkeblia
Sm06. Capacity Building for Plant Breeding	1	3	1	5	15	8	29	Martin, L. / Martín, A.
Sm07. Underutilized Pome Fruits	1	2	3	7	5	3	18	Postman
Sm08. Medicinal and Aromatic Plants	2	5	2	20	9	73	104	Mathé
Sm09. Reproductive Biology	1	3	1	10	20	22	53	Herrero / Hormaza
Sm10. Producers and Consumers	1	3	1	15	7	8	31	Oppenheim
Sm11. Ornamental Horticultural and Invasive Plants	1	2	2	5	0	5	12	Schutzki
Sm12. Microbial Molecular Profiling	1	2	3	4	8	7	22	Welbaum
Sm13. Fruit Growth	1	3	3	12	4	27	46	Palmer
Sm14. Turfgrass Management	1	2	4	2	0	12	18	Nektarios / Monteiro
<b>Total</b>		<b>36</b>	<b>31</b>	<b>119</b>	<b>87</b>	<b>230</b>	<b>467</b>	

and ISAFruit that were promoted by groups gathered around EU projects that come to the Congress to reach a larger audience, contributed much to the quality of the program.

**Seminar** topics were diverse and quite specific but complemented the themes of symposia. There were 31 invited speakers, 119 orals, 317 posters, including 87 short orals totalling 467 abstracts for the 14 Seminars (Table 5). Seminars such as MedFruit Tree Pests, Soilless Cultivation or Fruit Growth were organised in tandem with symposia forming clusters around

the same topic. The concept of clusters also included colloquia, thematic sessions and workshops. Papers pertaining to the same topic or cluster will be jointly published in volumes of *Acta Horticulturae*.

**Thematic Sessions** (Table 6) accommodated contributions that did not fit into symposia and seminars. Topics such as citrus, crops physiology, genetics and breeding, micro-propagation, plant pathology and pests were well attended and pointed out areas receiving increasing interest by the participants.



**The high number of posters on display at Pavilion 2.**

**Table 6. Thematic session overview.**

Events	No. days	No. oral sessions	No. invited speakers	No. orals	No. short orals	No. posters	Total abstracts	Conveners
T01. Biochemistry	1	2	1	6	12	2	21	Talón / Tadeo
T02. Citrus	1	3	0	18	0	44	62	Albrigo
T03. Crop Physiology	1	3	1	10	12	38	61	Chaves
T04. Economics and Management	1	2	0	12	4	12	28	Oppenheim
T06. Knowledge and Innovation	1	2	0	12	2	0	14	Hewett
T07. Engineering and Automation	1	1	0	6	7	2	15	Sase / van Henten
T08. Fruit Production Systems	1	3	0	12	14	13	39	Webster
T09. Genetics and Breeding	2	5	0	8	39	41	88	Leitão
T10. Integrated Pest Management	1	2	0	14	7	16	37	Hale
T11. Landscaping	1	1	0	2	2	7	11	Groening / Rinaldi
T12. Micropropagation	2	6	4	17	18	33	72	Drew
T13. Mineral Nutrition	1	2	0	11	14	30	55	Fernández-Escobar
T14. Modelling	1	1	1	2	6	8	17	De Melo e Abreu
T15. Plant Pathology	1	3	3	9	14	37	63	Hale
T16. Plant Soil and Environment Sciences	1	3	0	14	13	14	41	Schnitzler
T17. Propagation and Nursery Management	1	2	3	7	7	23	40	Criley
T18. Urban Horticulture	1	1	0	6	0	12	18	Groening / Rinaldi
<b>Total</b>		<b>42</b>	<b>13</b>	<b>166</b>	<b>171</b>	<b>332</b>	<b>682</b>	





**Table 7. List of workshops (convener).**

Ws01.	Genetics and Biotechnology in Posharvest (Fernández-Trujillo and Toivonen)
Ws02.	Promoting collaboration between ISHS, the Global Crop Diversity Trust, and Bioversity International (Hummer, Fowler, Williams)
Ws03.	Odemira: Horticulture in a Natural Park (Rosa)
Ws04.	Ornamental Plants and Pollution (Mauget)
Ws05.	The Rocha Pear in Portugal (Correia, Torres Paulo)
Ws06.	Vasco da Gama: ISAFRUIT-Project Experience (Bertschinger, Corelli-Grapadelli, van der Lans, van Schalk)
Ws07.	Genomics and Breeding of Olives (Baldoni, Valpuesta, de la Rosa, Muleo)
Ws08.	Horticulture in the Pacific Islands (Taylor, Halavatau, Markham)
Ws10.	Asian-Pacific Landscape and Urban Horticulture (Rinaldi)
Ws12.	What do we mean by quality? (Nicola, Brueckner)
Ws13.	Taxonomic Name Changes upon Horticultural Trade and Exchange (Criley)
Ws14.	Olive Genetic Resources (Rallo, Sbitri)
Ws15.	Fruits and Vegetables: a Neglected Wealth in Developing Countries (Ganry)
Ws16.	Perception and Acceptance of GM Horticultural Crops (Gray)
Ws17.	Abscission Regulation and its Application in Horticulture (Meir)
Ws18.	Advocacy for Horticultural Science (Stanley)
Ws19.	Biodegradable Plastics in Horticulture (Heisswolf, Guerini, Martín-Closas)
Ws20.	GAP in Protected Cultivation of Vegetables (Schnitzler, Leonardi)
Ws21.	Global Strategy for Nut Aflatoxin Safety (Calgagni, Lagana, Hokmabadi, Avanzato)
Ws22.	Industry Priorities on Research on Fruits and Vegetables (Trentini)
Ws23.	Networking the FAV and Health Networks (Desjardins)
Ws24.	Minor and Underutilized Tropical and Subtropical Fruit Crops for Nutritional Security in the Exist Century (Mittra)
Ws25.	Molecular-Marker Utilization in Horticulture and Horticultural Science (Bassil)
Ws26.	Proteaceae in the Global Economy (Petty)
Ws27.	Functional-Structural Plant Models (Costes, Hanan)
Ws28.	Grapes and Climate Change: International Cooperation (Bravdo, Medrano)

**Workshops** (Table 7) were informal meetings on novel topics emphasizing round table discussion, some of them related to Symposia and/or Seminars. The contributions to the workshops may be incorporated into the *Acta* of the corresponding Symposia.

The **Commitment** of a large number of ISHS members to build and carry out the scientific programme was the clue for the success of the IHC. Very active participation of the attendants was a major component in the excellent development of the Programme. A key factor to promote this involvement was the short-oral communications, an experience to be continued and improved in the ISHS future events. Finally, the scientific quality of many contributions and their technological implications should be emphasized.

## E-POSTERS

E-posters (electronic posters) were a new and interactive form of scientific communication at the Congress that provided a high visibility posters never had before. This presentation system proved popular and 1500 e-posters were uploaded on the IHC website. E-posters are visually similar to printed posters but can be used for on-screen presentation during oral ses-

sions and for on-line interaction with authors. Congress participants could visit e-posters on-line during the Congress by using computers in the poster hall or the Internet and leave messages and comments to the authors, who received the messages automatically by e-mail. E-posters are accessible on-line on the IHC webpage and the interaction with authors will continue for several months.

## EXHIBITION

The horticultural industry, R&D institutions, scientific societies, and stakeholders were present at the Exhibition, which included almost 40 booths including a large one for ISHS. The horticulture industry responded positively to the Congress invitation and their presence provided a complementary dimension to the scientific activities. The Exhibition, with the adjacent poster display halls, Internet café, and e-posters computer terminals, was the hub of the Congress and provided a lively meeting place during breaks. There was coffee, snacks, and fruit available to encourage conviviality. The Spanish Pavilion featured representation of Spanish institutions, companies and autonomic governmental agencies dealing with agriculture, and projected the image of a Congress involving all the Iberian Peninsula.



● The ISHS booth, with a beautiful painting in the back, was a lively presence in the Exhibition.



● Acta Horticulturae display was one of the highlights at the ISHS booth.



● Fruits and vegetables had a strong presence in the Exhibition.

The Exhibition also included horticultural art, displaying the historic photographs (1920s and 1930s) of vineyards and olive groves by Antonio Cezar d'Abrunhoza. The FruitArt project featured beautifully painted fruits from a competition involving secondary school students, which had the objective of raising young-people's awareness of the importance and benefits of fruit production and consumption.

## BROKERAGE EVENT

The Congress included for the first time a Horticulture Brokerage Event (HBE) with the objective of promoting bilateral meetings between horticultural professionals at an international level, creating links between producers and users of technology, establishing partnerships, and developing new R&D projects. The HBE was supported by a website, specifically developed for the HBE, in which each participant had to register a profile with a technology offer or request. These profiles were then published in the website to facilitate the schedule of meetings according to participant's intentions.

The HBE was an initiative of INOVISA in close partnership with the Portuguese Innovation Agency (ADI), the Cluster Agro-Industrial do Ribatejo, and The University of Évora. A total of 550 participants registered to the HBE, with meeting requests totalizing 780. All meetings took place during the Congress in a lounge area with meeting rooms.

A workshop on International Partnerships for Technology Transfer: Best Practices in Business / Research Relationships in the Horticultural Sector was organized in tandem with the HBE. The workshop was a success, with many participants from several countries and different professional profiles. Participants reinforced the importance of initiatives like the HBE, in the context of horticultural congresses or other similar future events, to promote technology transfer. The creation of an on-line brokerage platform was suggested by the IHC organizers and HBE participants as a tool to facilitate technology transfer between professionals in the horticultural sector.

## POST-CONGRESS TOURS

The post-congress tours were an opportunity to interact with the horticultural industry and to explore the cultural heritage of Portugal and Spain. Most of the tours were organised by grower organisations, which reinforced the interaction with the horticulture industry.

.....  
Eggplant diversity in display during the post-congress tour in Valencia, Spain.



The 9 one-day technical tours involved about 600 participants and included diversified destinations within driving distance from Lisbon. The topics ranged from wine and olives to vegetables and fruits but there was also time to enjoy the Portuguese countryside or to visit historic landmarks such as the historic towns of Évora and Óbidos.

A three-day tour took 50 participants to the city of Oporto and the Douro Valley in Portugal. This was the time to learn about and imbibe Port wine and visit the vineyards in the impressive historic Douro valley.

Four several-day tours in Spain included: a 3-day tour to visit ornamental horticulture in the western part of Andalusia, one of the most important regions for production of ornamental and flower crops in Spain; a 4-day tour to visit the deciduous fruit production in the Ebro Valley, in the Northwestern part of Spain, which has an important production of pome and stone fruits such as apples, pears, peaches, cherries and other stone fruits; a 5-day visit to the Island of Tenerife, in the Canary Islands, situated more than 1000 km to the south of the Iberian Peninsula, and where different visits were made related to tropical and subtropical ornamental, vegetable and fruit crops. Finally a post-congress workshop, in conjunction with EUCARPIA, dealing with the genetics and breeding of capsicum peppers and eggplant, took place in Valencia, in the Mediterranean coast of Spain; this post-congress workshop included oral and poster presentations, as well as a technical visit to an exhibition of pepper and eggplant diversity.

## LISBON

During the Congress it was difficult to forget Lisbon, the capital of Portugal and a legendary city with over 20 centuries of history that is now a magnet for visitors on business or holidays. The City of the Seven Hills spreads along the north bank of the Tagus estuary, only one step away from the Atlantic Ocean. In the 15th and 16th centuries, Lisbon was the hub of the "Age of Discovery," when Portuguese caravels "gave new worlds to the world." This was also the opportunity to escape from the Congress Centre and visit some of the city monuments such as the nearby historic Tower of Belém and stunning Jerónimos Monastery or to walk up the São Jorge Castle for breathtaking views over the river and old Lisbon quarters. The evenings were the time to enjoy delicious food and wines and to listen to Fado, the unique and haunting music of Lisbon.

## FAREWELL DINNER

On Thursday evening 1000 participants were driven for a coach tour along the Tagus estuary towards the elegant seaside resorts of Estoril and Cascais before the Farewell Dinner. A banquet was served in the Black and Silver Room of

the famous Casino Estoril. The occasion was used to present the IHC Poster Awards and for the Portuguese Horticultural Association to present several awards in recognition of outstanding contributions to the Association and to the development and innovation in horticulture in Portugal and all around the world (see text box).

The dinner was followed by the sweeping musical performance "Fado – History of a People" based on the Portuguese national song. This extravaganza explored the roots of Fado and its relationship with the soul of Portuguese people over the centuries.

Finally the ISHS said good-bye to Iberia and welcomed Australasia with an unusual musical performance announcing the next International Horticultural Congress, Brisbane, 2014. The *didgeridoo* sound and the *Maori* dances were a preview of the next Congress in Brisbane to be held in 2014.

### IHC Poster awards

#### Gold Poster Awards:

Beaudry, R.M.; Al Smairat, N.; Contreras, C. - Kinetics of Volatile Synthesis Following Cellular Disruption Associated with Masticated and Cut Fresh Apple Fruit  
Alonso, A.; Salazar, J.A.; Arroyo, A.; Grau, A. - Screening a Diverse Collection of Heirloom Tomato Varieties for Quality and Functional Attributes

#### Silver Poster Awards:

Falchi, R.; Pfeiffer, A.; De Marco, F.; Santi, S.; Vizzotto, G. - Sugar Transport in Peach Mesocarp and Seed During Development  
Rahman, M.J.; Inden, H.; Hossain, M.M. - Capsaicin Contents under High Temperature Stress in Sweet Pepper (*Capsicum annuum* L.)

#### Bronze Poster Awards:

Nyalala, S.; Alemayehu, S.; Grout, B.; Petersen, M. - Volatile Emissions of Methyl Cyanide from Leaves of *Gynandropsis Gynandra* as a Possible Spider Mite Repellent  
Van Hooijdonk, B.M.; Tustin, D.S.; Breen, K.C. - Annual shoot types developed within Scilate apple trees following artificial spur extinction and limb pruning treatments

### APH Awards

#### Honour Horticulturists:

- Prof. Dr. Paulo César Tavares de Melo, University of the State of S. Paulo, Brazil;
- Prof. Dr. Frederick Bliss, University of California, Davis and Director of Research, Seminis, USA.

#### Honorary Members:

- Eng. Armando Torres Paulo, President of the Pear Growers Association, Portugal;
- Ir. Heiko van der Borg, late Secretary General-Treasurer of the ISHS, The Netherlands.







● The Farewell Dinner was served in the immense Black and Silver room of Casino Estoril.



● The musical performance "Fado: The History of a People".

## ACKNOWLEDGEMENTS

We present our sincere thanks to the Congress sponsors and partners, private companies and institutions, not only for their financial support, without which the registration fees would have been much higher, but also for their active involvement.

We acknowledge the voluntary contribution of the members of the Executive Committee, the Local Organising Committee, the Scientific and Programme Committee, the International Advisory Committee and the Industry Committee. The committee members were the soul and the fuel of the organisation.

A very special mention goes to the conveners of the various events, who largely deserve the credit for the high quality of the scientific programme. It was a great pleasure and a big honour to work with such a qualified and dedicated team during the preparation of the Congress.

## ABOUT THE AUTHORS



● António Monteiro



● Víctor Galán



● Elvira Ferreira



● Luís Mira



● Pedro Oliveira



● Carlos Portas



● Jaime Prohens



● Luís Rallo



● Fernando Riquelme



● Raul de la Rosa

Luís Mira, Head of the IHC Horticulture Brokerage Event, Portugal  
 Pedro Oliveira, IHC Secretary General, Portugal  
 Carlos Portas, Chairperson of IHC International Advisory Committee, Portugal  
 Jaime Prohens, Responsible for IHC Activities in Spain, Spain  
 Luís Rallo, Chairperson of the IHC Scientific and Programme Committee, Spain  
 Fernando Riquelme, President of SECH-Spanish Society for Horticultural Sciences, Spain  
 Raul de la Rosa, Secretary of IHC Scientific and Programme Committee, Spain

António Monteiro, IHC Co-president, Portugal  
 Víctor Galán, IHC Co-president, Spain

Elvira Ferreira, President of APH-Portuguese Horticultural Association, Portugal

# The ISHS General Assembly – Lisbon, Portugal, August 24, 2010

Norman E. Looney, ISHS President (2002-2006-2010)

As is required by the Statutes of ISHS, the President and Board of Directors of the Society convened the General Assembly of ISHS members and other Congress participants during the 28th International Horticultural Congress. The purpose of the General Assembly is to inform the membership at large about the health of the Society by outlining the actions and achievements of the Board and the Society during the four-year period between Congresses. It is required that the General Assembly formally accepts this Report, approves any revision of the Statutes, and approves the decisions taken by Council with respect to the election of new officers of the Society and the selection of the location for the 2018 International Horticultural Congress. The General Assembly is also the occasion for honouring new Fellows and Honorary Members (see article p. 21), to present the biennial Miklos Faust Travel Award for Young Pomologists (see article p. 23), and to pass the responsibility of Society leadership to a newly elected President and Board of Directors. President Norman Looney was given the task of reporting on the Board's achievements since August of 2006. His opening remarks called attention to a Board 'retreat' and Strategic Planning exercise in 2006 that provided the framework for all of the Board efforts during its term of office. He highlighted the importance of using a professional facilitator during this exer-

cise which allowed all Board members to contribute fully and equally. He then proceeded to outline the most significant achievements of the Board and the Society over the past four years.

## MEMBERSHIP

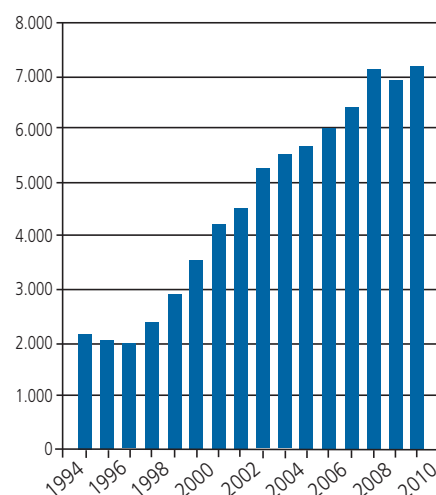
The Strategic Plan called for increasing Society membership in all of its realms – Country/Region Members, Individual Members and Institutional Members. Dr. Looney expressed great satisfaction with the growth achieved in two of these three categories. Countries and Regions represented on the Society's governing Council now stand at 60, compared to 47 in 2006. Individual Membership grew by approximately 1500 members during that same period

Country	N. Part	Country	S. Part
Spain	383	Netherlands	88
Italy	222	Poland	77
China	214	Australia	65
Japan	206	Belgium	60
Portugal	185	UK	58
Brazil	184	South Africa	58
USA	182	South Korea	55
Iran	119	Canada	50
Germany	118	Hungary	48
France	95	Denmark	48



Dr. Norman Looney, President of ISHS (2002-2006-2010).

Figure 1. Individual membership.



(Fig. 1). The President pointed out that by increasing the numbers of Countries/Regions represented on the Council, 93% of all Individual Members now have representation at this highest level of decision making – a significant improvement in the democratization of Society governance.

However, it was the growth achieved in particular geographic regions that the Board considered even more important. The President first called attention to the goal of strengthening the ISHS position with respect to Central and South America. By gaining back Argentina and adding Venezuela and Columbia as Country/Region Members, Latin America is now represented by seven seats on Council. Furthermore, by signing a Memorandum of Understanding with EMBRAPA (Brazil) and by reaching out to leaders and members of the Interamerican Society for Tropical Horticulture (ISTH-SIHT),

Audience at the ISHS General Assembly.





opportunities for growth of membership and in the number of scientific symposia held in South America have increased remarkably.

Similarly, with the recent addition of Kenya, Madagascar and Nigeria, Africa now has representatives from seven countries contributing to Council decisions. Dr. Looney highlighted the success of the first All-Africa Horticulture Congress (AAHC), held in Nairobi in 2009 and announced that the second AAHC will be held in South Africa in 2012. ISHS support for the Global Horticulture Initiative (see below) has been central to many new activities focussed on that continent.

With regard to Eurasia, the achievement of particular note was the decision by both Russia and China to join the Society as Country/Region members. This will provide Council representation to hundreds of present Individual Members and likely many hundreds more in the near future, given the rapid economic development of China. Gains were also made in the Middle East and in Southeast Asia. Both Oman and the Kingdom of Saudi Arabia joined the Society in 2010. Malaysia is the latest Southeast Asia country to commit to Country/Region membership.

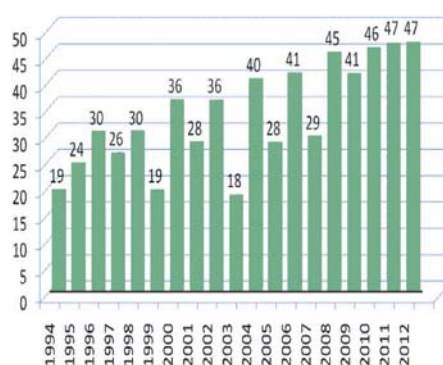
The President concluded his report about Society membership by predicting that this growth will continue. The Board is pleased with these efforts leading to greater engagement of horticultural scientists living in Asia, Africa and South America and predicts especially strong membership gains on these continents.

## STRENGTHENING THE SCIENCE PROGRAM

All of the Strategic Plan objectives relating to the activities of Sections and Commissions, and the program of international symposia for which they are responsible, were met or exceeded during the tenure of the 2006-2010 Board. This Board, with the support of Council, increased the budget for Section and Commission Chairs (the Executive Committee) but Vice President Ian Warrington (Chair of the Executive Committee) insisted on coupling increased funding to clear guidelines and expectations with regard to productivity. Furthermore, procedures were put in place for new nominations and elections formats that ensures transparency and democracy in the selection of Section and Commission Chairs and Vice Chairs.

The result is a motivated and creative Executive Committee that has both broadened the scope and improved the quality of the ISHS science program. It is particularly notable that the Society has experienced an increase in the number of International Symposia per year from an average of 32 in the previous 4-year period to more than 40 during the latest term. Furthermore, the stage is set for a continuing increase in this number (Fig. 2).

Figure 2. Symposia organized.



## PUBLICATIONS AND ON-LINE RESOURCES

The steady growth in the number of International Symposia has of course resulted in a parallel increase in the number of volumes of *Acta Horticulturae* published each year (Fig. 3). Furthermore, the number of total pages of *Acta* published in 2010 will be in excess of 18,000, compared to less than 15,000 four years earlier. The President pointed out however, that with the introduction of an online manuscript management system for the assembly and editing of each *Acta*, the time from presentation to publication in *Acta* is steadily declining. Nonetheless, this increase in the number of *Acta* has required additional staff in the office of the Secretariat.

Starting in 2008 there was a dramatic increase in the number of *Acta* full-paper downloads from the internet (Table 1). This relates to agreements signed with partner organizations and institutes (see below). An important measure of the global impact of this Society publication is the steady increase in the number of 'hits' to the *Acta Horticulturae* web site ([www.actahort.org](http://www.actahort.org)). That number is now in the range of 30,000 hits per day!

Publications Director Jules Janick and the entire 2006-2010 Board are especially proud of the improvements made to *Chronica Horticulturae*.

Figure 3. *Acta Horticulturae* volumes published.

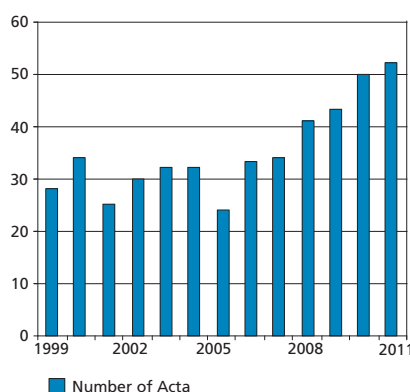


Table 1. *Acta* full-paper downloads (from 2008 onwards library subscriptions have free access to *Acta* paper downloads).

Year	Total
2004	20,761
2005	23,049
2006	25,998
2007	29,123
2008	164,511
2009	264,427

Improvements to both layout and content have positioned this quarterly magazine to be a 'must read' publication for our members and many thousands of others accessing it online. In fact, it was the impact and popularity of *Chronica* that convinced the Board to gain copyright protection of this and all other Society 'brands' as one of its Strategic Plan objectives.

Dr. Looney reported that *Scripta Horticulturae*, a publication launched by the 2002-2006 Board but 'established' over the past four years, is steadily gaining recognition as a repository for miscellaneous learned contributions to horticultural science. He pointed out that the latest volume of *Scripta*, the Eighth Edition of the International Code of Nomenclature for Cultivated Plants, will be published in several languages and will be widely distributed on all continents. It appears that *Scripta* is now positioned to take its place as a new income generator for our Society.

Given that one of the objectives of the 2006 Strategic Plan was to substantially enrich the knowledge base that can be accessed at [www.PubHort.org](http://www.PubHort.org), the President informed the Assembly about the agreements negotiated with the Journal of Horticultural Science and Biotechnology, the Journal of the American Pomological Society, the Journal of the International Society for Mushroom Science, Fruits, the Proceedings of the International Plant Propagator's Society (IPPS), and laid the groundwork for future additions such as the Journal of the Interamerican Society for Tropical Horticulture and the Proceedings of the American Society for Plasticiculture. These publications are now accessible and available to members using their ISHS Member download credits. Each journal that was added required lengthy negotiations, and in the case of the IPPS Proceedings involved a major digitization effort to make the historical volumes key word searchable.

## PARTNERING WITH OTHER SCIENCE SOCIETIES AND ORGANIZATIONS

In addition to these agreements with societies or organizations publishing a journal of interest

to PubHort, much attention by the Board was devoted to efforts to strengthen the Society through strategic relationships aimed at expanding our science program, advocating for the profession, or extending our products and services to a new audience. Dr. Looney specifically mentioned the agreements with EMBRAPA and the Interamerican Society for Tropical Horticulture (building membership and partnering in the development of international symposia held in Latin America) and with AIPH (International Association of Horticulture Producers). With AIPH the aim is to cooperate in efforts to advocate for the profession of horticultural science at the international floral exhibitions sanctioned by that organization. These Exhibitions often attract a million or more visitors, all with a demonstrated interest in horticulture but usually unfamiliar with the *profession* of horticultural science. As a case in point, Dr. Looney mentioned the great publicity for horticultural science that was achieved by being a part of the 2008 RoyalFlora event in Thailand.

In total, agreements were negotiated with 12 different organizations – well in excess of the four new relationships called for in the 2006-2010 Strategic Plan!

## OUTREACH – PROMOTING HORTICULTURE WITHIN THE CONTEXT OF INTERNATIONAL DEVELOPMENT

Building on progress made by the 2002-2006 Board, ISHS is now recognized as a major player within the international 'agriculture for development' community. This effort involved work on many fronts but the President called specific attention to the strategic agreement with the Wageningen-based Technical Center for Agricultural and Rural Cooperation ACP-EU (CTA; an organization that serves the agriculture development interests of the former colonies of Europe in Africa, the Caribbean, and the Pacific, i.e. the ACP Countries). Through its involvement with the CTA, ISHS made important progress toward building membership and participation in a number of ACP countries. Dr.

Orchid displays at the 2008 Royal Flora event in Thailand.



Looney pointed to the CTA support of African leaders participating in the Lisbon Congress and the anticipated ongoing cooperation that will bring Pacific Island scientists to the next Congress in Australia.

However, the great step forward was the launch of the Global Horticulture Initiative (GlobalHort) by ISHS, the World Vegetable Center (AVRDC), the Taiwan Cooperation for Development Fund, and the French Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) in 2006. Through its association with GlobalHort, ISHS is now firmly connected to a wide array of agencies, institutes and organizations that share the belief that horticulture can play a very important role in reducing poverty and improving nutrition throughout the developing world.

The President reported that these connections have opened the door to more international symposia in developed countries and to other opportunities for ISHS to contribute to professional 'capacity building' in poor countries seeking to expand horticulture science and industry. Already there has been a great increase in the number of ISHS symposia held in developing countries. Dr. Looney pointed out that 62 symposia were held in developing countries between 2006 and 2009 (compared to 29 in the previous 4-year period). Furthermore, 44 of these 62 symposia were held in countries classed by the World Bank as being poor or very poor. He concluded by saying that this effort to better serve our professional colleagues in developing countries will result in a very much more inclusive Society within a very few years.

## FINANCIAL MANAGEMENT

A guiding principle for the 2006-2010 Board was to 'grow' the Society in terms of its membership, science program, publications, partnerships, and advocacy and outreach initiatives while maintaining financial reserves equal to one year's budget. President Looney stated that this effort to achieve balanced and affordable growth was clearly successful. From 2006 to 2009 the annual expenditures increased from €1.071M to €1.227M. The funds in reserve in 2009 (in banks and secure investments) totalled €1.241M.

In his 2010 report to the Council, Treasurer Rob Bogers pointed out that periodic investments, made possible by end-of-year revenue in excess of expenses, became a part of the Society's secure reserves. In addition, this investment portfolio (positioned as 'defensive') appreciated substantially over the four-year period despite a poor performance in 2008.

## SUMMARY REMARKS

Dr. Looney concluded the Report by complimenting Drs. António Monteiro and Víctor Galán Saúco and their team of organizers representing the Portuguese Horticultural



Drs. Víctor Galán Saúco (left) and António A. Monteiro (right), Co-Presidents of IHC2010.

Association (APH) and the Spanish Society for Horticultural Science (SECH) for the outstanding quality and overall success of the Lisbon Congress. He also thanked Executive Director Jozef Van Assche and the entire Secretariat staff for their continuing excellent service to the Society. He reflected that with this strong Secretariat team and with strong and capable leaders serving on the Board, Executive Committee and Council, the Society moves into the next four years with excellent prospects for continuing growth in its membership, products and stature.

He remarked that ISHS is also a Society with its finances in good shape and with a significantly expanded list of partner societies and organizations that can expand and amplify many of its activities. It is a Society that can expect more and better international symposia, equally impressive Horticultural Congresses, and steady improvements to its flagship publications and online resources: *Acta Horticulturae*, *Chronica Horticulturae*, *Scripta Horticulturae*, and PubHort.org.

Finally, the President thanked his fellow Board members for their years of service to the Society. He called attention to the strong friendships they had developed and the high standard of discussion and debate that was maintained during their many years of very intensive involvement with the Society.

This Report was opened for discussion and was unanimously accepted by the Assembly.

## AMENDING SOCIETY STATUTES

Following the Board Report, the President called attention to the revisions to the Society Statutes that had been recommended by the Board, approved by the Council, and required General Assembly approval. The first amendment was needed to make provision for geographic regions to be represented on the governing Council. This required rewording of the Statutes in a number of locations to replace Country Member with Country/Region Member. The second amendment simply limits to one the number of proxy votes that can be held by any





Country/Region member of Council. These Amendments, previously published in *Chronica Horticulturae* 50(1):5-8, were accepted by the General Assembly without further debate.

## ANNOUNCING THE PRESIDENT(S) OF THE 29TH INTERNATIONAL HORTICULTURAL CONGRESS – BRISBANE, AUSTRALIA



• Drs. Ian J. Warrington (left) and Roderick A. Drew (right), Co-Presidents of IHC2014.

As it is also the responsibility of the General Assembly to approve the President or Presidents of the next Congress, it was announced that Drs. Roderick Drew of Australia and Ian Warrington of New Zealand would serve as co-Presidents of the 2014 Congress in Brisbane, Australia. It was also announced that Dr. Warrington would represent the Congress organizers by serving on the 2010-2014 Board of Directors as an *ex officio* member. Drs. Drew and Warrington then proceeded to provide a very useful overview of the present vision for this Congress and how it would contribute to the growth of the Society in Australasia.

## ANNOUNCING THE LOCATION OF THE 30TH INTERNATIONAL HORTICULTURAL CONGRESS

President Looney was then given the special pleasure of announcing that Istanbul, Turkey



• Turkey winning the bid for organizing IHC2018.

would be the location for the Congress in 2018. He called attention to the fact that this decision was very difficult for Council given that the competition was very strong. Others bidding for this Congress were Thailand, Brazil, Canada-USA, and Germany-Switzerland.

## SOCIETY AWARDS: RECOGNIZING SERVICE TO THE SOCIETY AND OUTSTANDING SCIENCE

The General Assembly also provides the appropriate occasion to announce the new Fellows and Honorary Members of the Society (see article p. 21). ISHS Fellows are horticultural scientists and members of the Society who have made contributions to horticultural science deemed exceptional and significant at an international level. Honorary Members are recognized for their significant and long-term contributions to the leadership of ISHS. The following colleagues, put forward by Director for Membership Services Jung-Myung Lee and his Awards Committee members, were deemed by Council to be worthy of the title of Honorary Member and were recognized during the General Assembly:

Prof. Dr. Uygun Aksoy  
Dr. Robert Bogers  
Prof. Dr. Daniel Cantliffe  
Prof. Dr. Jules Janick  
Prof. Dr. Jung-Myung Lee

Four new Fellows of the Society were then announced but only Professor Ian Warrington was present to accept this Award. Since the final step in approving these candidates could

not be taken until the Council meeting at Lisbon, it was not possible to forewarn candidates of this impending honour. President Looney, when announcing these new Fellows, indicated that a suitable occasion would be found to present the certificate and precious metal pin to all awardees.

The new ISHS Fellows are:

Prof. Dr. Sylvia Blankenship  
Prof. Dr. Silvia Dorn  
Prof. Dr. Schuyler S. Korban  
Prof. Dr. Ian Warrington

The General Assembly was also the occasion for recognizing the service to the Society provided by the outgoing members of the Executive Committee. In total, 14 colleagues were so honoured. They were Dr. Richard H. Markham of Section Banana and Plantain, Prof. L. Gene Albrigo of Section Citrus, Prof. Dr. Richard A. Criley of Section Ornamental Plants, Dr. Anthony David Webster of Section Pome and Stone Fruits, Dr. William Roca of Section Root and Tuber Crops, Dr. Jacky Ganry of Section Tropical and Subtropical Fruits, Prof. Dr. Ben Ami Bravdo of Section Vine and Berry Fruits, Prof. Dr. Errol W. Hewett of Commission Education, Research Training and Consultancy, Prof. Yves Desjardins of Commission Fruits and Vegetables and Health, Prof. Dr. Maria Isabel F.R. Ferreira of Commission Irrigation and Plant Water Relations, Prof. Dr. Roderick A. Drew of Commission Molecular Biology and In Vitro Culture, Dr. Kim E. Hummer of Commission Plant Genetic Resources, Prof. Dr. Wilfried H. Schnitzler of Commission Plant Substrates and Soiless Culture, Prof. Dr. Pietro Tonutti of Commission Quality and Post Harvest Horticulture.

## Outgoing members of the Executive Committee.



Dr. Richard  
H. Markham



Prof. L. Gene  
Albrigo



Prof. Dr. Richard  
A. Criley



Dr. Anthony  
David Websterr



Dr. William Roca



Dr. Jacky Ganry



Prof. Dr. Ben  
Ami Bravo



Prof. Dr. Errol  
W. Hewett



Prof. Yves  
Desjardins



Prof. Dr. Maria  
Isabel F.R. Ferreira



Prof. Dr. Roderick  
A. Drew



Dr. Kim  
E. Hummer



Prof. Dr. Wilfried  
H. Schnitzler



Prof. Dr. Pietro  
Tonutti

## CHANGING OF THE GUARD!

The General Assembly concluded with the formal presentation of the new President and Board of ISHS and the official handing over of

the symbol of office from Dr. Looney to Prof. Dr. António A. Monteiro. António Monteiro is joined on the Board by Dr. Kim E. Hummer of the USA, Prof. Dr. Georg J. Noga of Germany, Prof. Dr. Errol W. Hewett of New Zealand and

Prof. Dr. Yves Desjardins of Canada. Prof. Dr. Ian J. Warrington will serve as an *ex officio* member representing the 2014 Congress and Ing. Jozef Van Assche will continue to serve as the Executive Director.



- A. Official handing over of the symbol of office from Dr. Norman Looney to Prof. Dr. António A. Monteiro.
- B. Three ISHS Presidents: Drs. António A. Monteiro (2010-2014) (left), Norman Looney (2002-2010) (center) and Silviero Sansavini (1994-1998) (right).
- C. New Board of ISHS.





# Introduction to the New Chairs of Sections and Commissions

## STEPHAN WEISE



Stephan Weise

At the recent ISHS Council meeting in Lisbon Dr. Stephan Weise was confirmed as new Chair of the Section Banana and Plantain. He succeeds Dr. Richard Markham in this office. The new Chair will be assisted by an equally new Vice-Chair Dr. Jim Lorenzen.

Dr. Stephan Weise, a Canadian/Swiss national, has a PhD in Agricultural Sciences from the Swiss Federal Institute of Technology in Zurich. He started his career in Canada, where he coordinated projects on integrated weed management and farming systems at the University of Guelph. He spent the next 16 years in Africa leading various initiatives on tropical forest margins at the International Institute of Tropical Agriculture (IITA). Soon after joining IITA as a vegetation management specialist, he was appointed leader of the Humid Forest Programme in Cameroon in 1993.

Dr. Weise was subsequently named the regional coordinator for West and Central Africa and led the working group on Agronomic/Landscape Sustainability in a related CGIAR system-wide programme. Prior to joining Bioversity International in 2009, he was the regional manager of the Sustainable Tree Crops Programme, a public-private partnership and innovation platform that seeks to increase, in an environmentally and socially responsible manner, the income of West and Central African farmers growing cocoa, coffee and cashew nuts. Dr. Weise is currently the Director of Bioversity's Commodities for Livelihoods Programme, where he continues to encourage knowledge sharing and a culture of innovation.

## YAIR ERNER



Yair Erner

At the 11th International Citrus Congress in Wuhan, China 2008, the ISC (International Society of Citriculture) Executive Committee decided to nominate Dr. Yair Erner (Israel) as Vice-Chair of Dr. L. Gene Albrigo for the ISHS Section Citrus. This enabled the cooperation

between the Chair and the Vice-Chair until the candidacy of Dr. Erner as Chair was approved by the ISHS Council in August 2010. Leadership support for this Section will also be provided by the Vice-Chair, Dr. L. Gene Albrigo.

Dr. Yair Erner is a senior scientist at the Volcani Center, Institute of Plant Sciences. His research program focuses on alternate bearing, flowering and fruit quality. He cooperates with soil scientists on fertigation and reclaimed water use, at partial wetting of root zone, for citrus. The importance of inflorescence types, especially the leafy inflorescence, and source/sink relationship for fruit set was one of the major subjects. Since fruit quality became a major factor on the market, protocols for manipulating fruit size have been established and commercially used in Israel and world-wide.

Dr. Erner has acted as a Chairman of the R&D Committee on fruit trees, appointed by the chief scientist, office agriculture, as well as the chairman for evaluating citrus proposals in citrus. He was the Israeli member at the expert meeting to promote inter-country cooperation on citrus production improvement in the Mediterranean region, for several meetings. Dr. Erner acted as a member of several scientific committees and as co-organizer of the 1st International Citrus Biotechnology Symposium. He was appointed by the World Meteorological Organization, Commission for Agriculture Meteorology (CAgM) to be a reporter on definition of agro meteorology information required for commercial citrus crop.

Dr. Erner served twice as Head of the Citriculture Department and taught several courses at the Hebrew University of Jerusalem, Faculty of Agriculture for Bachelor, graduate and Ph.D. students. He was invited to deliver special topics, at certain meetings, in Israel and other countries. As Vice-Chair of the ISHS Section Citrus he already promoted the 2nd International Citrus Biotechnology Symposium held last year (Nov. 2009) in Sicily. He is endeavoring to develop new working groups for this section and find organizers for the symposia to be co-sponsored by the ISHS and ISC.

## MARGRETHE SEREK

Prof. Margrethe Serek was recently appointed as new Chair of the Section Ornamental Plants. She succeeds Prof. Richard Criley in this office and will be assisted by the equally new Vice-Chair, Dr. J.M. Van Tuyl (The Netherlands).

Margrethe Serek is Professor and Chair of Floriculture at Leibniz University of Hannover in Germany. She received her PhD degree in 1991



Margrethe Serek

at the Royal Veterinary and Agricultural University in Copenhagen in Denmark, where she continued her employment as associate professor in postharvest physiology of ornamentals and later as full professor of floriculture. In 2000 she accepted full professorship at University of Hannover in

Germany. Until 2007 Margrethe Serek kept a shared professorship at both universities, in Denmark and Germany, and she successfully established a joint research group, which actively cooperated in many years.

Margrethe Serek has a strong background in physiology, production and handling of floricultural crops. In the past decade she has broadened her research program to include investigation of molecular aspects of floricultural production and marketing. A large part of her ongoing projects focuses on tissue culture techniques, gene manipulation and molecular aspects of ornamentals and is performed in cooperation with and partly financed by the growers and breeding companies in Denmark and Germany. A large part of the research has been financed by national grants from the German and Danish governments as well as by other agencies.

More than 140 scientific articles were published by Margrethe Serek and her research staff in the field of postharvest physiology, genetic manipulation and molecular biology of ornamental crops. Her H-index is at present 21. She is recipient of four international awards: for the most outstanding research paper (from ASHS in USA) and for outstanding scientific work (Rudolf Hermanns Award in Germany, Substral Award in Scandinavia/Denmark, Khwarizmi International Award in Iran).

Margrethe Serek is active in hosting, training and collaborating with PhD, MSc and BSc students and visiting scholars and scientists from around the world. She is head of the examination commission for the 2-years Horticulture MSc International program run at Leibniz University of Hanover.

Margrethe Serek has been frequently attending international meetings, congresses and symposia, in some of which she was involved as a member of the scientific committee. She is a member of several international and national scientific societies: ASHS, ISHS, DGG (German Horticultural Association).

## GUGLIELMO COSTA



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Guglielmo Costa  
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Prof. Guglielmo (Mimmo) Costa has been elected Chair of the ISHS Section Pome and Stone Fruits. He succeeds Dr. Anthony David Webster. Prof. Daniele Bassi (Italy) was elected to the position of Vice-Chair.

Prof. G. Costa graduated at the Faculty of Agriculture - University of Bologna where, as a

faculty member, he has been working on several aspects of plant bioregulators, kiwifruit domestication and fruit quality assessment with non-destructive techniques. In these research fields, he coordinated several research projects and is author of many technical and scientific papers (more than 400) and book chapters in Italian and in English. Prof. G. Costa spent part of his career at Udine University from 1986 to 1997 where from 1989 to 1991 he covered the position of Director of the Istituto di Produzione vegetale e tecnologie agrarie.

Prof. G. Costa covered the position of President of the Fruit Section of the Italian Society for Horticultural Science up to 1995 and was Chairman of the ISHS WG on Bioregulators in Fruit Production and of the ISHS WG on Kiwifruit and Its Culture. He was Convener of the 11th ISHS International Symposium on Plant Bioregulators in Fruit Production (2009) and is currently organizing the 7th International Symposium on Kiwifruit (2010). Prof. G. Costa is member of several international and national scientific societies (ISHS, SOI, ASHS, PGRSA).

In 1997 Prof. G. Costa returned to the University of Bologna and since 1999 he's the Coordinator of the International Master Program in "Horticultural Science", a European teaching project which received the prestigious award Erasmus Mundus and was founded by the EU Commission. Prof. G. Costa is from 2008 the Head of the Department of Fruit Trees and Woody Plant Science of the University of Bologna.

## NOUREDDINE BENKEBLIA



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Noureddine  
Benkeblia  
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The ISHS Council recently confirmed Prof. Dr. Noureddine Benkeblia as Chair and Prof. Dr. Umezurike Linus Opara (South Africa) as Vice-Chair of the Section Root and Tuber Crops.

Prof. Noureddine Benkeblia graduated in 1988 from the Institute of Agriculture, Mostaganem (Algeria), and

holds a Doctor of Science degree and Habilitation in Natural Sciences from the Institute of Agronomy, Algiers in 2000. From 1990 to 1996 he worked as Lecturer in Mostaganem University, and then joined INRA, Avignon (France) as researcher from 1996 to 1999, and as postdoctoral researcher in 2001. Dr. N. Benkeblia was awarded a special fellowship and joined Rakuno Gakuen University (Japan) in 2002 as Visiting Professor where he was working until 2007. In 2007, he also joined the Faculty of Agriculture, Hokkaido University (Japan) as Research Associate from 2005 to 2007, and was awarded the degree of Doctor in Agriculture by the University of Kagoshima, Japan. In 2008, Dr. Benkeblia joined the University of the West Indies, Jamaica, and is presently Professor of Horticulture in the Department of Life Sciences at Mona Campus.

Dr. N. Benkeblia started working on postharvest technologies for vegetables in 1991. After 15 years, he focused his research interest on the metabolism of fructans and their roles in the storability of some vegetables. In 2005, he started using the concept of "metabolomics" to investigate the metabolism of fructans in vegetables and how this would affect their postharvest behavior and their storability. Presently, Dr. Benkeblia's Laboratory of Crop Sciences is involved in two main fields: "Postharvest Physiology and Biochemistry of Tropical Crops", and "Metabolomics of Fructans-Containing Tropical and Sub-Tropical Crops".

Dr. Benkeblia joined ISHS in 1996, and is a member of many international scientific societies, as well as consultant of NGOs such as United Nation Programme for Development (UNPD), Science Advisory Board (SAB), Gerson Lehmand Group (GLG), etc.

## SISIR KUMAR MITRA



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Sisir Kumar Mitra  
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Professor Dr. Sisir Kumar Mitra has been confirmed as the new Chair of the ISHS Section Tropical and Subtropical Fruits. Professor Mitra succeeds Dr. Jacky Ganry in this position. Good leadership will be assured with the involvement of Vice-Chair Dr. Víctor Galán Saúco.

Professor Mitra is a tropical and subtropical fruits scientist with a Doctorate in Pomology. He spent all his scientific career on tropical and subtropical fruit research and is an internationally recognized specialist on litchi, guava and mango. Professor Mitra worked at the East Malling Research Station, UK, as post-doctoral fellow and at Università degli Studi delle Tuscia, Italy, as Visiting Professor. Professor Mitra has attended some 35 international meetings, congresses and symposia as a member of the international

scientific committee, lead speaker or for chairing the technical session. He has directed more than 40 post-graduate students for M.Sc and Ph.D research and numerous R&D projects. He is the author of more than 250 scientific and technical papers and author or editor of 10 books. He is also the Technical Advisor of the International Tropical Fruits Network and Working Group Chairman of Papaya and Guava. Professor Mitra is a Fellow of the Horticulture Society of India and serving as an expert member in different research advisory committees of the National Research Institutes of Indian Council of Agricultural Research.

Professor Mitra is currently the Dean of Post Graduate Studies of Bidhan Chandra Krishi Viswavidyalaya (state agricultural university), West Bengal, India.

## BERNADINE C. STRIK



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Bernadine C. Strik  
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At the Council meeting of ISHS in Lisbon, Professor Dr. Bernadine Strik of the USA was confirmed as Chair and Dr. Nick Dokoozlian (USA) as Vice-Chair of the Section Vine and Berry Fruits. Dr. Strik succeeds Dr. Ben Ami Bravdo. Tribute was paid to Dr. Bravdo at the recent IHC in Lisbon for

his valuable 8-year leadership of the Section.

Dr. Bernadine Strik is a Professor of Horticulture at Oregon State University (OSU) in Corvallis, Oregon, USA. She has an international background having been born in The Netherlands and living in Australia for six years and in Canada for 16 years, where she was raised on an ornamental nursery crop farm. She obtained her bachelor's degree with honors at the University of Victoria in British Columbia majoring in botany and her Ph.D., with distinction, at the University of Guelph, Ontario, Canada in 1987 where she focused on strawberry physiology. Her graduate studies were funded by a Natural Sciences and Engineering Research Council of Canada Scholarship. Bernadine and her husband, Neil Bell, live on 2 hectares in the country near Monmouth, Oregon with their two children, Shannon and Nicole. Prof. Strik has been at OSU in the USA for 23 years.

Dr. Strik's responsibilities include Extension educational programs for the commercial berry crop industries, teaching courses on berry and grape physiology and production and fruit materials to undergraduate and graduate students, advising graduate students, and conducting research programs. Prof. Strik was the Extension Viticulture Specialist at OSU for five years before assuming a 100% berry crops appointment. Her research programs cover all berry crops with a focus on improving yield and quality, machine harvest efficiency, alternative





production practices, plant nutrition, season extension or manipulation, and organic production systems. She has advised 15 M.S. or Ph.D. students, has published many scientific papers on berry crop production and physiology, and has a strong Extension program. Her Extension publications and blueberry pruning video are widely distributed worldwide. Dr. Strik has been invited to give training workshops for industry advisors in various countries and consults internationally on berry crop production systems. Prof. Strik has been invited to give a keynote address at many international meetings.

Prof. Dr. Strik belongs to 8 professional organizations and holds or has held many leadership roles. She was Chair of the *Vaccinium* Working Group of this Section of the ISHS for eight years and co-convened the 9th International *Vaccinium* Symposium for ISHS in 2008. Prof. Dr. Strik has been a session moderator at two ISHS meetings, was on the Scientific Committee of four ISHS Symposia, once as Chair, and has served as an Associate Editor for *Acta Horticulturae* for two Symposia. She is also active in the American Society for Horticultural Science having served on several committees, was an Associate Editor of *HortTechnology*, and co-organized the ASHS meeting at OSU in Corvallis. In 2007, Prof. Dr. Strik was elected a Fellow of the American Society for Horticultural Science, its highest honor. She has also received industry honors and six awards for faculty excellence from Oregon State University.

Prof. Dr. Strik will be assisted by her Vice-Chair, Dr. Nick Dokoozlian who obtained his Ph.D. at the University of California at Davis. Dr. Dokoozlian joined the E&J Gallo Winery in Modesto, California in 2004 where he currently serves as Vice President of Viticulture, Chemistry, and Enology. His primary responsibilities involve research and technical innovation in the areas of grape growing and winemaking. Prior to joining E&J Gallo, Dr. Dokoozlian spent nearly 15 years as an Extension Viticulturist in the Department of Viticulture and Enology at the University of California, Davis. Dr. Dokoozlian is an Associate Editor of the *American Journal of Enology and Viticulture* and is heavily involved with many industry research activities and organizations. He is the current Research Chair of the US National Grape and Wine Initiative.

The combined expertise of Drs. Strik and Dokoozlian will provide strengths in berry and grape production and enology and the academic experience of both coupled with the industry focus of Dr. Dokoozlian should provide for a strong leadership team.

## DAVID ALDOUS

The ISHS Council recently confirmed Adjunct Associate Professor David Aldous as Chair of the ISHS Commission Education, Research Training and Consultancy (CMET) following the election of Emeritus Professor Errol Hewett, to



David Aldous

land, which followed his retirement from the Melbourne School of Land and Environment, The University of Melbourne in 2008. Trained as a plant physiologist and ecologist at The University of Sydney, Cornell University and Michigan State University, his areas of expertise have included sports turf and amenity grasslands, lifestyle and urban horticulture management and therapeutic horticulture. His research profile has covered areas such as turf grass managed under stressed environments, the economic analysis of the horticultural service industries, measuring the benefits of green open space, and the sustainability of green open space undergoing climate change.

Dr. Aldous has been the author and co-author of many scientific and technical papers dealing with lifestyle and urban horticulture management and edited and co-authored books on turf grass science and management. Dr. Aldous is actively involved with ISHS where he has been Vice-Chair of the Commission Education, Research Training and Consultancy for the last 6 years. He has convened and co-convened a number of international symposia and had papers published in a number of ISHS publications. He is currently an Associate Editor for *Hortscience*, The American Society for Horticultural Science, and is on the Executive Committee preparing for the 29th International Horticultural Congress, to be held in Brisbane, Australia in 2014.

## OLAF VAN KOOTEN



Olaf Van Kooten

Dr. Olaf Van Kooten was recently appointed as new Chair of the Commission Fruits and Vegetables and Health. He succeeds Dr. Yves Desjardins in this position.

Dr. Van Kooten is professor of horticultural production chains at Wageningen University. He has specialized in measuring, modeling and predicting product properties throughout the entire production and supply chain, with the intention of getting the products in a defined state on the consumer plates, especially when this implies taste and

the ISHS Board. Dr. Hewett was sincerely thanked for the many contributions made during his term of office at the CMET business meeting held recently in Lisbon. Dr. Aldous is an Adjunct Associate Professor within the School of Land, Crop and Food Sciences, The University of Queens-

land, which followed his retirement from the Melbourne School of Land and Environment, The University of Melbourne in 2008. Trained as a plant physiologist and ecologist at The University of Sydney, Cornell University and Michigan State University, his areas of expertise have included sports turf and amenity grasslands, lifestyle and urban horticulture management and therapeutic horticulture. His research profile has covered areas such as turf grass managed under stressed environments, the economic analysis of the horticultural service industries, measuring the benefits of green open space, and the sustainability of green open space undergoing climate change.

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## RICHARD L. SNYDER



Richard L. Snyder

The ISHS Council recently confirmed Dr. Richard L. Snyder as new Chair of the Commission Irrigation and Plant Water Relations. He succeeds Dr. Isabel Ferreira in this office. The new Chair will be assisted by Vice-Chair Dr. Arturo Alvino.

Dr. Snyder is a Biometeorology Specialist for the University of California Cooperative Extension and he is assigned to the Department of Land, Air and Water Resources at the University of California, Davis. He has 113 refereed publications on a wide range of topics including weather station networks, measuring evapotranspiration (ET) of many crops, evaporation pan conversions, determining crop coefficients, modeling ET of natural ecosystems, wetlands ET, modeling agricultural water demand, forecasting ET, evaluating fuel dryness for wildfires, degree days and phenological models, humidity calculations, irrigation system trends, weather generator simulation for ET estimation, mass and energy flux measurements over canopies, chilling and forcing models, canopy light interception, ET of immature tree crops, frost protection with sprinklers, frost protection principles, deficit irrigation of alfalfa, irrigation scheduling, and climate change. He was the principal investigator on the California Irrigation Management Information System (CIMIS) research and development project, which established a network of automated weather stations to disseminate weather and reference ET to agricultural and urban irrigators throughout the State. He is currently involved in research on long-term water resource planning in California. He continues to work extensively with colleagues to develop the "Surface

Renewal or SR" method for estimating sensible heat flux density as a method to determine evapotranspiration. He was the lead author on the two-volume *Frost Protection: Fundamentals, Practice and Economics*, which was published by the UN Food and Agriculture Organization.

Dr. Snyder teaches Biometeorology at UC Davis in addition to his statewide research and extension activities. He serves as a member of the Biometeorology Ph.D. program at the University of Sassari (Italy) and he has taught evapotranspiration and irrigation scheduling at the Istituto Agronomico Mediterraneo in Valenzano (Italy).

Dr. Snyder is active in the ET in Irrigation and Hydrology Committee of the ASCE-EWRI, and he serves as Chair of the Task Committee on Crop Coefficients. He recently served as Chair of the USDA Western Regional Committee on Climate Data and Evapotranspiration. He has been active in ISHS conferences and organized the Fourth International Symposium on Irrigation of Horticultural Crops.

## MAURIZIO LAMBARDI



● Maurizio Lambardi  
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The ISHS Council recently appointed Dr. Maurizio Lambardi (Italy) as Chair of the ISHS Commission Molecular Biology and In Vitro Culture (previously Biotechnology and Molecular Biology). Dr. Lambardi succeeds Prof. Roderick Drew. Tribute was paid to Prof. Drew at the recent IHC in

Lisbon for his valuable 4-year leadership of the Commission. Dr. Lambardi will serve in the position in close collaboration with the equally new Vice-Chair, Dr. Bart Panis (Belgium).

Dr. Lambardi graduated in Agriculture Science from the University of Florence and has a post-degree specialization in Plant Biotechnology from the University of Pisa, Italy. At present, he is Senior Researcher of the National Research Council (CNR) of Italy, project leader on propagation and conservation of woody plants at the IVALSA (Trees and Timber Institute) of Florence, and lecturer on In Vitro Culture at the University of Modena and Reggio Emilia.

Dr. Lambardi has wide-ranging expertise in plant biotechnology and in vitro culture systems. His research activity is mainly focused on the development of innovative approaches to plant biodiversity conservation, such as cryopreservation, cryotherapy and slow growth storage. In these fields, he has been in charge of national and international projects, as well as supervisor of Italian and foreign Master degree, PhD and Post-Doc students. Dr. Lambardi has been invited speaker at national and international congresses and post-degree courses, and is author or co-author of more than 130 scientific papers, reviews, book chapters and techni-

cal reports on plant propagation and biotechnology. He is reviewer for various international Journals in the field of plant tissue culture and cryopreservation. He was member of the Editorial Board of the ISI Journal "CryoLetters" (2005-2007), and presently of the ISI Journal "Propagation of Ornamental Plants".

For the ISHS, Dr. Lambardi has been Vice-Chair of the Commission Molecular Biology and In Vitro Culture for the last 4 years. Moreover, he is member of the Society of Low Temperature Biology, the International Association for Plant Biotechnology, the Italian Accademia dei Georgofili, and the SOI (Italian Society for Horticultural Science). As a member of the SOI, he organized in 2008 the 1st National Congress on Plant Micropropagation, after which he founded the Italian Working Group on "Micropropagation and in vitro techniques". He is presently in the Management Committee of the COST Action 871 "Cryopreservation of Crop Species in Europe".

## HANNAH JAENICKE



● Hannah Jaenicke  
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Dr. Hannah Jaenicke is the new Chair of the Commission Plant Genetic Resources. She succeeds Dr. Kim Hummer in this position. Good leadership of the Commission will be assured with the involvement of Vice-Chair Dr. Barbara Reed.

Dr. Hannah Jaenicke holds a Dipl. ing. agr. in plant breeding from Bonn University and a Dr. rer. nat. in plant physiology from TU Darmstadt, both in Germany. In her subsequent career in international development, she developed into a specialist in agrobiodiversity and related subjects, spanning agroforestry, horticulture, nutrition and health, plant propagation, product marketing and integrated rural development. Until April 2010, she was the Director of the International Centre for Underutilised Crops which she transformed into Crops for the Future, an international organisation for the promotion of underutilized crops. She is a versatile researcher-cum-manager having spent considerable time of her career in international agricultural research with the Consultative Group on International Agricultural Research (CGIAR), as well as having gained solid research management experience as Deputy Manager of the UK Department for International Development's Forestry Research Programme. Hannah integrates academic and development expertise with a focus on alleviating hunger and poverty and improving livelihoods. She has a keen interest in the role of agro-biodiversity in mitigating climate change by providing resilience to environmental and societal shocks and change. She spent 10 years living in Africa

and 4.5 in Asia, has great interest in the training and mentoring of younger people, and provides strategic leadership to research and development partners. She also has a keen eye for communication of research and development results to enhance impact at several levels and is experienced in proposal writing and evaluation as well as commissioning projects. Hannah was the Chair of the ISHS-ICRAF joint Working Group on Agroforestry 1998-2002, is currently the Chair of the ISHS Working Group on Underutilized Plants and was the Convener of the First ISHS International Symposium on Underutilized Plants in 2008. She works as a consultant from Germany.

## BILL CARLILE



● Bill Carlile  
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The ISHS Council meeting in Lisbon confirmed the appointment of Bill Carlile as Chair of the Commission Plant Substrates and Soilless Culture. He follows Dr. Wilfried Schnitzler in this position and will be assisted by Professor Michael Raviv from the Newe Ya'ar research center in Israel. Current-

ly Dr. Carlile and Professor Raviv will have responsibility for overseeing the activities of six working groups: Hydroponics; Growing media; Composts in Growing Media; Indoor plants in Hydroponics; Ornamentals in Substrates and Soilless Cultivation; Substrate Analysis.

Bill Carlile graduated from the University of London in 1970: obtained a Masters degree in Plant Pathology from the University of Exeter in 1971 and his PhD in Plant Pathology was awarded at Trent Polytechnic at Nottingham in 1975. Bill directed Research and Development at L&K Fertilisers from 1976 to 1978, when he was appointed Lecturer in Applied Plant Sciences at Trent Polytechnic, where he subsequently headed the Microbiology, Plant Sciences and Ecology departments there. During his time at Trent, Bill undertook many contract trials studies for both the horticultural and agrochemical industries.

In 2006 Bill moved back to industry as Chief Horticultural Scientist at Bord na Mona (Horticulture) in Newbridge, Ireland. He joined ISHS in 1981 and took up the position of Chair of the Growing Media (or Substrates other than soils in situ, as it was then) in 1994, and subsequently was elected Vice-Chair of the Commission Plant Substrates in 2006.

Bill has published extensively on both soilless substrates and plant protection. One of his books, 'Control of Crop Diseases' is about to be issued in its third edition, and is a standard UK introductory text. He was convenor of the ISHS symposium on Growing Media and Composting in Nottingham in 2007, and has refereed a





huge number of contributions to Actas over the years. He has supervised 12 students to MPhil/PhD level including six in growing media/composting. Bill is keen to enhance and improve coordination within the fields of hydroponics, growing media and composting within and external to ISHS.

## SIRICHAIR KANLAYANARAT

The ISHS Council recently confirmed Associate Professor Dr. Sirichai Kanlayanarat as Chair of the Commission Quality and Post Harvest Horticulture for the period of 2010-2014. Dr. Kanlayanarat succeeds Prof. Dr. Pietro Tonutti in this office. Tribute was paid to Prof. Dr. Tonutti at the 28th IHC in Lisbon, Portugal for his leadership of the Commission in previous years. The Vice Chair of this Commission is Dr. Peter Toivonen of Canada.



• Sirichai  
• Kanlayanarat  
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ology and supervised research theses of more than one hundred Masters and Ph.D students.

Dr. Kanlayanarat is conducting research in several areas of postharvest technology with special focus on postharvest physiology of tropical horticultural crops. He has extensive interna-

Dr. Kanlayanarat is a postharvest physiologist with a Ph.D from the University of Tsukuba, Japan. He served as the Chairman of Postharvest Technology Programme in the School of Bioresources and Technology, King Mongkut's University of Technology Thonburi, Thailand. He has been teaching classes in postharvest physi-

tional connections and established and coordinated a number of research networks with organisations such as JICA (Japan International Cooperation Agency), APEC (Asia-Pacific Economic Cooperation), FAO (Food and Agriculture Organization of The United Nations), etc. Moreover, Dr. Kanlayanarat organized several national and international workshops, meetings, conferences and symposia on quality management of fresh produce. He also coordinated the development of a computer assisted learning package on postharvest management of tropical horticultural crops in five languages, which had been commissioned by APEC.

Dr. Kanlayanarat is a prominent research leader in postharvest technology and contributor to the innovation in postharvest industry in Thailand.



# ISHS Honorary Membership and Fellow Awards

**At its recent meeting in Lisbon the ISHS Council decided to grant the ISHS Fellow Award to four ISHS members and Honorary Membership to five members. According to the Society's Rules of Procedure, the ISHS Fellow Award is presented to a person who is a member of ISHS, in recognition of this person's outstanding contribution to horticultural science worldwide, while Honorary Membership is given to a person who is a member of the ISHS, in recognition of his/her exceptional service to the Society.**

**The Nominations and Awards Committee had selected the suggestions that had been received from individual members, and forwarded these suggestions with a motivated recommendation to the ISHS Board. The Board had discussed the Committee's recommendations and sent its motivated nominations to the Council for final decision.**

## ISHS FELLOWS

### Prof. Dr. Sylvia Blankenship (USA)



• Sylvia Blankenship  
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Dr. Blankenship is a world-class horticultural scientist whose many accomplishments during her career as a postharvest physiologist have contributed significantly to the understanding of ethylene biology in horticultural crops. Her work with ethylene

action inhibitors in particular has changed the course of research in the area of fruit ripening and provided an invaluable commercial tool for postharvest management of climacteric fruit.

For scientists in the international postharvest community, Dr. Blankenship's name will always be associated with the groundbreaking discovery and development of the ethylene action

inhibitor, 1-methylcyclopropene (1-MCP). This development has had an enormous impact on postharvest science and technology, particularly commercial practice. It has brought great advantages to experimental postharvest science in allowing the control of ethylene action and so increased our understanding of ripening and senescence processes.

Dr. Blankenship has been an inspiration for many young scientists and students of horticulture around the world, in particular early-career female scientists. This is particularly important in a field with relatively few female horticultural-science role models.

### Prof. Dr. Silvia Dorn (Switzerland)

At ETH Zürich, Prof. Dorn has established herself as one of the most prolific and productive tree fruit entomologists throughout the world. Her large and ambitious program is internationally recognized and respected for the comprehensive approach taken towards answering



• Silvia Dorn  
• .....

research questions. Professor Dorn has trained 71 MSc students, 24 PhD students and 14 post-doctoral students in her laboratory. Her laboratory has produced a very large number of excellent scholarly articles, nearly all published in top-tiered journals and

whose subjects encompass behavioural, physiological, ecological and biochemical bases of host selection by fruit pests and their natural enemies, as well as other pests and beneficial species associated with other crops. Her work with identification of female attractants for codling moth and oriental fruit moth, the genetic variability of codling-moth dispersal, as well as development of a monitoring system for apple blossom weevil all have a strong bearing for improved pest management practices.

During her work in the agricultural industry, Silvia Dorn was named an inventor on several international patents, and her major scientific achievement was the discovery, development and market introduction of the very first insect growth regulator (IGR) for use in plant protection, fenoxycarb. She spearheaded efforts to identify key insect pests for deployment of this material, particularly in pome and stone fruit, vine and citrus crops. This product alone has led to novel tools for pest control as well as tremendous improvements in Integrated Pest Management programs worldwide.

### Prof. Dr. Schuyler S. Korban (USA)



Schuyler S. Korban

Prof. Schuyler S. Korban received the ISHS Fellow Award as an acknowledgement of his (1) sustained excellence in the development and release of disease-resistant apple cultivars and advanced selections, (2) pioneering research accomplishments in the area of plant genetic analysis, (3) proven ability

to tackle novel and innovative research endeavours, (4) unique capacity to engage in research that both pushes the frontiers of scientific understanding and provides practical outcomes that benefit producers and consumers, (5) outstanding teaching record, and (6) leadership role in promoting horticultural and scientific programs.

Dr. Korban's knowledge of plant genetics and biotechnology is outstanding, and he has an exemplary record of publications in high-impact journals. He has trained numerous graduate students from many different countries and has provided a great deal of service to several horticultural societies and committees. He has served as an associate editor for the *Journal of the American Society for Horticultural Science* (1994-1997), *In Vitro Cellular and Developmental Biology – Plant* (1998-present), and *Plant Cell, Tissue and Organ Culture* (1998-present), and has organized various symposia and/or workshops at both national and international conferences.

### Prof. Dr. Ian Warrington (New Zealand)



Ian Warrington

Prof. Warrington has made an outstanding contribution to horticultural science worldwide through his scientific research, his leadership, his collaborations and his involvement in international activities. He is a Fellow of the Royal Society of New Zealand and the American Society for Horticultural

Science and an Honorary Fellow of the New Zealand Institute for Agricultural and Horticultural Science. In addition he was awarded a Doctor Honoris Causa degree in literature from Massey University.

Prof. Warrington has made a contribution to science in a wide range of horticultural crops including vegetables, grapes, kiwifruit and ornamental plants. Among his many publications are more than 100 refereed scientific papers, in particular in the area of horticultural physiology, specifically environmental effects on horticultural crops. His work on temperature

effects on apples has probably been one of the great advances in this field.

As CEO of HortResearch and in other positions Prof. Warrington has played a major role in the development of horticulture and horticultural research in New Zealand. He has taught many students, both from New Zealand and abroad, in particular from Thailand, who have become respected horticultural scientists. He has contributed to the ISHS and the Society's activities with great passion and success and will continue to do so in the years to come, as co-chair of the 2014 International Horticultural Congress.

## ISHS HONORARY MEMBERS



Uygun Aksoy

### Prof. Dr. Uygun Aksoy (Turkey)

Prof. Aksoy has served on the ISHS Council representing Turkey from 1997 until the present and was the first woman elected to the ISHS Board, serving from 1998 to 2006. She served as the Secretary of the Board during both terms and played an

important role as Chair of the ISHS Committee for Research Cooperation at a time when ISHS was actively developing policies to cooperate in research in developing countries.

Prof. Aksoy has participated in numerous ISHS symposia and Horticultural Congresses, and organized and hosted the ISHS Board and Executive Committee meetings held in Antalya in 2001. As a member of the original Fruit Section, she was co-organizer and *Acta* editor of a number of symposia; she is the founding chairperson of the Working Group on Figs. She also was co-convenor and *Acta* editor of the International Symposia on Techniques to Control Salination for Horticultural Productivity and on Organic Horticulture (IHC 2010).

Prof. Aksoy is a founding member of the Turkish Society for Horticultural Science and the Turkish Association for Organic Agriculture, which she chaired for 6 and 4 years, respectively. Between 1999 and 2003, Prof. Aksoy was on the Scientific Committee of CIHEAM (International Centre for Advanced Mediterranean Agronomic Studies). She is a member of the Steering Committee of the MAIB (Mediterranean Agronomic Institute of Bari) Mediterranean Organic Network and of the scientific committees of the International Nut and Dried-Fruit Foundation and FRUCOM.

### Dr. Robert Bogers (The Netherlands)

Dr. Bogers has given outstanding, meritorious service to our Society over a long period of time. He had carried out numerous roles with distinction, not least of which has been his prudent



Robert Bogers

management of ISHS finances over the past 8 years.

For 25 years Dr. Bogers has contributed to the scientific operations of our Society. Being director of the Bulb Research Centre in The Netherlands he started his work for the ISHS in 1985 as convener and *Acta* editor of the IV Interna-

tional Symposium on Flowerbulbs, and acted as Chairman of the Working Group on Flowerbulbs from 1985 till 1994. From 1994 till 2002 he was Chairman of the Section Ornamental Plants. During that period he also chaired the Scientific Programme Committee of the XXV International Horticultural Congress in Brussels in 1998. As the President of the BeNeLux Society for Horticultural Science he was co-organizer of the First Symposium on Horticulture in Europe (Vienna, 2008).

In 2002 Dr. Bogers became Council member for The Netherlands and ISHS Board member. His service during the past 8 years as a meticulous, professional Treasurer has secured the solid financial future of our Society. His dedication to developing a solution to the concerns of a minority of countries with Country membership issues has shown real compassion for members. During these 8 years, Dr. Bogers also represented the ISHS at various occasions, both in international organizations and in symposia and other scientific meetings in Europe.

### Prof. Dr. Daniel Cantliffe (USA)



Daniel Cantliffe

Dr. Cantliffe is a distinguished Professor of Horticulture and a long-time head of the Department of Horticultural Science at the University of Florida. He is honoured as Honorary member of the ISHS in recognition of his long and meritorious service as Vice Chair and Chair of the Section Vegetables, his tireless service at the ISHS Council since 1990 as representative of the USA, and his endeavours in the field of international scientific cooperation, e.g., during the World Conference on Horticultural Research held in Rome in 1998.

Prof. Cantliffe has made a very important contribution to the scientific programme of the Society as a member of more than 27 ISHS Symposium-organizing and Scientific Committees, and was co-editor of many *Acta*, particularly in the field of vegetable production. He published over 80 *Acta* papers and had numerous former students from all over the world involved in IHC, Council and Executive Committee activities.





#### Prof. Dr. Jules Janick (USA)



Jules Janick  
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Prof. Janick is one of the outstanding horticultural scientists in the world. He is a living legend whose contributions to horticultural science are substantial and unmatched by any horticultural scientist. His research accomplishments and those of his many students are notable in the areas of plant breeding, genetics and tissue culture; for this he was awarded as Fellow of the ISHS in 2006.

Prof. Janick has been associated with the ISHS since 1962. He has represented the United States and ASHS on the ISHS Council (1994-2000). He served on the ISHS Publications Committee from 1999 and was instrumental in developing the current style of *Acta Horticulturae*. He was elected to the ISHS Board and has served for eight years (2002-2010) as Director of Publications, Chairman of the Publications Committee and Science Editor of

*Chronica Horticulturae*. Prof. Janick has transformed *Chronica Horticulturae* into a highly respected publication serving international horticulture and the Society. He was instrumental in organizing *Scripta Horticulturae*, which has now released 10 volumes. He has edited or served on the editorial board of 8 issues of *Acta Horticulturae*.

Prof. Janick organized a symposium on temperate fruit breeding at the International Horticultural Congress in 2002, was a keynote speaker at the International Horticultural Congress in 2006 and chaired a Colloquium on the Iberian Encounter with America and Asia at the International Horticultural Congress in 2010.

#### Prof. Dr. Jung-Myung Lee (Korea)

During many years Prof. Lee has been a very active member of the ISHS. He has played a leading role in the success of the Society. He is a well-recognized leader in horticultural research and education, especially in Asia, and has brought very favourable attention to Korean Horticulture and to the ISHS.

Prof. Lee served as Chairman of the Organizing Committee of the IHC2006 in Seoul. To guarantee the success of the Congress, Dr. Lee refused



Jung-Myung Lee  
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the honour of being nominated as President of the Korean Society for Horticultural Science. His contribution to the scientific and financial success of the Congress will be difficult to match. A unique aspect of this Congress was the simultaneous hosting of a very large International Horticultural Exhibition, which attracted more than 60,000 visitors in 4 days.

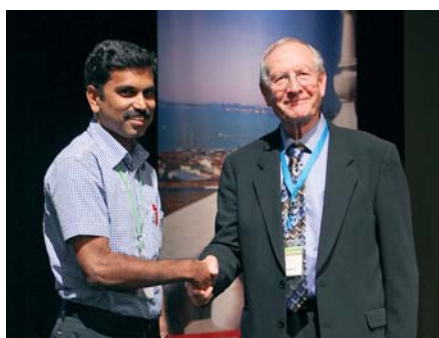
Prof. Lee has also served as Board member of the ISHS during the past 4 years. During this term, he showed his leadership to recruit many Asian members and countries to ISHS.

Academically, Dr. Lee is well-known for his knowledge and research work in vegetable grafting. His grafting technique is widely used, not only in Asian countries but also in Europe and the USA.

## Miklos Faust Travel Award for Young Pomologists Presented at IHC 2010

The Miklos Faust Travel Award for Young Pomologists was awarded during the 28th International Horticultural Congress in Lisbon. The award is in memory of Dr. Faust, renowned pomologist who emigrated to the United States from Hungary and worked for many years as a scientist in the United States Department of Agriculture and long served as the Head of the Fruit Laboratory in Beltsville, Maryland. This Award reflects Dr. Faust's life-long belief that young scientists should be given the opportunity to share their discoveries and enthusiasm for science with colleagues from other countries and other cultures. The winners of the 2010 Awards, presented during the General Assembly of ISHS on August 24, 2010, are Dr. G. Manjunatha with the Plant Cell Biotechnology Department of the Central Food Technology Research Institute, Mysore, Karnataka, India and Dr. Ben van Hooijdonk with Plant and Food Research at Havelock North, New Zealand.

Dr. Manjunatha studies fruit ripening and is presently using transcriptome analysis to determine the role of nitric oxide (NO) signaling in the regulation of ripening of banana. His study involved a unique approach to intercept ethylene biosynthesis in fruits by endogenous elicita-



Norman Looney congratulating G. Manjunatha (left) and B. van Hooijdonk (right).  
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tion of NO in order to delay ripening, and extend shelf life. His Post-doctoral Research Associate position was supported by the Department of Biotechnology of the Indian Ministry of Science and Technology.

Dr. van Hooijdonk's research encompasses a broad range of projects that aim to improve fruit quality and orchard productivity in sustainable apple and pear orchard production systems in New Zealand. His research addresses the genetic basis of apple fruit texture and taste and the development of new technologies that improve pear tree precocity and production effi-



ciency. Other work aims at integrating knowledge of architecture and physiology of apple trees into a structural-functional model capable of simulating the effects of horticultural manipulation to assist the phenotyping efforts of fruit breeders.

The Miklos Faust Award is made possible by a bequest managed by the American Society for Horticultural Science and administered by a panel of horticultural scientists from the USA, Canada, England, Italy, and Israel. Judges for the 2010 Awards were Drs. A.D. Webster, Amnon Erez, and Jules Janick.



# Demonization of Science, Sanctification of Poverty

Jules Janick and Claudia Silviana Mureşan

One of the marvels of modern society is the general adoption of technologies that only a few decades ago were not only unknown but unthinkable. Advances have come with dizzying rapidity. Innovations in medicine such as knee and hip replacement have become routine and we are at the cusp of personal genomic analysis for medical forecasting. Nowhere is this technology more visible than in information technology. In the last 20 years we have seen the almost universal adoption of the personal computer, the expansion of the Internet, and the universal use of the cell phone. We are seeing the replacement of the library by internet information services such as Google and Wikipedia. Manuscripts for scientific journals are now sent and edited electronically and the entire scientific literature may soon be available online. Some of these technological advances have resulted in the leapfrogging of established technologies in the developing world such as standard telephone lines and hard copy.

Despite this embracement of technology in our everyday lives there appears to be one area where scientific progress is often rejected and scorned. We refer specifically to the adoption of agro-biotechnology despite its widespread use throughout the world, e.g. over 80% of the maize, soybean, and cotton grown in the US are genetically transformed and adoption is high in Argentina, Brazil, China, India and South Africa. Despite the progress obtained by plant breeding and the Green Revolution, despite the technology of climate controlled agriculture, despite the progress of mechanical harvest, agricultural innovation has been promoted as something to fear and reject. Transgene technology and genomics, perhaps the greatest achievements of modern biology are considered anathema by many, especially when they relate to food and agriculture. In fact, many now treat the entire paradigm of agricultural science with skepticism and scorn, e.g.

"The Green Revolution strategy integrated Third World farmers into the global markets of fertilizers, pesticides and seeds. It disintegrated their organic links with soils and communities. The progressive farmer of Punjab became the farmer who could most rapidly forget the ways of the soil and learn the ways of the market. One

outcome was environmental degradation – violence to the soil resulting in water-logged or salinated deserts, diseased soils and pest-infested monocultures. Another outcome was violence in the community, especially to women and children. Commercialization, linked with cultural disintegration, created new forms of addictions and new forms of abuse and aggression." (Shiva, 1993)

Synthetic fertilizers, long considered one of the gifts of chemistry, are now seen as soil poisons, and pesticides rather than treated as plant medicines are considered instruments of death. Even traditional plant breeding is scorned with a call to return to traditional landraces or heirloom cultivars, an attitude that is not far from Johnny Appleseed's rant against grafting "They can improve the apple in that way, but that is only a device of man, and it is wicked to cut up trees that way. The correct method is to select good seeds and plant them in good ground and God only can improve the apple." (Fedoroff and Brown, 2004). Hybrids that increased average maize yields by a factor of seven are considered inappropriate for areas that are food deficient such as sub-Saharan Africa. The fact of the matter is that science and especially science in agriculture is being demonized. The scientist has been transformed from the gentle Jonas Salk in a white lab coat eliminating polio, to the misguided and ethically-challenged Dr. Frankenstein creating a monster. For the most fervent activists, science and technology are not only capitalist, reductionist or inadequate – they are liabilities rather than solutions and even murderous (Yapa, 1993).

At the same time, traditional peasant agriculture and subsistence slash-and-burn farming, instead of being considered backwards and poverty inducing, are touted as culturally positive with benefits to be treasured and emulated. Poor struggling farmers are represented as joyful peasants in native costumes – picturesque locals, in a sort of simple paradise. Primitive cultures are considered not only essential to preserve, but disrespectful to contaminate with modern technology. Often improvement in their agriculture is considered a loss of culture and in a new twist, these populations instead of being urged to develop now need to be saved from develop-

ment. Poverty instead of being a scourge has been sanctified! The constant toil and the threats of famine are ignored while extolled is a life supposedly rich with ritual and tradition. "Sustainable" small farming solutions assume that farmers or indigenous people would or should be content with a little more than subsistence and that their little farms should be world enough for them. In this view, subsistence farmers are not economic agents who can legitimately seek profit from their activity by applying the best technology and management techniques but are cast as guardians of seeds, biodiversity, and natural wisdom.

The leaders of the movement to demonize science in agriculture, with perfectly good intentions, have been powerful in turning public opinion as they jet around the world and communicate via their iPods, laptops or netbooks while extolling a peasant agriculture. Their disdain of technology in agriculture is clearly one dimensional. What is disturbing is that the demonization of science has encouraged a new anti-progress drive. Instead of being considered "red in tooth and claw" and feared as unpredictable wild, and dangerous, nature is considered benign, warm and nurturing as typified in the term Mother Nature. Interfering with nature is considered criminal violence. In this view, the past is always preferable to the future. The struggle of frontier life is cast as the *Little House on the Prairie*; the monotony of salt pork and grits is considered the lost world of healthy country cooking; traditions are reinvented as the fear of milk fever and tuberculosis is conveniently forgotten when practitioners of natural and holistic medicine return to organic food, meditation, yoga, and herbal cures. Famine and despair from crop-loss at the end of a year of labor and the gloom portrayed in Van Gogh's painting *The Potato-eaters* are ignored in the narratives of traditional peasant farming. Their struggles are poignantly described by an ancient Egyptian scribe: "Dost thou not recall the picture of the farmer when the 10th of his grain is levied? Worms have destroyed half the wheat, and the hippopotami have eaten the rest; there are swarms of rats in the fields, the grasshoppers alight there, the cattle devour, the little birds pilfer" (Durant, 1954).

There are key terms used by anti-scientists who lead this new Luddite movement. The benign





ones are green, ecologically-friendly, natural, organic, participatory, pesticide-free, pro-poor, holistic, indigenous, local; the inflammatory ones are GMO, monster, Frankenfood, mad scientist, multinational. Names become symbols (Fig. 1) and labeling has consequences. Monsters must be executed, witches burned, and vampires staked through the heart. It is no wonder that anti-science radicals have resorted to uprooting experiments and burning laboratories. There have been "cremate Monsanto" campaigns in India and Haiti. Perhaps worse, fear of science has generated a new anti-intellectualism that has found outlets in various mass movements such as the fear of inoculation or fluoridation, which erupt as political obsessions; recent manifestations are the present concerns over teaching of evolution, acceptance of creationism, and disregard for the evidence for global warming. Various non-scientific theories of food and human nutrition that spring up without rigorous testing have divided the population and turned it against modern agriculture and food production. Appealing

holistic theories claim that each and every single element of reality is connected to the whole in mysterious ways. Thus, the best way to understand reality is not through science, and the best foundation for our decisions or opinions is not scientific rationality. A more 'authentic' relation to everything in the "real world" is easier mediated by sympathy or resentment, for instance. Nothing is therefore neutral; everything requires us to take a stance, to become activists: the eucalyptus is bad and the earthworm is good, corporations are bad and subsistence farmers are good, cow nitrogen fertilizers are bad and cow dung is good, copper sulfate is good while glyphosate is bad. And all bad things must be fought in order to preserve the mythical equilibriums of Mother Nature. We recall that in 1953 (the year Watson and Crick described the structure of the DNA), Martin Heidegger famously delivered a lecture now titled *The Question Concerning Technology* where he showed that the essence of modern technology is the "enframing" of nature as a "standing reserve" of exploitable resources.

Somewhere else, he also said that exploiting nature through modern agriculture is equivalent to nothing less than "genocide":

"Agriculture is now a motorized food-industry – in essence, the same as the manufacturing of corpses in the gas chambers and the extermination camps, the same as the blockade and starvation of the countryside, the same as the production of the hydrogen bombs." (Fariás, 1989)

Horticulture is in the center of this controversy. Our own Society would seem to be schizophrenic as we have outlets for both biotechnology and organics. While the core value of ISHS is indeed science, horticulture still uses an ancient set of technologies such as grafting and pruning, and has an esthetic and cultural side. In general, professional horticulturists are pragmatic and reasonable. We know that unwise and indiscriminate use of pesticide is harmful and we rue the previous use of arsenicals and mercurials but we are also aware of the problems of epidemics and epizootics. We know that over-fertilization can reduce quality and contaminate aquifers but we are aware that micronutrients may be required and that applied nitrogen, potassium and phosphorus is often essential to sustain and increase crop yields. We revere some of the qualities of landraces and heirloom cultivars but recognize there is a reason they are no longer grown on a large scale. Most of us do practice organic horticulture in our backyard vegetable gardens as practical on a small scale but we are quick to use herbicides on our lawns to eliminate crabgrass and dandelions.

The goals of science-based horticulture and organic agriculture are not different. Both long for food safety, healthy and nutritious diets, and equitable returns to all parties. The difference is that the organic movement has morphed into a religion with an ethos that many find difficult to understand. For example, the protest against tissue culture, claiming that plants need to fulfill their life cycle, is incomprehensible to agricultural scientists. The edict that organic fruit trees must be based on organically-produced rootstocks seems weird to pomologists. The diatribes against pesticides is strange since the organic movement accepts spraying with copper and lime sulfur; their unwillingness to use inorganic fertilizers is also odd since applications of rock phosphates are considered acceptable. The proponents of these systems are much less doctrinaire when their health is concerned. Pesticides are bad for plants but medicines for humans are good. Ionizing radiation for pest control is anathema but acceptable for the control of cancers. Scientific horticulture works to minimize pesticides, appreciates the biological control of pests, and applauds the elimination of pesticides in greenhouses. We know that this technology involving a sophisticated role of moni-

**Figure 1. Recurrent symbolic images in the agricultural biotechnology wars.**



toring, raising of predators, use of complex pheromones, requires more not less science.

What is difficult to understand is that the organic movement, in spite of its laudable goals of eliminating dangerous pesticides, refuses to consider a viable alternative: namely, the use of biotechnology to exploit natural resistance in the living organisms. All plants have natural resistance and immunity to many pests and diseases. Some of our most prized plants, such as narcissus are pest free because of natural resistance. The fact of the matter is we are living in a world with a great and growing need for biotechnology, especially in poverty stricken areas. New devastating virus problems such as papaya ringspot, brown streak in cassava, bacterial wilt of bananas, and huanglongbing in citrus may only be controlled with biotechnology. Furthermore, the problems of malnutrition in the poorest areas of the globe might be addressed by improving the nutrition value of foods along with increasing yields, both with the aid of biotechnology. We love our home gardens but we are convinced that the feeding of enlarging populations will require factory production of food. We appreciate biodiversity but we know weeds constitute the greatest peril to agriculture in many parts of the world. We are aware that we must direct Nature by her methods to survive.

*Yet Nature is made better by no mean  
But Nature makes that mean; so over that art  
Which you say adds to Nature, is an art  
The Nature makes.*

Shakespeare, The Winter's Tale IV:iv

In the last analysis we are horticulturists...lovers of gardens, lovers of culture. But we are also scientists, the science based on the courage "to know." We revel in the search for the unraveling of Nature for the betterment of humankind.

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# The Global Trade in Ornamental Geophytes

Rina Kamenetsky and William B. Miller

Ornamental geophytes, also called “flower bulbs” contribute significantly to the global ornamental industry, and are utilized for commercial bulb and flower production, outdoor and forced fresh cut flowers and potted plants, and for landscaping and gardening. This is a very large and diverse group of species, belonging to more than 800 genera. Geophytes exhibit great diversity in morphology, growth and developmental biology, and physiological responses to environmental factors (Benschop et al., 2010; De Hertogh and Le Nard, 1993; Kamenetsky, 2009). Geophyte plants and their flowers have been appreciated and cultivated for thousands of years and were frequently mentioned in mythology, ancient history, art and literature, long before they were widely grown commercially or extensively researched.

World-wide, the value of the flower bulb industry is estimated to be over \$1 billion, while import and use of flowers of ornamental bulbs occupies a noticeable place within global cut flower production. Currently, 16 leading countries (Table 1) are producing ornamental geophytes of 15 most popular genera on more than 32,000 ha (Buschman, 2005). In the Netherlands, the leading bulb producer world-wide, the production value in 2005 was \$29,491/ha, while the export value was \$34,048/ha (AIPH, 2006). The total flower bulb export of the Netherlands in 2005 was  $756 \times 10^6$  (Van der Veer, 2006).

The ornamental industry is dominated by seven genera: *Tulipa*, *Lilium*, *Narcissus*, *Gladiolus*, *Hyacinthus*, *Crocus*, and *Iris*, but *Freesia*, *Ornithogalum*, *Hippeastrum*, *Allium* and *Muscari* are also prominent. While production of flower bulbs is still concentrated in temperate-climate regions of the world, as the global demand for all ornamental geophytes increases, innovative production techniques and marketing are developing in “alternative” climates. This process is true not only for the leading genera, but also for the extensive diversity of new ornamental crops (Bryan, 2002; Benschop et al., 2010).



Dutch hyacinth field in North Holland.

due to the need to reduce production costs and realizing the fact that high quality bulbs can be produced in many areas of the world (Benschop et al., 2010). For example, significant tulip bulb production takes place at least in 15 countries, with the largest production area being in the Netherlands with 10,800 ha (88% of global

## TRADITIONAL CROPS

The introduction of the tulip to the Netherlands from Turkey, in the middle of the 16th century, was a key factor in the development of flower bulb industry in Europe, mainly in the Netherlands (Pavord, 1999). With the exception of *Narcissus*, all the major genera have been introduced to Europe from Asia (*Tulipa*, *Lilium*, *Hyacinthus*, *Crocus*, and *Iris*) or South Africa (*Gladiolus*). The position of the Netherlands was predominant in bulb industry during the 19th and 20th centuries, and at the end of the 20th century they controlled about 92% of the total world bulb trade (Anon., 1999). This market position was obtained through a long history of industry cooperation in three key areas: research, promotion, and pre-clearance inspection (to certain markets such as the US and Japan) to facilitate rapid release from entry ports, thereby minimizing potential for injury due to failed temperature or environmental controls during shipping. Over time, however, a larger number of bulbs will be produced in countries other than the Netherlands mainly

Table 1. Estimated world production of ornamental geophytes (flower bulbs) in 2002/2003 (Buschman, 2005).

Country	Hectares	Major flower bulbs produced
The Netherlands	20,921	Tulip, Lily, <i>Narcissus</i> , <i>Gladiolus</i> , <i>Hyacinths</i> , <i>Crocus</i> , <i>Iris</i>
UK	4,660	<i>Narcissus</i> , <i>Gladiolus</i> , Tulip
France	1,289	Lily, Tulip, <i>Iris</i> , <i>Gladiolus</i> , <i>Dahlia</i> , <i>Narcissus</i>
China	1,281	<i>Narcissus</i> , Lily, Tulip
USA	995	<i>Narcissus</i> , Tulip, <i>Gladiolus</i> , Lily, <i>Iris</i>
Japan	883	Lily, Tulip, <i>Gladiolus</i>
Israel	456	<i>Narcissus</i> , <i>Ranunculus</i>
Poland	335	Tulip, Lily, <i>Narcissus</i> , <i>Gladiolus</i> , <i>Dahlia</i>
New Zealand	258	Tulip, Lily, <i>Zantedeschia</i> , <i>Iris</i> , <i>Freesia</i>
Chile	240	Lily, Tulip
South Africa	200	<i>Hippeastrum</i> , <i>Nerine</i> , Lily, Tulip
Brazil	200	<i>Gladiolus</i> , <i>Hippeastrum</i>
Germany	190	Tulip, <i>Gladiolus</i> , <i>Narcissus</i> , <i>Crocus</i>
Belgium	185	<i>Begonia</i> , Lily
Denmark	60	Tulip, <i>Narcissus</i>
Argentina	47	<i>Gladiolus</i> , Tulip
<b>Total</b>	<b>32,200</b>	



● Bulb lifting equipment, The Netherlands.



● Airwalls, a common sight in the world bulb industry. They are used to dry bulbs after lifting and to actively ventilate tulips to remove ethylene in case of *Fusarium* infection.



● Tulip bulbs encased in plastic nets, just after lifting from the field. This system allows tulip production in less traditional soils such as clay. The net allows harvesting of bulbs without massive amounts of soil. Bulbs are inserted into the nets via specialized equipment at planting in the autumn and removed by slitting the net as it is lifted onto machinery during harvest.

production), followed by Japan (300 ha), France (293 ha), Poland (200 ha), Germany (155 ha) and New Zealand (122 ha). The majority of *Lilium* bulb production occurs in 10 countries.

The Netherlands produces 2.21 billion lily bulbs, of which most are exported to the countries within the EU (1.0 billion) and outside the EU (0.7 billion). Approximately 0.41 billion lily bulbs are used for cut flower production within the Netherlands.

Currently, the European Union (EU) and the USA are the leading export markets for flower bulbs. Using the principles established by Blaauw and co-workers (Hartsema, 1961), the Netherlands has focused primarily on the commercial forcing of tulips, Dutch irises and lilies as fresh cut flowers. In contrast, in the USA the primary use of forced flower bulbs has been as flowering potted plants. Approximately two-thirds of the imported and domestically grown bulbs in the USA are used for forcing and the other 1/3 of bulbs are used in home and commercial landscaping and gardens. The USA has been an increasing market for the last 3-4 decades, however, in all markets horticultural uses change slowly. The consumer has focused not only on longer lasting and more reliable plants and flowers, but also on an expanded variety of flower colors, plant types, and other horticultural characteristics.

## NEW CROPS

Market saturation with traditional plants and flowers has stimulated an increased interest in "novelties." Thus, many countries are evaluating their indigenous flora as a source of potential ornamental crops. Regions where intensive research on new crops is occurring include: Israel (Halevy, 2000; Kamenetsky, 2005), Australia (Plummer et al., 2000), South Africa, and Northeast Asia comprised of Japan, Korea, China and Taiwan (Ohkawa, 2000). However, most countries lack knowledge about indigenous plant genetic resources and this hinders the development of new crops.

The flora of South Africa, which includes over 2700 flower bulb species, has provided horticulture with the well known *Gladiolus*, *Freesia*, *Nerine*, and *Zantedeschia* ("calla lily"), but there are other species that need to be evaluated, bred and developed. These species are known as "specialty bulbs", e.g., *Ixia*, *Agapanthus*, *Gloriosa*, *Cyrtanthus*, *Lachenalia*, *Babiana* (Du Plessis and Duncan, 1989; Ehlers et al., 2002; Niederwieser et al., 2002). It is likely that one of the barriers to commercialization of many beautiful South African bulbous plants will be their relatively short vase or display life. While little has been done to study physiology and intensive horticulture of these plants, even less effort has been devoted to understanding and controlling senescence and postharvest loss in these species.

The Middle East and Central Asia are the origins of almost all the currently grown "classic" bulbous crops, and other potentially useful species can be found in these regions (Avishai et al., 2005). Mediterranean species of *Scilla*, *Allium*, *Pancratium*, *Iris*, and *Fritillaria* have great orna-



● *Ornithogalum dubium* mother stock plants flowering in an Israeli greenhouse. *O. dubium* has found increasing favor in the last decade for both cut flowers and pot plants. It has a very long shelf life.



● Paperwhite (*Narcissus tazetta*) field in Israel. Israel produces the vast majority of the world's paperwhites, commonly used for winter home forcing. Photo by courtesy of Asa Flower Bulbs, Israel.



● Planting a *Hippeastrum* (*Amaryllis*) field in South Africa. *Amaryllis* is the most well known South African bulb export and is renowned for its high quality.

mental potential (Halevy, 2000; Avishai et al., 2005; Kamenetsky, 2005).

Species of *Alstroemeria* and *Hippeastrum* native to Brazil, as well as *Griffinia* (*Amaryllidaceae*), *Neomarica* (*Iridaceae*), and *Gomphrena* (*Amaranthaceae*), have been collected because





- A small-scale commercial planting of *Lachenalia* in South Africa. A 30-year breeding program at ARC-Roodeplaat has led to a number of excellent cultivars being released to the trade.



- A view of one of the FloraMax flower auctions in New Zealand featuring essentially 100% locally grown product. In addition to local flower production, New Zealand is home to a rapidly growing lily and tulip bulb production and export industry, which is critical for best quality off-season production in the Northern Hemisphere. Such efforts are mainly under Dutch direction.

- Tulip bulb production field in Japan. Most bulb production in Japan feeds local flower production.



of their showy flowers or unique growth habit (Tombolato and Matthes, 1998). New cultivars of *Eucrosia* and *Hippeastrum* (Meerow et al., 1992; Meerow, 2009) have been developed and are being produced commercially.

In Chile various hybrids of *Alstroemeria* have been bred by means of a combination of traditional and biotechnological techniques (Bridgen et al., 2002). Other prospective genera include *Leucocoryne*, *Conanthera*, and *Rhodophiala*.

## EMERGING PRODUCTION AREAS

Of course, bulbs have been grown in the southern hemisphere for many decades, often for local, in-country use. The inversion of season provides new opportunities for many bulbous crops that are otherwise "trapped" into a fairly narrow production window. For example, the main flowering season of northern hemisphere tulips is approximately late December through Mother's Day in the USA in May, although by growing bulbs in warmer climates, some additional earliness can be obtained. Hence the tradition of growing tulips and hyacinths in the south of France to allow earlier fall flowering. Companies such as Hadeco in South Africa have long supplied early-flowing amaryllis (*Hippeastrum*) to the market. So, the stage was set for the expansion, in the last 15-20 years, of much larger scale southern hemisphere production of major crops such as tulip and lily. The tulips and lilies cultivated in the Southern Hemisphere (Table 1) are used for autumn flowering (September-January) in the Northern Hemisphere, especially in the USA, the Netherlands, Japan, Taiwan, China and Canada. For lilies, the result has been the availability of bulbs that perform better in the decreasing and low-light period from September through February. The alternative would be northern-hemisphere grown bulbs subjected to long periods of frozen and potentially low oxygen storage. While these technologies are feasible and do allow year-round flowering from a single lifting time, industry experience is that better quality plants and flowers are obtained from southern hemisphere bulbs that have not been subjected to at least an additional six months of storage. However, improved postharvest storage technologies such as freezing and low oxygen are portable, and can be easily adopted worldwide. Legitimate concerns exist about the likelihood of surpluses of bulbs as a result of an improved ability to store them for longer periods.

Globally, the floriculture sector experienced significant changes. In addition to traditional countries, globalization and increased competition have led to the development of new bulb and flower production centers. For example, floricultural production in Latin America, Africa, and Asia is increasing rapidly. In addition, China, India, Malaysia, Pakistan, Taiwan, Thailand, Singapore, Sri Lanka, and Vietnam are emerg-

ing as new centers of bulb and flower production. It is anticipated that the north-south axis will be important to the export market. Africa will increase flower export to Europe and South America to the USA and Canada. Within Asia, there will be a growing inter-regional trade with emerging countries like Malaysia, Thailand, and



- Overview of tulip breeding and selection efforts at one of the Japanese Research Stations.



- In the USA, the state of Washington is home to a number of bulb producers. The above field, near Mt. Vernon, is one example. Over the last 15-20 years, the crop area and intensity of bulb production has dropped and flower forcers are relying more on offshore (Dutch and southern hemisphere) sources for forcing bulbs.

the Philippines. Australia and New Zealand have the potential to enter the niche market in Asia with high-quality bulb and flower products (De Groot, 1999).

## OUTLOOK

It seems clear that Dutch companies will maintain their worldwide position in the bulb industry for years to come. This is due to industry history, expertise, capability and financial structures that facilitate proper investment in new ventures. Due to public and environmental pressures in the Netherlands, it is likely that domestic crop area will decrease, but worldwide pro-





***Galanthus elwesii* in natural habitat, Taurus Mountains of Turkey. This area is still the centre for collection of wild bulbs.**

duction area under Dutch control (especially of the major crops) will increase for the foreseeable future. However, there are many opportunities for niche players to emerge with niche crops, whether they are improvements on current crops, or development of new technologies, or categories of crops.

During the past decades, the globalization of the floricultural trade has led to advances in the transfer of knowledge and economic progress in developing countries. In addition the competition for flower bulb markets has been constantly increasing and, consequently, it has increased the demand for high quality bulbs and bulb flowers. Since many bulbs can be stored for long periods, the potential for overproduction continues world-wide, with subsequent effects on product and industry profitability. Generally, as in all floriculture, a key need within the flower bulb industry is to stim-

***Paeonia* cut flower production in Chile. The Flowerbulbs Working group of ISHS was expanded in 2008 to be the "Flowerbulbs and Herbaceous Perennials" working group.**



ulate demand and increase consumption and use of bulbous plants.

Multidisciplinary research will be essential for niche crops, and for continuing development of existing ones. This paradigm has led to the initiation of studies dealing with physiological, biochemical and molecular aspects of internal and environmental regulation of geophyte development, improvement of the integrated pest man-

agement (IPM), introduction of sustainable production methods, new approaches for classical and molecular breeding, and research on flower quality, postharvest handling, and transportation. Since final use (forcing or garden use) of bulbs occurs worldwide, local and regional research capability in new production regions is critical.

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# Organic Horticulture Expands Globally

David Granatstein, Elizabeth Kirby and Helga Willer

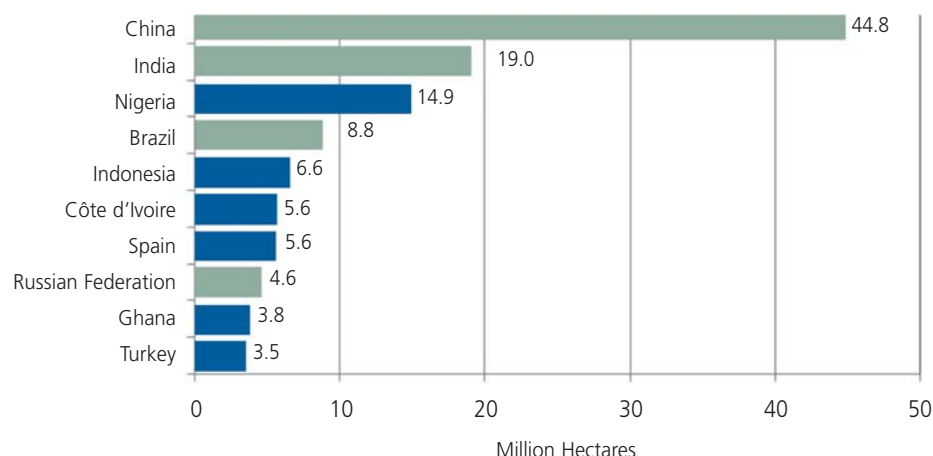
## INTRODUCTION

Organic agriculture is expanding worldwide, driven by consumer demand in North American and European markets, as well as its claimed potential to address resource conservation, food security, and farm income issues in developing countries. Organic systems often build soil organic matter, sequestering carbon to help mitigate greenhouse gases (Niggli et al., 2007; Raviv, 2010). Horticultural crops, especially fruits and vegetables, are being promoted as a critical part of a healthy diet that can help avoid problems such as obesity, diabetes, and heart disease. Not surprisingly, consumers interested in healthy diets are often also attracted to organic foods (Hartman Group, 2006), and thus organic horticultural crops play a prominent role in consumer purchases. The Organic Trade Association recently reported organic fresh produce sales at 11.4% of all USA fresh produce sales in 2009, up from 9.8% in 2008 (OTA, 2010). Organic produce accounted for 38% of all USA organic food sales in 2009. Statistics on organic production are continually improving, particularly with the world-wide annual survey conducted by the Research Institute for Organic Agriculture (FiBL) and the International Federation of Organic Agriculture Movements (IFOAM) (FiBL/IFOAM, 2010a), the main results of which are published annually in the yearbook "The World of Organic Agriculture" (Willer and Kilcher, 2010). In this article, we attempt to characterize the extent of organic horticulture production around the world, including its share of production and its diversity.

Various agriculture statistics bodies use differing definitions for crop groupings and for what is defined as "horticulture." Merriam-Webster's On-line Dictionary (2010) defines horticulture as "the science and art of growing fruits, vegetables, flowers, or ornamental plants." The International Society for Horticultural Science (ISHS) takes a broader view, including crops such as nuts, olives (technically a fruit, but classified separately), medicinal and aromatic plants, root crops such as potato and cassava, and beverage crops such as coffee and tea and cocoa. For this article, we take a broad view with more focus on fruits and vegetables.

Data were gathered from certification agencies and governments from around the world and represent both land already certified as well as land under conversion, since many data sources do not separate or include the latter. However, land under conversion is under organic man-

**Figure 1. Countries with the largest horticultural areas, 2008. Grey: limited data on organic land use/crops available; Blue: crop details available. Source: FAOSTAT, 2008, and FiBL/IFOAM, 2010a.**

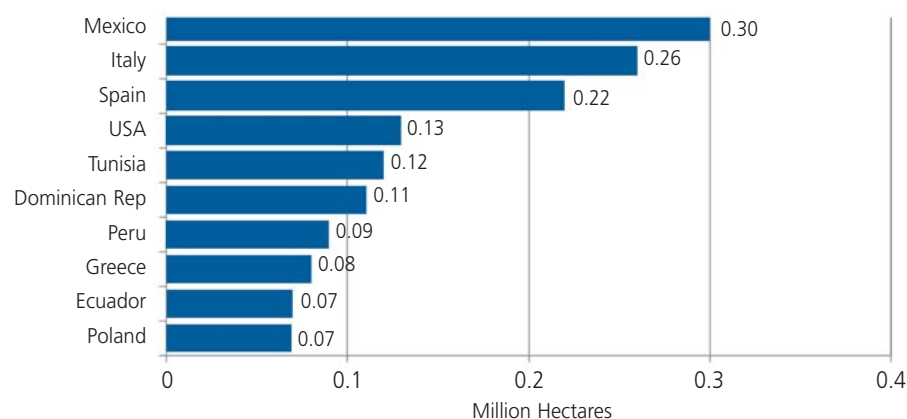


agement. Clearly, there is additional land managed with organic techniques but not associated with certification. For example, based on a comparison of US Department of Agriculture (USDA) survey data (USDA-National Agricultural Statistics Service, 2010) and certifier data in Washington State, USA, there were nearly as many farms self-identifying as organic as those that were certified, but the former equaled about 2% of the certified land base and 0.5% of the certified farm gate sales (Kirby and Granatstein, 2009).

In addition, not all countries reported crop details, such as China, Brazil, and India, which all had large areas of organic land (>1 million ha). These countries have significant "conven-

tional" horticultural production (Fig. 1); the portion of the organic land in horticultural crops is unknown and could significantly change some of the data presented here, especially the rankings of the leading countries with organic horticulture area (Fig. 2). China reported some temperate tree fruit and grape area over the years (FiBL/IFOAM, 2010b) and the USDA-FAS (Xu, 2008) mentions organic vegetable production in China. According to Organics Brazil, the country's most widespread organic crops are sugar, coffee, soybean and fruits (Vallada, 2009). Fruits include both temperate (e.g., apples, grapes) and tropical (bananas, kiwi, passion fruit). Organic Amazon fruits such as açai and guarana are rapidly gaining popularity in

**Figure 2. Countries with the largest reported organic horticultural area, 2008. Source: FiBL/IFOAM, 2010b.**





Processing organic cocoa beans by hand, Ghana. Photo by David Granatstein.

export markets. Other horticulture crops include cashew, vegetables and yerba mate. Exports of organic horticulture crops from India include tropical and subtropical fruits, coconut, walnuts and cashews, vegetables such as garlic, onion, tomato and potato, many spices, and tea and coffee.

## HOW EXTENSIVE IS ORGANIC HORTICULTURE?

Based on FAO data for 2008 (FAOSTAT, 2008), about 220 million ha of land worldwide were harvested for horticultural crops. This was some 14.3% of the 1,540 million ha of arable and permanent crop land harvested (excluding grasslands). According to FiBL/IFOAM (2010b), organic horticultural area was 2.15 million ha in 2008, up from 1.37 million ha in 2005. The 2.15 million hectare total includes fruits, olives, nuts, vegetables and melons, some root crops (potato, sweet potato, cassava, taro and yam), cocoa beans, coffee, tea and mate, flowers and ornamentals, medicinal and aromatic crops,

coconuts, hops, nurseries, and mushrooms. Categories are similar for the FAO value although some categories have more crops represented (e.g., carob is included in FAO value but not in organic value). Thus, organic horticulture accounted for roughly 1% of all horticultural land worldwide, and 6% of all organically managed agricultural land (excluding wild harvest and non-agricultural grazing land). Thirty-five million ha, or 0.8% of all agricultural land worldwide were managed organically in 2008 (Willer, 2010). The horticultural crops included here experienced a collective growth in area of 56% since 2005, considerably more than that of all organic agricultural land, which increased by 10% in the same period. Part of this may be due to better data collection of already existing but not reported organic production as well as to increasingly better knowledge of land use patterns and crops grown in organic agriculture.

The leading organic horticulture crops, in terms of reported area, are fruits, coffee, and olives, followed by vegetables, nuts, and cocoa beans (Table 1). Organic coffee represented a large share of all coffee land (4.8%). Mexico, Peru, and Ethiopia were leading organic coffee producers, accounting for 40%, 16%, and 14%, respectively, of all global organic coffee production area. Organic coffee accounted for 25%, 22%, and 16%, respectively, of all harvested coffee hectares in these countries. Latin America produced three-quarters of all organic coffee exports (Giovannucci and Pierrot, 2010). Leading organic cocoa bean producers included Dominican Republic and Ecuador, accounting for 48% and 24%, respectively, of all global organic cocoa hectares.

Olives, technically a fruit, are commonly classified separately due to their use in the production of oil. Organic olive production often does not entail significant changes from the traditional system (European Commission, 2010),



Organic pineapple ready for export from Ghana to Europe. Photo by David Granatstein.

and thus about 4% of all olive hectares worldwide are under organic management. The major producing countries included Tunisia (115,000 ha), Italy (113,596 ha), Spain (101,268 ha), and Greece (64,136 ha), all countries bordering the Mediterranean Sea.

Over 110 countries reported some organic horticultural production in 2008. Europe was the largest producing region, with Italy (citrus, temperate fruits, grapes), Spain (nuts), and Germany (root crops) as major producers; Turkey produced many organic fruits and led in organic flowers (Fig. 3). Tropical and sub-tropical fruits (Mexico, Ecuador), coffee (Mexico), and cocoa bean (Dominican Republic) gave Latin America the second largest area. Africa provides tropical and sub-tropical crops, cocoa bean and coffee, and olives (Tunisia). The USA was the leading vegetable producer.

Figure 3. Distribution of organic horticultural land by region, 2008 (total area: 2.15 million hectares). Source: FiBL/IFOAM, 2010b.

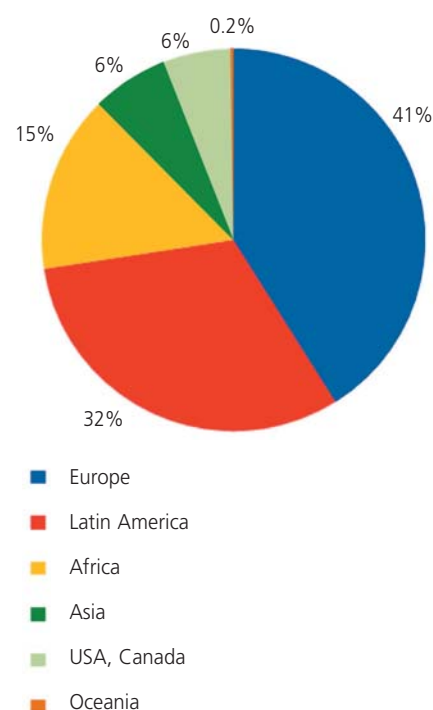


Table 1. Top six horticultural crops under organic management in 2008.

Crop	Organic land (ha) 2008	Organic % of world area <sup>b</sup>	Increase in ha 2005-2008	Increase in %
Fruits <sup>a</sup>	508,651	0.9	214,916	73
Coffee	463,615	4.8	152,146	49
Olives	436,186	4.0	90,427	26
Vegetables	264,103	0.25	99,080	60
Nuts <sup>c</sup>	181,634	2.1	112,991	165
Cocoa beans	165,208	2.0	93,332	130
Other <sup>d</sup>	135,464	-	-	-

<sup>a</sup> Includes > 7,300 ha from Fruits/Nuts/Berries, no details.

<sup>b</sup> Share calculated with the FAOSTAT (2008) crop data (area harvested).

<sup>c</sup> A large walnut area (40,000 ha) in Poland resulted from a special subsidy. Prior to 2008, the walnuts were classified as Fruit/Nuts/Berries, no details. This partly explains the huge increase in the Nut category since 2005.

<sup>d</sup> Other category includes Flowers/Ornamentals, Medicinals/Aromatics, Coconuts, Hops, Tea/Mate, Nurseries, and Mushrooms.

Source: FiBL/IFOAM, 2010b; CDFA, 2008; WSDA, 2008.





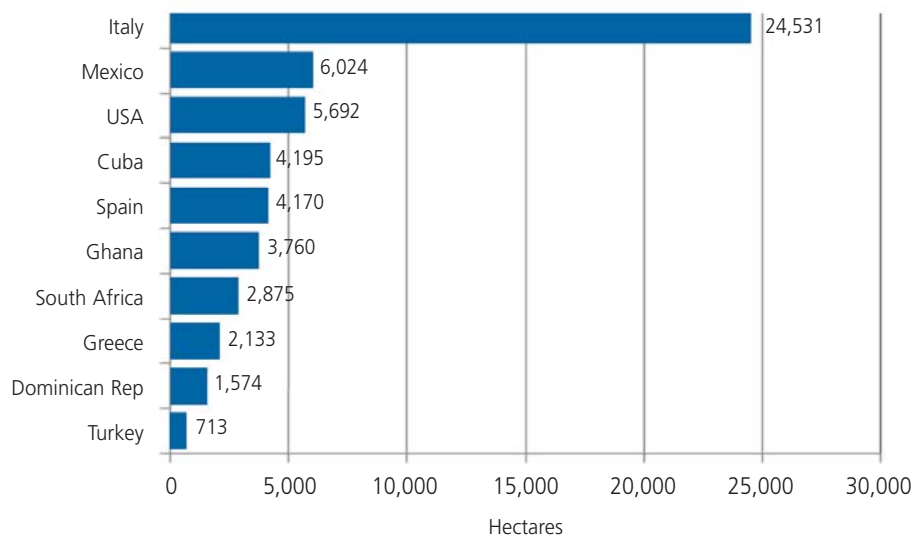
**Table 2. Area and proportion of organic fruit crops, 2008.**

Category	Area (ha)	% of organic fruit (base 508,651 ha)	Organic % of world area
Grapes	150,543	29.6	2.0
Tropical & Sub-tropical fruit	140,723	27.7	0.7
Citrus	57,631	11.3	0.7
Pome fruit	43,234	8.5	0.7
Stone fruit	35,804	7.0	0.7
Berries <sup>a</sup>	31,285	6.2	4.6
Temperate fruit, no details	42,583	8.4	
Fruit, no details	6,848	1.3	

<sup>a</sup> Includes strawberries.

Source: FiBL/IFOAM 2010b; CDFA, 2008; WSDA, 2008. Table revised September, 2010.

**Figure 4. Organic citrus area (hectares) by country, 2008 (Reported world organic citrus total: 57,631 ha). Source: FiBL/IFOAM, 2010b.**



**Table 3. Organic tropical and sub-tropical fruits (including citrus), 2008.**

Crop	Area (ha)	Leading countries	Organic % of world area
Avocado	37,406	Mexico (84% of all organic)	8.8
Banana	52,996	Ecuador, Dominican Republic	1.1
Date	2,093	Tunisia (50% share)	0.2
Kiwi	3,532	Ecuador (85% share)	4.3
Mango	25,669	Mexico	0.5
Papaya	1,542	Mexico (50% share)	0.4
Pineapple	6,620	Rwanda, Costa Rica, Ghana, Mexico	0.8
Orange <sup>a</sup>	25,752	Italy, Mexico, USA	0.6
Lemon, lime <sup>a</sup>	6,895	Italy, Dominican Republic	0.7
Grapefruit <sup>a</sup>	1,346	USA, Italy	0.5

<sup>a</sup> 40% of reported citrus had no details by crop.

Source: FiBL/IFOAM, 2010b; CDFA, 2008. Table revised September 2010.

## ORGANIC FRUIT PRODUCTION

The first attempt to characterize global organic fruit production was made with 2006 data (Granatstein et al., 2010). At that time, there

were at least 250,000 ha of organic temperate fruit (tree fruit, grapes, and berries) reported under production worldwide (fully converted plus in conversion), with about 25% of the area with no details provided. We have expanded the scope in this review to include tropical and



**Intercropping organic raspberries and lettuce, Washington State, USA. Photo by Carol Miles.**

sub-tropical fruits, and citrus (Table 2). Olive, technically a fruit crop, was mentioned above.

Twenty-six countries reported organic citrus production, with the top three being Italy, Mexico, and the USA (Fig. 4). Oranges, and lemons and limes were the predominant crops reported, but 40% of the area had no details provided. Organic citrus area expanded 70% since 2005.

Many tropical and sub-tropical fruits are produced organically. The most widely grown include banana and plantain, avocado, mango, pineapple, kiwi, papaya and date. Fig, pomegranate, passion fruit, guava, persimmon, litchi, noni, and pitaya are grown to a lesser extent. Among the 37 countries reporting these crops, the top three in land area were Mexico (46,670 ha), Ecuador (21,708 ha), and Dominican Republic (15,871 ha). Area increased over 2.5 fold between 2005 and 2008. Nearly 9% of global avocado production was under organic management in 2008, based on these and FAO data (FAOSTAT, 2008) (Table 3).

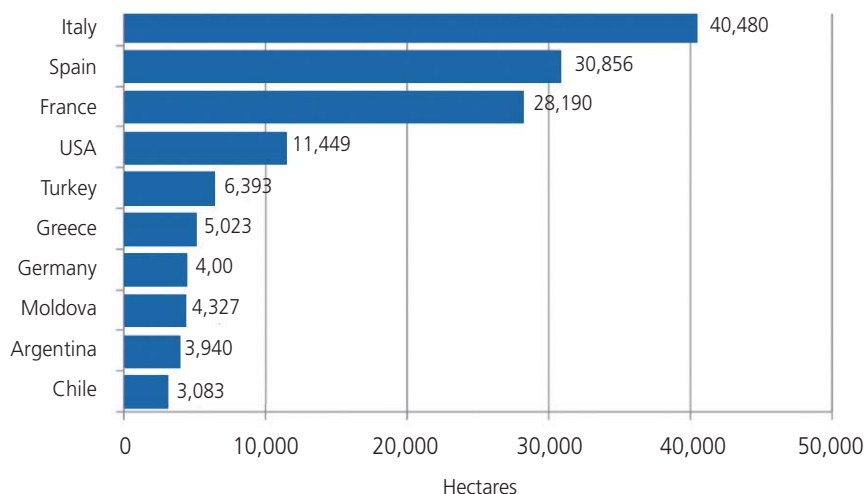
The top three countries with organic berries were Poland, Lithuania, and the USA. Poland reported 13,322 ha of unspecified berries and 1,020 ha of strawberries, while Lithuania reported 4,111 ha with no details. The USA had 1,228 ha of strawberry, 832 ha of blueberry, and smaller areas of raspberry, blackberry, and cranberry. Reported organic berry area grew 360% from 6,806 ha in 2005, with strawberries experiencing a 10-fold increase.

Organic grape production is most common in Mediterranean-type climates (winter rainfall, summer drought) and often requires minimal change from existing management (e.g., California; Vasquez et al., 2006, 2008). Grapes are the most extensively-planted fruit crop in

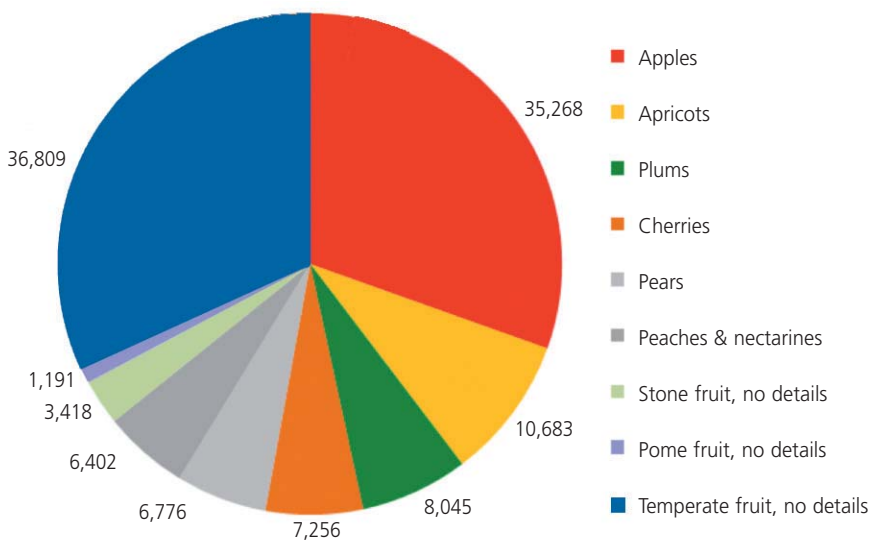
the world. The largest grape producing countries (Italy, Spain, and France) are also the top three organic grape producers (Fig. 5). Organic grapes represented 2.0% of all grape hectares

worldwide in 2008, a relatively large organic share for the world's top fruit crop. The organic grape share was 5.3% in Italy, 3.5% in France, and 2.6% in Spain. These same countries

**Figure 5. Leading organic grape producers in 2008.** Source: FiBL/IFOAM, 2010b.



**Figure 6. Organic temperate tree fruit area (ha), 2008 (total area: 116,000 ha).** Source: FiBL/IFOAM, 2010b; CDFA, 2008; WSDA, 2008.



**Table 4. Main organic vegetable crop categories, 2008.**

Crop category	Area (ha)	% of organic vegetable area	Main specific crops	Leading countries
All vegetables	264,103	100		
Vegetables, no details	129,665	49		
Roots/Tubers/Bulbs <sup>a</sup>	49,448	19	Potato, carrot, onion	USA, Germany, UK
Pulses	35,408	13	Peas, beans, broad beans	Italy, UK, USA
Grown for fruit, or other	21,365	8	Tomato, sweet corn, pepper, melon	Italy, USA, Rwanda
Leafy/Stalked	20,716	8	Lettuce, spinach	USA, Italy, UK
Brassicas	7,501	3	Broccoli, cauliflower, cabbage	Italy, USA, UK

<sup>a</sup> Value includes defined beet, carrot, garlic, potato, sweet potato, onion, cassava, taro, and yam; does not include crops classified as Root crops, other; Root crops, no detail, or any defined sugar beet or other fodder root crops.

Source: FiBL/IFOAM, 2010b; CDFA, 2008; WSDA, 2008.



**Organic eggplant, Alvarez Farm, Yakima Valley, WA, USA.** Photo by Colleen Donovan.

accounted for 27%, 19%, and 20% of all organic grape hectares worldwide. The USA had 8% of the global organic grape hectares, while 36 other countries reporting organic grapes had 26% of the area. Few countries report the end use of organic grapes (wine, table, raisin, grape juice). For conventional grapes, about 70% go to wine and juice production (OIV, undated) with some 20% of production for table use. Grape juice is a neutral sweetener that is used in a number of processed organic products. Organic grape area increased 50% from 2005 to 2008.

Organic temperate tree fruits were examined in detail previously using 2006 data (Granatstein et al., 2010). Apples remained the leader in 2008, with over 35,000 ha under organic management. The other reported areas were apricots, plums, cherries, pears, and peaches/nectarines (Fig. 6). There was an apparent decline in overall organic temperate tree fruit area from 2007 to 2008; however, this was not the case everywhere. For example, the area of organic apples increased 60% in 2008 in Washington State, USA. While countries with dry summer climates still tend to dominate reported stone and pome fruit production (western USA, 14,746 ha; Italy, 14,887 ha; Turkey, 11,325 ha), production has increased in more humid regions. Poland, Germany, and France all have over 6,000 ha of organic temperate tree fruits, including pome and stone fruits. Newer products and strategies to control diseases and insect pests have helped.

## ORGANIC VEGETABLE PRODUCTION

Since a large portion of organic vegetable area was reported with no details (49%), accurately identifying the leading crops was not possible. Main vegetable crop categories were ranked by reported area in Table 4. The top three countries for organic vegetables were the USA, Mexico, and Italy. Organic vegetable area increased by 60% from 2005. With the available detailed





data, the top eight leading vegetables crop areas (ha) appeared to be potato (29,327), lettuce (11,705), carrot (8,095), peas (8,048), tomato (6,600), green beans (5,134), sweet corn (4,327), and sweet peppers (3,036). Sweet corn (maize) is primarily a USA crop. For many countries, including important vegetable producers, no breakdown of the vegetable area was available. Mexico reported over 35,000 ha of organic vegetables with no details, while large areas of organic fresh market vegetables with no other detail came from Indonesia (18,104 ha), and Germany (6,000 ha). USA imports of organic vegetables from Mexico include a variety of vegetables such as tomatoes, peas and beans, squash, melons, cucumbers, onions, celery and radishes (USDA-Agricultural Marketing Service, 2010).

For Roots/Tubers/Bulbs, potato was the dominant crop with 29,327 ha, followed by carrot (8,095 ha), onion (2,929 ha), cassava (2,088 ha) and sweet potato (1,650 ha). Top organic potato producers were Germany (8,150 ha), USA (3,348 ha), UK (3,270 ha) and Austria (3,187 ha), accounting for 61% of the area. The USA had 5,040 ha (62%) of reported organic carrots, and 98% of all sweet potato (both primarily in California). The majority of reported cassava area was in Rwanda (1,200 ha), Mexico (500 ha) and the Dominican Republic (350 ha). The UK had 2,346 ha of other root crops (not specified). Organic carrots were 0.7% of all carrot area worldwide; organic potatoes accounted for < 0.2% of all potatoes.

Vegetable pulse crops include fresh, frozen or

canned beans and peas. Italy reported 16,756 ha of organic pulses, or 47% of the world total. The UK and the USA were the second and third largest producers. The organic share of global vegetable pulse area was 1.7%.

Lettuce and spinach dominated the Leaf/Stalked vegetables, with the USA accounting for 96% and 89% of the reported area, respectively. The UK reported 1,300 ha in this category with no details. Reported organic lettuce area was 1.1% of the global lettuce area.

## ORGANIC NUT PRODUCTION

Total organic nut area was 181,634 ha, with Spain (70,041 ha) the leading producer. Limited reporting of specific organic nut crops (77% of reported nut area had no detail by crop) precluded an accurate characterization of this segment. Area was reported for almonds, cashews, chestnuts, hazelnuts, macadamia nuts, pecans, pistachios, and walnuts, with about 19,000 ha of organic almonds and 16,000 ha of organic cashews. Forty-six countries reported organic nut production, which increased 2.5 times from 2005.

## MEDICINAL AND AROMATIC PLANTS

This category includes plants cultivated for culinary, medicinal, and aesthetic purposes, such as ginger, vanilla, cloves and pepper. Other examples included minor areas of geranium, aloe vera, patchouli, chamomile, and lemongrass. There were 65,323 total ha reported, with



Organic peppers, Alvarez Farm, Yakima Valley, WA, USA. Photo by Colleen Donovan.

21,917 ha in this category defined as permanent crops. However, 89% of the hectares were reported with no details. Tanzania, Madagascar, Nepal, Mexico, USA and Sudan were the leading countries, accounting for 58% of global organic area. Tanzania had 3,000 ha (99%) of the total reported organic ginger while Indonesia had 60% of the 2,295 ha organic vanilla area and 100% of the reported clove area (458 ha). Madagascar sources reported 4,684 ha of aromatic plants and 1,274 ha of culinary herbs and spices. And Mexico had 5,149 ha of medicinal plants (no detail) and 218 ha of organic pepper. Nepal, Sudan, and USA each reported more than 5,000 ha of undefined medicinal, culinary, and/or aromatic plants. No data were available from India.

## FLOWERS AND ORNAMENTALS

Organic flowers and ornamental plants were reportedly grown on at least 2,132 ha, a 6-fold increase from 2005. Data are difficult to collect as crop area may be reported as mixed horticulture or greenhouse production, or as other unsegregated agricultural land classifications. The majority of the ornamental area was reported from Turkey (1,597 ha). Main European countries reporting area included the Netherlands (125 ha), Germany (120 ha), and Switzerland (43 ha). The USA had 106 ha of organic flowers, with smaller areas in Africa and Latin America. An additional 596 ha of greenhouse production, with no crop detail, was reported from the USA. The production of organic flowers appears to be expanding. According to the Organic Trade Association, USA value of organic flower sales more than doubled, to \$42 million, between 2005 and 2008 but represented a small share (0.6%) of the \$6.6 billion in USA retail florist sales.

Organic fruits and vegetables are the mainstay of many box schemes, Wenatchee, USA. Photo by Michel Wiman.





Organic produce at a farmers' market, Eugene, Oregon, USA. Photo by David Granatstein.

## WILD COLLECTION

Large, uncultivated, wild collection areas for berries, medicinal and aromatic plants, nuts, and other plants have been certified organic in many areas of the world. In 2008 the reported area totaled 25.3 million ha; crop details were available for only 30% of the hectares. Certified wild berry area (8.1 million ha) was primarily in Finland. Brazil had the second largest wild collection area (6.18 million ha), mostly undefined. However, Latin America had 1.2 million ha of wild nuts. Africa had a large proportion of the world's reported wild medicinal and aromatic plants, including 3 million ha of devils claw (Namibia), and nearly 7,787 ha of honeybush.

## ECONOMICS AND MARKETS

Horticultural crop consumption is expected to increase with the emphasis on fruits and vegetables for a healthy diet (Wells and Buzby, 2008). Given diet-related illnesses in North America and Europe, the major markets for organic foods, and the perceived health benefit of organic foods by consumers (Reuben, 2010; Hartman Group, 2006), future prospects for organic horticultural crops are encouraging. However, the yield, quality, and economic implications of organic horticulture are less clear. For example, comparison studies of 'conventional' and organic apples have found no significant difference in yields in a semi-arid climate (Glover et al., 2002) but a 26% yield reduction of Class 1 fruit in a humid climate (Weibel, 2002). Yield results reported for some developing countries show substantial increases with organic methods, while modest yield declines were more typical in intensive horticulture in developed countries (Scialabba and Hattam, 2002; Pretty and Hine, 2001; Badgley et al., 2007). Crop, climate, technology, and experience all interact to determine how well organic crops will yield. For organic horticultural crops sold through mainstream retail food channels, products must

meet the same quality as a conventional counterpart. Washington State extra-fancy apples meet the same legal standards, whether organic or conventional. One Washington State fruit company has found that organic apples can produce higher packouts coming out of long-term storage (i.e., less cullage) than conventional apples, and research results support this (Reganold et al., 2001). Organic horticulture can perform better or worse than a conventional counterpart depending on the conditions, and thus stereotypes that describe organic fruits and vegetables as lower quality and lower yielding are frequently not accurate (Raviv, 2010).

The cost of organic horticulture production also varies by crop, environment, and experience. In a recent survey of organic apple growers in Washington State, 25% stated that their organic production was the same or lower cost than what comparable conventional production would be (D. Granatstein, unpubl. data). Comparisons of University enterprise budgets for organic and 'conventional' crops provide some insight into the economics of organic horticulture. For example, total direct costs were 6% lower for organic strawberries in California, yield was 43% lower (due to more diseased fruit) while prices were 64% higher, leading to a 5% increase in net return for organic (Granatstein et al., 2010). With the additional risk involved in a crop such as strawberry, this may not be a strong enough economic incentive for many growers. According to Pay (2009), organic coffee production in Central America costs 10-15% more than 'conventional', but yields decline from 545 to 320 kg/ha. Price premiums, as high as 40%, have been declining and an estimated 10% of the organic coffee growers in the region have exited organic production. Budgets were done for both organic and 'conventional' fresh market lettuce in the Willamette Valley of Oregon, USA (Seavert et al., 2007a, b), and organic lettuce was far more profitable despite lower yields (Table 5). Thus, economic viability of organic horticulture is situation dependent. But the expansion of horticulture land under organic management suggests that for the most part any yield reductions or cost increases are currently compensated for by

premium prices paid by an expanding cadre of consumers.

Horticultural products are very important in the organic market place. Over one-third of all organic food sales in the USA are for fruits and vegetables, and even during the difficult economic conditions of 2008, sales of organic fruits and vegetables increased over the previous year. However, only a few countries have publicly accessible data on the organic market. For example, Germany reported 5.8 billion euros of retail sales volume of organic foods in 2009, which represented 3.4% of all food sales (similar to the USA). Market data for Germany from January-June 2008 show relatively high market shares for organic tropical and subtropical fruits (including citrus), exceeding 10% in some cases. Organic lemons accounted for 25% of all lemon sales. In total, organic fruit had a 4.1% share of product volume and a 5.8% share of sales. Carrots were the leading organic vegetable, with a 17.5% of volume and a 25.3% share of sales. Organic vegetables accounted for 6.9% of the value of all vegetables sold in Germany (BOELW, 2009).

In Switzerland, with about 1 billion euros of organic food sales in 2009, organic vegetables accounted for 10.7% of the value of all vegetables sold in supermarkets, with organic fruit at 7%, and overall organic food at 5.2% (Bio Suisse, 2010).

For many developing countries, exports of organic products are an important source of income, and organic products are often cultivated for the purpose of export. In Argentina, for instance, 90% of the volume of organic production goes to export. Again, horticultural crops play an important role: of the total export volume of 123,729 tonnes (t), fruit accounted for more than one third (45,000 t), followed by processed products (many of these based on horticultural crops) and vegetables (12,000 t) (SENASA, 2010). According to a recent report (Olsen, 2008), Peruvian exports of organic cocoa beans in 2006 represented nearly half of the value of total cocoa sales and one third of the total volume exported. The value of organic exports from Peru was 10 times higher in

**Table 5. Economics of organic and conventional fresh market lettuce, Willamette Valley, Oregon, USA, 2007.**

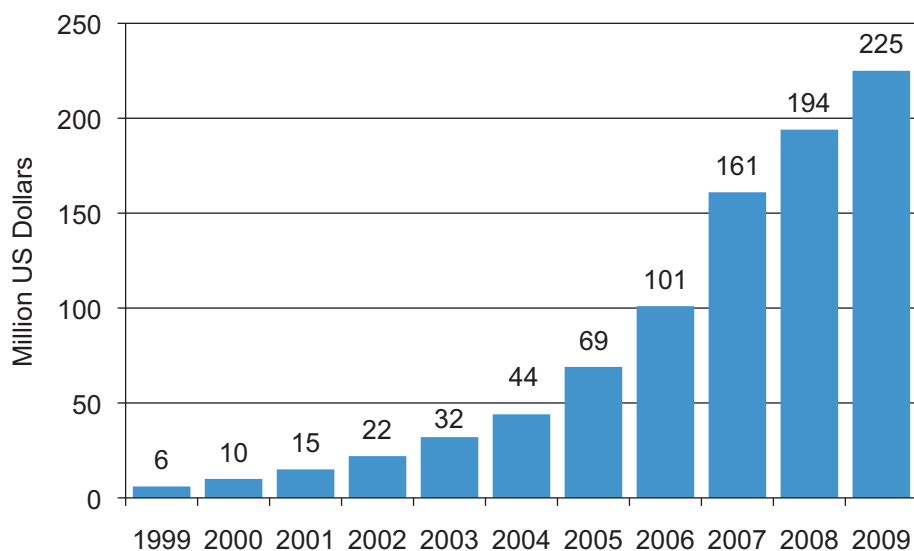
	Conventional	Organic	% Change with organic
Yield (cartons/ha)	2,223	1,606	-28
Total costs (\$/ha)	12,802	13,064	+2
Net return (\$/ha)	4,982	9,413	+89
Price (\$/carton)	8.00	14.00	+75
Cost per carton (\$)	5.76	8.14	+41
Net return per carton (\$)	2.24	5.86	+162

Based on Seavert et al., 2007a, b. \$=US dollars





**Figure 7. Growth of organic exports from Peru.** Source: Aduanas, as cited in Martinez, 2010.



2009 than in 2002, attesting to tremendous growth (Fig. 7). Also the share of organic bananas was high, and Olsen (2008) states that a shift from conventional to organic banana production is nearly complete, a figure which is, however not supported by the data on organic banana area (FiBL/IFOAM, 2010b) when compared to the FAO area reported. As much as 85% of Mexico's organic production is exported to temperate climate regions, primarily the USA, the European Union and Japan, including coffee and off-season fresh vegetables (CIASC, 2009). Organic food exports from India are projected to reach \$1 billion by 2015, up from \$125 mil-

lion in 2010 (Johnston, 2010), and overall organic food sales (export and domestic) may reach 700 million euros by 2012 (Menon, 2009).

## CONCLUSION

Horticultural crops can be difficult to grow, given insect, disease, and weed control challenges, and organic production constrains the number of tools and techniques available. Despite these challenges, the area of organic horticulture has shown a large expansion since 2005. Research on organic horticulture to

address these challenges is increasing, notably with the expanded emphasis on organic production within the U.S. Department of Agriculture (Martin, 2009). With more research and development, including the breeding of crops specifically for organic horticulture systems, progress can be expected. This will be important given the downward price pressure on organic prices in some major markets (e.g., coffee, apples) and the need to provide limited resource farmers in many countries with techniques that fit their economic reality and their need for resource conservation (Jiménez, 2007). As evidence, conferences on organic production in developing countries are drawing increased interest and attendance. Organic producers will continue to benefit from research on biocontrol (Khan, 2010), organic waste recycling, and conservation farming that is not focused on organic systems but that delivers results compliant with organic standards. While small in terms of its share of overall horticultural land, the effect of organic production is likely much greater, as many larger producers have land under both organic and 'conventional' management, and it is not uncommon for these growers to adopt practices first used on their organic land (e.g., compost) on the rest of their hectares when they see positive results. Organic farming, including horticultural production, represents one approach to moving agriculture in a more sustainable direction, one that can provide added value to producers in niche markets, enhance food security in developing countries, and deliver a range of ecosystem services to the public at large.

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Preliminary planning is underway, pending final agreement with ISHS, to host the 2nd International Organic Fruit Conference during summer 2012 in Washington State, USA. Contact David Granatstein for more information or to be put on the mailing list ([granats@wsu.edu](mailto:granats@wsu.edu)).

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# Asian Vegetables in Australia

Jenny Ekman

The discovery of gold in Australia in 1851, triggered the immigration of thousands of prospectors gripped with “gold fever” from Britain, Europe, America, and other parts of the world. At least 40,000 of these immigrants were Chinese, mostly from rural areas in Guangdong Province in Southern China. Many brought vegetable seeds from home, which they grew wherever they camped. As the frenzy of the gold rushes faded, some of the Chinese started businesses as market gardeners or became cooks on outback stations. The green vegetables grown by Chinese gardeners saved many outback settlers from scurvy during the early days, there being few other sources of Vitamin C available in remote areas. By the late 1800s, 75% of the vegetables consumed in Victoria and New South Wales were grown by Chinese farmers and they had replaced storekeepers and grocers as the new merchant elite within the Chinese community. Although their main crops were vegetables familiar to Europeans, most would have cultivated their traditional foods as well. The Chinese continued to dominate fruit and vegetable growing in Australia until the 1930s and in some areas they still supply the local market. Asians now represent a significant and dynamic part of the Australian population and Asian food is an important part of Australian cuisine.



Chinese fruit and vegetable hawker, circa. 1895. Photograph from the National Library of Australia. Vegetables appear to include carrots, turnips, beans and cauliflowers.

## THE ASIAN VEGETABLE INDUSTRY

Traditional Asian vegetables in Australia include lotus root (*Nelumbo nucifera*), snake beans (*Vigna unguiculata*), kang kong (*Ipomoea aquatica*), and buk (bok) choy (*Brassica rapa* subsp. *chinensis*). The definition of an “Asian vegetable” therefore implies that it is in some way “exotic”. Products that become commonplace may therefore no longer be considered Asian vegetables. ‘Bunching Onions’ or ‘Green Onions’ (*Allium fistulosum*) are also often sold as ‘Shallots’ in Australia, even though they bear little resemblance to the small, brown bulbs of *Allium cepa* var. *aggregatum* or *Allium oschaninii*. The latter are sold as ‘French Shallots’ or ‘Eschallots’. Bunching Onions originated in Asia and have made the transition to

an everyday food. These issues aside, value of the Asian vegetable industry is estimated to have increased from \$AUD50 million in 1993/94 to 136 million in 2000/01, and worth at least 151 million in 2009/2010.

As the value of the industry increases, production methods change. Asian vegetable growers in Australia generally fall into one of two broad groups: market gardeners or large scale producers. While the majority of production is soil based, there is an increasing move to hydroponics and protected cropping technology.

### Market Gardeners

Market gardeners are often recent migrants who speak English as a second language. Although their farms are less than 5 hectares, they usually produce a range of different vegetables. There are more than 300 such Asian vegetable farms in the peri-urban area around Sydney. Smaller clusters of market gardeners are also found around Melbourne, Brisbane and Darwin.

Accurate production figures are hard to obtain as many small growers sell directly to local shops, markets and restaurants. Growers also often supply consolidators with larger wholesale businesses, which operate through the central market system. In many cases farms are only leased so there is little incentive to invest in new technologies or infrastructure. Combined with low availability of capital, this means that growing practices tend to be simple and non-mechanised, with the extended family providing much of the labor. Seedlings are often pro-



duced on site and may be grown using saved seed or cuttings – especially for niche products such as long leafed coriander (*Eryngium foetidum*) and Vietnamese balm (*Elsholtzia ciliata*). The seedlings are planted out by hand in mounded beds watered by overhead irrigation. Sometimes simple plastic tunnel houses or rain-shelters are used to improve growth and protect the crop.

The vegetables are harvested by hand and soil is removed by simply dipping into a tank of water or rinsing with a pressure hose. No other postharvest treatments are used. The harvested portions are packed into waxed cardboard cartons or plastic crates. Although the vegetables

Hydroponic production of fu qua (bitter melon) in the Sydney Basin. The plants are grown over a trellis, making the fruit easy to harvest.





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● **Market gardener production of Tung Ho (*Chrysanthemum coronarium*) (A) and Gai Lan (*Brassica oleracea* var. *alboglabra*) (B).**  
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are not usually cooled by using forced air systems, they may be placed in a small cool room for up to 24 hours to allow consolidation before despatch. In general, these growers rely on speed rather than temperature control to get their products to market in good condition.

By keeping outlays low, market gardeners have often weathered the storms of market fluctuations more easily than larger farms with larger debts. Nonetheless, they are now under threat from many sources. Urban encroachment into arable land is a major issue, especially as it encourages land speculation. Where farmland is not-rezoned for housing, new suburban neighbours can be unsympathetic to chemical sprays, plastic tunnels (considered unattractive), or noisy machinery.

Increasing regulations relating to food safety, environmental impacts and land use patterns also create challenges for small businesses. Access to water is increasingly restricted and can be a significant production cost for growers limited to town water supplies. In some areas nitrate pollution of ground water and salinity are also serious problems. Farming is hard work with long hours and many growers hope that their children will go to University rather than staying on the land. With an average grower age over 50, market gardening is in decline.

### Large Scale Producers

Many retailers and wholesalers consider large scale production to be the way forward for the Asian vegetable industry in Australia. Large scale producers have the capacity to invest in technology and infrastructure to improve efficiency. These farms cover up to 50 ha and are capital rather than labor intensive. Seedlings are usually supplied by specialised nurseries and planted mechanically. Entomologists may be employed to assess and control pests, probes are used to monitor soil moisture, and leaf analysis is used to verify nutritional status. Trained staff implement the quality assurance programs demanded by some customers.

Postharvest handling is also more sophisticated than methods used by market gardeners. After harvest, vegetables are vacuum or forced air cooled. Different lines may be trimmed and bunched or flow wrapped before cartonising. Some producers also process the vegetables into fresh cut stir fry mixes or ready to eat salads. Cool rooms are often large and may be humidified, with the capacity to store product as required. Most businesses have their own refrigerated trucks to ensure that the cold chain is maintained.

Large scale producers tend to grow only a few of the most popular Asian vegetable product lines along with traditional vegetables such as celery or lettuce. Products are sold through either the central market system or, in the case of larger producers, directly to one of the super-market chains.

### Hydroponics and Protected Cropping

In recent years water availability has become one of the biggest issues facing Australian vegetable growers. Hydroponic production of Asian vegetables can use as little as 1% of the water used to grow the same vegetables in soil. Hydroponics also minimises land requirements and improves efficiency of fertiliser use.

Many Asian vegetable lines are well suited to hydroponic production. Cucurbits such as fu qua (*Momordica charantia*) and sin qua (*Luffa acutangulata*) can be grown in bags of an inert medium such as coconut coir or composted pine-bark. The bags are placed on the ground and supplied with nutrient solution through drippers. Such systems operate as run-to-waste, with small amounts of runoff that can potentially be captured and recycled. Artificial wetlands are sometimes used to remove excess nutrient from such waste water. The plants themselves are trained over a simple trellis to facilitate harvest.

Leafy vegetables are more commonly grown using nutrient film technology (NFT) systems.

Rock wool or potting mix plugs, each with several small seedlings, are placed through holes into sloping channels carrying a recirculating film of nutrient solution. Keeping the nutrient film shallow maintains its oxygen content, helping ensure that the plant roots do not become anaerobic. For both NFT and medium systems, nutrient solution electrical conductivity (EC) and pH are managed according to crop requirements and weather conditions.

Many Asian vegetable growers (market gardeners and large scale producers) are starting to switch to hydroponic production of various Asian vegetables. For leafy vegetables, one of the major benefits is that plants do not need to be washed at harvest. Hydroponic leafy vegetables tend to have reduced incidence of postharvest rots and leaf diseases compared to the same products grown in soil, extending their shelf life. For example, the shelf life of hydroponically grown buk choy and gai lan (*Brassica oleracea* var. *alboglabra*) can be twice that of the same products grown in soil.

Some hydroponic growers are now starting to use covers. Netting the top and sides of the crop can protect it from hail, strong winds and

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● **Production of Mizuna (*Brassica rapa* subsp. *nipposinica*) for incorporation into fresh cut salad mixes.**  
.....





sunburn damage, reduce the chance of frost and restrict movement of pests. Although costly, hail netting can help produce plants of excellent quality more reliably than is possible in an open environment.

.....  
**Production of Gow Gee (*Lycium barbarum*) in a plastic tunnel house (A), Run-to-waste hydroponic production of Fu Qua (B) and NFT production of Pak Choy (C) and Coriander (D) under hail netting.**  
 .....



## PRODUCTION AREAS

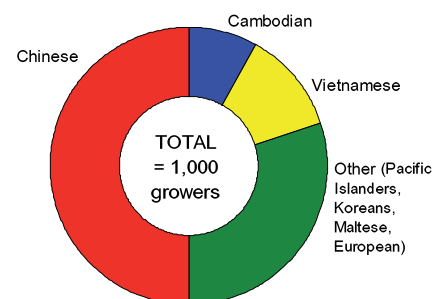
Asian vegetable production in Australia tends to cluster around the major cities of Sydney, Melbourne, and Brisbane with lower volumes produced close to Darwin, north of Adelaide and Hobart in Tasmania. Approximately half of all the Asian vegetables grown in Australia, worth at least \$72 million, still come from the Sydney Region. Most are grown in the peri-urban areas to the west, southwest and, increasingly, the coastal area just north of the city. Production around Sydney is dominated by growers with an average farm size of only 2 ha. Approximately half are of ethnic Chinese background, mostly Cantonese speakers from Southern China. There are also significant numbers of growers with Vietnamese, Cambodian or Korean backgrounds. A diverse range of crops are grown, from common vegetables to niche products and unusual gourds and herbs that may have been family favourites from years before. Leafy greens and herbs are grown year round with beans and cucurbits produced during the warmer months of November to March. While some clusters of market gardeners remain around Melbourne (mostly of Vietnamese origin), most production is by large scale vegetable farmers who have lived in Australia for several generations. Summer production is expanding as growers of traditional vegetables convert to leafy Asian greens. The most commonly grown products include wombok also known as Chinese cabbage (*Brassica rapa* subsp. *pekinensis*), pak choy (*Brassica rapa* subsp. *chinensis*) and buk choy.

The production area close to Darwin provides another contrast. The Northern Territory industry has expanded from 30 growers producing \$2.5 million farm gate value in 1995 to over 60 growers producing \$12 million farm gate value in 2005. Production is mainly during winter, the dry season in the tropical north. While the region grows over 20 vegetable lines, production is focussed on fu qua (41%) and okra (23%) with smaller amounts of snake bean (*Vigna unguiculata* ssp. *sesquipedalis*), gourds such as chi qua (*Benincasa hispida* var. *chieh-gua*) and shui qua (*Luffa cylindrica*) and herbs. The main challenge for these producers is the long transport time (about 10 days) to southern markets such as Sydney or Brisbane. Most growers are small scale and lack sophisticated cooling facilities, essential for extending storage life. However, the rapid expansion of the industry has led to opportunities for some, who have effectively made the transition from market gardeners to scale producers.

Queensland production has the widest geographical spread. Small farms cluster in the peri-urban area around Brisbane with larger vegetable farms to the west in the Lockyer Valley and south west in Stanthorpe. There are also pockets of production north along the coast and, most notably, the Atherton tablelands in the far north.



.....  
**Main locations of Asian vegetable production in Australia.**  
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**Asian vegetable growers in the Sydney Region by ethnic background.**  
 .....

Although South Australia has significant numbers of growers with Vietnamese background, most grow conventional products such as cucumbers and tomatoes rather than Asian vegetables. The region produces only 3% of Australia's total Asian vegetables. In contrast, Western Australian growers are mainly Anglo-Saxon backgrounds. In the 1990s the state was a major exporter of wombok, burdock (*Arctium lappa*) and white radish (*Raphanus sativus*) to Singapore, Taiwan, and Hong Kong. However, competition from China has severely reduced these markets and the industry has declined as a result.

Tasmanian production is mainly focussed on leafy products for local consumption or salad mixes. However, there is potential to expand the burgeoning industry of wasabi (*Wasabia japonica*). Wasabi is suited to the cool, wet climate of Tasmania and was initially grown traditionally in gravel beds with flowing water. However, platypus (*Ornithorhynchus anatinus*), the Australian semi-aquatic egg laying mammal, proved to be an unexpected pest, uprooting young wasabi plants through their habit of foraging for food on the bottom of streams. New wasabi plantings are growing in soil or exploring the use of hydroponics and greenhouse technologies.





Hydroponic production of wasabi (*Wasabia japonica*).



Standardised names of some Asian vegetables commonly available in Australia.

## MARKETING

Much of the growth in the domestic market for Asian vegetables has been driven by increases in the number of Australians with Asian ancestry, a market that has doubled since 1996. Vegetables are an extremely important fresh food for many people of Asian origin, who are likely to shop at least twice as many times a week as the average Anglo-Saxon consumer.

Food choices of Anglo-Saxon Australians have widened greatly from the traditional "meat and 3 vegetables" of the 1970s. Most have some familiarity with Chinese, Japanese, Vietnamese and Thai cuisine. However, although such foods are commonly eaten at restaurants, they are far less likely to be cooked at home. Asian vegetables still represent only 4% of all vegetable sales

by value, even though they are often cheaper than similar, European vegetables. Two of the main reasons for this are name confusion and culinary use.

Confusion regarding the names of Asian vegetables has long been a barrier to industry expansion. For example "Buk Choy" (*Brassica rapa* subsp. *chinensis*) may be spelled Bok, Pak, Baak, Buc + Choy, Tsoi or Choi in any combination. It is also sometimes called Chinese cabbage, as is wombok. For a product such as *Ipomoea aquatica* an even wider range of names is used including kang kong, rau muong, phak bung, en choy, hung choy or anglicised as water spinach. A recent project in Australia sought to implement a naming system for Asian vegetables and was agreed to by grower groups, wholesalers, and Australia's two major

supermarket chains representing approx 60% of retail sales of vegetables. Most names are based on Cantonese pronunciations, the language used by most of the growers in the past.

Surveys have shown that an Anglo-Saxon Australian who regularly buys Asian vegetables is most likely to be an educated, professionally employed city-dweller on an above average income. They will generally purchase one or more vegetables every two weeks and occasionally more frequently. Even those consumers who do not usually purchase Asian vegetables have seen them in retail stores. Asian vegetables have a strong positive image as healthy, fresh, cheap and locally grown. However, the majority of consumers also see them as being "for other people, not for me". When surveyed, consumers often express lack of confidence about

Promotion of Asian vegetables through an in-store taste testing (A) and provision of matching recipe cards (B).





how to prepare and cook the products or worry that their partner or children won't like them. Nearly one third of surveyed consumers who had never bought Asian vegetables said this was because they had just never thought to do so.

Australians generally do not eat enough vegetables. The 2007-2008 National Health Survey found that only 10% of women and 7% of men eat the five daily serves of vegetables recommended by the National Health and Medical Research Council. The survey also found that 62% of Australian adults are overweight or obese, an increase of 5% since 1995. Many Asian vegetables are easy to prepare, quick to cook, can be incorporated into a variety of meals and have good nutritional qualities. Promoting Asian vegetables through taste testing in stores and providing information at the point of sale (e.g. recipes, preparation instructions, nutritional data) could overcome these barriers to purchase and help increase total vegetable consumption. This could not only profit growers and retailers of these products, but also have significant benefits for the Australian population in general.

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# Temperate Tree Fruits and Nuts in India

M.K. Verma, N. Ahmad, A.K. Singh and O.P. Awasthi

In 2009, the temperate tree fruit and nut crops of India were grown over an area of 480 thousand hectares with a production of 2471 thousand tonnes (t) and average productivity of 5.14 t/ha (Indian Horticulture Database, 2010). Over the last 50 years, there has been a gradual increase in area, production, and productivity but most of the increase has come in area planted. The major temperate fruits are apple, pear, peach, plum, apricot, cherry, almond, and walnut. Restraints to temperate fruit production are both climatic and economic. Local breeding programs are needed in India for all fruits.

## GEOGRAPHY AND CLIMATE

India, situated north of the equator between 8° 4' and 37° latitude and 68° 7' and 97° 25' longitude, is bounded on the southwest by the Arabian Sea and on the southeast by the Bay of Bengal. To the north and northeast lies the mighty Himalayan range. To the west lies Pakistan and to the east, Bangladesh and Myanmar. In the north, China (Tibet), Nepal and Bhutan share the international boundary with India. To the south Sri Lanka shares the maritime boundary and is separated from India by a narrow channel of the Bay of Bengal formed by the Palk Strait and the Gulf of Mannar (Fig. 1). India is one of the largest countries of the world and covers an area of about 3,287,263 km<sup>2</sup>. It measures 3,214 km from north to south and 2,933 km from east to west and has a

land frontier of 15,200 km and a coastline of 7,516 km. Only the mountain ranges of Himalayas are temperate. Several sub-mountain tracts of varied lengths and heights support diverse flora and fauna.

There are three main climatic seasons in India: monsoons (June-September in the southwest and, October-November in the northeast), summer (April-July), and winter (October-March). "Winter" prevails from October to March and is marked by cool day and night, cloudy as well as clear skies, and occasional hot days. In the northern Himalayan areas, the temperature falls by 0.6°C for every 100 m rise in altitude, which causes a variety of climates from nearly tropical in the foothills to tundra type above the snow line. There is sharp contrast between temperatures of the sunny and shady slopes, and a high

Figure 1. Climatic regions in India.



diurnal range of temperature, temperature inversion and rainfall variability based on altitude. Most of the rainfall is in the form of snow during late winter and spring months. The area

to the south of the great Himalayan range is protected from cold winds coming from the interior of Asia during winter. The leeward side of the mountains receives less rain while the well exposed slopes get heavy rainfall. The places situated between 1070 and 2290 m altitude receive the heaviest rainfall and the rainfall decreases rapidly above 2290 m. The Himalayan range has heavy snowfall during the winter months, particularly from December to February, at altitudes above 1500 m with a high diurnal range of temperature.

The temperate climatic zone area is found in the states of Jammu & Kashmir, Himachal Pradesh, Uttarakhand, and parts of Arunachal Pradesh, Meghalaya, Manipur, Sikkim and Nagaland. Because of an ideal climate this region offers tremendous opportunity for production of high quality temperate pome fruits (apple and pear),



● Topography of hill horticulture.

stone fruits (peach, plum, apricot, and cherry), and nuts (walnut, almond, chestnut, pecan nut, and hazelnut) (Table 1).

The temperate climate in India differs from Europe, North Asia, USA, and Canada where the availability of sufficient chilling, adequate

**Table 1. Suitable areas for temperate fruit and nut crop production in India.**

State	Zones in the different growing states	Average annual rainfall (mm)	Approximate elevation (m)	Suitable fruit & nut crops
Jammu and Kashmir	Temperate: High hills with low winter temperature and snowfall	600-1000	1200-2500	Apple, pear, cherry, peach, plum, apricot, almond, walnut
	Dry Temperate: High elevation, very cold, and little rainfall	130-300	Above 3000	Apricot, pear, apple, prune, walnut, grape
	Sub-temperate: High elevation, very cold and little rainfall	800-1000	800-1200	Apricot, peach, plum, pear, almond, walnut
Himachal Pradesh	Cold and Dry: Dry Temperate	240-400	2750-3650	Apple, apricot, cherry, chilgoza, pistachio nut, walnut, hazelnut, almond, grape, prune
	High hills and valleys in interior temperate	900-1000	1500-2750	Apple, pear, cherry, almond, walnut, chestnut, hazelnut, strawberry
	Mid-Hills: Sub-temperate	900-1000	900-1500	Peach, plum, apricot, almond, persimmon, pear, pomegranate, pecan nut, walnut, kiwi fruit, strawberry
Uttarakhand	Dry Temperate	240-400	2750-3650	Apple, apricot, cherry, chilgoza, pistachio nut, walnut, hazelnut, almond, grape, prune
	High-Hill Temperate	900-1000	1500-2750	Apple, pear, cherry, almond, walnut, chestnuts, hazelnuts, strawberry
	Mid-Hills: Sub-temperate	900-1000	900-1000	Peach, plum, apricot, almond, persimmon, pear, pomegranate, pecan nut, walnut, kiwi fruit, strawberry
Arunachal Pradesh	Temperate pockets in districts of Kameng, Siang, Tirap, and Lohit	2000-3000	900-4000	Apple, peach, plum, pear, apricot, walnut, chestnut, cherry
Meghalaya	Temperate pockets in districts of Central Plateau-Khasi and Jaintia	2000-2500	950-1900	Plum, pear, peach, apricot, persimmon
Manipur	Temperate pockets in districts of Sekmai, Maram, Tadubi, Mao, Ukhrul, and Tengnoupal	1400-1600	900-2000	Peach, plum, pear, apricot, persimmon
Nagaland	Temperate pockets in districts of Mokokchung, Wokha, Tuensang Kohima, and Phek	2000-2500	1000-3000	Peach, plum, pear, apricot, persimmon







● Topography in Kashmir valley.  
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sunshine, and appropriate daylength are responsible for high quality fruit production. The climatic features of the temperate zones of India are characterized by abundant rains during monsoon (June to September), foggy weather with low sunlight intensity during the day, and temperatures less than 30°C during the peak summers especially in Himachal Pradesh, Uttarakhand, Jammu Province and parts of the Northeastern states. However, a slightly more suitable area, which has similar climatic conditions as in some European countries, is found in the Kashmir valley in Jammu & Kashmir and the Kinnour valley in Himachal Pradesh, which produces the best quality temperate fruit and nut crops in terms of yield and quality.

About 80% of the temperate region in India is rainfed. In most of the areas, the bulk of the precipitation takes place during three or four months (mostly in the monsoon period from June-September). However, the Kashmir valley is devoid of monsoon rains (June-September) and March-April is the rainy season, but precipitation is received during winter in the form of snow. The remaining periods are more or less completely dry and trees can suffer from serious moisture stress, a major factor for low productivity. Because rainfall occurs within a short period, and the terrain is hilly, there are special problems. Rain water travels down the hill slopes at high velocity, eroding the soil, making gullies, with little chance of being absorbed. The result is floods during the rainy season and drought or moisture stress in the dry season.

In mountainous tracts, soils (cultivable area and depth) are less compared to the plain area. Relatively flat areas occur in small valleys, river banks, and ridge tops. In most areas, entire hillsides are dotted with villages set amidst terraced fields. The soil profile, depth, and characteristics change according to slope gradient; many soils in levelled areas have poor drainage.

## HISTORY

Temperate fruits in India have a complex, little understood history. Literary records suggest temperate fruits in Rajtarangni during the reign of King Nara (2000 BCE). The Indian scriptures, *Charaka Samhita* and *Susruta Samhita* (680 BCE) mention walnut, almond, and pistachio.

The Kashmir valley in the Himalayas has a long history of pome, stone, and nut fruits. Some areas in the Kashmir valley are still popularly known as Chaere-van (apricot forest), Chunt-var (apple yard), Tangdar (pear fields), and Alkhi Bag (sour cherry). Some of these fruits appear to be introductions while others like walnut and *Malus baccata* apple are indigenous. Hiuen Tsang (629-645 CE) mentioned cultivation of pear, plum, peach, and apricot around the vicinity of Kashmir. The Shamir, rulers of the 15th century laid out gardens and orchards in Kashmir valley of Jammu and Kashmir. Sultan Zain-ul-Abidin "Budshah" (1420-1470) imported many fruits from Central Asia along with the art of grafting. In the Mughal period (16th century), the *Ain-i-Akbari* mentions the 'Ambri' apple of Kashmir, which might have been introduced from Uzbekistan. Almond was probably introduced to Kashmir during the 16th century by Persian settlers.

Europeans introduced apples in the Nilgris, Tamil Nadu, through the botanical garden in Ootacamund in the 1850s. The British were pioneers in the establishment of apple industry in Nainital district, Uttarakhand. In Garhwal Division, apple was first introduced by Mr. F.E. Wilson in 1859 in the Harsil area of Uttarkashi. Apple was introduced in Kumaon hills at Chaubattia, Uttarakhand in the later half of the 19th century with the first apple orchard established in the Ramgarh area of Nainital.

Apple cultivation was reported by Mr. Duke in 1876 in Jammu and Kashmir. The most commonly produced apple cultivars were 'Ambri

Tsunt', 'Ser Trel', 'Nabid-Trel', 'Ts'k Tsunt', 'Tetshukur', and 'Ballpru'. M. Ermens, formerly Head Gardener of Public Works in Paris, came to Kashmir in 1865, made a thorough investigation of the soils, climate, rainfall, and other conditions, and introduced and planted the apple cultivars in Chasm-e-Shahi, Srinagar, Jammu & Kashmir in 1875. Sir Edward-Buck, realizing the potential and scope for producing European fruits, submitted a scheme for improvement of fruit culture in Kashmir to the Government of India in 1889. Later on, Mr. Gollan, a French gardener, came to Kashmir, collected 25,000 wild apple rootstocks, and established a nursery for grafting; plants were subsequently distributed to the state orchardists.

The credit for commercial plantation of apple goes to Christian missionaries and British Army officers who settled in Western Himalayas for tea cultivation. Captain R.C. Lee, a retired British soldier, planted the first apple garden at Bandrole in the Kullu valley in 1870. A number of apple cultivars were introduced by Alexander Coutts in his orchard called "Hillock Head" at Mashobra (presently Regional Horticultural Research Station, Mashobra) in 1887. Commercial apple production was given an impetus by Satya Nand (Samual Nicholas) Stokes, a resident of Philadelphia, USA, who imported 'Delicious' apple along with American technology in the first quarter of the 20th century and planted it at Kotgarh in Shimla Hills. This cultivar flourished in the bright sunshine and warm summers of the North Indian Hills and much of 'Delicious' apples in India today derive from plants imported by Stokes. Cultivars such as 'Topred', 'Vance Delicious', 'Hardiman', and Spur types, such as 'Red Spur', 'Golden Spur', 'Red Chief', 'Oregon Spur', 'Starkrimson', 'Silver Spur', were introduced between 1950-1985.

## POME FRUITS

### Apple

Apples are produced on 274 thousand ha, with annual production of 1.9 million t, but productivity (7.2 t/ha) is low compared to the world average (14.0 t/ha). Most cultivars now grown were introduced from Europe, USA, Canada and Australia and 'Delicious' strains contribute nearly 80% of total production. There are still small areas under less known cultivars such as 'Irish Peach', 'Benoni', 'Mother', 'Jonathan', 'Rome Beauty', 'King of Pippin', 'Apirouge', 'Kerry Pippin', 'Chamure', 'Baldwin', 'Yellow Newton', and 'Versified'. Recent introductions focused on spur-type, highly colored, high-yielding cultivars and strains with better quality. A few were found promising in terms of yield and quality traits including 'Red Chief', 'Oregon Spur', 'Top Red', 'Rich-a-Red', 'Gala', 'Fuji', 'Silver Spur', 'Gold Spur', 'Lal Ambri', and 'Sunheri' and were recommended for intensive orcharding on dwarfing clonal rootstocks (MM.106, MM.111 and M.9) with drip irrigation. However, almost all the cultivars originat-





Modern high density apple orchards.



A



B



C

Modern apple cultivars: A. Oregon Spur, B. Red Chief, C. Gala Mast.



Grading of apples at farmer's field.

ed from cold temperate countries, and therefore many of them are not well adapted to the North-western Himalayan climatic conditions, showing a lack of color, appropriate shape, and firmness with sensitivity to sunburn. One of the main climatic limitations for optimum fruit color development compared to cold areas and/or mountain areas is low day-night temperature fluctuations. There are five scion breeding pro-

grams aiming for fruit yield, quality and scab resistance: (1) Central Institute of Temperate Horticulture (CITH), Srinagar; (2) Sher-e-Kashmir University of Agricultural Science & Technology (SKUAST-K), Shalimar-Srinagar; (3) Dr YS Parmar University of Horticultural Science & Forestry (YSPUHF), Nouni-Solan; (4) Horticultural Experimental & Training Centre (HETC), Chaubattia-Ranikhet; and (5) Tamil Nadu

Agricultural University, Coimbatore. They have released a number of more adapted cultivars such as 'Lal Ambri', 'Sunheri', 'Firdous', 'Shireen', 'Akbar', 'Amred', 'Ambroyal', 'Ambrich', 'Ambstarking', 'Chaubattia Princess', 'Chaubattia Anupam', 'Chaubattia Agrim', and 'KKL 1'.

## Pear

Pears are grown in almost all the parts of temperate zone due to availability of low and high chill cultivars. Pears are produced on 33 thousand ha with annual production of 183 thousand t with an average productivity of nearly 6.0 t/ha. The introduction of pear cultivars started during the 16th century and continues with cultivars from Europe, USA, Japan, China and Australia. European pears are adapted where chilling hours are sufficient and summers have clear sunny days. Asian pears are grown in high hills to mid-hills and some cultivars such as 'Patharnakh' are grown in the sub-tropical plains of Punjab, Uttar Pradesh, Rajasthan, Tamilnadu and North-Eastern States. Old Asian cultivars ('Baghugosha', 'Kieffer', 'Chinese Sand Pear', and 'Patharnakh') contribute up to 80% of the



'Kashmiri Nakh' - a high quality famous pear cultivar of Kashmir.

Packaging of pears in wooden boxes for long distance transport.







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● **Newly released apricot cultivars: A. CITH Apricot-I, B. CITH Apricot-II, C. CITH Apricot-III.**

annual production (nearly 66 thousand t). Recently 'Bartlett', 'Red Bartlett', 'Max Red Bartlett', 'Flemish Beauty', 'Starkrimson', 'Clapp's Favorite', and 'Leconte' are found to be suitable under areas receiving sufficient chilling hours with clear sunny summers. There has been little research effort in pear. Some low chilling cultivars developed by GBPUAT (Govind Ballabh Pant University of Agriculture and Technology), Pantnagar, and Punjab Agricultural University, Ludhiana include 'Pant Pear 3, 17, 18', 'Punjab Nector', 'Punjab Gold', and 'Punjab Soft'.

## STONE FRUITS

### Peach

Peach, the main fruit crop of the mid-hills, was produced on 13.4 thousand ha with annual production of 45.8 thousand t. Productivity is very low (3.4 t/ha) as compared to the world average (11.2 t/ha) and up to 50 t/ha in some countries. This is mainly due to lack of high yielding cultivars suitable for varied altitude ranges of humid-temperate mountainous agro-ecosystems. The lack of suitable soils, irrigation facilities, and frequent occurrence of drought during fruit development stage adversely affects yield. The Ramgarh area of Nainital and Rajgarh area of Himachal Pradesh produce good quality peaches. Major cultivars are 'World's Earliest', 'Judy Elberta', 'Crawford Early', 'J.H. Hale', 'Flordasun', 'Shan-e-Punjab', 'Saharanpur Prabhat', 'Peshawari', and 'Quetta'. In India, breeding for development of sub-tropical cultivars was initiated by Punjab Agricultural University and Research Station, Saharanpur (UP) and releases include 'Shan-e-Punjab', 'Partap', and 'Saharanpur Prabhat'. 'Pant Peach 1', a low chilling semi-cling stone fruit was developed by GBPUAT, Pantnagar. 'Paradelux' is a local clonal selection that is suitable to mild temperate climatic areas and bears heavy yields, with large,

attractive fruits with good flavor. The National Bureau for Plant Genetic Resources, New Delhi provides logistic support to CITH, Srinagar, YSPUHF, Solan, and other research institutes for cultivar introductions such as 'Cresthaven', 'Glohaven', and 'Red Globe' peach and 'Fantasia' and 'Snow Queen' nectarine.

### Plum

The total plum area under cultivation is 21 thousand ha and produces 56.6 thousand t annually with low productivity (2.68 t/ha) as compared to world average (4.15 t/ha). Old cultivars predominate such as 'Santa Rosa', 'Sharp's Early', 'Formosa', 'Wickson', 'Satsuma', 'Burbank', and 'Green Gauge'. Recent introductions of plum ('President') and prune ('Duarte', 'Grand Duke', and 'Early Italian') are promising and farmers are enthusiastic. Unfortunately plum breeding has not received much attention in India. Two cultivars 'Pant Plum 1' and 'Fla 12' were released by GBPUAT, Pantnagar for sub-tropical areas.

### Apricot

The highly perishable apricot is only being grown on a commercial scale in Ladakh province of Jammu & Kashmir, but small areas are scattered, there and in Himachal Pradesh and Uttarakhand. The total area under cultivation is 17.1 thousand ha, and produces 51.8 thousand t. Productivity is low (3.0 t/ha) as compared to world average (7.0 t/ha) due to the lack of suitable cultivars for India. 'Ladakh' apricot is mainly utilized for drying. The major cultivars are 'Halman', 'Suka', 'Rakshey Karpo', 'Tokpopa', and 'Khalman'. Jammu & Kashmir, Himachal Pradesh and Uttarakhand produce apricot for fresh consumption from traditional cultivars such as 'Moorpark', 'Charmagz', 'Kaisa', 'Frogmore Early', 'Gilgiti Sweet', 'Amba', and 'Quetta' but these have poor shelf

life. Various breeding programs were initiated and newly released cultivars include 'CITH Apricot-I, II, III', 'Chaubattia Madhu', 'Chaubattia Kesri', and 'Chaubattia Alankar'; new introductions include 'Rival', 'Tilton' and 'Chinese'.

### Sweet Cherry

Sweet cherry is still growing in the selected pockets of Kashmir valley and few areas of Himachal Pradesh due to its requirements for high chilling and clear sunny days. It is grown on 2.8 thousand ha and produces 8.5 thousand t annually, with low productivity (3.0 t/ha) as compared to world average (4.8 t/ha). The cultivation is concentrated in four districts of the Kashmir valley with traditional European cultivars: 'Misri' ('Bigarreau Noir Grossa'), 'Awal Number' ('Guigne Pourpera Pecoco'), 'Double' ('Bigarreau Napoleon'), 'Siyah Gole' ('Black Heart'), 'Tontal' ('Guigne Noir Grossa Lucenta') and 'Makhmal' ('Guigne Noir Hative'). Cultivars such as 'Stella', 'Bing', 'Van', and 'Compact Stella' are promising, but there is a need to start breeding programs.

## NUT CROPS

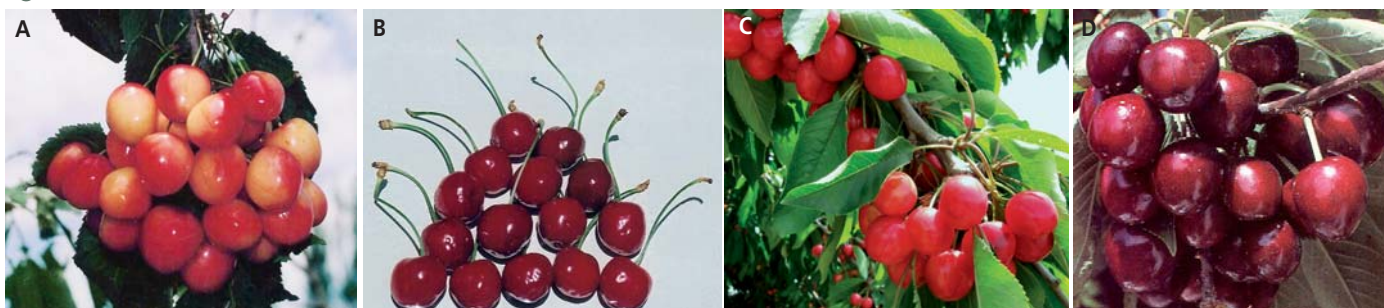
### Walnut

Walnut is the major temperate nut crop grown in India. Production has increased almost 10-fold (125 thousand t) during the last 45 years and is now grown on 101 thousand ha. This is the only temperate nut crop exported in large quantity. Kashmir walnuts are popular within and outside the country because of its superior quality. The nuts are classified as paper shell (Kagzi) and thin shell (Burzil). The kernels are of superb quality range from extra light to light in color. The entire cultivation is based on seedling trees. In the last two decades there has been some progress on clonal selections. The CITH released five cultivars ('CITH I to V') with average kernel weight of 10-12 g. SKUAST-K released 'Suleiman' and 'Hamdan'; YSPUHF-Solan released 'Govind' and 'Partap'.

### Almond

Almond is the second most important temperate nut crop and is confined to the Kashmir valley. The total area under almond cultivation is 21.3 thousand ha, which produces 15.6 thou-

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● **Promising sweet cherry cultivars: A. Double, B. Misri, C. Bing, D. Stella.**





.....  
: Newly released walnut cultivars: A. CITH Walnut-I, B. CITH Walnut-II, C. CITH Walnut-III, D. CITH Walnut-IV, E. CITH Walnut-V.  
.....

sand t annually but productivity is very low (0.73 t/ha) as compared to USA (2.99 t/ha) and world average (1.13 t/ha). Most plantings are seedlings and are produced on rainfed, infertile Karewa lands. Green almonds are also grown in mid-hills to plains in Himachal Pradesh, Uttarakhand, Jammu, and Punjab. It is believed that almonds were introduced from Persia by Mughal rulers for cultivation in Kashmir valley. Recent introductions include 'Non-Pareil', 'IXL', 'Merced', 'California Paper Shell', 'Chelistan', 'Pranyaj', and 'Primorskij'. 'Non-Pareil' is performing better under Kashmir conditions but is mildly sensitive to spring frost. SKUAST-K developed four cultivars, mostly clonal selections ('Shalimar', 'Makhdoom', 'Waris', and 'Parbat') that have slight tolerance against spring frost; under close spacing and drip irrigation yields of 6-year-old plants have been 3 t/ha. A breeding program has been established.

#### Grape

Scant information is available on grape cultivation in temperate climate in India. However, it is

worth to mention that grapes did not receive much attention of growers in these areas due to unknown reasons. But its cultivation is increasing very fast in tropical and sub-tropical areas, where productivity is recorded at the highest in world. Farmers are getting good returns due to scientific adoption of packages and practices.

### THE FUTURE OF TEMPERATE FRUITS IN INDIA

Temperate fruits contribute significantly to the horticultural economy of India. Apple production dominates the scene and systematic cultivation and marketing of apple can change the rural economy in the hills of North-Western India. New vision and concerted efforts are required for change in cultivar mix and supply of quality planting material from elite clones on indexed clonal rootstocks. High density planting, water management including micro-irrigation, integrated plant nutrient management and IPM strategies for plant protection are some of the areas that need greater R&D focus.

### ABOUT THE AUTHORS



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: Indigenous almond cultivars: A. Shalimar, B. Makhdoom, C. Waris.  
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### REFERENCES AND FURTHER READINGS

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Indian Horticulture Database 2010. National Horticulture Board, Ministry of Agriculture, Government of India, 85, Industrial Area, Sector-18, Gurgaon-122015, India.  
Ravindran, C., Kohli, A. and Srinivasa Murthy, B.N. 2007. Fruit production in India. Chronica Hort. 47(2):21-26.  
Teaotia, S.S. 1993. Horticultural Development in the Hindu-Kush Himalayan Region. Oxford and IBH Publ. Co. PVT. LTD., New Delhi.







# New Books, Websites

## BOOK REVIEWS

The books listed here are non-ISHS-publications. For ISHS publications covering these or other subjects, visit the ISHS website [www.ishs.org](http://www.ishs.org) or the Acta Horticulturae website [www.actahort.org](http://www.actahort.org)

**The Garden of Invention: Luther Burbank and the Business of Breeding Plants.** Jane S. Smith. 2009. The Penguin Press, New York, USA. 354p. ISBN 978-1-59420-209-4. \$25.95. [www.penguin.com](http://www.penguin.com)



Plant breeding is usually classified as both a science and an art and Luther Burbank (1849-1926) is the consummate artist of horticultural plant breeding. While his science was shaky – he was skeptical of Mendelism and his concept of inheritance was weird – he was intuitively correct in his methods. His hero was Charles Darwin and Burbank considered plants and species as eminently plastic and susceptible to alteration. He pursued hybridization with a vengeance and had an innate understanding of the value of genetic diversity combined with an uncanny ability for selection. His record keeping was practically nonexistent but like all successful breeders he was intimately knowledgeable about the wealth of his material and he was an indefatigable worker. His success was amazing and he is credited with some 800 releases!

As a young man Burbank discovered a single rare pod containing 23 seeds from an open-pollinated 'Early Rose' potato, planted them and came up with two selections, one of which became the 'Burbank' potato; its russet mutation is still the most famous cultivar in the United States and the source of all of McDonald's French fries. Not bad for a first attempt. Burbank sold it to James J.H. Gregory,

a seed dealer in Marblehead, Massachusetts for \$25 and was indeed fortunate in having his name attached to the selection. He moved to Santa Rosa, California, went into the nursery business, and soon developed the concept that plant breeding could be a business. In the process Luther Burbank became the most famous horticulturist in the United States and perhaps the world where he became known as the Wizard of Santa Rosa. Among his many accomplishments, Burbank was responsible for the plant patents law of 1930. In a famous quote he wrote:

*A man can patent a mousetrap or copyright a nasty song, but if he gives to the world a new fruit that will add millions to the value of earth's annual harvests he will be fortunate if he is rewarded by so much as having his name connected with the result.*

The concept that new plants could be protected by patent, has become a dynamic force in plant breeding.

Plant breeder, nurseryman, and business entrepreneur, Burbank's story is an unbelievable epic of 19th and early 20th century horticulture. Burbank became associated with Thomas Edison and Henry Ford, as examples of the creative spirit of the United States of America. His image is memorialized on a US postage stamp released in 1940. Luther Burbank still today, along with the ex-slave plant scientist George Washington Carver, remains the best known horticulturist in America. His rise from modest circumstances to cultural icon and mythic plant wizard is wonderfully chronicled by Jane S. Smith, historian and English professor. She has done an outstanding bit of writing in describing the extraordinary career of Burbank whose many creations are still being grown worldwide.

Reviewed by Jules Janick, Purdue University, USA

**Orticultura Mediterranea Sostenibile (in Italian). (Sustainable Mediterranean Vegetable Production.) Romano Tesi. 2010. Patron Editore, Bologna, Italy. 503p. ISBN 978-88-555-3062. € 42. [www.patroneditore.com](http://www.patroneditore.com)**

Professor Romano Tesi (University of Florence, Italy) has published a new book written in Italian on the concept of sustainability applied to the production of vegetables in Mediterranean regions. The book introduces different approaches (conventional, integrated, and organic) to the cultivation of vegetable species and provides a compendium of scientific and technical information useful to growers,



consultants, and researchers. The contents include chapters on produce quality, protection structures (greenhouses and tunnels), seed and transplant production, irrigation, and fertilisation. One hundred and twelve species are covered with information on botany, the properties of their edible organs, cultivar classification, soil and climatic requirements, growing techniques including weed control, harvesting and storage, and pests and diseases. The text contains many tables and illustrations in color.

Reviewed by Alberto Pardossi, University of Pisa, Italy

## NEW TITLES

Arora, R. (ed.) 2010. Medicinal Plant Biotechnology. CABI Publishing, Wallingford, UK. 384p. ISBN 9781845936785 (hardback). £95.00 / \$180.00 / € 135.00. [www.cabi.org](http://www.cabi.org)

Kado, C.I. 2010. Plant Bacteriology. APS Press, St. Paul, MN, USA. 336p. ISBN 978-0-89054-388-7 (hardcover). \$139.95. [www.apsnet.org](http://www.apsnet.org)

Karasev, A.V. and Hilf, M.E. 2010. *Citrus tristeza virus* Complex and Tristeza Diseases. APS Press, St. Paul, MN, USA. 304p. ISBN 978-0-89054-378-8 (softcover). \$149.00. [www.apsnet.org](http://www.apsnet.org)

Lartey, R.T., Weiland, J.J., Panella, L., Crous, P.W. and Windels, C.E. (eds.). 2010. Cercospora Leaf Spot of Sugar Beet and Related Species. APS Press, St. Paul, MN, USA. 304p. ISBN 978-0-89054-387-0 (hardcover). \$159.00. [www.apsnet.org](http://www.apsnet.org)

Xu, Y. 2010. Molecular Plant Breeding. CABI Publishing, Wallingford, UK. 752p. ISBN 9781845933920 (hardback). £125.00 / \$240.00 / € 175.00. [www.cabi.org](http://www.cabi.org)

# 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](http://www.ishs.org/calendar)

Crop Protection in Southern Britain 2011, 23-24 February 2011, Impington, Cambridge, UK. Info: Rebecca Morgan, Association of Applied Biologists, The Warwick Enterprise Park, Wellesbourne, Warwick, CV35 9EF, UK, Phone: +44 (0) 2476 575195, Fax: +44 (0) 1789 470234, Email: [rebecca@aab.org.uk](mailto:rebecca@aab.org.uk), Web: [www.aab.org.uk](http://www.aab.org.uk)

GM Crops: From Basic Research to Application, 28-29 June 2011, Harpenden, UK. Info: Rebecca Morgan, Association of Applied Biologists,

The Warwick Enterprise Park, Wellesbourne, Warwick, CV35 9EF, UK, Phone: +44 (0) 2476 575195, Fax: +44 (0) 1789 470234, Email: [rebecca@aab.org.uk](mailto:rebecca@aab.org.uk), Web: [www.aab.org.uk](http://www.aab.org.uk)

VII World Avocado Congress, 5-9 September 2011, Cairns, Australia. Info: Nataly Rubio, Congress Coordinator, Australia, Phone: (61)7 3846 6566, Fax: (61)7 3846 6577, Email: [congress@avocado.org.au](mailto:congress@avocado.org.au), Web: [www.worldavocadocongress2011.org.au](http://www.worldavocadocongress2011.org.au)



## SYMPOSIA AND WORKSHOPS

# Commission Economics and Management Third Int'l Symposium on Improving the Performance of Supply Chains in the Transitional Economies



Participants relax en route.

Organised by Associate Professor Peter J. Batt from Curtin University in Perth, Western Australia and Dr. Nolila Mohd Nawi from Universiti Putra Malaysia, the Third International Symposium on Improving the Performance of Supply Chains in the Transitional Economies: Sustainability and Corporate Social Responsibility attracted some 41 delegates from over 14 countries. Conducted over 5 days from July 4 to 8 in Kuala Lumpur, Malaysia, a total of 35 papers were presented dealing with various

aspects of supply chain management in the transitional economies, purchasing and marketing, food safety and product quality, facilitating and enhancing collaborative marketing groups, farm production systems, organics and sustainability.

In his opening address, Mr. Yong Lee Keng, Head of Nestle Agricultural Services in Malaysia, described the need for sustainable development to be something that meets the needs of the present without compromising the



Mr. Yong Lee Keng, Head of Nestle Agricultural Services in Malaysia, delivers his keynote address.

ability of future generations to meet their needs. Redefining the triple bottom line, Mr. Yong suggested that sustainability could only be achieved when there was a win-win-win situation for people, the planet and business. Over 140 years, Nestle has built into its business the fundamental principle that to have long-term success for shareholders, Nestle must comply with all applicable legal requirements and that all Nestle activities must be sustainable. To achieve its objectives, the main vehicle that Nestle employs is the Sustainable Agriculture Initiative, a platform that has been in place since 2002. The SAI is a strategy that ensures the supply of raw agricultural materials of the desired quality under competitive conditions, which





have been produced in a way that is safe for the farmer and the environment. The key outcome was the desire to create shared value.

The concept of value, in one way or another, was present in the majority of the papers presented to the symposium. For those papers that explored the various means of linking smallholder farmers to modern institutional markets, value was achieved when smallholder farmers were able to deliver a superior quality product to downstream customers in a more consistent manner and a more competitive price. Invariably, this required smallholder farmers to collaborate in some way, to collectively plan and schedule plantings, and to implement quality management systems that met customers' expectations. While vast differences in quality expectations remain between the traditional wet market and the modern institutional market, particularly with regard to food safety and environmental sustainability, as input costs continue to rise and there is greater uncertainty

associated with climatic variables, there is mounting evidence of a gradual shift among smallholder farmers towards low input production systems as a risk mitigation strategy. Such is resulting in the more widespread use of open pollinated varieties, animal manures, fermented plant juices and concoctions, vermi-compost, integrated pest control, crop rotations and companion planting. Yields are being sacrificed to reduce costs and thus the exposure to potential debt, should the crop fail or the prices received fall below those necessary to be profitable.

For many of the delegates, as this was their first visit to Malaysia, delegates spent a day in the field visiting a vegetable cooperative at Hulu Yam and the wholesale market at Batu Caves. The visit to the farm provided useful insights into the constraints impacting upon the production and the subsequent marketing of green leafy vegetable crops grown in Kuala Lumpur. The visit to the wholesale market provided delegates with a unique opportunity to compare



Processing green leafy vegetables at the Selangor Veggies Park.

the quality of the fresh produce available from a number of alternative sources including Australia, China, Indonesia, New Zealand, South Africa, Thailand and the US.

Despite the low number of delegates, most participants agreed that this was one of the better symposiums. Fewer papers mean fewer concurrent tracks and thus all of the sessions were well attended with often very lively discussion.

As this was the third time this symposium has been held in South East Asia, the next symposium will be held in Antalya, Turkey, from April 16-21, 2012, co-hosted by Akdeniz University and Curtin University. On this occasion, the theme of the symposium is Horticulture at the crossroads: cultural diversity for common markets.

Peter J. Batt

## CONTACT

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The wholesale market at Batu Caves.



# Asia Pacific Symposium on Postharvest Research Education and Extension

The Asia Pacific Symposium on Postharvest Research Education and Extension (APS2010) held in Thailand on August 2-4, 2010 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 International Society for Horticultural Science (ISHS)

Commission Education, Research Training and Consultancy and Quality and Post Harvest Horticulture.

At the opening ceremony, Assoc. Prof. Narumon Jeyashoke, Dean of School of Bioresources and Technology, KMUTT welcomed 162 participants from more than 20 countries to the symposium. Prof. Dr. Errol

Hewett, former Chair of the Commission Education, Research Training and Consultancy, gave an update of ISHS activities. In the first keynote presentation, Prof. Dr. Errol Hewett gave a perspective and trends of postharvest technology innovation and opportunities of extension for horticultural produce. Dr. Robert Premier, from Salad Fresh, Global SF pty Ltd.,



Participants attending APS2010.



Thai traditional songs were performed to welcome all participants to APS2010.



Invited and keynote speakers with Assoc. Prof. Narumon Jeyashoke, Dean of School of Bioresources and Technology, KMUTT.

Australia delivered his experience on the role of postharvest extension in ensuring food safety in fresh cut industry. Dr. Rosa Rolle from FAO Regional office for Asia and Pacific presented her paper on capability building in support of postharvest development in Asia: FAO's initiative and activities. The symposium brought together many eminent researchers and industry experts from several disciplines to discuss the capacity building, networking and collaboration in postharvest research, education and training

in the Asia-Pacific region as well as the development and innovation in quality and safety management of agri-foods with the goal to supply quality of fresh produce in an affordable and sustainable manner to customers in the future global economy.

The first two days of the symposium were devoted to 38 oral and 53 poster presentations on a diversity of topics including several aspects of postharvest research, curriculum and training programme development, modes of delivery of postharvest education, postharvest education material development including computer assisted learning and international networks of training organizations and multilingual training.

There was considerable discussion among the symposium delegates on the capacity building, training materials, postharvest curriculum in research extension, postharvest training tutorials development: computer assisted learning for fresh produce as well as postharvest quality management systems. Several postharvest extension programmes in the Greater Mekong Subregion Countries were presented. There was also consideration given to the development of

posters to communicate with all sectors related to maintaining quality and safety of fresh produce.

The final day of the symposium was a study tour to the Chitlada Palace: a royal project demonstrating a rice mill and rice-husk compressing plant, an old pasteurizing machine as foundation for an orange and sugar-cane juice plant, cheese-making, fruit-drying, candle-making and honey making. Participants also visited Vimanmek Palace "The world largest golden teakwood palace" in Bangkok.

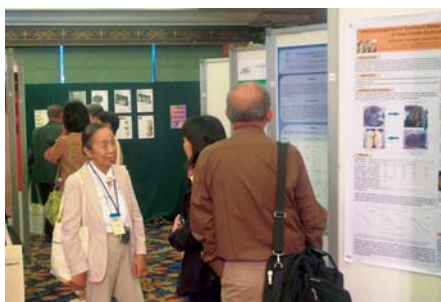
Participants and accompanying persons were entertained at a welcome reception featuring a wide variety of wonderful Thai foods and Thai classical music and dance performed by graduate students of the Division of Postharvest Technology, KMUTT.

This Asia Pacific Symposium on Postharvest Research Education and Extension was highly valued as exemplified by the internationally recognized scientists from many countries. This symposium emphasizes the need for postharvest research, education and extension in particular for managing quality and safety of agri-foods.

The proceedings of the symposium will be published as a volume of *Acta Horticulturae* and copies of the proceedings will be available from ISHS.

Sirichai Kanlayanarat and Panida Boonyaritthongchai

Poster presentation session at APS2010.



## CONTACT

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# Commission Landscape and Urban Horticulture

## Tenth Int'l People Plant Symposium together with the Canadian Horticultural Therapy Association Annual Conference – A Joint Meeting



Participants of the Symposium.

The 10th International People Plant Symposium and the Canadian Horticultural Therapy Association Annual Conference – A Joint Meeting, was held on the beautiful campus of the Nova Scotia Agricultural College, Truro (Nova Scotia, Canada) from August 6 to 8, 2010. The Conveners, Candice Shoemaker, Professor of Horticulture and Human Health, and Norman Goodyear, Professor of Horticultural Science, succeeded in offering a program for researchers, educators, and practitioners to discuss and develop a deeper understanding of the depth and breadth of research currently being conducted in the field of horticultural therapy and to highlight research needs with a particular focus on the practitioner. Around 50 participants from 8 different countries attended the symposium/conference.

The theme of the symposium/conference was Digging Deeper: Approaches to Research in Horticultural Therapy and Therapeutic Horticulture. Dr. Diane Relf, Professor Emeritus of Virginia Tech University, gave an opening lecture titled “Advancing Horticultural Therapy through Research and Publishing.” Dr. Relf offered a compelling call for research and publishing, stressing that the job isn’t done until the research is published. She talked about the gen-

eral research questions of how does horticultural therapy work and why does it work, but also suggested research on demographic, survey and census data is also needed to help grow the profession of horticultural therapy. Given the nice mix of practitioners and researchers in attendance, and the size of the group, a lively discussion on how we can answer some of the questions Dr. Relf posited followed.

There were two plenary addresses in the afternoon session on day one. Dr. Jay Stone Rice, Instructor with the Horticultural Therapy Institute and Therapist, explored how theory informs the research question by presenting the triune brain theory and its application in participatory research investigating people-plant relationship interactions. Matthew Wichrowski, Horticultural Therapist with the Rusk Institute of Rehabilitation Medicine, New York University Langone Medical Center gave a real-world practitioner example of pilot research to publication. Matthew presented three case studies exemplifying different approaches to evaluating people-plant interactions in a physical rehabilitation setting. After the poster session and the business meetings of the Canadian Horticultural Therapy Association and the People Plant Council, we enjoyed a maritime themed dinner.

The keynote presentation by Leah Diehl started day two of the symposium/conference. As the Editor of the Journal of Therapeutic Horticulture, Leah knows the pulse of the horticultural therapy profession and shared this with us through her ‘top ten list’ of opportunities for the profession. Oral presentations on a wide-range of topics from research and program reports on horticultural therapy to theories, models, and research methods used in people/plant research were part of day two. Representatives from six countries – Germany, Korea, Japan, Hong Kong, Canada, and the U.S. – presented the status of horticultural therapy in their countries for the last session of the day. While similarities were identified, each country also had unique characteristics. On the final day of the symposium/conference, concurrent oral and workshop sessions on research and horticultural therapy activities were presented.

The Conveners goal was to organize a symposium/conference with a relaxed atmosphere to encourage discussion on papers and presentations with authors and other participants to enhance the development of current research practices and enable the identification of gaps in horticultural therapy research. The intimate size and comfortable setting facilitated achievement of this goal. The conference/symposium fostered lively debate and dialogue between the participants and established new personal contacts for the launching of new ideas and collaborative projects. Feedback during the closing session and evaluation forms indicated that the participants were extremely satisfied with the program. Participants are looking forward to the opportunity to meet in the Netherlands in 2012.

Candice Shoemaker

### CONTACT

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# Commission Plant Protection

## Int'l Symposium on Plum Pox Virus (ISPPV2010)



Participants at the conference center, Sofia.

The first International Symposium on Plum Pox Virus (ISPPV-2010) entitled "A century of plum pox virus research", held on 5-9 September 2010 in Sofia, Bulgaria, has attracted research scientists from 21 countries of Europe, America and Asia (Japan). In addition, the research workshop of the EU-FP7 Sharco was also held, at the same time, thus the joint meeting permitted all attendees to get more information about the relevant and updated approaches to fight against plum pox virus. In the opening session, Dr. Michel Ravelonandro, Chairperson of the Sharka Working Group, has addressed his acknowledgement to the Convener, Dr. Ivanka Kamenova and her staff and reminded the participants about the chronological activities leading to this 1st Symposium on PPV. After that, Prof. Nikola Vichev Kolev, who represented the Agricultural Academy of Bulgaria, mentioned that local growers and, of course, all concerned by PPV problems, believe in such scientific opportunity to gain some updated knowledge to combat sharka disease. Seven sessions were organized and more than 30 poster presentations covered the major areas of diagnostics, disease survey, virus characterization, conventional breeding and transgenic results. This report highlights the diversity of new and modern approaches developed to control PPV across the world, from the endemic areas (Balkan, central and Mediterranean Europe) to the new countries recently affected with PPV (North America and Japan).

While more knowledge about the common strains (D, M and Rec) found in Europe was developed in epidemiology as well as virus characterization, unexpectedly Canadian and American researchers in cooperation with Ukrainian teams brought interesting informa-



Attendees inspecting and discussing at the poster session.

tion about the exotic strain designed as W, that is naturally widespread in Ukraine. PPV remains a severe potyvirus affecting *Prunus* because the indigenous commercial Japanese apricot (*P. mume*) is also endangered. Due to the unexpected distribution of the disease, the local authorities urged the growers and scientists to set up a strict eradication program. Japanese scientists have forged a new research approach to limit the spread of PPV. An opportunity to demonstrate the Japanese know-how permitted to show how to rapidly detect and manage the detection survey for PPV. The goal of this demonstration was the fast and accurate detection of PPV (less than 2 hours) by Japanese researchers with the modern technology published by Canadian researchers a few years ago (lamp-detection technique). Such technology transfer renders the protocols and content useful to be commercially exploited. Such technical solution is necessarily less than perfect because the performance is more accurate with plant tissues covered with symptoms. When referring to the genetic resistance approach – several European teams occupy this space – three types

of strategy are developed, notably the conventional breeding techniques, biotechnology and molecular markers.

At the third day of the symposium, a scientific visit to the Fruit Growing Institute (FGI)-Plovdiv paid more attention to commercial *Prunus* diversity managed by the leading scientific unit of the Agricultural Academy of Bulgaria. The research activity of the institute suggested more integrated approaches to produce high quality fruits. Valorizing commercial *Prunus* diversity reflects one priority of the FGI, it was also shown that they are contributing in the education of local growers (advisory, consulting...). Technologies based on the protocols adopted (rootstock adaptation, management of virus spread...) in the EU-FP7 Sharco are ongoing.

At the last day of the symposium, poster presentations were still continuing. We also discussed the future location of the Second Symposium on PPV. Dr. Milan Navratil who was volunteer to suggest the candidature of Olomouc (Czech Republic) received the full majority vote of the attendees to organize the 2nd ISPPV at mid-September 2013.

As usual, the Sharka Working Group organized a round-table discussion with the contribution of the major actors in the world (American, European and Japanese) about the harmonization and control of PPV. Common constraints identified were to harmonize the basic contrasts between countries with PPV outbreak, or sporadic infection and those endemically concerned. Evidence of lack of knowledge about the PPV-*Prunus* interactions in different environments for processing common restrictive measures is apparent when comparing the successful eradication achieved by the Americans in Pennsylvania and that applied in different areas of Europe. These contrasts show the strengths and weaknesses of national plant protection services (PPS) in the direct inspection of 3 major stages of commercial *Prunus* production (mother plants, nursery and orchards). A cultivation guideline conceived by the EU-FP7 consortium is under discussion.

Michel Ravelonandro and Ivanka Kamenova

Dr. Michel Ravelonandro, Chairperson of Sharka Working Group, 1090 INRA – Bordeaux, BP 81 (Virology), 33883 Villenave d'Ornon, France, email: ravelona@bordeaux.inra.fr

Dr. Ivanka Kamenova, Convener of ISPPV2010, AgroBioInstitute, 8 Dragan Tzankov Blvd., 1164 Sofia, Bulgaria, email: ivanka.kamenova@yahoo.com







## New ISHS Members

ISHS is pleased to welcome the following new members:

### NEW INDIVIDUAL MEMBERS:

**Australia:** Mr. Peter Calabria, Mr. Phillip Ford, Mr. Terence Freimond, Mr. Jon Grunseth, Ms. Anna Hooper, Ms. Jivanjot Kaur, Dr. Neena Mitter, Mr. Phong Nguyen, Mr. Daniel Patience, Ms. Kamani Ratnayake, Mr. Leigh Ridge, Mr. Alan Schwarz, Mr. Dayne Steggles, Dr. Benjamin Thomas, Ms. Sahar Van Dyk; **Austria:** Harald Aufreiter; **Belgium:** Séverine Ms. Delstanche; **Brazil:** Prof. Dr. Eunice Calvete, Ana Maria Gomes, Dr. Ana Ledo, Dr. Claudia Petry, Dr. Mauricio Rangel; **Canada:** Mr. Mike Aleman, Dr. John Armstrong, Ms. Claire Belisle, Mr. Nelson Esteves, Michael Kauzlaric, Mr. John McGuire, Mr. Christopher Renwick, Charles Sallis, Todor Todorov, Mr. Nicholas Vranckx; **Chile:** Ms. Patricia Sone; **China:** Krishna Bhuvanendra Kumar, Dr. Jubin Shi, Prof. Dr. Wang Wenhui, Prof. Dr. Cao Yufen; **Chinese Taipei:** Mr. Ming-Chung Lee; **Colombia:** Enrique Calderon Junguito, Mr. David Garcia, Mr. Juan Carlos Gonzalez U; **Costa Rica:** Mr. Laurent Lostalo, Juan Carlos Saenz; **Cyprus:** George Aristeidou, Katerina Christodoulou, Marios Kyriakou, Mr. Nicos Seraphides; **Finland:** Ms. Jaana Väisänen; **France:** Dr. Paule Moustier, Ms. Nelly Rangod; **Germany:** Mr. Jens Varnskuehler; **Greece:** Mr. Ejaz-ul-haq

Syed; **Hong Kong:** Mr. Man Tik Cheung, Ms. Sau Ying Chui; **India:** Mr. Shiv Anjan Dalmia, Mr. C.R. Devaraj, Dr. Major Dhaliwal, Mr. Vivek Joshi, Mr. Amol Kalyanpur, Dr. Kamal Kirad, Dr. Girigowda Manjunatha, Mr. Ramesh Puranam, Prof. Dr. Ram Rajasekharan, Mr. Sathinder Reddy, Mr. Gopal Krishan Sharma, Mr. Malvinder Singh, Mr. Pratap Subba; **Iran:** Dr. Hossein Abbaspour, Farzaneh Bekhradi, Dr. Rahim Ghareshkeikbayat, Mr. Mehdi Hosseini Farahi, Dr. Bijan Kavooosi; **Ireland:** Mr. Gerald Kiernan; **Israel:** Mr. Nir Rubin, Idan Siesel; **Italy:** Mr. Wilfried Baudoin, Dr. Diego Bellone, Dr. Oscar Brenner, Dr. Luisa Dalla Costa, Mr. Norbert Gasser, Dr. Andreas Primavera, Dr. Luigi Tarricone; **Japan:** Mr. Md. Mokter Hossain, Dr. Shinichi Numata, Mr. Kazuyoshi Yuasa; **Kenya:** Dr. Theophilus Mutui; **Korea (Republic of):** Mr. Daekeun Hwang; **Latvia:** Aldis Viksne; **Lebanon:** Mr. Hussein Fawaz, Dr. Youssef Sassine; **Malaysia:** Prof. Dr. Vijay Kumar, Dr. Uma Palanisamy, Mr. Shamsuddeen Rufai, Thomas Wong; **Mexico:** Andrés Gámez, Mr. Arturo Gonzalez, Mr. Mario Gutierrez, Ms. Marisa Thompson; **Netherlands:** Mark Bronder, Ms. Alies Gonlag, Mr. Geert Leffers; **New Zealand:** Mr. Jeff Broad; **Nigeria:** Mr. Emmanuel Kwaya, Dr. Makanjuola Okelana; **Pakistan:** Mr. George Widdowson; **Peru:** Mr. Klaus Bederski, Mr. Antonio Biondi; **Philippines:** Orlando Balbon, Mr. Lothar Trueggelmann; **Portugal:** Joana Arroz Correia

Albuquerque, Cothn Cothn, Dr. Isabel Madaleno, Prof. Maria Manuela Pintado; **Romania:** Prof. Dr. Aurelian Adrian Baci, Liana Maria Popescu, Dr. Marian Vintila; **South Africa:** Dr. Derek Donkin, Mr. Pierre Du Plooy, Ms. Nthabeleng Ranyane, Ms. Karen Swanepoel; **Spain:** Dr. Angel Fernandez i Marti, Dr. Florentino Juste; **Switzerland:** Dr. Amin Chaanin; **Thailand:** Dr. Somchai Charnnarongkul, Ms. Peyanoot Naka; **Turkey:** Prof. Dr. Mehmet Nuri Nas, Zeynep Oz, Prof. Dr. Burhan Ozkan, Prof. Dr. Halit Yetisir; **United Arab Emirates:** Mr. Mark Stannard; **United Kingdom:** Mr. Luke Bell, Mr. David Berry, Dr. James Carew, Prof. Evor Hines, Ms. Susan Holmes, Mr. Ming-Fung Lau, Dr. Steven Rothwell; **United States of America:** Mr. Joseph Albano, Arash Amini, Mr. Luis Borquez, Ms. Katy Classon, Ms. Carolina Contreras, Danielle Crammer, Matthew Delaney, Jonathan Dixon, James Doornink, Jeff Girard, Mr. Jody Gorran, Joseph Grant, Robert Hurlbett, Ken James, Kenneth James, Gary Jorgensen, Dr. Pablo Jourdan, Gage Koehler, Ms. Mary Leibe, David Miles, Dr. Suren Mishra, Ms. Rebecca Nelson, Juan Paz, Mr. Robert Pickens, Mary Provance-Bowley, Shubin Saha, Beth Scheckelhoff, Nick Shipley, Ms. Rue Snell, Martin Stone, Ms. Dianne Velasco, Ms. Karen Williams, Mark Wollam; **Vietnam:** Ms. Dan Nguyen

### DOCTOR HONORIS CAUSA AWARD

Professor Janick was awarded Doctor Honoris Causa of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania, on September 30, 2010 "for the exceptional achievements and his outstanding contribution at worldwide horticultural science and practices." The award was conferred by Professor Dr. Doru Pamfil, Rector, at a ceremony in combination with the 9th International Symposium entitled Prospects for the 3rd Millenium Agriculture. The laudatio was delivered by Professor Doctor Radu Sestras, Dean, Faculty of Horticulture.

Jules Janick (right) receives Doctor Honoris Causa diploma from Rector Doru Pamfil of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania.



## NEW ISHS WORKING GROUP ON AQUAPONICS

The formation of a new Working Group within the Commission Plant Substrates and Soilless Culture was approved at the meeting of the ISHS Executive Committee and Council in Lisbon in August.

Aquaponics is the combination of fish farming (aquaculture) with the production of horticultural crops (usually vegetables) using hydroponic methods. The system is extremely environmentally friendly, as it is a totally re-circulating system, so that the only water loss is through transpiration through the growing crop, and the only "fertilizer" inputs for the plants are derived from the waste products produced by the fish, which are fed fish meal and plant waste. As none of the solution is ever dumped there are huge environmental advantages over conventional hydroponic systems.

With the steadily reducing fish yields from wild fish in the oceans, and the increasing pollution problems from aquaculture and hydroponics,

it would appear that aquaponics offers tremendous potential in developed countries, and for the less developed countries the rewards may be even higher in that it has the potential to produce fish protein and fresh vegetables using very limited fresh water resources.

Papers on aquaponics have been presented at both hydroponic symposia and at aquaculture conferences for the past 8 years, and it is timely to consider this as developing area of interest. Unfortunately because it falls within two such distinct disciplines, to date it has not found a home, but because some 70% of the income from aquaponic projects comes from horticulture, it is considered appropriate for it to be within ISHS.

The interim Chair of this Working Group is Dr. Mike Nichols from New Zealand (m.nichols@massey.ac.nz), and it is hoped to arrange a meeting of the Working Group at a future hydroponics symposium, at which a permanent Chair will be elected.

# Calendar of ISHS Events

For updates and more logon to [www.ishs.org/calendar](http://www.ishs.org/calendar). To claim the reduced registration for ISHS members make sure to mention your membership number when registering and ensure your ISHS membership is current. If in doubt: check your membership status online at [www.ishs.org/directory/](http://www.ishs.org/directory/)

## YEAR 2011

**NEW** ■ February 7-11, 2011, Lucknow (India): **I International Symposium on the Horticulture of Opium Poppy**. Info: Prof. Dr. Ram Rajasekharan, CSIR-CIMAP, PO CIMAP, Near Kukrail Picnic Spot, Lucknow 226015, India. Phone: (91)5222359623, Fax: (91)5222342666, E-mail: [director@cimap.res.in](mailto:director@cimap.res.in) E-mail symposium: [papaver@cimap.res.in](mailto:papaver@cimap.res.in) Web: <http://papaver.cimap.res.in>

■ March 14-17, 2011, Salatiga (Central Java) (Indonesia): **I International Symposium on Sustainable Vegetable Production in South-East Asia**. Info: Prof. Dr. Stefaan De Neve, University of Gent, Coupure Links 653, 9000 Gent, Belgium. E-mail: [stefaan.deneve@ugent.be](mailto:stefaan.deneve@ugent.be) or Dr. Sri Rochayati, Indonesian Soil Research Institute, Jl. Juanda, Bogor, Indonesia. E-mail: [sri.rochayati@gmail.com](mailto:sri.rochayati@gmail.com) E-mail symposium: [VegSEA2011@ugent.be](mailto:VegSEA2011@ugent.be) Web: <http://www.vegsea2011.ugent.be/>

■ March 19-23, 2011, Davis, CA (United States of America): **I International Symposium on Wild Relatives of Subtropical and Temperate Fruit and Nut Crops**. Info: Dr. Mallikarjuna Aradhya, USDA Germplasm Repository, One Shields Avenue, University of California, Davis, CA 95616, United States of America. Phone: (1) 530-752-6504, Fax: (1) 530-752-5974, E-mail: [aradhya@ucdavis.edu](mailto:aradhya@ucdavis.edu) or Dr. Daniel Kluepfel, USDA ARS - 378 Hutchison Hall, Dept. Plant Pathology, Univ. Ca, Davis, One Shields Ave., Davis, CA 95616, United States of America. E-mail: [dakluepfel@ucdavis.edu](mailto:dakluepfel@ucdavis.edu) Web: <http://www.wildcrops2011.org/>

■ March 24-26, 2011, Djerba (Tunisia): **IV International Symposium on Medicinal and Aromatic Plants SIPAM2011**. Info: Dr. Houcine Khatteli, Institut des Régions Arides, Route de Djouf, Km 22,5, 4119 Médenine, Tunisia. Phone: (216)75633121, Fax: (216)75633006, E-mail: [h.khatteli@ira.rnrt.tn](mailto:h.khatteli@ira.rnrt.tn) or Dr. Mohamed Neffati, Institut des Régions Arides (IRA), Route de Djorf Km 22,5, 4119 Medenine,

Tunisia. Phone: (216)75633839, Fax: (216)75633006, E-mail: [neffati.mohamed@ira.rnrt.tn](mailto:neffati.mohamed@ira.rnrt.tn) E-mail symposium: [sipam@ira.rnrt.tn](mailto:sipam@ira.rnrt.tn) Web: <http://www.sipam.ira.rnrt.tn/>

■ April 4-7, 2011, Adelaide (Australia): **International Symposium on Organic Matter Management and Compost Use in Horticulture**. Info: Mr. Johannes Biala, PO Box 74, Wynnum Queensland 4178, Australia. Phone: (61)7-39011152, Fax: (61)7-33962511, E-mail: [biala@optusnet.com.au](mailto:biala@optusnet.com.au) Web: <http://compost-for-horticulture.com/>

■ May 8-12, 2011, Volterra (Italy): **VIII International Workshop on Sap Flow**. Info: Prof. Dr. Luca Sebastiani, S.S.S.U.P. Sant Anna, Piazza Martiri della Libertà, 33, 56127, Pisa, Italy. Phone: (39)050883111, Fax: (39)050883495, E-mail: [l.sebastiani@sssup.it](mailto:l.sebastiani@sssup.it) or Dr. Roberto Tognetti, Università degli Studi Molise, Dipartimento STAT - Univ. del Molise, Contrada Fonte Lappone, 86090 Pesche, Italy. Phone: (39)0874404735, Fax: (39)0874404678, E-mail: [tognetti@unimol.it](mailto:tognetti@unimol.it) or Antonio Motisi, Dipartimento di Colture Arboree, Facoltà di Agraria, Univ. Di Palermo, Viale delle Scienze, 11, 90128 Palermo, Italy. Phone: (39)0917049021, Fax: (39)0917049025, E-mail: [motisi@unipa.it](mailto:motisi@unipa.it) E-mail symposium: [sapflow8th@sssup.it](mailto:sapflow8th@sssup.it) Web: <http://www.sapflow8th.sssup.it/>

■ May 15-19, 2011, Puebla (Mexico): **II International Symposium on Soilless Culture and Hydroponics**. Info: Dr. María de las Ni Rodríguez Mendoza, Area de Nutrición Vegetal. IRENAT, Colegio de Postgraduados, Montecillo, Texcoco Edo. Méx, 56230, Mexico. Phone: (52) 595 95 51030, Fax: (52) 595 95 1 01 98, E-mail: [marinie@colpos.mx](mailto:marinie@colpos.mx) E-mail symposium: [issch@colpos.mx](mailto:issch@colpos.mx) Web: <http://www.soillessculture.org/>

■ May 15-19, 2011, Alnarp (Sweden): **I International Symposium on Microbial Horticulture**. Info: Dr. Beatrix W. Alsanius, Dept. of Horticulture, SLU, Box 103, 230 53 Alnarp, Sweden. Phone: (46)40415336, Fax: (46)40465590, E-mail: [beatrix.alsanius@ltj.slu.se](mailto:beatrix.alsanius@ltj.slu.se) or Dr. Hakan Asp, Department of Horticulture, Box 55, 230 53 Alnarp, Sweden. Phone: (46)40415326, Fax: (46)40415519, E-mail: [hakan.asp@ltj.slu.se](mailto:hakan.asp@ltj.slu.se) or Prof. Dr. Paul Jensen, Box 53, SLU, LTJ-Faculty, SE-230 53 Alnarp, Sweden. Phone: (46)706878960, Fax: (46)40 460421, E-mail: [paul.jensen@adm.slu.se](mailto:paul.jensen@adm.slu.se) E-mail symposium: [ishs-microhort@ltj.slu.se](mailto:ishs-microhort@ltj.slu.se) Web: <http://www.ishs-microhort.com/>





- May 16-19, 2011, Fukuoka (Japan): **VI International Symposium on Edible Alliaceae**. Info: Assist. Prof. Masayoshi Shigyo, Faculty of Agriculture, Yamaguchi University, Yoshida 1677-1, Yamaguchi 753-8515, Japan. Phone: (81)839335842, Fax: (81)839335842, E-mail: shigyo@yamaguchi-u.ac.jp  
E-mail symposium: isea2011@convention.co.jp  
Web: <http://www2.convention.co.jp/isea2011/>
- May 23-26, 2011, Wenatchee, WA (United States of America): **IV International Conference Postharvest Unlimited 2011**. Info: Dr. Jim Mattheis, USDA ARS TFRL, 1104 N. Western Ave, Wenatchee, WA 98801, United States of America. Phone: (1)5096642280ext249, Fax: (1)5096642287, E-mail: james.mattheis@ars.usda.gov  
Web: <http://www.postharvestunlimited2011.org/>
- June 5-10, 2011, Neos Marmaras-Sithonia, Chalkidiki (Greece): **International Symposium on Advanced Technologies and Management towards Sustainable Greenhouse Ecosystems - Greensys2011**. Info: Prof. Dr. Constantinos Kittas, University of Thessaly, School of Agricultural Sciences, Fytokou St., N. Ionia, 38 446, Magnesia, Greece. Phone: (30)2421093158, Fax: (30)2421093234, E-mail: ckittas@uth.gr E-mail symposium: info@greensys2011.com Web: <http://www.greensys2011.com>
- June 13-17, 2011, Quebec City (Canada): **International Symposium on Responsible Peatland Management and Growing Media Production**. Info: Dr. Line Rochefort, Department of Plant Sciences, Université Laval, Pavillon P. Comtois, 2425, rue de l'Agriculture, Québec, QC G1V 0A6, Canada. Phone: (1)4186562131ext2583, Fax: (1)4186567856, E-mail: line.rochefort@fsaa.ulaval.ca or Jean Caron, Department of Soil Sciences, Université Laval, Pavillon P. Comtois, 2425 rue de l'Agriculture, Quebec, QC G1V 0A6, Canada. Phone: (1)4186562131ext2881, Fax: (1)4186567856, E-mail: jean.caron@fsaa.ulaval.ca Web: <http://www.peatlands2011.ulaval.ca/>
- June 15-19, 2011, (Turkey): **I International Mulberry Symposium**. Info: Prof. Dr. Sezai Ercisli, Ataturk University Agricultural Faculty, Department of Horticulture, 25240 Erzurum, Turkey. Phone: (90) 442-2312599, Fax: (90) 442 2360958, E-mail: sercisli@atauni.edu.tr E-mail symposium: sercisli@hotmail.com
- June 19-23, 2011, Saint-Jean-sur-Richelieu (Canada): **IX International Symposium on Modelling in Fruit Research and Orchard Management**. Info: Dr. Gaetan Bourgeois, Agriculture and Agri-Food Canada, Horticultural R&D Centre, 430 Blvd. Gouin, Saint-Jean-sur-Richelieu, QC J3B 3E6, Canada. Phone: (1)4505152017, Fax: (1)4503467740, E-mail: gaetan.bourgeois@agr.gc.ca
- June 20-24, 2011, Yerevan (Armenia): **XV International Symposium on Apricot Breeding and Culture**. Info: Dr. Alvina Avagyan, Armenian State Agrarian University, 74, Teryan Street, Yerevan, Armenia. Phone: (374)93415037, Fax: (374)10202834x121, E-mail: alvinaav@mail.ru or Dr. Aleksandr Kalantaryan, 37 Mamikonyants street. ap.49, 00010 Yerevan, Armenia. Phone: (374) 10237805, E-mail: alikjan@gmail.com E-mail symposium: info@apricot2011.com Web: <http://www.apricot2011.com/>
- June 21-23, 2011, Lucknow (India): **Global Conference on Augmenting Production and Utilization of Mango: Biotic and Abiotic Stresses**. Info: Dr. Hutchappa Ravishankar, Central Inst. for Subtropical Hort., Rehmankhara, PO Kakori, Lucknow, Uttar Pradesh, 227 107, India. Phone: (91)5222841022, Fax: (91)5222841025, E-mail: drhravishankar@gmail.com E-mail symposium: mangosymposium@gmail.com
- June 22-26, 2011, Zlatibor (Serbia): **X International Rubus and Ribes Symposium**. Info: Prof. Dr. Mihailo Nikolic, Faculty of Agriculture, University of Belgrade, 6 Nemanjina, 11080 Belgrade, Serbia. Phone: (381)63 801 99 23, Fax: (381)11 21 93 659 or Dr. Brankica Tanovic, Pesticide & Environment Research Inst., 31b Banatska, 11080 Zemun-Belgrade, Serbia. Phone: (381) 11 31 61 773, Fax: (381) 11 30 76 133 E-mail symposium: x.rubusribes@agrif.bg.ac.rs Web: <http://www.x-rubusribes.agrif.bg.ac.rs/>
- June 27 - July 1, 2011, Kuala Lumpur (Malaysia): **II International Symposium on Underutilized Plants: Crops for the Future - Beyond Food Security**. Info: Festo John Massawe, Nottingham University Malaysia Campus, School of Biosciences, Jalan Broga, 43500 Semenyih, Malaysia. Phone: (60)389248218, Fax: (60)389248018, E-mail: festo.massawe@nottingham.edu.my  
E-mail symposium: cropsforthefuturesymposium@nottingham.edu.my  
Web: <http://www.cffsymposium2011.org/>
- June 29 - July 3, 2011, Nanjing (China): **III International Conference on Landscape and Urban Horticulture**. Info: Prof. Dr. Wuzhong Zhou, Institute of Tourism & Landscape Archit., Southeast University, No. 2 Si Pai Lou, Nanjing, Jiangsu, 210096, China. Phone: (86)2583692608, Fax: (86)2583690357, E-mail: wzzhou@seu.edu.cn  
E-mail symposium: sec.luh2011@gmail.com Web: <http://www.luh2011.org/>
- July 5-7, 2011, Wisley (United Kingdom): **I International Trials Conference: Assessment of Ornamental Plants**. Info: Dr. Simon P. Thornton-Wood, Royal Horticultural Society, Wisley, Woking, Surrey GU23 6QB, United Kingdom. Phone: (44)1483224234, Fax: (44)1483211750 E-mail symposium: ornamentals2011@rhs.org.uk  
Web: <http://www.rhs.org.uk/Plants/ornamentals2011.asp>
- July 6-9, 2011, Saas-Fee (Switzerland): **I International Symposium on Medicinal, Aromatic and Nutraceutical Plants from Mountainous Areas**. Info: Dr. Christoph Carlen, Agroscope Changins-Wädenswil ACW, Centre de Recherche Conthey, Route des Vergers 18, 1964 Conthey, Switzerland. Phone: (41) 27 345 35 11, Fax: (41) 27 346 30 17, E-mail: christoph.carlen@acw.admin.ch Web: <http://www.agroscope.admin.ch/mapmountain/>
- July 17-21, 2011, Torino (Italy): **II International Conference on Quality Management of Fresh Cut Produce: Convenience Food for a Tasteful Life**. Info: Prof. Dr. Silvana Nicola, Dipartimento di Agronomia, Selvicoltura e Gestione del Territorio, Via Leonardo Da Vinci 44, 10095 Grugliasco (TO), Italy. Phone: (39)0116708773, Fax: (39)0112368773, E-mail: silvana.nicola@unito.it E-mail symposium: email the freshcut2011 secretariat Web: <http://www.freshcut2011.org/>
- September 3-7, 2011, Xinzhen, Henan (China): **II International Jujube Symposium**. Info: Prof. Dr. Mengjun Liu, Research Center of Chinese Jujube, Agricultural University of Hebei, Baoding, Hebei, 71001, China. Phone: (86)312754342, Fax: (86)3127521251, E-mail: kjliu@hebau.edu.cn or Dr. Jubin Shi, Haoxiangni Jujube Co. Ltd., Xinzhen, Henan, 451150, China. Phone: (86)37162489919, Fax: (86)37162489198, E-mail: ijs2008@yahoo.com.cn
- September 5-7, 2011, Pitesti (Romania): **II Balkan Symposium on Fruit Growing**. Info: Dr. Mihail Coman, Fruit Research Institute, Str. Popa Sapca, Nr. 14, Cod. 110150, Jud. Arges, Pitesti-Maracineni 0300, Romania. Phone: (40)248278292, Fax: (40)248278477, E-mail: mihail-coman1@gmail.com E-mail symposium: office@icdp-pitesti.ro Web: <http://bsfg2011.icdp.ro/>
- September 10-12, 2011, Damghan (Iran): **I International Symposium on Mycotoxins in Nuts and Dried Fruits**. Info: Dr. Hossein Abbaspour, Islamic Azad University, Damghan Branch, Damghan, Iran. Phone: (98)2325235214, Fax: (98)2325235214, E-mail: abbaspour75@yahoo.com
- September 11-15, 2011, Warsaw (Poland): **XIII Eucarpia Symposium on Fruit Breeding and Genetics**. Info: Dr. Emilian Pitera, Warsaw University of Life Sciences, SGGW - Department of Pomology, ul. Nowoursynowska 166, 02-787 Warszawa, Poland. Phone: (48)225932087, Fax: (48)225932111, E-mail: emilian\_pitera@sggw.pl  
Web: <http://www.eucarpia2011.woiak.sggw.pl/>

For updates logon to [www.ishs.org/calendar](http://www.ishs.org/calendar)

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