Chronica Horticulturae

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Horticultural Highlights

Results from the ISHS Membership Survey 2012 • Peat, Politics and Pressure Groups • History and Early Development of the Modern Chrysanthemum • History, Myth and Conservation Threat of the African Baobab Tree in India

Symposia and Workshops

EUCARPIA – Section Ornamentals "Ornamental Breeding Worldwide" • Light in Horticultural Systems • Postharvest Quality of Ornamental Plants • Biostimulants in Agriculture • Orchard Systems, Rootstocks and Environmental Physiology • Irrigation of Horticultural Crops • Persimmon • Vaccinium and Other Superfruits • Improving the Performance of Supply Chains in the Transitional Economies • People Plant • Postharvest Research, Education and Extension

ISHS

CHRONICA HORTICULTURAE

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Editorial Office and Contact Address:

ISHS Secretariat, PO Box 500, B-3001 Leuven 1, Belgium. Phone: (+32)16229427, fax: (+32)16229450, e-mail: **info@ishs.org**, web: **www.ishs.org** or **www.actahort.org**.

Editorial Staff

Yves Desjardins, Science Editor, **yves.desjardins@fsaa.ulaval.ca**
Kelly Van Dijck, Associate Editor, **kelly.vandijck@ishs.org**
Peter Vanderborght, Associate Editor - Production & Circulation, **peter.vanderborght@ishs.org**

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Cover photograph: Greenhouse chrysanthemum production in the Netherlands. IStockPhoto. **See article p. 20.**

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ISHS

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The ISHS: Rise to Be Known or Cease to Exist?

António Monteiro, President of ISHS

António Monteiro

Most of you have already noticed the colourful and dynamic new design of the ISHS webpage. It is a pleasant breath of fresh air for the face of our public image.

Over the years ishs.org has grown considerably and consistently, adding more and more pages to *Acta Horticulturae*, increasing access to horticultural publications in www.pubhort.org; almost reaching the point of information overload. The recently introduced upgraded webpages have eye catching, changing images, improved graphic design and pertinent technical information. They incorporate state-of-the-art content management features in a well-organized fashion. This is the first stage of a complete website overhaul of the webpages hosted by ISHS.

Peter Vanderborght, the ISHS webmaster at the ISHS secretariat, explained to me that the Society website will draw information in real-time from the main Oracle-powered ISHS database sources. It will combine this information with other data into what will be a subject-oriented web-portal-like structure starting from the core fundamentals of the ISHS, namely the Sections and Commissions.

To achieve this complicated task in a transparent and fluid way, the ISHS decided to make use of an open source web content management system (CMS) called Drupal™. Drupal™ is a free software package that allows website managers to easily organize and publish content with an endless variety of customization. Drupal™ is robust and versatile enough to allow easy site management without compromising quality or security. With support and advice from the Board member responsible for publications, the Secretariat IT staff members are using it to redesign our website.

In addition to the pages of general interest that one would expect of any website, the new ISHS webpages feature context-oriented dynamic data filtering options as well as providing a dedicated area for each of the subject-oriented user groups, e.g., ISHS Sections and Commissions. Users may want to bookmark these useful pages that will be tailored to their interests as a hub of relevant information.

To facilitate some of the powerful features that members have requested, such as having our website become a focal point of communication and content dissemination, ISHS counts on the willingness and availability of each of the chairpersons to manage their Section/Commission site and curate 'their' pages. This interaction is required to connect both members and non-members in a medium that unlocks the data that they need.

The new webpage will be an important tool for easy communication among ISHS members and to reach out to the horticulture scientific community at large.

Scientific information management is becoming critical due to the plethora of available information, its diversity, and the range of groups it targets. In applied scientific areas such as Horticulture, there are many relevant sources of information besides scientific articles. Some could be rather informal, and others too technological-oriented, but all of them are useful knowledge and contribute to innovation. ISHS is faced with the challenge of integrating these varied sources of horticulture-related information to create and offer a unique and valuable information package.

The ISHS webpage is our visible interface with the world. I see it as the tip of an iceberg strongly anchored on a growing database that includes ISHS and non-ISHS publications together with informal information provided by ISHS members or coming from our events. The interface already exists to provide easy and interactive communication but the database is a long term and complex project that has just started. As an effective horticulture-related information broker the ISHS has to use appropriate information technologies to simultaneously play in various grounds, e.g., scientific publications, technical reports and peer-to-peer events.

Scientific publications are and will continue to be the primary source of information. The reputation of a scientific society, such as the ISHS, is closely linked to the prestige and impact of its publications. The ISHS is able to host valuable journals on PubHort, but this does not replace the need for its own horticultural journal that reflects the editorial policy of the Society and encourages the submission of manuscripts by its members. The eventual establishment of an ISHS scientific journal has been an important topic of debate going on for several years without a clear commitment due to the complexity of such a decision. There is now a good opportunity for the ISHS to enter into a partnership with a peer-reviewed journal. I hope to have good news along the forthcoming months after discussions have come to fruition.

Personal contacts continue to be essential for information and knowledge exchange, despite easy electronic communication. The number of conventional scientific meetings has never been so high, even if many of them could be replaced by electronic contacts or Web meetings. My feeling is that electronic communication is no substitute for physical presence at meetings, however, to be successful, conventional meetings such as ISHS symposia, must develop scientific programs that fit into the new paradigm of present-day information technology.

The ISHS is suffering competition from stand-alone meetings organized with the help of electronic communication tools. The internet replaces the use of conventional address databases or institutional membership lists to advertise meetings and maximize attendance. ISHS must embrace this evolution because it also brings advantages. The electronic tools that others use to imitate our meetings can be used to improve the quality and the value of ISHS symposia.

At the present time the number of ISHS symposia per annum is increasing. I am concerned that this rate of increase is unsustainable and undesirable. I suggest that we plan fewer but better meetings. These meetings should serve as landmark events in their respective fields of science. The ISHS Executive Committee, with the valuable involvement of the ISHS Board, is considering revision of the guidelines for the organisation of ISHS symposia to make them more attractive to ISHS members and the greater horticulture scientific community and better serve their needs. Meetings need to be organised in collaboration with stakeholders, with active participation of colleagues from the industry, and include activities that encourage personal contact during the meetings. For example, brokerage events and peer-to-peer initiatives could be conducted in addition to

conventional listening to and discussing scientific presentations. These events could provide a wealth of information for the ISHS to capture and disseminate.

The ISHS symposium proceedings, *Acta Horticulturae*, are our flagship publication. Symposia and *Acta* operate in tandem, incorporating tremendous synergies but requiring permanent improvement to stay at the front line of horticultural meetings. The proceedings are certainly one of our weaknesses as shown by the difficulty in publishing all oral presentations and by the easy flow of some of these presentations to well-known horticultural journals. *Acta*, though viewed by some conveners as an obligation, is really an advantage that adds value to the meetings for long term scientific reference and web-visibility. The current investment in information technology will make *Acta Horticulturae* a competitive proceedings series. Our never-ceasing, hardworking Board member and Editor, Professor Yves Desjardins, will soon announce the new *Acta* layout with the introduction of digital object identifier (DOI) codes. ISHS will have a new on-line manuscript submitting and editing system that will make it possible to have the *Acta* book available AT THE TIME of the symposium. "Impossible," you say. Just wait and see!

I agree that some of these improvements are occurring slowly but the ISHS does not have the financial resources to directly purchase the expensive and sophisticated systems used by multinational publishing companies. We can afford only inexpensive and open-source software that subsequently needs to be customized to our needs. Nevertheless, these "low-cost" systems represent a relatively high investment for us. This investment is possible only because of our sound financial situation.

The ISHS has a strong advantage relative to commercial publishing companies due to our Society members producing the information that we publish. Symposia generate *Actas*. The 7000 members of ISHS represent an immense potential for submitting manuscripts to an eventual journal and ISHS horticultural events can feed the webpage with news. All this information is the start of a "web of horticultural knowledge".

I hope the new ISHS webpage and its associated tools are going to be the core of a fast developing information structure. It is our small step into the new era of electronic communication. This information will be shared by ISHS members and external users making horticulture better known outside the restricted professional and scientific communities. The challenge will be to combine on the same site information for horticulture experts and for the general public.

The other day a student of mine thought that a certain product did not exist because it could not be found on the internet. It sounds absurd, but it shows us a reality we need to face. Now is the time for ISHS to invest in improving our electronic communication to become part of the global on-line, twittering, blogging, goggling information village. The ISHS must become better known, or, as I questioned at the beginning, our Society will "cease to exist."

Postcard

I frequently have to deal with bibliometrics in my current responsibilities at the University. I am always amazed by the high number and the apparent sophistication of the indexes used to evaluate and compare the impact of scientific publications. Over the last 25 years, scientists have learned to cope with an apparent dogma: the more citations, the bigger the impact and the higher the value of the research published in scientific journals. In a similar manner to other applied scientific areas, horticulture has been caught by this creed. We know the primary objective of research is not to be cited, but to contribute to the advance of knowledge and to the socio-economic progress of humankind. There are methods to evaluate the real impact of research, but they are rather challenging and complex to implement. Therefore many prefer the simplicity of counting articles and citations. When relying solely and blindly on bibliometrics to evaluate their staff, scientific institutions are encouraging research to progressively drift away from the real and important problems science has to solve. This is particularly true in horticulture.

António Monteiro

Letter to the Editor

I read with interest the article by Roy McCormick (A whole foods plant based health perspective, an opportunity for horticulture?, *Chronica Horticulturae* 52(4):5-9) extolling a diet low in animal foods and high in vegetables and fruits as beneficial for people with problems of coronary artery disease (CAD). I too am a believer in the health benefits of fruits and vegetables but I believe the take home message to avoid animal protein and fat is a vast oversimplification of the problems of diet and health. There are many factors other than just diet that are involved with the incidence of CAD such as lack of physical activity, obesity, and smoking. Lean meat and dairy products can be included in a diet for individuals with CAD and fatty fish which is high in omega-3 fatty acids is recommended. It is well established that some populations, specifically Eskimos (Inuit) who were restricted to a traditional diet devoid of vegetables and fruits and composed almost exclusively of meat and cold-water fish and aquatic mammals such as seal, whale, and walrus with very high protein and fat intake did not have high incidence of heart attacks or CAD (*J. Am. Coll. Cardiol.* 2009; 54(7):585-594. doi:10.1016/j.jacc.2009.02.084). It appears fish oils high in omega-3 fatty acids play a protective role. Current Eskimos who revert to traditional Western diet lose all the benefits of the exclusive meat and fat diet. There is a large literature on the Eskimo paradox. A recent extensive study published on The New England Journal of Medicine's Website extols the benefits of the Mediterranean diet rich in fruits, vegetables, nuts, olive oil, wine with fish and mostly white meat in reducing heart attacks and stroke. The benefits of extremely low fat diets remain controversial.

Jules Janick, Purdue University, USA

MEMBERS HAVE SPOKEN: Results from the ISHS Membership Survey 2012

Errol W. Hewett, Secretary of the ISHS Board, Responsible for Innovation, Industry and Insight

INTRODUCTION

In an attempt to obtain more information about ISHS member needs and requirements it was decided to undertake an electronic survey of all members in 2012. While the database of the Society was up-to-date, it lacked detail in many places. For example, it was impossible to determine the professional interests or technical area of specialization for many members. Often it was impossible to determine their place of work or the nature of their professional activities, whether mainly research, education, extension or consultancy. In addition it was not always possible to determine their particular interest in horticulture. Many individuals who were members did not indicate their affiliation to a particular Section, Commission or Working Group. This made it very difficult for the Secretariat, Chairs of Sections and Commissions or the Board to target members with individual notifications.

It was decided to undertake an e-survey of all members. A questionnaire was designed for ease and speed of obtaining a response; only 3 open-ended questions were inserted. Professor Phil Gendall, Professor of Marketing (Emeritus) from Massey University, provided access to the software and invaluable assistance with the creation and analysis of the survey results. The Secretariat sent out the survey to members on 3 separate occasions. If the respondent did not answer the first message, then a second and a third message were sent. The entire exercise was completed within 6 weeks.

Table 1. Proportion of total membership by country who voted in the member survey.

Country	No of respondents	Total no. of members	% of total who responded
USA	302	1077	28.0
Italy	164	430	38.1
Spain	126	452	27.9
Japan	118	421	28.0
Australia	112	378	29.6
China	98	284	34.5
Germany	90	250	36.0
Brazil	73	269	27.1
India	73	162	45.1
The Netherlands	72	254	28.3
United Kingdom	61	223	27.4
South Africa	59	144	41.0
France	53	212	25.0
New Zealand	50	105	47.6
Mexico	44	176	25.0
Canada	42	227	18.5
Portugal	42	153	27.5
Belgium	40	135	29.6
Israel	40	95	42.1
Iran	39	88	44.3

RESPONSES FROM THE SURVEY

1. Response by Country

Overall the survey was very successful. There were 2,624 responses constituting 37% of our membership – an excellent response. Members from 112 countries participated – fantastic.

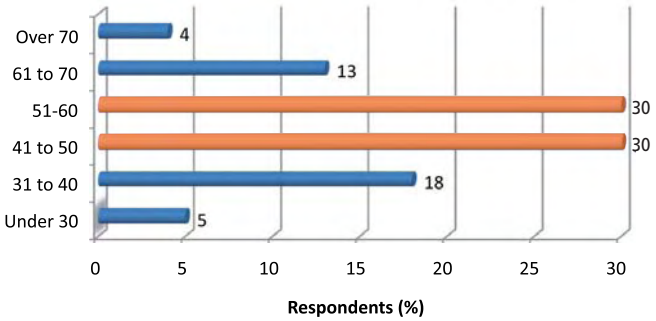
The largest response numbers were from USA, Italy, Spain, Japan, Australia, China, Germany, Brazil, India, The Netherlands, United Kingdom, South Africa, France, New Zealand, Mexico, Canada, Portugal, Belgium, Israel and Iran.

Countries with the highest proportion of ISHS members who voted in this survey were New Zealand (47.6%), followed by India (45.1%), Iran (44.3%), Israel (42.1%) and South Africa (41.0%), but with only one exception, each of the countries listed had more than 20% of members voting (Table 1).

2. Age Distribution

The majority (69%) of ISHS members who responded were in the 40-60 age group (Fig. 1); only 5% were less than 30 years of age and there were >100 members older than 70 years.

Figure 1. Age distribution of ISHS members.



Implications

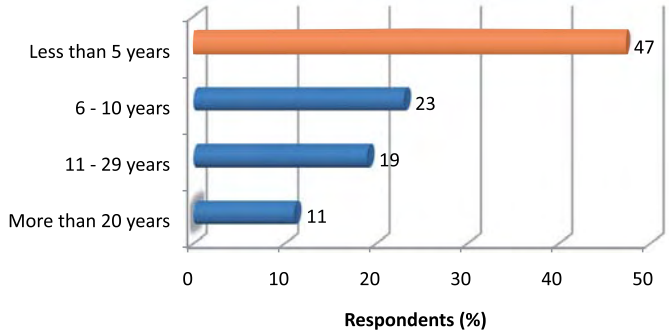
The Board needs to adopt a strategy to increase membership of young scientists. It is recommended that ISHS creates an *ad hoc* committee to make recommendations to the Board on the best way for this to be achieved. The outcome could possibly be to encourage establishment of a special student group; it might be to use social media in a much more coherent way than is done at present; it might be to offer more scholarships in conjunction with national societies.

Similarly, it is suggested that consideration be given to establishing a separate section for retired or Emeritus members >70 years of age. This might involve 50% of the normal annual registration fee.

3. Time of Involvement in ISHS

It was surprising to find that 47% of members had been involved with ISHS for less than 5 years, with 70% having been involved for less than 10 years (Fig. 2). Therefore we have many new members who have limited experience or knowledge about how ISHS is structured and how it works. Only 11% have been members for more than 20 years. To a large extent these data reflect the rapid growth following the IHC meetings in Toronto, Seoul and Lisbon and the increase of members following participation in ISHS symposia.

Figure 2. Length of time of membership with ISHS.



Implications

As nearly 50% of members have been with ISHS for less than 5 years, it must be assumed that they have little knowledge of, or experience with ISHS processes, procedures and protocols. ISHS must embark on a programme to educate members about these important matters. At the very least this might include a series of short articles in *Chronica Horticulturae*. In addition there might be specific sessions at International Horticultural Congresses on "What is the ISHS and how does it work".

4. Nature of Employment and Type of Work

Most of our responding members were involved in research and development (85%) and worked in tertiary education institutions (51%) (Figs. 3 and 4). Classroom teaching occupied 37% of members and 24% were involved in extension activities. Only 19% of members worked for government agencies and 20% were from industry or were self-employed.

Figure 3. Nature of employment of members.

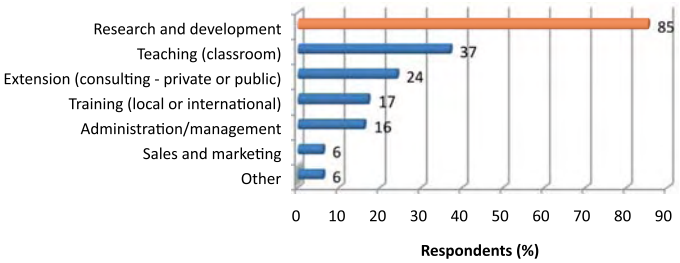
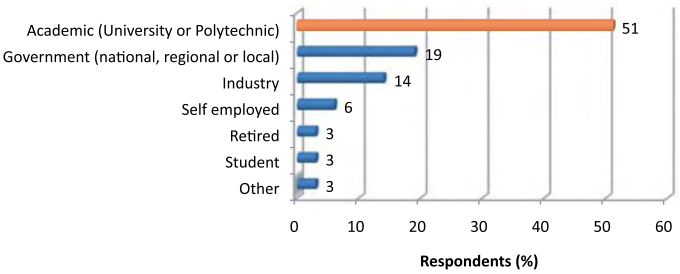


Figure 4. Type of work of members.



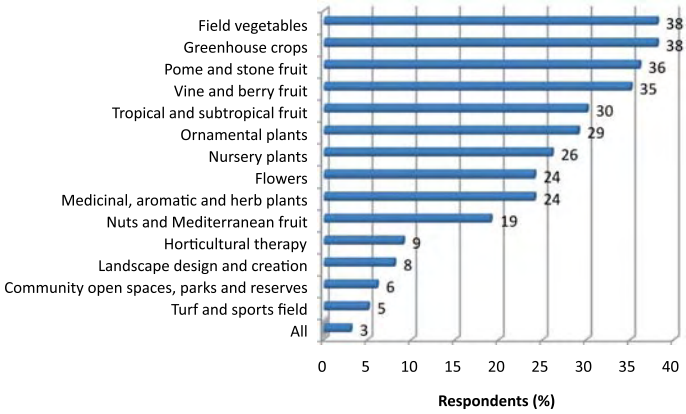
Implications

The following groups are under-represented in ISHS membership: students and industry/private sector/self-employed people. Membership from these groups can be increased but ISHS will need to create new services that will attract them to become members. Private sector responses to the survey were 15% from the USA, 7.6% from The Netherlands, 6.8% from Australia, 5.9% from the UK, 3.9% from Germany and South Africa, 3.3% from Spain and 3.2% from India and New Zealand.

5. Type of Horticultural Crops or Services of Members

The major interests of the Society, as indicated by the Sections, Commissions and Working Groups, were well distributed among members (Fig. 5). More than 3,200 members were involved with different fruit crops, 2,000 members indicated an involvement with field vegetables and greenhouse crops and 2,000 members were involved with ornamentals, flowers and nursery plants. It was interesting to note that 9% of members were involved in aspects of horticultural therapy.

Figure 5. Crops and interests of members.



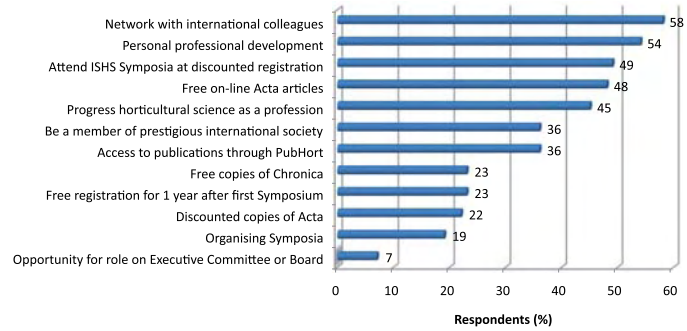
Implications

The majority of ISHS members are involved with the main food and flower/ornamental crops. Therefore ISHS must continue to provide and improve benefits and services for these members. ISHS could consider adding other commissions that reflect major international concerns about environmental aspects, including climate change and water, although with appropriate focus these could be dealt with in the existing structure. Of interest is the number of members interested in horticultural therapy (especially in the USA (7.9%), China and Italy (5.7%), Australia and India (4.8%), Spain, Iran and Japan (3.5%) and Mexico (3.1%)).

6. Why Did People Join ISHS?

More than 50% of respondents indicated that opportunities for networking and personal professional development were key reasons for joining ISHS (Fig. 6). This was closely followed by the ability to attend symposia and congresses at discounted rates (49%), access to free on-line *Acta*

Figure 6. Reasons why members joined ISHS.



articles (48%) and desire to progress the horticultural profession (45%).

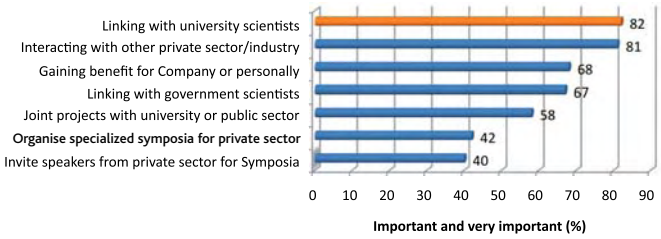
Implications

The dominating importance of symposia and congresses enabling international networking and professional development is a major service available to members that must be maintained and enhanced. A drive to increase involvement of students will be an important way to increase membership. ISHS must be innovative in ways to further enhance its professional reputation internationally.

7. Private Sector Members

Of the 2,633 members who responded, 764 (or 29%) were from the private sector or were self-employed. This group was asked how important specific aspects of ISHS membership were to them (Fig. 7). For about 82% of respondents, linking with university scientists was important or most important, 81% indicated that interacting with other private sector or industry colleagues was important or very important, while 69% indicated linking with government scientists was important or very important. Specialised symposia or having industry speakers at symposia were not nearly as important as the networking aspect of ISHS membership.

Figure 7. Importance of ISHS to private sector/industry/self-employed members.



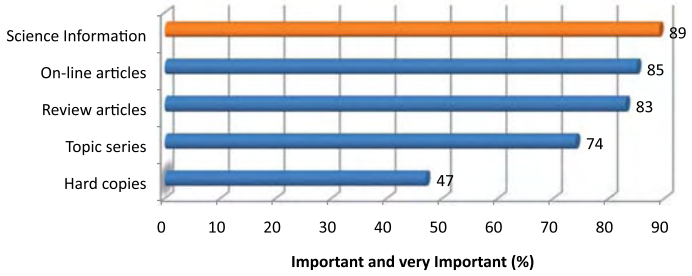
Implications

Opportunities for international networking with other colleagues in all sectors are critically important to private sector members. Work is required by both members and ISHS to persuade company managers of the importance of ISHS membership and attending symposia and congress events for the professional development of their staff.

8. Value of *Acta Horticulturae* to Members

Most members (89%) rated *Acta* very highly as an information source (Fig. 8), 85% rated it highly for its on-line articles, 83% rated the review articles as important or very important and 74% thought having a series of volumes on the same topic was important or very important.

Figure 8. Importance of *Acta Horticulturae* features to members.



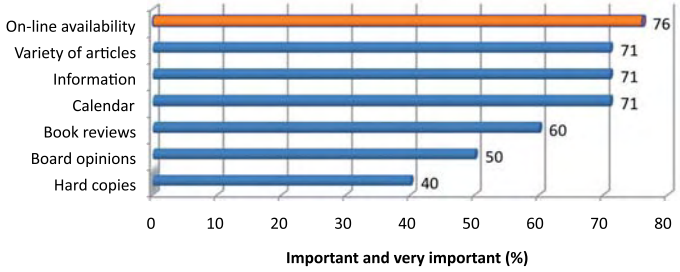
Implications

Despite criticism about not having an impact factor (see elsewhere in this survey) *Acta Horticulturae* is of great value and is a very important source of information for members with the on-line availability of papers highly valued. The pressure to increase the number of free paper downloads per year will continue, especially from members from developing countries. ISHS should consider ways to accommodate these needs without compromising its financial position.

9. Value of *Chronica Horticulturae* to Members

Overall the importance of *Chronica Horticulturae* to members was less than it was for *Acta Horticulturae* (Fig. 9). The on-line version was the most popular feature of *Chronica* (76%) and for 71% the calendar of events was rated important. It was an important source of information on diverse topics for 73% of members.

Figure 9. Value of *Chronica Horticulturae* to members.



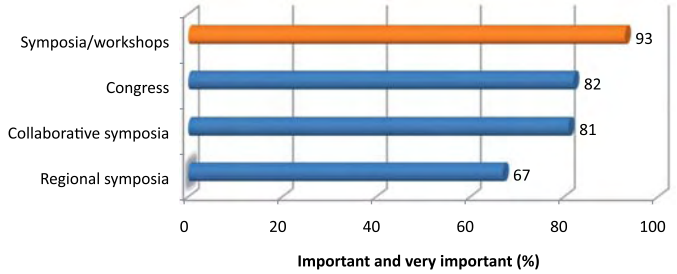
Implications

It will be important to maintain and enhance the quality and diversity of articles in *Chronica*. Access to the on-line version is important, as is the calendar of events. Perhaps the number of book reviews could be increased.

10. The Role and Functions of the ISHS

10a. Importance of Events Organised by ISHS. International symposia/workshops were by far the most important events organised by ISHS, with 93% of respondents rating them as very important/important (Fig. 10), while the 4 yearly International Horticultural Congresses were very highly rated by 82% of members, and 80% considered collaborative symposia/workshops with other international agencies as being important. There was strong support for regional symposia (67%), probably a reflection of the economic situation in many countries and the increase in membership in Asia, Africa and Central/South America in recent years. The cost of travelling to and participating in meetings in Europe and North America is prohibitively high for members from developing countries.

Figure 10. Rating of the importance of events that ISHS organises.



Implications

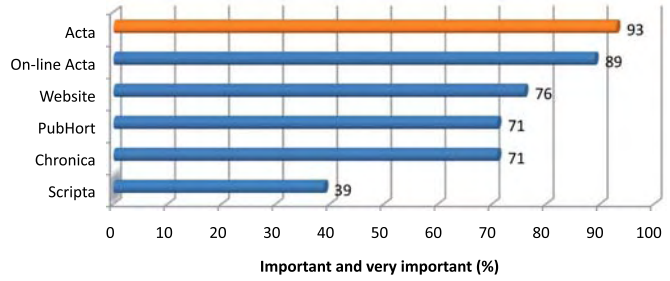
The vast majority of members rated symposia, workshops and congresses as being important or very important, re-affirming the significant importance that members attach to this critical ISHS activity.

The desire by more than 2/3 of members to have regional meetings reflects a need that will have to be addressed, either by more controlled selection of venues for meetings than has existed in the past, or alternatively, by organising multiple meetings of like subjects at the one venue at the one time.

A precedent for this occurred in Thailand February 2012, where 4 separate symposia were held at the same time. There are implications relating to finances that will need to be addressed in the event that multiple symposia are held concurrently.

10b. Importance of Selected ISHS Services. Publication of *Acta Horticulturae* (92%), on-line *Acta* articles (89%), international networking (81%) and the ISHS website (76%) were rated as very important or important by members, while *Chronica Horticulturae* (71%) and *Scripta Horticulturae* (33%) were less important, the latter because it was probably less well known (Fig. 11).

Figure 11. Importance of selected ISHS services for members.



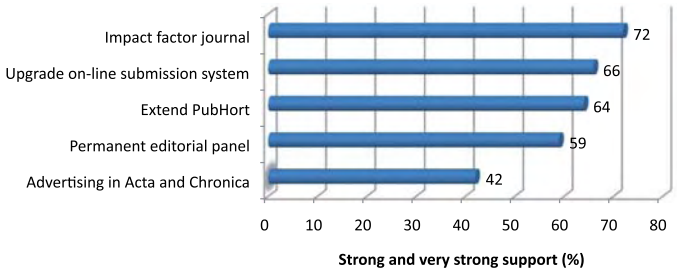
Implications

Acta Horticulturae is of overwhelming importance to members. *Scripta Horticulturae* must be promoted now that there are 16 separate issues available. Many members had not seen a *Scripta* and a surprising number of members did not know that it even existed, in spite of the fact that it is listed within the PubHort part of the ISHS website.

11. Publication and Journal Initiatives that Could Be Undertaken by ISHS

Just over 70% of members wanted to see ISHS establish an international journal that had an impact factor (Fig. 12), while 65% thought that the on-line abstract and paper submission system for *Acta* should be upgraded and 64% wanted to see an extension of horticulture related journals through the PubHort portal.

Figure 12. Publication or journal initiatives that could be taken by ISHS.



Implications

Members want ISHS to establish an international horticultural science journal with an impact factor, although no recommendations were given as to how this might be done. Partnerships need to be developed to bring additional relevant journals into the PubHort basket of publications; an associated discount on paper downloads or page charges for these should be considered.

ISHS should establish a science editing group as soon as practicable to assist with manuscript reviewing.

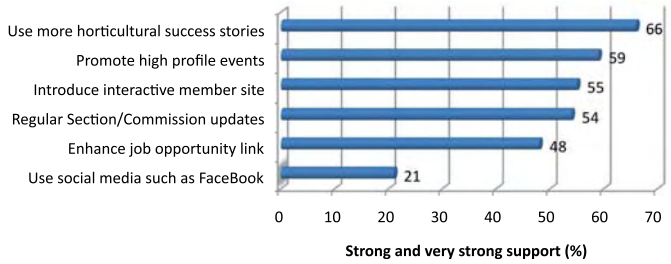
Gradual adoption of advertising from reputable clients should be introduced in both *Acta* and *Chronica Horticulturae* as one way to increase income. More than 40% of respondents were in moderate to very strong support of this idea.

12. Possible Changes to the ISHS Website

There was 90% support for providing well-written stories about horticultural success and including them on the ISHS website. It is likely that such stories would be written by a contract journalist(s). They may evolve from research done by members or they may address major international issues such as water, plant stress as a result of climate change, food waste and the importance of science to help solve these problems. 87% of members supported the idea of inserting details of high profile public events associated with horticulture onto the website. Developing an interactive website where members could maintain contact with each other, or with Chairs of Sections, Commission and Working Groups, was supported by 83% of respondents (Fig. 13). Only 52% of respondents supported the increased use of social media. This may reflect the age distribution of members rather than the utility of the idea for the future.

Members will note that there has been significant improvement of the ISHS website that went live in December 2012.

Figure 13. Possible changes to the ISHS website.



Implications

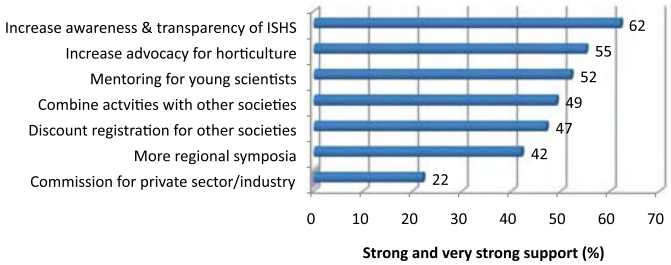
Members want to have more good stories about horticulture and horticultural science on the website. That these articles need to be written for both members and the general public, suggests that ISHS should enter into a contract with one or several journalists to write regularly about success stories or major issues. Promotion of high profile events on the website was also important, as was the development of the capacity on the website for members to interact, including the updating of information for Sections, Commissions and Working Groups. Chairs should be encouraged to do this. Support for using Facebook, Twitter or equivalent social websites was only moderate, perhaps reflecting the age spread of members. It is suggested that ISHS needs an enthusiastic, dedicated young person to drive this aspect of our business.

13. Other Initiatives that ISHS Could Introduce to Benefit Members

There is a clear need to continue and expand efforts on advocacy; in other words tell people what horticulture is and why horticultural research, education, training and extension is critically important for economic, social and nutritional reasons (Fig. 14). More than 90% of respondents supported the idea of increasing awareness of what ISHS does and 85.5% wanted increased efforts in advocacy. There was good support (82%) for introduction of mentoring sessions for young scientists at symposia and/or congresses.

Since the survey, ISHS has published "Harvesting the Sun" to unanimous praise from members [see www.harvestingthesun.org].

Figure 14. Additional services that ISHS could introduce to benefit members.



Implications

There is much support for increasing the promotion of our profession and describing what horticulture is and why it is important to humankind. ISHS has a key role in promoting the benefits of horticultural science underpinning efficient and sustainable food production, postharvest and supply chains, as well as community and open space horticulture (advocacy). There is also much support for introducing a mentoring system for young scientists, for providing professional activities with other societies and trying to get discounted rates of membership and subscriptions to other societies. In contrast to an earlier question, there is considerable support for regional meetings. This might occur through organising and managing simultaneous meetings from different Working Groups at the same place at the same time. There was moderate support only for a separate Commission for private sector members.

14. Open Ended Questions

The greatest number of comments in these questions related to the lack of an impact factor for *Acta Horticulturae*. This was widely lamented and desired by many members. The suggested action was to establish or join another international journal with an impact factor. However, it was clear that many respondents did not understand why *Acta* does not have an impact factor; most thought it was to do with quality of articles. We know that this is NOT the reason; rather it is because ISHS does not publish a recognizable and accepted series with a proscribed number of volumes and numbers each year.

There were a large number of points raised in the open-ended questions. The more relevant of these are listed below:

- There was a surprisingly low level of knowledge about how the Society operates, the contents of the website and the rules and responsibilities of members, the Executive Committee and the Board.
- A desire to see more transparency in how the Society's funds are being used.
- ISHS should do more for young (student) members. Ideas included mentoring sessions at symposia and congresses; advertising opportunities for laboratory exchanges, postdoctoral positions and career positions on an upgraded position on the website; open forum on-line. The new ISHS website has started to address these issues.
- Facilitate establishment of on-line discussion group(s) for members; set up facility for a chat room(s).
- Costs of attending symposia and congresses are too high for many respondents; provide more regional meetings.
- Provision of a greater number of free downloads from *Acta*; in fact several people wanted all papers to be freely available for download.
- The current yearly/biyearly fees for the Society could be converted to include longer durations like 5/10/15 years at a reduced cost.
- Organise combined meetings at one venue to reduce the number of meetings and to facilitate interaction among Working Groups with broadly similar interests.
- Engage in Open Access activities for all publications.
- Senior ISHS personnel should participate in major international events (World Food Prize, World Food Forum, Rio+20, major national horticultural events) to demonstrate ISHS commitment to and interest in human health, nutrition and well-being. This will highlight ISHS as an important international presence, increase exposure, and provide information for media stories.
- Invest in more public relations, especially with good news stories. It is critical for advocacy to let people know what we do.
- Links to more journals through PubHort.
- Provide an efficient, well-organised and well indexed image library to be freely used by the members for presentations, publications or lectures.

CONCLUSIONS

This survey provided a valuable snapshot in time of the views of a good representation of ISHS members towards their Professional Society. It demonstrated that members value highly the services provided for them. Not surprisingly, the symposia, congresses and publications of *Acta* were strongly appreciated by members for their value as information sources and networking opportunities. But the survey clearly indicated issues that remain to be addressed. These include gaining an impact factor for *Acta Horticulturae*, developing a professional horticultural science journal, and improving opportunities for young scientists and for private sector members.

The Board is moving to improve the process for publication of abstracts and articles for *Acta Horticulturae*. The ISHS website has been revamped to provide a much fresher, interactive, interesting and easier-to-navigate service for members. Members are being asked to provide more high impact horticultural news items for the web and several other matters raised in the survey are being addressed.

It is recommended that a member survey similar to this be undertaken in 5 years time. It is critically important that the views and opinions be taken into account by the Board in formulating strategies for future directions of the Society.

Acknowledgements

Professor Phil Kendall for his invaluable assistance in providing his skills and experience in organising this survey. Peter Vanderborght, ISHS Secretariat, for organising the mailing of the survey form on three separate occasions.

About the Author

Errol W. Hewett is Board Member of the International Society for Horticultural Science and Professor of Horticultural Science (Emeritus) at the Institute of Food, Nutrition and Human Health, Massey University, PO Box 158, Oneroa, Waiheke Island, Auckland, New Zealand. Email: ewmrhewett@xtra.co.nz

Errol W. Hewett

Peat, Politics and Pressure Groups

Bill Carlile and Paul Waller

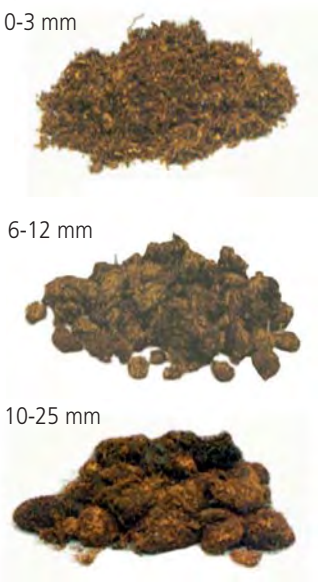
Shortly after its adoption as the growing medium of choice in Europe for propagation, pot plant and nursery stock production, peat became the target for campaigners protesting about the effect of its extraction on destruction of rare habitats. More recently, those extracting peat have been criticised for removing a natural carbon store, with consequent potential effects for global climate change. Protests and campaigns against the use of peat have been most pronounced in the U.K., but calls for the growing media industry in the EU and elsewhere to adopt a more sustainable approach to acquisition of raw materials are now common. This article reviews the history and background to the 'peat debate', particularly major developments over the last two years in the U.K.

PEAT AND ITS USE IN HORTICULTURE

From the early 1960s, wherever peat could be produced and used economically, it has been the growing medium of choice for professional horticulture, and for many hobby gardeners. Research undertaken in California, where the renowned Cornell peat-perlite growing media mixes were developed, and in Germany, where black peat formed the basis of successful growing media, conclusively demonstrated the value of peat in growing media. Such work stimulated an increase in the use of peat in horticulture world-wide and, although many crops grown under glass are now raised in near-hydroponic systems with mineral wool, peat remains the principal constituent of growing media for propagation and growing-on of pot and nursery stock plants in many countries. However, many papers delivered at ISHS symposia on growing media, and other studies have indicated the potential for use of alternative materials to peat, especially where peat is expensive to import and/or use compared with locally available materials (Blok and Verhagen, 2009; Handreck and Black, 2010; Bilderbeck, 2013).

Currently in the European Union (EU), the highly sophisticated equipment of plant propagators, production systems of pot growers under glass, and outdoor operations with nursery stock plants in large containers are based on the use of peat as the dominant component of the growing medium. Its uniformity gives consistent performance and reliability which are essential for meeting strict production schedules in pot plant production. Although peat quality can vary according to its age and degree of decomposition, blends of different peat fractions are commonly used to achieve the desired properties of water and air content needed for specific uses (Fig. 1). Finer (0-5 mm) particle size fractions are used for seedling germination and early plant growth; peat of coarser texture (5-20 mm) is widely used for pot plants; and large fractions (15-30 mm, or even larger) may

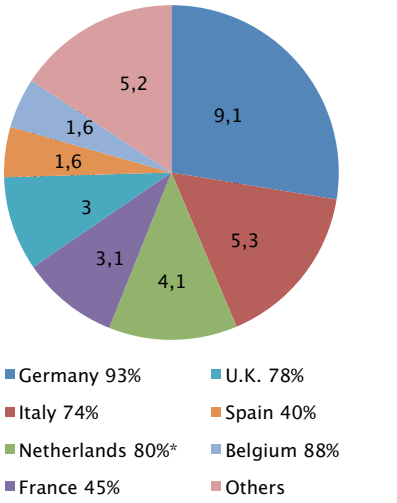
Figure 1. Peat fractions.



form the basis of media for nursery stock plants and young trees, these requiring good aeration during their long period of growth, sometimes years, in containers. The pH of peat is easily adjusted, its absence of nutrients means that these can be added to give desired concentrations for individual plant species, and it poses few problems of microbial contamination.

The adoption of peat as principal component of growing media in the EU is linked to the proximity of peat deposits and extraction sites to the centres of horticultural production. Peat is principally extracted in Germany, Sweden, Finland, the Baltic states and Republic of Ireland for use by EU plant producers, and much is exported to many countries in Europe and markets as far afield as China and even Australia. Canada is the principal source of peat for commercial nurseries in the USA, and occasionally peat from Canada may be exported to Europe, as happened in 2012 following one of the worst recorded peat harvests in some countries (IPS, 2012). In the EU, the major horticultural users

Figure 2. Quantities of growing media produced in the European Union in 2005. Figures in the pie chart are millions of cubic metres of growing media produced in each country in 2005. The total produced in the EU for that year was 34 million cubic metres. The graph also indicates the percentage of peat growing media for selected countries in 2005. Based on the data of Schmilewski, 2009.



* excludes inorganic media, predominantly mineral wool

of peat are growing media producers based in Germany, Italy and the Netherlands, followed by those in the U.K. and France (Schmilewski, 2009 and Fig. 2). The U.K. and France (along with Spain) differ from most other countries in that growing media are primarily used by hobby (amateur) gardeners rather than in professional horticulture as typified by the Netherlands, Italy and Germany.

THE 1990s ANTI-PEAT CAMPAIGNS IN THE U.K.

Much debate has arisen in the last half-century on whether peat can be regarded as a sustainable medium, and in some countries lobbyists have argued that peat should be phased out as a substrate for plant growth. Prominent among those calling for reduction and indeed elimination of peat as a component of growing media have been environmental campaigners in the U.K. Here, individual activists and small groups were protesting against peat extraction as early as the 1960s and 1970s (Caulfield, 1991), with some dynamiting and blocking drains on sites of extraction such as the Thorne and Hatfield moors in South Yorkshire.

Figure 3. A selection of leaflets from the anti-peat campaign in the U.K. during the 1990s.

Figure 4. Growth of tomatoes after three weeks in a peat-free medium (right) compared to a peat-reduced medium (left). The media were stored for six months at ambient temperature. Plants and photograph by kind permission of Ray O'Haire, University College, Dublin.

A huge upsurge of interest in the potentially damaging effects of peat extraction in the U.K. occurred following a British Association for Nature Conservation conference in Edinburgh in 1989 (Carlile, 1999). Although the extent of peatlands in the U.K. has been reduced primarily due to past use in agriculture and forestry, the growing media industry was perceived as the principal threat to the remaining peat bogs, particularly those classified as lowland raised mires. Following the 1989 conference, a number of environmental non-governmental organisations (NGOs) quickly adopted anti-peat views; new alliances and groups sprang up and a plethora of publications were produced denigrating the use of peat in horticulture (Fig. 3), with many suggesting the immediate prohibition of use and replacement by other materials. Publications varied from books such as 'Gardening without Peat' published by Friends of the Earth, to leaflets such as those produced by the Royal Society for Protection of Birds (RSPB). A series of documents were published as 'Commissions of Investigation': a joint project by the Peatlands Campaign Consortium, an umbrella organisation comprising many groups with interests in conservation including Plantlife, the Joint Nature Conservation Council and World Wildlife Fund (Carlile, 1999; Alexander et al., 2008). Research studies were instigated on peat-free materials by the RSPB and the government body English Nature within a project entitled 'Peatering Out™'. (Anon., 2002).

Campaigns from these NGOs involved publicity via press releases to gardening magazines and national and local press, and even through persuading many magazines, some of whom had no links at all with horticulture, to run anti-peat articles. Prominent celebrities and even the Prince of Wales joined the argument against peat. In hindsight the accuracy and claims of many of these individuals and lobby groups did not stand up to close scrutiny (Carlile, 1999, 2004a).

At the height of the anti-peat campaign in the early 1990s, the U.K. peat industry had to respond to this onslaught of pressure from environmental NGOs. The principal U.K. forum of peat and growing media manufacturers, the Peat Producers Association, drew up a Code of Conduct for Peat Extraction, instigated searches into alternative constituents for growing media, and indeed changed its name to the Growing Media Association in 2002, inviting non-peat producers to join (Carlile, 2004a).

Some peat-free media were quickly introduced to the market, especially the retail (hobby) sector (Carlile, 2004a). However, in the 1990s, many of these media were produced without adequate research into their performance, and in particular their potential to deteriorate in storage after manufacture (Carlile, 2004b). Improperly stabilised materials, such as partially composted softwood barks and green wastes from municipal waste collection sites, formed the principal components of these early peat-free media.

With few exceptions these peat-free media turned out to be disastrous, resulting in retardation of seedling emergence and often extremely poor plant growth (Fig. 4). Comments to one of the authors (BC) at the time included the suggestion that some would be better marketed as herbicides. Their introduction to retail markets aimed at hobby gardeners led to considerable mistrust of peat-free materials, an attitude that has prevailed among many U.K. hobby gardeners to the present day, despite much exhortation from organisations such as the BBC in its (very popular) gardening programmes to use peat-free growing media. It is not surprising that at that time very few professional growers elected to adopt peat-free, or even peat-reduced materials as substrates. The coordinator of the U.K. Sustainable Growing Media task force summed up the situation thus: *'Therefore, whilst intellectually the task of the anti-peat campaign was well intentioned, in hindsight the rapid drive to 100% peat-free products was a tactical error whose legacy impedes consumer confidence to this day. If the campaign groups had been more sensitive to the economic and quality challenges of creating an alternative to peat at the launch of their campaign I believe more would have been achieved'* (Anon., 2012).

GOVERNMENT ASPIRATIONS AND THE RESPONSE OF THE GROWING MEDIA INDUSTRY

Notwithstanding the indifferent reputation of peat-free materials established in the U.K. during the mid 1990s, the then Minister for the Environment set, as part of the U.K. Biodiversity Action Plan (BAP), a target that 'U.K. horticulture would be 40% peat-free by 2005, and 90% peat-free by 2010' (Anon., 2007). In addition, a pro-active stance came from some major multiple retailers – by far the largest outlets for growing media in the U.K. – in the late 1990s. Rather than moving directly to peat-free materials, some major multiple retailers formed agreements with growing media suppliers to proceed via incremental dilution; an alternative approach to that advocated by campaign groups demanding peat free products (Alexander et al., 2008; Duncan, pers. commun.).

The first part of this BAP challenge, 40% replacement of peat by 2005, was in fact met, indeed exceeded by U.K. producers of growing media, though largely due to the inclusion of soil conditioners in calculations of peat use within U.K. horticulture (Anon., 2006). The replacement of peat in soil conditioners by materials such as bark and so-called green composts proved easy to accomplish. Although by 2005 most major producers of growing media for the U.K. market were very active in developing alternative materials to peat for use in growing media, relatively low volumes

were incorporated as diluents in media, or as peat-free media. In 2008, the Growing Media Association, along with the U.K.'s Horticultural Trades Association and other groups including major multiple retailers established a voluntary Growing Media Initiative (GMI) in order to help the horticultural industry in the U.K. meet (the then) government targets for reduction in peat use (HTA, 2010). Member companies, after passing an independent annual audit, were awarded a grade of GMI membership based on the average peat content of the U.K. retail bagged growing media they manufacture or sell to the end consumer.

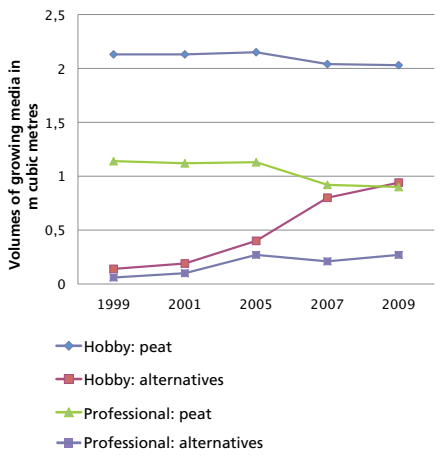
- Gold GMI membership was awarded to those businesses which had achieved 90% + peat free status
- Full GMI membership was awarded to those businesses which had achieved 55% + peat free status
- Provisional GMI membership was awarded to those businesses which were committed to achieving 90% + peat free status and are currently operating at a minimum of 20% replacement in retail products

However, as 2010 approached, it became clear to all parties: producers, lobby groups, and the U.K.'s Department of Environment, Food and Rural Affairs (DEFRA, which is responsible for agriculture and horticulture), that 90% replacement of peat in horticulture was not going to be achieved. Nevertheless, by 2009, the industry had moved to around 58% replacement of peat in horticultural products (Anon., 2010a and Fig. 5): a not inconsiderable achievement, with the successful introduction of several peat-reduced and even peat-free products, particularly to retail markets.

THE U.K. TO GO PEAT-FREE?

Notwithstanding this industry-based achievement, a new initiative was outlined by DEFRA in 2010 that proposed the complete replacement of peat in U.K. horticulture; in retail markets by 2020, and in the professional sector by 2030 (Anon., 2010b). DEFRA also commissioned a series of desk studies into aspects of peat extraction and use in the U.K. including costs to the U.K. horticultural sector of implementing the BAP targets (Anon., 2009a), assessment of greenhouse gases associated with growing media (Anon., 2009b), and the supply and availability of alternative materials to peat for use in growing media (Anon., 2009c). Despite identification of costs and lack of suitable materials in sufficient volumes within DEFRA's own studies, as well as detailed responses from the growing media industry and professional growers to DEFRA's peat-free initiative, the proposals to phase out peat were included as U.K. government policy in the Natural Environment White Paper of 2011 (Anon., 2011b).

Figure 5. Trends in use of peat and peat alternatives in the professional and hobby (amateur) sectors of U.K. horticulture (from Anon., 2009a).



DEFRA's peat-free targets have attracted much opprobrium, particularly from the professional sector of U.K. horticulture. The principal basis of DEFRA's arguments was not related to biodiversity, the main focus of pressure groups in the 1990s, but to the contribution to climate change of CO_2 release from extracting peat in the U.K. A critical analysis by Rieley (2012a,b) has concluded that peat extraction and use contributed to less than 0.04% of CO_2 emissions in the U.K., and furthermore has had little effect on biodiversity or damage to archaeological sites. Rieley has summarised the situation thus: *'Looking back over the last 25 years it is evident that the issue of peat extraction for horticulture in the U.K. has become polarised between a profitable and important industry and an environmental lobby that does not agree with peat extraction under any circumstances, using arguments that cannot be substantiated scientifically. Successive U.K. Governments have been caught in the middle of this often acrimonious and sometimes belligerent dispute but, on balance, they have been swayed by pressure from environmentalists. It is time to re-evaluate this one-sided confrontation with a more realistic and pragmatic approach to the issues involved. Phasing out the use of peat in horticulture in England will not lead to an increase in biodiversity, a reduction in greenhouse gas emissions or improved protection of valuable archaeological sites. It will, however, threaten an important sector of the economy and the jobs of the many people employed in it'* (Rieley, 2012b).

In June 2011, DEFRA proceeded to establish a Sustainable Growing Media (SGM) task force with the primary aim of identifying and overcoming the issues relating to the elimination of peat from U.K. horticulture. Within the SGM task force a series of working groups were drawn up from representatives of 35 organisations from across the growing media supply chain, including retailers, growing media manufacturers, growers and environmental organisations, to which specific responsibilities were assigned.

Of these, the only significant progress and detailed reports of the SGM task force were produced by those working groups under the aegis of the horticulture industry and the Royal Horticultural Society (RHS). Working groups led by DEFRA themselves only partially addressed the issues delegated to them. Those topics, largely on conservation, delegated to environmental organisations such as Friends of the Earth, attracted virtually no response at all, and produced no formal reports to meetings of the task force (Anon., 2011a). Indeed the government response to the work of the task force acknowledged *' two flagship projects that have emerged from the Task Force are those developing a performance standard for multi-purpose compost and a set of responsible sourcing and manufacturing criteria for growing media ingredients'*. These were solely the work of the growing media industry and the RHS.

Despite the variable nature (or lack) of reports submitted by the working groups, the DEFRA task force chairman, Dr. Alan Knight, produced a report that attempted to direct policy forward on a consensual basis through a 'road map' of progress. A key feature of the SGM task force was to propose an approach that broadened focus from the single issue of peat to include an assessment of the environmental, social and economic credentials of the whole range of growing media materials. Knight himself made the following salient points: *'Firstly, all growing media must be fit for purpose, and secondly, the transition to sustainable growing media needs to be economically viable'* and that *'In theory, this will allow an assessment of all growing media constituents, without disproportionately focusing on peat, to ensure the long term outcome is sustainable for the industry as well as the environment'* (Anon., 2012).

From the environmental viewpoint, the report concluded that no peat used in horticulture should be sourced from pristine or high quality peat habitats. This was a strong area of consensus within the task force and indeed is the route the growing media industry within the U.K. has mostly taken, with sourcing policies protecting peat habitats which are designated as Sites of Special Scientific Interest. The chairman of the SGM task force (Anon., 2012) also commented on the dogmatic attitude of some of the environmental NGOs stating that *'The environmental movement needs to restate its rationale for zero peat use in horticulture and be consistent in the delivery of that message, not just across the U.K. but also across the EU and beyond. It also needs to balance its narrative on peat in horticulture with other uses of peat'*.

The U.K. government has welcomed the SGM task force report, and endorsed many of its conclusions (Anon., 2013). The government agreed that all materials used in growing media should be assessed against the same sustainability criteria and that the focus should not be limited to the consideration of a single material such as peat. Furthermore, the Government indicated

Figure 6. The Horticultural Development Company's report on research into peat and alternative media for professional growers (Bragg and Tones, 2012).

its commitment to an industry-led voluntary partnership approach to deliver a transformation of the growing media supply chain within horticulture. It recognised the need to fund research into peat alternatives and announced that DEFRA will partner with the Horticultural Development Company (HDC) to establish a new match-funded, 5-year research programme (starting in 2013) with a total value of £1m.

In fact, much of the experimental work in the U.K. on peat alternatives undertaken since 1990 has been carried out by manufacturers of growing media, and industry-based projects funded by the HDC, whose income is derived principally from growers. HDC sponsored work on the potential for peat alternatives as substrate constituents has been recently summarised (Bragg and Tones, 2012 and Fig. 6). Research has included comprehensive surveys on peat reserves, usage and alternative materials (Bragg, 1990), considerations of peat alternatives available in the mid-2000s (Waller, 2006), and many grower-based practical studies on the potential for peat alternatives as constituents of media for bedding, nursery stock, modular transplants and mushrooms. Additional studies on the properties of constituents were also undertaken. Some work has been supported by the Waste and Resources Action Programme (WRAP), a government-funded organisation principally involved in recycling of waste materials. WRAP has been especially active in developing standards for composted materials with a view to their inclusion in growing media (WRAP, 2011 and Fig. 7).

VIABLE PEAT ALTERNATIVES – BUT HOW MUCH IS AVAILABLE?

In the U.K., much greater volumes of growing media (ca. 70%) are used by hobby (amateur) gardeners than by professional growers, who use approximately 30% of about 4 million cubic metres consumed in 2009 by the U.K. market (Anon., 2010a and Fig. 5). Growing media producers in the U.K., driven in many cases by pressure from their major retail customers from the hobby market, have evaluated many materials for use as replacements for peat in growing media, but by the mid-2000s their choices were limited – largely due to the high volumes needed – to four organic constituents (Fig. 8). These are coir, wood fibre, composted bark and composted garden and landscape-derived green materials, frequently containing waste from household collections by municipal authorities. All of these have disadvantages compared to peat: nevertheless some provide advantages.

- Coir is expensive, primarily due to its transport costs in compressed form (Fig. 9) from the Indian sub-continent to Europe, and needs to be thoroughly washed to remove salts. However, it can completely replace peat in some types of growing media, and is an excellent rooting material. Some professional growers have replaced peat with coir, for example in culture of strawberries in modules, and with *Lilium* spp., but even here, it is common for growers to add 20-30% of well-humified peat as a 'buffering' agent to reduce the potential for pH changes.
- Bark has become expensive due to the demand for some types as a co-fuelling material in biofuels as well as a decline in demand for wood by builders. High quality, suitably composted barks can form the basis of growing media for pot and especially container plants, where the high air content of the medium may allow good root development. Poorer barks may immobilise nitrogen, particularly if stored in bags for the retail market.
- Production of wood fibre through electrically-driven screws is expensive, and wood is also currently in demand as a co-fuelling material. Furthermore, some wood fibres have a high propensity to immobilise nitrogen and to degrade within pots used for some long-term pot and nursery stock plants. However, wood fibre, due to the heat generated in its production, has the great merit of being largely sterile, and its lightweight nature serves to

Figure 7. Turning composted materials destined for use in growing media. Photograph by kind permission of Dearbhail NiChualain, Bord na Mona.

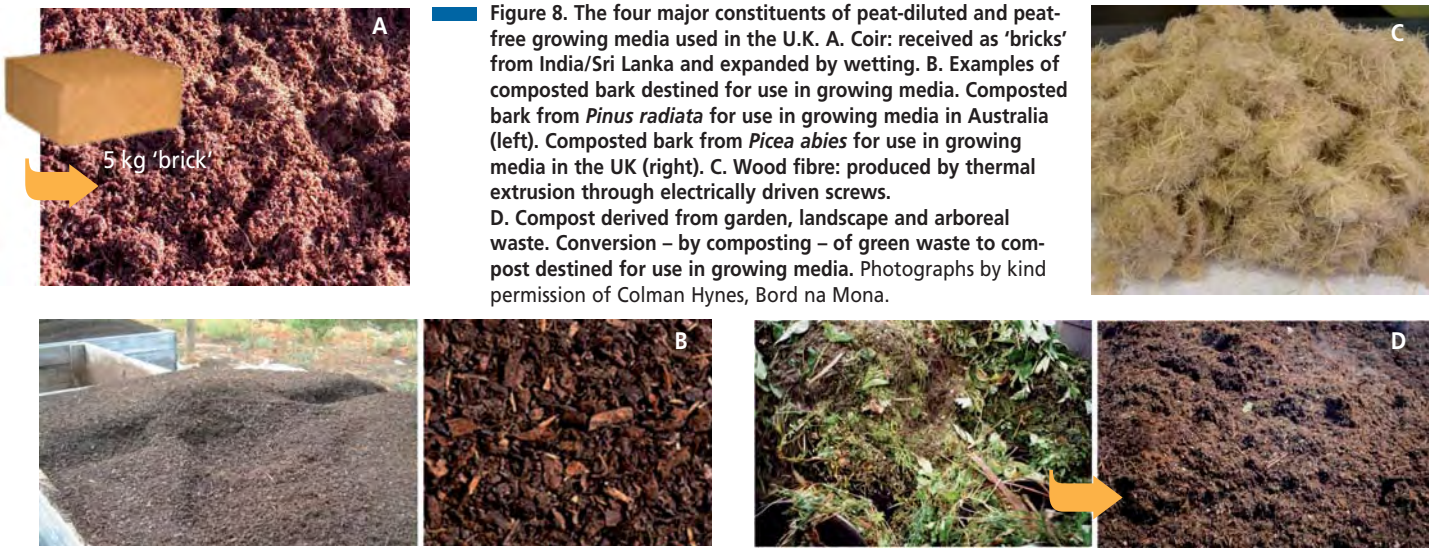


Figure 8. The four major constituents of peat-diluted and peat-free growing media used in the U.K. A. Coir: received as 'bricks' from India/Sri Lanka and expanded by wetting. B. Examples of composted bark destined for use in growing media. Composted bark from *Pinus radiata* for use in growing media in Australia (left). Composted bark from *Picea abies* for use in growing media in the UK (right). C. Wood fibre: produced by thermal extrusion through electrically driven screws.
D. Compost derived from garden, landscape and arboreal waste. Conversion – by composting – of green waste to compost destined for use in growing media. Photographs by kind permission of Colman Hynes, Bord na Mona.

Figure 9. Compressed coir 'bricks' ready for export from India. Photograph by kind permission of Tom de Vesci, Horticultural Coir.

Figure 10. Growth of tomatoes in a medium diluted with composted green materials, compared to that in a conventional (professional) peat-based medium. The additional growth in the peat-diluted medium is attributed to the presence of higher concentrations of nitrogen, phosphorous and trace elements in the composted material. Standard potting medium (extreme left); growing media with green compost at 50% (the three rows of plants to the right). Plants and photograph by kind permission of Ray O'Haire, University College, Dublin.

reduce the bulk density of mixtures with decomposed peats.

- Composted green materials derived from garden waste as well as landscape and arboreal operations are heavy, often saline, frequently have a high pH, and if containing material collected from kerbside bins may be contaminated with heavy metals, fragments of glass and plastic, and unwanted microorganisms. Nevertheless, these green materials are cheap and available in the U.K. in high volumes. With stringent quality control, they can be used successfully as peat diluents (Fig. 10). Additionally, they may contain plant nutrients, and retard liverwort growth and suppress plant pathogens.

Several growing media manufacturers supplying products to the U.K. market have undertaken major research and development programmes involving extensive growing trials with the above-mentioned constituents. The products developed by Melcourt Industries and Bulrush Horticulture (now part of the Pindstrup Mosebrug A/S group) using bark and wood fibre, from William Sinclair Horticulture with peat-free materials, the Scotts company with coir, and by Bord na Mona Horticulture from Ireland (who supply over half of the U.K. hobby market's growing media) with composted green materials, have attracted favourable comment from customers and many from independent tests conducted by the U.K. consumers association for hobby gardeners and reported in their Which? Gardening magazine (Which? Gardening, 2013).

The problem of availability and quality of alternative materials to peat for professional growers is also well recognised by grower organisations such as the British Protected Ornamental Association. Their concerns on supply and quality as well as those of sustainability and costs are addressed in the BPOA policy statement (BPOA, 2013) that the key issues of the DEFRA task force should include:

- an evidence-based way of showing the environmental and social footprints of all growing media constituents to ensure that in terms of environmental and social responsibility, we are not replacing peat with alternatives that are similar to or less responsible than peat itself,
- measures to ensure that any increased costs associated with the move towards more environmentally and socially responsible growing media are shared by the entire supply chain, right down to the end consumer, and
- that any future policies or initiatives in the U.K. are applied such that U.K. growers are not placed in an unfair position compared to their competitors abroad.

Figure 11. 1990s cartoon from the German environmental campaign group Bund für Umwelt und Naturschutz Deutschland (BUND). The message is that peatlands are better with four-legged animals compared to two-legged!

DEVELOPMENTS ELSEWHERE: IPS AND EPAGMA

For many years in Europe, the pressure for peat substitution in growing media was perceived as essentially a U.K. problem. With few exceptions, environmental lobby groups have not been as active in other European countries, and thus there has been little pressure to change from peat to other materials in growing media (Anon., 2010c). Countries such as Italy, Spain and to some extent France have little indigenous peat that can be extracted for use in growing media; the Netherlands has little remaining peat after centuries of extraction mainly for fuel; and other countries such as the Sweden, Finland and the Baltic states have considerable reserves of peat in contrast to the relative few intact mires in, for example, England (Montanarella et al., 2006). Germany, like the U.K., has peat resources that have attracted the attention of some environmental campaign groups such as Bund für Umwelt und Naturschutz Deutschland (BUND – synonymous with German Friends of the Earth) (Fig. 11). The Irish Peatlands Conservation Council (IPCC) is active in the Republic of Ireland, not just with peat extraction for growing media and fuel, but also the effects of local peat removal under turbary rights.

Even so, environmental campaigns have not been as pronounced in mainland Europe and elsewhere compared to the U.K. Nevertheless, the International Peat Society (IPS) in conjunction with the International Mire Conservation Group, the latter an organisation dedicated to the preservation of peatlands, published in 2002 a series of guidelines within the book 'Wise Use of Mires and Peatlands – Backgrounds and Principles including a Framework for Decision-makers' (IPS, 2002). The aim of the book was to highlight the nature and importance of

peatlands, identify problems arising from their use as fuel and in growing media and how these may be addressed. Following this publication, IPS has further developed a Strategy for Responsible Peatland Management issued in 2010 (IPS, 2010), whose aims are to:

- undertake peatland management according to the principles and within the framework of *'Wise Use of Mires and Peatlands'* by safeguarding their environmental, social and economic functions and respecting their local, regional and global values.
- ensure that high conservation value peatlands are identified and conserved, 'utilised' peatlands are managed responsibly and drained, degraded or otherwise irreversibly changed peatlands are rehabilitated to restore as many ecological and landscape functions as possible.
- provide those involved in or responsible for peatland management with strategic objectives and actions for implementation.

It is not the intention of this article to give a detailed account of peatland restoration, but much work has been sponsored and/or carried out in this area by peat organisations such as the Canadian Sphagnum Peat Moss Association (CSPMA, 2011), and companies such as Bord na Mona in Ireland and Klasmann-Deilmann in Germany.

The increasing environmental influence within EU agriculture policy in recent years has led many land-based industries to coordinate and pool their interests through industry-based lobby groups and organisations. One such formed in 2004 is the European Peat and Growing Media Association (EPAGMA) that represents the peat and growing media industry at a European level and 'acts as the interface of peat and growing media companies with regard to the EU institutions (European Commission, European Parliament and Council of Ministers), and where appropriate, other stakeholders'. The organisation is dominated by peat producers and had as one of its major initial aims 'to ensure a positive political environment for the development and success of the peat sector across Europe' (IPS, 2005). More recently, it has extended its remit to cover all growing media.

In common with the International Peat Society, the aims of EPAGMA include a commitment to high environmental practices in peat extraction, the sustainable use of peat as a local energy source, as well as promotion of the unique properties of peat as a substrate in horticultural plant production. The organisation is very active in labelling of peat and growing media products, especially with respect to their environmental credentials, and is also active in monitoring legislation in the EU that may affect the interests of its members. EPAGMA has developed a Code of Practice with which its members must comply. The Code defines the principles for responsible management for the first stages of the peat production chain including site selection and preparation, peat extraction, and after-use of peatlands.

National governments outside the U.K. have now entered the peat debate. In the Netherlands, government-backed proposals to enhance the sustainability of the peat supply chain for Dutch horticulture are soon to be brought under the responsibility of an independent 'Foundation for Responsibly Produced Peat', the development of which is being coordinated by a temporary technical committee with representatives from industry, users of growing media as well as environmental and other NGOs. The Foundation is now developing a certification scheme for responsibly sourced peat, drawing to some extent on the Responsible Peatland Strategy of IPS and Code of Practice of EPAGMA (Boon, 2011). The certification system aims at minimising the negative effects of peat extraction whilst maximising its positive effects. It forbids peat extraction from high conservation value areas but accepts that peat extraction could be allowed from highly degraded areas followed up by appropriate after-use. This approach is very different from that of the U.K. government, and perhaps reflects the important role of peat in Dutch horticulture. Furthermore, workers in the Netherlands at Stichting RHP, a well-respected organisation responsible for development of certification schemes for quality of growing media and their constituents, have attempted to broadly classify all constituents of growing media from an environmental standpoint (Verhagen and Boon, 2008).

Elsewhere, even in countries such as Canada, which has some of the most extensive peat reserves in the world with less than 0.02% (17,000 hectares of 89 million hectares of peatlands) under extraction for horticultural use, the need to adopt sustainable principles including peatland restoration is recognised: restoration is an area of research that has been strongly supported and funded by the Canadian Sphagnum Peat Moss Association (CSPMA) over many years and from whose work the CSPMA is able to state that *'the restoration efforts of the industry can return a peatland that has been harvested for horticultural use to a functioning ecosystem within a period of 7-10 years'* (CSPMA, 2011).

DEFINING SUSTAINABILITY

Throughout the peat debate, a key feature has been the concept of sustainability, and calls, such as that of the chairman of the U.K.'s Sustainable Growing Media task force (Anon., 2012), have been made for a clear definition and scope of sustainability with respect to growing media. The Bruntland Commission of the United Nations (Anon., 1987) defined sustainable development as that which meets the needs of the present without compromising the ability of future generations to meet their own needs. Further to this, the 2005 World Summit (Anon., 2005) noted that sustainability requires the reconciliation of environmental, social and economic demands; these forming the three pillars of sustainability. In terms of sustainability of growing media, peat has been identified by environmental lobbyists as an unsustainable constituent in terms of habitat destruction and potential contribution to climate change. However, rather less attention has been given to economic sustainability: here the ability of businesses within and related to growing media to survive and prosper. Even less attention has been paid to the linked social sustainability of individuals and communities through businesses that depend on production of growing media constituents and formulated media for their livelihood. Evaluation of all three pillars of sustainability with respect to growing media needs to be undertaken, not just for peat, but for all actual and potential constituents of growing media (Carlile, 2013).

Determining the criteria by which sustainability may be assessed is a complex process. This is well illustrated within the report on Life Cycle Analysis of growing media recently commissioned by EPAGMA. This study, probably the most comprehensive of its type, examined potential influences on climate change, ecosystem quality, resources and human health of various growing media formulations devised for use with 'fruity vegetables, pot plants, young plant production using loose-filled trays, tree nursery stock, and the hobby market' (EPAGMA, 2012). In general, for all the areas of application, the growing media that had the highest impact on the climate change and resources indicators were, as expected, the mixes containing peat. For the human health indicator, the most impacting mixes proved to be those growing media containing coir pith, and growing media containing green compost. For the ecosystem quality indicator, growing media containing coir pith generally had the highest impact due to inclusion of land occupation during the coconut harvesting stage as part of the life cycle analysis parameters. As a life cycle analysis, the EPAGMA study widened the parameters beyond those of climate change and biodiversity previously focused upon by environmental campaigners.

GOING FORWARD

In the U.K. the pressure to restore peatlands has never been greater, and indeed the U.K. branch of the International Union for Conservation of Nature (IUCN), following the production of a comprehensive report in 2011 (IUCN, 2011) emphasising the contribution of peatlands as a carbon store, is currently coordinating and implementing restoration programmes for a range of degraded peat habitats. The refusal in late 2012 to allow further peat extraction on Chat Moss near Manchester, one of the few

Figure 12. A novel peat alternative? It looks like peat: it feels like peat: it has the bulk density of peat. Fibre produced from the oversize fraction of composted materials.

remaining English bogs used for this purpose, perhaps illustrates the gathering momentum towards the ultimate prohibition of peat extraction in England. Pressures are increasing elsewhere: the Baltic states – Estonia, Latvia and Lithuania – export much peat to Germany, Italy, France and other countries, but are now coming under pressure from NGOs there to do so more responsibly.

In the future, in addition to pressures from environmental organisations, other novel studies and concepts may influence peat use in horticulture. Accelerated growth of Sphagnum moss in experimental field studies in Canada and Germany has led to proposals for 'sphagnum farming' that may allow rapid production of a key growing media constituent. Novel approaches to substrate development are likely, such as that in the U.K. of production of a fibrous material from the oversize fraction of composted green waste (Fig. 12)...formerly a problematic waste product from composting (Longmuir, pers. commun.). Large-scale production of this material, that is very similar to peat in appearance, is likely in the very near future. Carbon trading may influence extraction from peatlands: indeed it has been suggested that future living peat bogs might enjoy revenue streams based on the premise of keeping them intact. In theory high carbon emitting companies such as airlines and vehicle manufacturers could buy bogs to keep them intact to offset carbon emissions elsewhere in their business. Countries that are currently sitting on large reserves of peat may in future find them more valuable for carbon trading than use for fuel... or growing media!

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About the Authors

W.R. Carlile

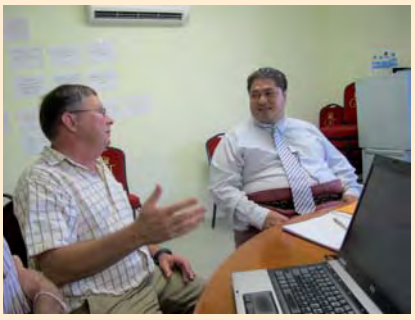
Bill Carlile taught for many years at Nottingham Trent University, and undertook contractual work there as well as fundamental research into soilless growing media, supervising several postgraduate students to higher degree level. After tenure as Head of Microbiology, Applied Plant Sciences and Ecology, Bill moved to Bord na Mona in Ireland, taking up the post of Chief Horticultural Scientist. He retired from this post in 2011, but still acts as consultant to Bord na Mona. Bill has produced many research papers and review articles on growing media, and has also written two textbooks on crop protection. Bill currently chairs the Commission Plant Substrates and Soilless Culture.
Email: Bill.Carlile@bnm.ie

Paul Waller

Paul Waller worked for 30 years in R&D and Technical Service and Marketing roles in one of the largest U.K. horticultural companies that harvested peat and manufactured growing media. Paul formed his private consultancy in 2002 specialising in growing media and the evaluation and utilisation of alternatives to peat. He has extensive international experience and is Chairman of the European Standards Committee CEN TC223 - 'Soil Improvers and Growing Media'.
Email: p.waller@ntlworld.com

29TH INTERNATIONAL HORTICULTURAL CONGRESS, 17-22 AUGUST 2014, BRISBANE, AUSTRALIA

Recently the Executive for IHC2014 met with one of its partner organisations in Nuku'alofa, the capital of the Kingdom of Tonga, to progress the development of IHC2014 into the Pacific Island communities. Expect a lively introduction and welcome from the Australian, New Zealand and Polynesian contingents. The Congress infrastructure, which has the theme of "Horticulture-Sustaining Lives, Livelihoods and Landscapes" is well advanced with the planning of its scientific program, accommodation, and entertainment. Research, teaching and extension sessions will cover a range of horticultural commodities and services through approximately 50 specific symposia and workshops. Inspect the website on **www.ihc2014.org** and register early to present a paper or poster at this prestigious international event. For further information about the Congress please contact Dr. Russ Stepenson (russ.stephenson@daff.qld.gov.au) or Dr. Gordon Rogers (gordon@ahr.com.au) or simply register at www.ihc2014.org to automatically receive news and updates about this event.



IHC2014 co-president Prof. Dr. Rod Drew with Tonga Fisheries Minister, Hon. Sangster Saulala during a Ministerial Visit to meet with members of the IHC2014 Executive Meetings.

Members of the IHC2014 Executive and partners, Pacific Island, Tonga and Horticulture Australia representation at the Executive Meetings for IHC2014.

Adel Kader (1941-2012)

Adel Kader

The Prince of Postharvest has passed on: his Legacy remains in the hearts, minds and lives of those he has touched on his remarkable journey throughout our World.

It was with great sadness that we learned of the sudden and unexpected death of our great friend and colleague Adel Kader, 10 December 2012. The postharvest and horticultural development community mourns the loss of a leader, teacher, mentor, colleague and friend. His big heart finally failed him while travelling home from a postharvest conference in South Africa where he had been with his daughter SuSu.

Adel was born in Egypt in 1941. In 1959 he graduated B.Sc. in Horticulture from the Ain Shams University in Cairo, followed by his M.Sc. in Vegetable Crops in 1962 and a PhD in Plant Physiology in 1966, both from UC Davis. He served as an Assistant Professor at Ain Shams University for five years, then as a lecturer and consultant at the Kuwait Institute for Scientific Research for two years. In 1972 he was employed at UC Davis as an Assistant Researcher. He remained on the faculty of UC Davis for the remainder of his career where he had an enormous influence on the lives and careers of young scientists from around the globe. During his career he trained 36 PhD students and over 60 postdoctoral researchers coming from all over the world.

Adel was a prolific writer and keenly aware of the importance of disseminating the research results of his students and colleagues. He was author of more than 230 scientific publications and he was the most cited author by his postharvest colleagues. He was always in demand as a speaker at international conferences, and his reviews on quality maintenance and "Postharvest taste quality" were always in demand. He always encouraged new and upcoming scientists; at conferences he sought out young scientists, questioned them about their work, proffered advice and encouragement, and was often seen chatting among an animated group keen to listen to the wisdom of this great man. In South Africa he was often the last senior scientist to leave the venue with a group of postgraduate students trailing behind – a veritable Pied Piper of Postharvest. We all remember his trademark presentation of a prize to the youngest participant at the conferences he attended; always something associated with postharvest – sometimes a book, other times an essential tool such as a refractometer or a penetrometer – always something relevant and something to treasure.

The many accomplishments of Adel's life and career are exemplified by the milestones of recognition: Chair of the University of California, Davis Pomology Department; Fellow, President, and Chair of the Board of Directors of the American Society for Horticultural Science; Organizer of the International Horticultural Congress; recipient of the UC Davis College of Agriculture and Environmental Science's Award of Distinction, among others. In August 2004 (Verona) and July 2012 (Malaysia) he was awarded a Recognition Award for Excellent Contributions to Global Postharvest Horticulture by the ISHS, and in November this year in South Africa he was recognised for his outstanding contributions to Postharvest Science by the International Commission of Agricultural Engineering (CGIR).

Adel's signature achievement was the development of the UC Davis Postharvest Technology Center. From a loose affiliation of Postharvest Extension Specialists, who published sporadic issues of a postharvest bulletin, he developed what is widely recognized as the world's best source for postharvest information and education. His vision established the annual postharvest short course, now in its 35th year. The impact of this course, with more than 2,500 participants, including students, researchers, teachers, regulators, and postharvest practitioners from around the world, is incalculable. To ensure the Center's continued vitality, he also developed, and was a tireless advocate for, the UC Davis Postharvest Program Endowment Fund.

Adel recognised the need for a comprehensive text on postharvest that would be of value to students but also to postharvest practitioners. His vision and energy lead to the publication of the first and subsequent editions of the text "Postharvest Technology of Horticultural Crops", the Third Edition of which has sold more than 5,700 copies in English and has also been translated into Spanish. When he died, he was coordinating the writing of the Fourth Edition of his signature book. Adel also served as author and editor of many publications, including the popular "Small-Scale Postharvest Handling Practices: A Manual for Horticultural Crops" which he co-authored with Lisa Kitinoja, and which was translated into nine additional languages. Adel led the development of the Postharvest Technology website which has become the premier place to find postharvest information and receives several million page view visits annually.

Adel had an international vision. He cooperated with international organizations, such as FAO and ONU, government programs, such as USAID, and foundations, such as Gates Foundation. He worked with, and was an invited speaker in many countries. He travelled, spoke and/or taught in Argentina, Australia, Belgium, Brazil, Canada, Greece, Italy, Saudi Arabia, Egypt, Jordan, Lebanon, Syria, Kuwait, United Arab Emirates, Iraq, India, Mexico, The Netherlands, New Zealand, Poland, Chile, Uruguay, Turkey, Morocco, Tunisia, Ghana, Sudan, Philippines, Thailand, Malaysia, China, Spain, the United Kingdom and others.

After his retirement in 2007, Adel hardly slowed down. He enjoyed spending more time with his grandchildren, but he was able to give a greater focus on worldwide humanitarian horticultural efforts. Recently Adel was a key player in the Global Horticulture Assessment, which laid the foundation for the development of the Horticultural Collaborative Research Support Program (Horticulture CRSP), which USAID awarded to UC Davis. As an advisor during the writing of the proposal, and as a member of its International Advisory Board, he made significant contributions to the success and direction of the program. He was still in demand as a keynote speaker and his message remains relevant throughout the developing and developed world.

We have all benefitted from his intellectual integrity and his way of discussing and interacting with colleagues and students. He could be very critical of poor science, he had strong views that he voiced strongly and persuasively, but he was the first to praise good work and to encourage others in their endeavours. He was always very willing to share his knowledge, he provided copies of his presentations willingly, and his photographs and teaching slide shows were widely used in postharvest teaching around the world. He had no secrets and he was very critical of colleagues who kept their research and information secret. He was happy to help with a bibliographic reference, photos, a power point presentation, a publication, and always gave sensible and relevant advice.

I had the pleasure and privilege to spend time with Adel and SuSu in Stellenbosch in late November where he was an invited keynote speaker. It was interesting that Adel spent some time relating to the audience some of his personal and career highlights; on reflection it now seems that this was a personal valediction as he reflected on key events during his long and productive life. We had the time to discuss common philosophies, goals and dreams, and to discuss possible ways to further enhance postharvest education, training and research to reduce the very high food losses and food waste that still occur in the supply chain. To have this precious opportunity and time to

Professor Kader, SuSu Kader (his daughter), Professor Sirichai Kanlayanarat (right, current Chair of the ISHS Commission Quality and Postharvest Horticulture) and (left) Professor Errol Hewett, (ISHS Board member and past chair of ISHS Commission Quality and Postharvest Horticulture). Photo taken in Stellenbosch, South Africa on the occasion of Adel's last public presentation at the CGIR 2nd International Conference on Postharvest Technology and Quality Management, 25-29 November 2012. Photograph provided by Wilawan Kanlayanarat.

spend with Adel was something for which I will always be grateful and forever remember.

In one of Adel's final statements to his colleagues in Israel, which summarises his lifelong philosophy, he said the following:

More attention should be given to overcoming the socioeconomic constraints that limit application of currently available technologies for maintaining food quality and safety and reducing losses in developing countries. Additional human and financial resources should be allocated to postharvest research, education and extension to achieve the goal of reducing postharvest food losses and waste. Also, more national and international cooperation and coordination are needed to more efficiently utilize these human and financial resources for dissemination of science-based information about food quality and safety maintenance to all those involved in food production, handling, marketing, and consumption. All appropriate information technology methods should be used whenever feasible. Extracting available information and reformatting it into brief and targeted messages in the relevant language and with easy-to-understand illustrations increases its potential utilization. Professional societies can play an important role in facilitating collaboration and cooperation among existing organizations involved in training and educating postharvest quality and safety professionals. Increased funding that requires interdisciplinary collaboration among various institutions in the public and private sectors will assure the relevance and positive return on investment (ROI) of postharvest research, education, and extension activities.

We are deeply saddened by the sudden loss of our friend, colleague and mentor, and extend our sincere condolences to his family – Aileen, Susu, Sami and his wife Shantel, and his grandchildren whom he loved so much. We thank you for sharing your husband, father, and grandfather with us. We will all miss him too. But we all celebrate his wonderful life and his many accomplishments. The world is left a much better place for his lifelong involvement.

I am indebted to my following colleagues for information included in this tribute: Beth Mitcham, Giancarlo Colelli, Amnon Lichter, Elhadi Yahia, Sirichai Kanlayanarat, Abdullah Hassan, and others in the Postharvest Technology Centre UC Davis.

Errol W. Hewett

Contact

Errol W. Hewett, Board Member International Society for Horticultural Science, Professor of Horticultural Science (Emeritus), Institute of Food, Nutrition and Human Health, Massey University, PO Box 158, Oneroa, Waiheke Island, Auckland, New Zealand. Email: ewmrhewett@xtra.co.nz

History and Early Development of the Modern Chrysanthemum

Judith M. Taylor

INTRODUCTION

Chrysanthemums have been a source of delight for millennia, first in China, then Japan, but only relatively recently in the Western countries. Modern chrysanthemums can be dated from 1789 when Captain Pierre-Louis Blancard carried 6 plants of *C. morifolium* back from China to Marseilles in France. 'Old Purple' grew in his garden and eventually found its way to Paris and London. The chrysanthemum's subsequent development into one of the leading commercial flower crops by a series of devoted breeders is the story of this article.

HISTORY

Chrysanthemum history can be considered in three parts. The first part is the extensive and intensive period in China, and later in Japan, lasting about 1400 years from the 5th century BCE. The second part is the initial introduction into Western Europe in the late 17th century when very little happened. No one paid very much attention to the modest flower and it lapsed into obscurity.

The third part, the most interesting, is the beginning of the modern period in 1789 when a sea captain in Marseilles named Pierre-Louis Blancard (not Blanchard as is sometimes written) imported specimens of *Chrysanthemum morifolium* from China and gave cuttings to the Abbé de Ramatuelle, Thomas d'Audibert, 1750-1794. In 1790 the abbé left Provence together with other priests and moved to Paris. Four years later he was dead. He died from a fall trying to escape arrest during the revolution.

This was the first really large flowered chrysanthemum ever seen in Europe. Only a few had survived the journey and the one Blancard sent the abbé, and which ultimately reached London, was tall and purple.

For a short time the abbé worked on the chrysanthemum in Paris. It is astonishing that the flowers survived. These were perilous times in France. With the revolution raging it is remarkable that people even thought about flowers. As a symbol of the hated Royal family, it is even more amazing that the Jardin du Roi escaped utter destruction. Surprisingly, the institution flourished under the new regime and was renamed the Jardin des Plantes, one of the seven departments of the Museum of Natural History in 1800. A few of the more intellectual of the revolutionaries believed that understanding natural history was important to a new world order.

SCIENCE

Chrysanthemums are in the *Asteraceae* family, producing blossoms with large composite heads. Short disc florets are clustered in the center of the blossom. Long slim ray florets supply the "petals" surrounding the disc. The current botanical name of the horticultural chrysanthemum is *Dendranthema grandiflorum* but in the United States it goes by the affectionate nickname of "mum". Germplasm from other *Dendranthema* also contributes to the modern hybrid, possibly *D. japonicum* and *D. indicum*. *C. indicum* is the type species of the genus *Chrysanthemum*.

The next important division is into classes based on the flower's shape, the so-called horticultural divisions. This nomenclature has evolved over the past century, absorbing new forms as they were discovered. The American Chrysanthemum Society's classification is based on the shape and arrangement of the ray as well as the disc florets: Irregular Incurve; Reflex; Regular Incurve; Decorative; Intermediate Incurve; Pompon; Single/Semi-Double; Anemone; Spoon; Quill; Spider; Brush & Thistle and Exotic. These classes are in keeping with the international system (Fig. 1).

EARLIER CLASSIFICATIONS

A.H. Haworth, an English horticultural observer, wrote about the Chinese chrysanthemum in 1833 (Haworth, 1833). Haworth also tried his hand at a classification that same year. He listed 6 classes in J.C. Loudon's *Gardener's Magazine*: Ranunculus-flowered, Incurved Ranunculus-flowered, China Aster-flowered, Marigold-flowered, Tassel-flowered and Half Double Tassel-flowered. It was a start. By 1880, a more modern grouping emerged in England.

At first the miniature form, now known as pompon, was called "liliputian" but the resemblance to the pompon on top of the French sailor's hat was irresistible and the name stuck. For a while the early growers called it "pompone". As members of the *Asteraceae*, chrysanthemums and dahlias look very much alike, up to and including the pompon forms.

The plant is native to the Northern Hemisphere and is widespread across the Eurasian landmass. It is found most abundantly in the Mediterranean region, particularly Algeria and the Canary Islands and in northern Asia, such as China, Japan and Korea. A few species are endemic to North America, mainly *Tanacetum*. The European and North African species are diploid whereas the Asian plants range from diploid to decaploid.

COMMERCIAL IMPORTANCE

This flower is now one of the most important floricultural crops in many countries. Together with poinsettias and orchids it appears at various positions in the lists of the top ten most frequently sold potted plants, cut flowers and garden plants in the United States. In the 1990s, Japan led the way with 2 billion stems of chrysanthemum cut flowers (Anderson, 2007). During that epoch, The Netherlands sold 800 million stems, Colombia 600 million, Italy 500 million and the United States 300 million. Chrysanthemums in Italy are almost solely used for funereal purposes and Italians get quite upset if a guest arrives with a bunch of chrysanthemums as a hostess gift. In the United States, a grand total of 45 million hardy potted chrysanthemums were sold in 2010, 7 million for indoor pots and 8 million bunches as cut pompons (USDA, 2011). By comparison, 36 million pots of poinsettias were sold during that same period and 21 million pots of orchids.

DEVELOPMENT IN EUROPE

Chrysanthemums seized imaginations in England and France at much the same time. Here was a compact floriferous plant, available in attractive colors, easy to grow and coming into bloom at the end of the summer. It could continue in flower as late as December. This was something to conjure away the bleak dullness of autumn. Haworth suggested that if they were planted against a sunny wall in England and properly tended the flowers might still be coming in January. The French climate was somewhat more propitious and the flowers flourished in the warmer regions.

Figure 1. National Chrysanthemum Society bloom classification. Class 1: 'Mt Shasta', best Irregular Incurve bloom, grown by David Curtis. Class 2: 'Apricot Courtier', best Reflex bloom, grown by David Eigenbrode. Class 3: 'Golden Gate', best Regular Incurve bloom, grown by Normandie Atkins. Class 4: 'Peacock', best Decorative bloom, grown by Ron and Georgene Hedin. Class 5: 'St Tropez', best Intermediate Incurve bloom, grown by David Curtis. Class 6: 'Kelvin Mandarin', Pompon bloom, grown by Ed Mascali. Class 7: 'Peggy Stevens', best Single and Semi-Double bloom, grown by David Curtis. Class 8: 'Seatons Ruby', best Anemone bloom, grown by David Curtis. Class 9: 'Kimie', best Spoon bloom, grown by David Eigenbrode. Class 10: 'Delistar', best Quill bloom, grown by David Curtis. Class 11: 'Senkyo Kenshin', best Spider bloom, grown by David Curtis. Class 12: 'Cisco', best Brush and Thistle bloom, grown by Dorrie McDonald. Class 13: 'Lone Star', best Exotic bloom, grown by Jerry Donahue. Class 1-12: Photographer: Todd Brethauer, Old Dominion Chrysanthemum Society. Class 13: Photographer Ralph Parks (deceased), Delaware Valley Chrysanthemum Society. Reproduced with permission.

Figure 2. 'Old Purple', the earliest large flowered chrysanthemum to flower in England. Photographer: Thomas Brown, reproduced with permission.

England

The chrysanthemum was said to flower for the first time in England at Colvill's nursery in the King's Road, Chelsea in 1796 (Genders, 1971). Colvill's 'Old Purple' was tall with double purple flowers. Its Linnaean name was *Chrysanthemum morifolium* (now *C.* x *morifolium* Ramat). It was a form of the purple flower Blancard had imported and came from the Jardin du Roi in France (Fig. 2).

In fact, chrysanthemums had been grown at the Chelsea Physic Garden many years before in the quiescent "2nd epoch" but were ignored and lost. A Dutch merchant, Jacob Layn, had introduced chrysanthemums into The Netherlands in about 1688, but just as occurred in England, once they died out no one remembered anything about them and a century later it was as if they had never been there. There were said to be 6 cultivars of the flower.

Early enthusiasts also had *C. indicum* in their gardens. Its single yellow flowers were an additional source of color. In 1751, Peter Osbeck, one of Linnaeus' students, found *C. indicum* near Macao in Southern China and sent it back to Europe (Wilson, 1910). Philip Miller cultivated it in the Chelsea Physic Garden as early as 1764.

After the chrysanthemum was reintroduced, it spread slowly throughout England. The Horticultural Society of London was enthusiastic and Curtis' Botanical Magazine carried pictures of the new flower. George Harrison of Downham in Norfolk was enamored of the plants. In 1831, he protected the late plantings under glass with stunning results. Eventually his efforts led to the first chrysanthemum show in Norwich in 1843. Three years later

the Stoke Newington Chrysanthemum Society was started. This later became the National Chrysanthemum Society (Salter, 1867).

Genders mentioned several chrysanthemum enthusiasts who were active before the next major event, the advent of the Chusan Daisy (Genders, 1971). There were Isaac Wheeler of Oxford, who exhibited his flowers at the Horticultural Society in 1832 and another resident of Downham, John Freestone of Watlington Hall who was the first Englishman to ripen seed and raise new cultivars. Chrysanthemum seed is hard to collect and handle, so this was a real achievement.

In Vauxhall, Chandler's Nursery grew seedlings from seed sent by John Salter, an English nurseryman who worked in Versailles for many years before having to return in 1848 because of the communist uprisings in Paris. Two of Salter's cultivars lasted a very long time. They could be found in some nursery catalogues as late as 1960 (i.e. 'Queen of England' and 'Annie Salter').

In 1822, J.C. Loudon, the formidable one-armed horticultural editor and writer, said that Joseph Sabine, secretary of the Horticultural Society of London (subsequently the Royal Horticultural Society) knew of 14 chrysanthemum types. Loudon also commented that there were supposed to be more than 50 types of chrysanthemum in China. By 1826, Sabine could point to 48 cultivars of this plant in the society's grounds. Louis Noisette, noted for his roses, took a few of Sabine's cultivars back to France in 1826 (Lochot, 1930).

Until Robert Fortune brought the Chusan Daisy, *C. rubellum*, back from China in 1846 these were the only types of chrysanthemum in the British Isles. They formed the backbone of all breeding efforts. (You will look in vain for *C. rubellum*. It is now *Chrysanthemum zawadskii* subsp. *latilobum* (Maxim.) Kitag). Fortune's introduction became very popular and led to considerably increased interest in the flower. The diminutive daisy-like plant was the forerunner of the pompon group. Another great advantage of the Chusan Daisies was that they flowered much earlier in the year, enabling them to be grown outdoors.

It was still possible to find some of the British cultivars from the early and mid-19th century in the 20th century. Genders listed at least 3 pompons which appeared in John Forbes' catalogue in 1960: 'Model of Perfection', 'Bob' and 'Mlle. Marthe'. Forbes had a nursery in Hawick, Scotland.

Robert Fortune embellished his already stellar reputation by collecting the Japanese cultivars and taking them back to England in 1862. They were quite unlike the previous specimens. Some were shaped like a camellia and there was a wider range of colors. Putting all these together the nurserymen were able to establish a commercial cut flower trade.

Significant British Figures

Some of the people whose stories follow were fairly prominent in their day and there is considerable information about them. In the case of more obscure men, very small measures of information have had to be gleaned in quite indirect ways. The same will be seen as the story moves from the UK to France and later to the United States.

The criterion I used to keep the list within bounds was a somewhat arbitrary limit of 8 cultivars. There are records of more than 150 men raising chrysanthemums before 1900. If the breeder had introduced 8 or more cultivars I included their name. I ignored this self-imposed rule only in a few instances.

William Bull, Sr., 1828-1902

William Bull, the "new plant merchant", acquired a portion of John Weeks' nursery, Chelsea, in 1861. In 1863 he leased additional space from Weeks. He purchased the nursery outright in 1874, changing the name to Bull's Establishment for New and Rare Plants. By 1878 he became well known for the introduction of so many new plants. He specialized in greenhouse plants and in pelargoniums, fuchsias, and verbenas. 'Chelsea Gem', a pelargonium he introduced in 1880, is still grown.

Henry Cannell, 1833-1914, Swanley, Kent

Cannell began as a jobbing gardener but was very ambitious and eventually built up a large nursery and floral business before succumbing to financial problems and ending up in bankruptcy. At its peak , the firm was well known both nationally and internationally, but the death of 3 of his 4 children had the inevitable impact on his life and ability to function. In 1897, he sent specimens of his chrysanthemums to the trials at Cornell University in New York State, together with another English breeder, Robert Owen of Maidenhead. Cannel was very interested in many types of flower and was known for fuchsias, pelargoniums and verbenas, but his most profound interest was in the chrysanthemum. He recalled that he had first seen it as a child and never forgot the impression it made on him.

W. Clibran and Sons

Clibran owned Oldfield Nurseries, 10 and 12 Market Street, Altrincham, Cheshire. In November 1900, the firm successfully "displayed single-flowered chrysanthemums at the National Chrysanthemum Show" (Robinson, 1902). Their flowers were exhibited at many shows for years.

Robert Forster

Forster's name is associated with W. Clibran & Sons, although he lived and worked in Surrey. He was the Superintendent of the cemetery in Nunhead. It is hardly surprising he was very active in growing flowers. He had ample space in which to experiment. The information about his activities comes from reports in the gardening magazines of the late 19th and early 20th centuries: *The Garden* and *Gardening World.*

John Freestone

Freestone was a very early raiser of chrysanthemums in Norfolk. Burbidge referred to him in his 1884 book.

> ... "Mr. Short and Mr. Freestone about the year 1835, showed 'Nonpareil' and 'Norfolk Hero' ... The first public Chrysanthemum show for cut blooms was held at Stoke Newington" (Burbidge, 1884).

In all, he seems to have produced 9 cultivars of chrysanthemum and was said to be the first Englishman to raise chrysanthemums from seed.

W.J. Godfrey

Godfrey ran the Exmouth Nurseries in Exmouth, Devonshire but also participated in some of the shows with the Devonshire branch of Veitch. Old John Veitch had started his English nursery in Exeter before branching out to the smart trade in London. Godfrey was very prolific. Robinson reported in 1895 that he showed 'Miss Dorothy Shea', 'Charles Blick', 'Duchess of Devonshire', 'Lizzie Cartledge', and 'Aureole Virginale' among other cultivars.

Robert Owen, 1840-1897

Owen owned the Floral Nursery, Castle Hill at Maidenhead in Berkshire. He showed his incurved cultivar 'Lord Rosebery' at the National Chrysanthemum Society exhibition in 1893 together with about 4 other kinds (Robinson, 1890). He also showed 'Magicienne' which won a first class certificate and he was the developer of 'Robert Petfield'. This was a seedling of the 'Princess of Wales'.

John Salter, 1798-1874

Salter was the grandson of an English cheese monger who ran a nursery in Versailles until 1848. He then was obliged to return to England because of the communist uprisings in Paris that year. The number of chrysanthemums he is known to have introduced was more than 75, many of them prizewinners. Once back in London, he set up the Versailles Nursery in Hammersmith where his son Alfred worked with him. Salter named one of his more successful cultivars 'Alfred Salter'.

Charles Lennox Moore Teesdale, 1816-1901

Charles Teesdale was born in Guernsey to a military family just one year after the battle of Waterloo, but elected not to follow the family trade. Teesdale worked for the Post Office in London, gradually rising in rank. Subsequently he retired to Heene, a very select part of the small Sussex town of Worthing on the south coast. There he was a Justice of the Peace and

a magistrate. Growing chrysanthemums was an avocation. Teesdale left more than 16 new cultivars.

Veitch and Sons

The Veitch family ran a distinguished nursery for 4 generations, starting in Exeter and then moving to London. They were known for very bold business moves such as sending private collectors to many parts of the world and offering some of the rarest and most remarkable plants on earth. In Exeter, Veitch employed John Dominy as a hybridizer. He was the first person to introduce a hybrid orchid, an astonishing feat at the time. Introducing new chrysanthemums was part of their background activity, not their main thrust, but as in everything else, they did it very well.

W. Wells, 1848-1916

Wells took over Goacher's nursery at Merstham, Surrey (Redhill). He wrote a book about the finer details of raising chrysanthemums in 1898 (Wells, 1910). It was clearly successful for it went through a number of editions.

France

One of the reasons the chrysanthemum did so well in France was because of the warmer climate, particularly in the Southwest. After the auspicious start in Marseilles, a warm Mediterranean port, Toulouse became the center for chrysanthemum development. Growers had had similar experience with roses in the semi-tropical Midi. Gardeners in these towns did not have to contend with the cold damp of the English autumn.

In 1891, a statistically minded staff writer at the *Revue Horticole* had the happy idea of counting how many cultivars each of the English and French chrysanthemum breeders had introduced by that time (Carrière, 1891a). Simon Délaux of Toulouse led with 431 cultivars, then came Auguste de Reydellet, 229, and Louis Lacroix, 202. Fourth place was taken by the Englishman Smith with 136. The author concluded by saying that in the aggregate the top three men had introduced more cultivars than all the Englishmen combined.

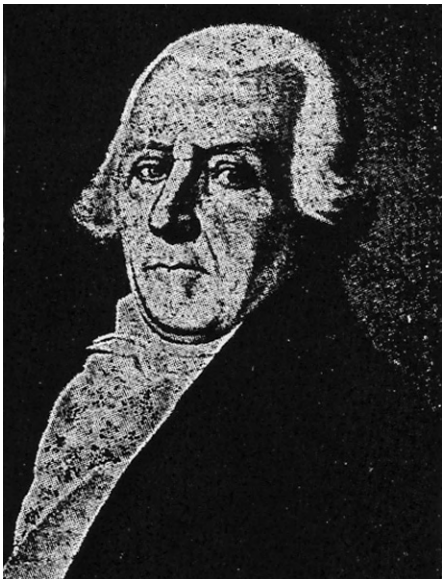
Unfortunately many of the French breeders died without much trace. Careful efforts to find biographical information were not successful in many cases. Apart from the few very significant figures quite often we are left with only a name and a town and not much else.

Captain Marc Bernet

A Captain Marc Bernet, 1775-1855, grew the plant in Toulouse (Fig. 3). He had been born in Toulouse and retired there after a career in the French Army (Carrière, 1891b). Bernet was the first European to collect chrysanthemum seed successfully (Lochot, 1930). This gave him the idea of creating new cultivars. In 1827, he introduced the handsome violet colored

Figure 3. Captain Marc Bernet (artist unknown).

Figure 4. Captain Pierre-Louis Blancard (artist unknown).



'Grand Napoleon'. Bernet handed over many of the daily tasks to his 17-year-old gardener Dominique Pertuzès and continued to introduce new cultivars for many years. Eventually Pertuzès went into business for himself. Alas, he and his brother François both later competed with Captain Bernet, as did many others in Toulouse.

At first Bernet had only about 30 seeds, but in the later 1830s and the 1840s he could plant as many as 300 seeds. He was ruthless in selecting strong and reliable seedlings from his crosses. The names of some of his early cultivars were recorded: 'Rose Croix', 'Duc d'Albuféra', 'Annibal', 'Maréchal Maison', 'Reine Blanche', 'Georges Sand', (a little daring for a provincial captain), 'Baronne de Staël', 'Princesse Pauline' and about 20 others.

Bernet became rather puffed up over his success but was legitimately very annoyed by other people passing off his flowers as their own and selling them to make money. At first he had been very generous and shared his results with many horticulturists, but since there was no such thing as copyright law in those days he had to protect his ideas and work himself. He trusted his niece's husband Lebois and finally permitted only the latter to grow his new cultivars. Bernet sometimes wrote under the pseudonym "Dr Clos". He was also known as the Chevalier Bernet for the decoration he received.

Lebois later left Toulouse, moved to Paris and started a new business. He shared the bounty with three other upright men, Auguste Miellez in Lille, John Salter in Versailles and Philippe Pelé in Paris. In 1854 Pelé introduced the first successful line of dwarf pompon chrysanthemums.

Pierre-Louis Blancard, Marseille

Captain Blancard, 1741-1826, came from an old Marseille family (Fig. 4). He was born and died in the city. Blancard went to sea very young with his father but in spite of a rather attenuated education, he became interested in commerce and geography. In 1813, he wrote a brief treatise or *Manual on the Commerce of the Indies and China* which was published for the first time by the Geographical Society of Marseille 1910, almost a century later. After retirement he joined the Agricultural Council in Marseille.

The merchant family of Audibert employed him once he obtained his captain's certificate. His first trading voyage for the Audiberts was in 1770 to the Ile de France. The ship left from the port of Brest and returned 2 years later. On the fifth voyage, leaving Marseille in 1787 and lasting almost 3 years, he sailed to Ile Bourbon, Reunion, Bombay (now Mumbai), the Maldives, Sumatra and Singapore. In the isle of Wampoa he found a pilot who took the ship to Canton. It was at the last port that he bought half a dozen chrysanthemum plants. The return journey took 15 months and only 3 of the plants survived. He acclimatized the survivors in his garden in Aubagne. One of them was tall and purple, known afterwards as 'Old Purple'. Blancard made a similar trip 2 years later in 1791. The French Revolution had broken out while he was away on the 5th voyage and perhaps he felt happier being at sea a little longer. For all its hazards the sea was a bit more secure than the unpredictable events of the revolution.

Blancard's voyages were documented in considerable detail and the records are in the archives in Marseille (personal communication, Josette Sakakini). Many years later his granddaughters, who lived in England, were found to be in extreme penury. Charitable members of the National Chrysanthemum Society of England took up a collection to help alleviate their distress. The city of Marseille named one of its main streets Promenade Blancard, his house

has had a plaque on it since 1938 and a small alleyway is also named for him in the city.

Laurent Boucharlat, Lyon

Boucharlat introduced some of Delaux's early cultivars with his own. He experimented with miniatures and introduced a number of the pompon cultivars. 'Mme Custex Desgranges', a very important early white ("hâtive") appeared in 1873. It was the basis of future "corbeilles automnales".

Ernest Calvat, 1858-1910, Grenoble

Ernest Calvat was an extremely prolific breeder of new cultivars. He left almost as many as Simon Délaux. Calvat was an amateur flower breeder, earning his living as a glove manufacturer. At one point he was president of the Horticultural Society of the Dauphinée, indicating his position in the horticultural hierarchy of his time. The Calvat family was prominent in Grenoble. M. Calvat's father, Ernest Calvat, served as mayor from 1871 to 1873. The future *chrysanthemiste* was born in 1858 and christened Jean Marie Ernest, but was always known solely as Ernest.

Anatole Cordonnier, Bailleul (Normandy)

Cordonnier wrote a short book and several articles in the *Revue Horticole*. He was extremely enthusiastic about chrysanthemums with very large blossoms. From the record he seems to have bred only ten new cultivars, but in view of his fascination with these flowers, it is possible he bred others of which no records have been retained.

Simon Délaux, Toulouse

Délaux lived and worked in St-Martin de la Touche, near Toulouse. He was a major figure in the early chrysanthemum world but it has not been possible to learn anything more about him. He was the first to do intentional cross-fertilization and introduced more new cultivars than anyone else.

Louis-Jules Lemaire, 1859-1925, Paris

Louis-Jules Lemaire was Philippe Pele's grandson. He was the last person to grow his own plants in Paris and was known to be a master hybridizer. His two sons Louis and Paul worked in Bagneux, but later moved to Saint Jean-de-Braye, near Orleans in 1949. His granddaughter Paulette Lemaire collected as much information about her family and its work as she could and developed the Conservatoire National du Chrysanthème in Saint Jean-de-Braye, to commemorate them all.

Pierre-Louis Victor Lemoine, Nancy

Surprisingly little has been written about this most amazing of all the heroic hybridizers of the 19th century. Without his work it is likely that garden centres as we know them might never have developed or come much later. An enormous proportion of the standard annuals, perennials and flowering shrubs in commerce came from his nursery. If there is one plant with which his name is forever associated it is lilac, *Syringa*. Lemoine did not focus on the chrysanthemum but nevertheless introduced a respectable number of very good new cultivars.

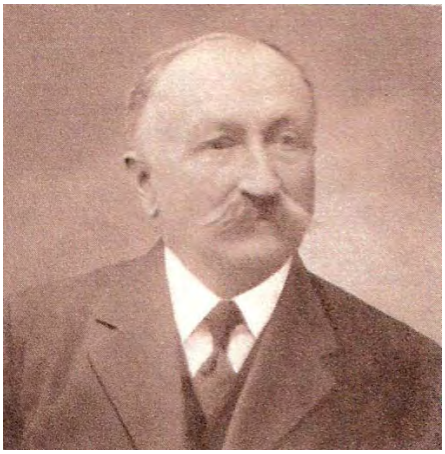
Auguste Miellez, Esquermes les Lilles

Miellez was important because he worked quietly with plant crossing in the early 1830s while it still was considered to be a suspect activity and somewhat impious. Lemoine knew about him as a very young man and spent several months in his nursery learning the techniques. Miellez is perhaps best known for his roses.

Auguste Nonin, Route de Paris, Chatillon-sur-Bagneux

Auguste Nonin, 1856-1956, inherited his father Emile's nursery in Chatillon at the early age of 15 (personal communication, Monique Barrier) (Fig. 5). His father, Emile Nonin, was killed in his own garden by a sentry during the Franco Prussian war. Nonin was very astute and understood the conditions in which he had to work, the markets and the world of competitions. As a young man he travelled widely, particularly to England where his work on chrysanthemums was greatly appreciated.

Figure 5. Auguste Nonin (photographer unknown).



He won a Certificate of Merit at the London exhibition in1905 for 'Perle Chatillonnaise', a large creamy white blossom tinged with pink. 'Coquette de Chatillon', 'Chatillon', 'Sarah Bernhardt', 'Président Truffaut', 'Président Loubert', 'Raymond Poincaré' and 'William Turner' were amongst his most successful introductions. Nonin was elected a vice president of the Société Nationale d'Horticulture Française on two occasions.

André-Philippe Pelé, Paris

Another early enthusiast was the Paris nurseryman André-Philippe Pelé. He raised his seeds in the south and was extremely thoughtful about which ones he selected for further study. Pierre Coindre of Avignon bred the first early chrysanthemum in 1850. In 1855 Pelé exhibited his series at the Societé Nationale d'Horticulture show.

According to Lochot (1930), himself a chrysanthemum breeder, it was Robert Fortune's introduction of seven Japanese species in 1862 which invigorated the field. Everyone was excited by the large blossoms with long, narrow and fantastical petals.

Dominique Pertuzès, Toulouse

Pertuzès started out as Bernet's gardener at the age of 17, but later began his own business. Pertuzès stole Bernet's work and competed with him rather unscrupulously. No biographical information is available.

Alexandre De Reydellet, Valence

De Reydellet died in 1905, but it is not known when or where he was born. He was the stationmaster at Bourg-les-Valence (Drome) and chrysanthemums were his hobby. Some biographical information was obtained from various sources. He was a member of the Association horticole lyonnaise and member of the SNHF. He was one of the founders of the Société Française des Chrysanthémistes and one of the first to sow chrysanthemums at a time when no one (*sic*) knew that chrysanthemums gave seeds. One of his earliest cultivars was 'La Triomphante' in 1877.

Vilmorin-Andrieux, Paris

The seed house Vilmorin-Andrieux has been at the same address in Paris for more than 200 years. Philippe-Victoire Vilmorin, 1746-1804, founded the firm in 1775 after marrying the daughter of Pierre Andrieux, a seedsman and botanist in the quai de la Mégisserie. Andrieux's wife Claude Geoffroy was the expert. Together they became the suppliers of seed to Louis XV, a huge advantage in those days. What happened at court set the standard for everyone else. Pierre-Victoire was a physician with a keen interest in plants. The firm prospered for six generations but about 35 years ago it was sold to a large conglomerate and is now part of Groupe Limagrain.

UNITED STATES

The chrysanthemum appeared very quickly in the United States after its arrival in Europe. This was true of many flowers which had a similar trajectory. Charles Mason Hovey wrote in his 1846 Massachusetts horticultural magazine: "they (chrysanthemums) were a great source of gratification". Soon afterwards the Pennsylvania Horticultural Society held a show in 1846 promoting it as "the coming flower".

Within the next 20 years the flower consolidated its hold on gardeners' imaginations. By about 1865 shows devoted to them were springing up in many towns and growers

Figure 6. 'Mrs Alpheus Hardy' (artist unknown). Photographer: Thomas Brown, reproduced with permission.

competed for prizes and medals just as in the old country. The venerable Pennsylvania and Massachusetts Horticultural Societies were in the forefront of this movement.

As this ferment continued the introduction of the exquisite white Japanese cultivar 'Mrs Alpheus Hardy' took the Western world by storm (Fig. 6). A Japanese student at Amherst wanted to please his sponsor, Alpheus Hardy. He arranged for a specimen of this flower to be sent to the professor in 1891, naming it after the teacher's wife. It was a precursor of the "spider" type with exquisitely curved and fluffy petals. The firm of Pitcher and Manda in New Jersey popularized it and disseminated it very widely.

Hardy was a prominent Boston merchant very much respected for his charitable work in the community. When a young Japanese man was smuggled into the United States to gain an education the Hardys took him in and supported him. They renamed him Joseph Hardy Neesima. He was the first Japanese person to obtain an American college degree.

Major Figures

Dr Henry P. Walcott, 1838-1932

As far as is known, Dr Henry P. Walcott of Cambridge, MA was the first person in the United States to plant seeds of Japanese and Chinese chrysanthemums successfully. He showed some of his seedlings in 1879 (Morton, 1891). In his day he was a very distinguished amateur horticulturist and received many awards. By profession he was an expert on public health and served on the Advisory Council of the American Public Health Association in the 1880s, representing Massachusetts. He was a founding professor of the Harvard School of Public Health and held many other important positions within the public health world (Ames, 1883). He considered his best cultivars to be: 'R. Walcott', 'Shasta', 'Savannah', 'Wenonah', 'Monadnock', 'Semiramis', 'Alaska', 'Ramona', Nevada', Cambridge', 'Pontiac' and 'Tacomah'. Walcott's use of native American names was a novel departure for the time.

It is clear that Henry Pickering Walcott was an outstanding man, good at everything he did and always concerned for the public welfare.

Edwin Fewkes and Sons, Massachusetts

Morton writes: "There is no commercial house in New England more favorably known to chrysanthemum growers than that of E. Fewkes & Sons, of Newton Highlands, Mass." At one time these gentlemen held the entire stock of 'Mrs. Alpheus Hardy', and were the first to flower and exhibit it in America; they still retain the silver medal awarded to its first bloom by the Massachusetts Horticultural Society. It was also from this bloom the first cut was made that illustrated the horticultural papers and catalogues at that time.

John Lewis Childs, 1856-1921, John Lewis Childs Seed Company, Floral Park, NY

Childs was born in Maine and started his career in the seed business in 1874, when he went to work for a nurseryman in Queens, NY, C.L. Allen. He was very successful with many achievements. The nursery was so large that the town was named Floral Park for it. Childs' widow continued to operate the business for a time but it finally closed down in the 1930s because of the Great Depression.

John Condon, Brooklyn

John Condon appears to have been a very enterprising businessman and good at promoting himself. This was the background against which he bred chrysanthemums in his greenhouses along Fort Hamilton Parkway in Brooklyn. He ran a successful florist shop in Fifth Avenue and played a role in Brooklyn's civic life. He managed to get his name in the local paper, the *Brooklyn Eagle*, quite frequently. Condon's business was near the Greenwood Cemetery. He regularly advertised fresh flowers for funerals at low prices, also flowers for weddings. Condon himself was buried in the Calvary Cemetery in Queens.

Frederick Dorner and Sons

Dorner was born in Germany in 1837. He immigrated to the United States to work with his brother Philip in LaFayette, Indiana in 1855. At the time many ambitious young German men were crossing the Atlantic Ocean to improve their lots. It was hard for a poor man to buy land in Germany and life remained very class ridden and stratified. Dorner later did excellent work in dianthus.

Peter Henderson

Peter Henderson, 1822-1890, was a Scottish nurseryman who settled in New York and rapidly became one of the best known and most prosperous of all the American nurserymen at the time. He was known to be a prodigiously hard worker, sitting up late at night to write the innovative series of manuals about practical gardening and horticulture for profit. He believed that any intelligent person could become a successful market gardener without undergoing a long complicated apprenticeship.

Henderson also bred new cultivars and was involved with many different types of flower. In 1875 he published *Gardening for Pleasure*. He devoted a brief chapter to the chrysanthemum, describing its fairly recent ascent in popularity and the development of increasingly frequent shows. The book went through several editions and the one I consulted is from 1888. More than 20 years later, in the 1911 edition of *Practical Horticulture*, Henderson had only added one or two new cultivars to his list from the 1880s.

Robert Kilvington

The first known hybrid cultivar in the US, 'William Penn', was exhibited by Robert Kilvington of Philadelphia at the annual meeting of the Pennsylvania Horticultural Society in 1841. No biographical information is available. At that stage chrysanthemums were still grown outdoors. After about 1850, their culture was transferred to greenhouses. Amateur and private breeders took up the greenhouse flower very soon after this transition. Some of the most notable were Charles Totty of Madison, New Jersey, Eugene H. Mitchell of the Dreer Company in Philadelphia and Elmer Smith of Adrian, Michigan. Smith began his work at the end of the 19th century and by 1923 had introduced 445 cultivars (Anderson, 2007). Both public and private breeders worked with garden chrysanthemums.

John Thorpe, 1842-1891, Pearl River, NY

Thorpe was born in England but moved to the United States in 1874. For a time he worked for the firm of W. Hallock and Sons in Queens, NY. While working there he produced some excellent cultivars, and sent out his first seedlings in 1883. At the end of the 1880s he was appointed the chief of floriculture at the Chicago World Columbian Exposition in 1893 but subsequently settled in upstate New York, opening his own business.

In his day, Thorpe was a very well known and significant figure (Morton, 1891). It is clear he had considerable organizational and administrative ability. William Robinson referred to him as "the father of the chrysanthemum in America".

Charles H. Totty, 1873-1939

Totty was born in Shropshire and moved to the United States when he was 20 years old. By 1896 he had settled in Madison, NJ. He opened a nursery in New Jersey and also ran a very suc-

cessful florist shop at 4 East 53rd Street in New York, right at 5th Avenue. Some of his best known chrysanthemum cultivars were the prize winning 'Patricia Grace', 'Mrs. Henry Evans', 'White Chieftain', and 'Amaterasu'. Totty also operated an active mail order business. The New York Horticultural Society awarded him a medal in 1913 for developing a new rose 'Shell Pink Shawyer'.

CONCLUSION

The above comments only skim the surface of a long, very complex story. The development of the modern chrysanthemum, like that of so many other leading floral crops, resembles a painting by Georges Seurat, made up of a myriad of tiny dots. Each person's life work was absorbed into the whole. Significant contributions built on the ones which came before.

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ABOUT THE AUTHOR

Judith M. Taylor MD is a London born retired neurologist educated at Oxford but now living in San Francisco. She is the author of four books: *The Olive in California: history of an immigrant tree; Tangible Memories: Californians and their gardens 1800 – 1950; The Global Migrations of Ornamental Plants: how the world got into your garden* and *Visions of Loveliness: the work of forgotten flower breeders* (in press). She is working on a 5th book, a sequel to *Visions of Loveliness*. This article is an excerpt from that sequel, tentatively titled: *An Abundance of Flowers: plant breeders who populated your garden*. She has also contributed many articles to the literature on the history of ornamental plants. Her website is: www.horthistoria.com.

Judith M. Taylor

History, Myth and Conservation Threat of the African Baobab Tree in India

R.K. Roy, S. Kumar and A.K. Goel

The "African baobab tree" (*Adansonia digitata* L.; *Bombacaceae*) is a native of tropical Africa (Sub-Saharan Africa – Angola, Botswana, Ethiopia, Ghana, Nigeria, Somalia, and Zambia). This is a very curious and historical tree from a botanical and horticultural point of view (Wickens and Lowe, 2008). The generic name *'Adansonia'* commemorates the French surgeon Michel Anderson who worked as a natural historian in Cairo (1727-1806) and *'digitata'* refers to digitate leaves consisting of five leaflets (like fingers of a hand). The name 'baobab' originated from the Egyptian name 'bu hobab' (derived from the Arabic 'bu hibab'), meaning fruits with many seeds. Cairo merchants who traded exotic

products came across with this plant during the 16th century and named it 'baobab'. Moreover, the tree has many other vernacular names related to its different attributes, like 'dead rat tree' (the shape of the fruit resembles a dead rat with its tail hanging from a long peduncle), 'monkey bread tree' (bread-like soft edible pulp of the fruits), 'cream of tartar tree' (creamy tartar of the flowers), 'gorakh imli' (referring to the sour taste of the fruit pulp), 'upside-down tree' (fleshy stem and branching pattern), 'kalpavriksha' (a tree which survives all through 'kalpam') and 'parijatvriksha' (tree of heaven).

The tree has been an intricate part of Indian culture and tradition for centuries, and a Sanskrit nomenclature is also available, viz. 'gaja bala', 'gorakshi', and 'gandha bahula', as well as names in several other Indian languages including Hindi, Tamil, Telgu, Kannada, etc.

HISTORY OF INTRODUCTION AND MYTH

Migration of plants is a global phenomenon. This has been facilitated by traders, travellers, plant explorers, diplomats, missionaries, and botanists, as a result of cultural, political, religious, social and trade interactions (Roy, 2011). Many new ornamental tree species were introduced in India during the Mughal period (1526-1628) and the British colonial era (1529-1900). Portuguese, Dutch and French invasions also contributed to the introduction of many new genera and species of trees to India. Many of these are so naturalized that they have become part of Indian flora. The introduction of *Adansonia digitata* to India is a silent and historic one. The exact route and period of introduction is unknown and unrecorded. It is believed that Arabian traders collected this tree and grew it in Egypt before a subsequent migration to other countries of Asia, including India. A water colour painting drawn by Sita Ram (1814-15) shows evidence of the existence of a group of *Adansonia digitata* in Allahabad, U.P. (Varmah and Vaid, 1978).

There are several myths, legends and superstitions associated with 'baobab trees' both within India and internationally. Many traditional Africans believe that God planted the baobab tree up-side down and that they actually grow like this. In another legend, it is described that baobab was the first tree appearing on earth. Next in the sequence was palm tree with slender stem and graceful foliage. Seeing the palm, the baobab desired to be taller than the palm. When the beautiful 'flame tree' with red flowers came in, the baobab was quite envious of the beautiful flowers and so on. God became very angry, and eventually pulled the baobab up and replanted it up-side down to keep it quiet. Actually, during its juvenile stage the baobab is not at all different from other trees. Its only distinctive feature at this time is the presence of digitate leaves. When it grows to an adult plant, all of a sudden, people notice the formation of its massive trunk and the appearance of a clustered branching pattern reminiscent of its Godly origin. For some, the tree is a symbol of fertility and is worshiped for various purposes. This tree is extremely useful for providing food and medicine, thus its name 'tree of heaven' or 'tree of life'.

Many giant century-old specimens are distributed in India and for various reasons are a great source of attraction to plant lovers and a centre of botanical curiosity. Sometimes, these trees are a point of tourist attraction and some have religious connection, being part of a heritage plantation at temples, mosques and *dargahs*. The tree is also considered to be a symbol of 'fulfillment of desire' and as such people worship it on special occasions (Roy, 2009).

BOTANICAL DIVERSITY AND DISTRIBUTION

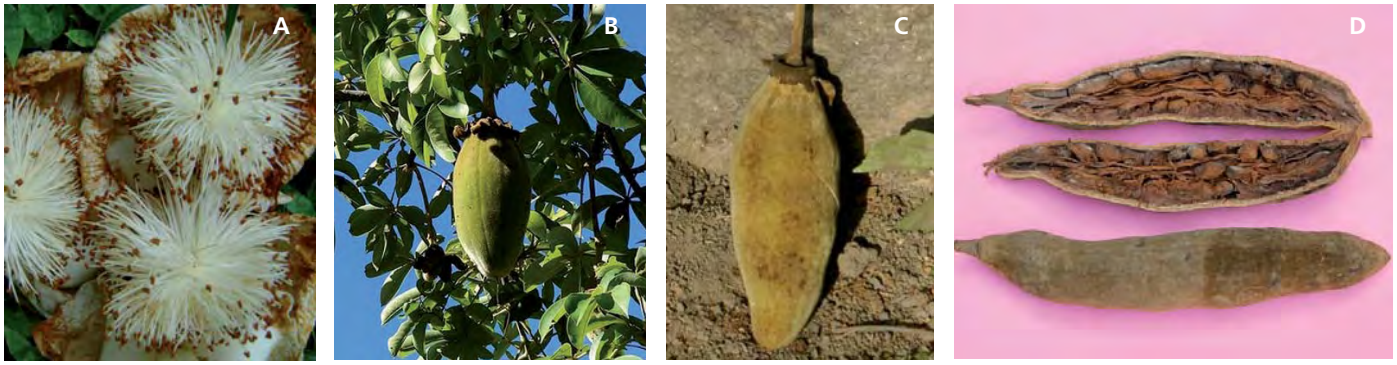
The genus *Adansonia* includes the following species: *A. digitata, A. grandidieri, A. gregorii, A. madagascariensis, A. perrieri, A. rubrostipa, A. suarezensis* and *A. za*, all of which vary in shape and size. Of these, *A. digitata* is the most popular and widely spread throughout the world (Baum, 1995a). The main reasons for its domestication in various countries are its food value and agro-forestry importance and its curiosity as a botanical specimen (Dovie, 2003).

Adansonia species are found in the natural habitat of the African savannah, which is characterized by low altitude and a dry-hot climate similar to arid or semi-arid conditions. *A. digitata* is also found in other countries, viz. Barbados, Cuba, Congo, Egypt, Guyana, Haiti, Indonesia, Malaysia, Mauritius, Philippines and others. These species are generally sensitive to water logging and frost due to their succulent stem and tropical adaptability (Menninger, 1962).

At D.K. Government College for Women, Nellore, Andhra Pradesh (trunk girth 16 m; 140 years old).

In India, *A. digitata* is well distributed in the states having a tropical or subtropical climate. This species has been reported in the eastern states like Bihar, West Bengal and Orissa. Northeastern states have very few specimens, nor does Himachal Pradesh, Jammu and Kashmir. As a result of surveys, the existence of century-old and heritage specimens have been found in Andhra Pradesh (Hyderabad – Golconda Fort, Nellore), Karnataka (Bijapur), Gujarat (Bhavnagar), Madhya Pradesh, Maharashtra, Rajasthan (Banswara) and Uttar Pradesh (Allahabad and Barabanki). These trees confirm the antique association with

***Adansonia digitata*. A. Flower, B. Immature fruit, C. Mature fruit, D. Pulp and seeds.**



Veermata Jijabai Bhonsale Udyan (Victoria Garden), Mumbai (trunk girth 10 m; 150 years old).

Zoological Garden, Kolkata (trunk girth 8 m; 150 years old).

Adansonia rubrostipa, Botanic Garden, CSIR-NBRI, Lucknow.

India. Zoological and botanical gardens of India (Kolkata, Lucknow, Mumbai, Bangalore, Pune) have been maintaining several old and gigantic trees. Several other specimens have also been seen in various other locations.

REPRODUCTIVE BIOLOGY

Similar to the particular architectural attributes of the trunk, reproductive biology is also very intriguing. The species takes about 15-20 years to reach flowering stage. The flowers are large (15-20 cm long), white in colour, and hang pendulously from the branches. Flowers open in the night and are pollinated by nocturnal agents (Baum, 1995b). The flowering season spans from March to May depending on the climatic conditions. Due to its massive structure, many nocturnal birds, bats (*Epomophorus wahlbergi*), bluebottle flies (*Chrysomyia marginalis*), and moths – American bollworm (*Heliothis armigera*), spring bollworm (*Earias biplaga*) and red bollworm (*Diparopsis castanea*) – hide in the tree during the daytime and are pollinators during the night. A strong persisting smell is released by the flowers and attracts these birds and insects. In some cases, bush babies (*Galago crassicaudatus*) also feed on the flowers, helping with pollination. The flowers usually drop off in the morning after pollination and the ovaries attached to the branches develop into fruits. The fruits contain soft bread-like pulp and many viable seeds and take about 3-4 months to mature.

STRUCTURAL CURIOSITY AND LIFE SPAN

Adansonia digitata is remarkable for its unique morphology. The massiveness of the trunk and gigantic size of its branches make it a distinctive genus. The girth of the main trunk of a mature tree ranges from 25-35 m. The tree reaches about 15-25 m in height. *Adansonia digitata* is the largest succulent tree; it can retain about 113,400 litre of water inside the trunk and branches in order to survive a long drought period.

The tree's life span is estimated between 3000-6000 years, which is believed to be the longest life span in the plant kingdom. Some of the

Barabanki, Uttar Pradesh (trunk girth 15 m; 300 years old).

Naya Quila, Golconda Fort, Hyderabad (450 years old).

'A group of *Adansonia* trees at Allahabad'. Drawing in water colour by creator artist Sita Ram (1814-15).

A massive specimen of *Adansonia digitata* at Modjadjiskloof, Limpopo Province, South Africa (one of the oldest trees in the world, 6000 years old).

century-old specimens are so gigantic that discerning their age by morphological appearances is very difficult and remains inconclusive as the tree does not have annual growth rings. Carbon dating has been used to ascertain the age of trees in several cases (Patrut et al., 2011, 2012).

SYNERGIC ASSOCIATION WITH OTHER FAUNA

The ecological impact of this species on fauna is particularly interesting. Synergic association of eagles, vultures, owls, nocturnal birds, bats, lizards, rodents, squirrels, tree frogs, scorpions, snakes, spiders, honey bees, and several other insects has been reported. These animals usually use trunk crevices, cavities and holes for shelter and nesting. A mature tree supports an entire community, including people, cattle, birds, insects, wild animals. The interdependence of species associated with *Adansonia digitata* is remarkable and this species is a classic example of a tree contributing to the ecological balance,

Adansonia gregorii.

being a perfect host to more than one dozen fauna (Maheshwari, 1971).

FOOD, ECONOMIC AND MEDICINAL VALUE

This tree rightly bears its name 'tree of life' because of its numerous usages for food, medicine and other economic purposes (French, 1944; Kamatou et al., 2011). Young leaves are rich in vitamin C (six times more than orange) and uronic acid. In West Africa the fruit are in high demand as a soup vegetable in addition to their usage as condiments and seasoning. Fruits are 15-20 cm long and have a velvety outer skin with pale yellow colour when ripened. The powdery pulp is rich in vitamins, antioxidants and other nutrients [protein – 5.3 g, carbohydrates – 30 g, fat – 0.15 g, alimentary fiber – 48 g, sodium – 2 mg, vitamin A – 200 mg, vitamin C – 300 mg, thiamine (B1) – 0.48 mg, riboflavine (B2) – 0.28 mg, niacine (PP) – 3 mg, vitamin B6 – 2.13 mg, calcium – 265 mg, phosphorus – 210 mg and iron – 7 mg (average on 100 g fruit pulp)] as reported by Carr (1955, 1958), Nour et al. (1980) and Nicol (1957). Several commercial products made from the fruit pulp powder are available internationally as nutrient supplements. In 2008-09, the European Union and United States Food and Drug Administration granted general recognition of baobab dried fruit pulp as a safe food ingredient (Anon., 2008; Tarantino, 2009).

In India, however, there is no record of regular use of fruit pulp powder as a food ingredient. Medicinal use has been reported in Ayurveda, Unnani for treating diarrhoea, dysentery, hyper acidity and other skin ailments (Anon., 1986).

Seed oil is used in the cosmetic industry, while oilcakes, leaves and tender stems are used as fodder. Dried inner bark is used for paper making and packaging purposes. Fibres found in the inner bark are suitable for making rope, string, baskets, fishing nets and cloth.

LANDSCAPE USE

At present, the use of *Adansonia digitata* in landscaping for beautifying parks and gardens is limited, mainly due to a lack of plants in horticultural nurseries. However, a tall, older plant creates a lot of curiosity and attraction in gardens wherever they are grown (Bose and Chowdhury, 1991; Roy, 2013).

CONSERVATION AND POPULARIZATION

Adansonia digitata is a rare plant in India and not commonly found in parks and gardens. They are mainly found at old heritage sites, forts, temples and mosques. However, the species does not figure in the Red Data Book of Botanical Survey of India. It is also not included in the IUCN Red list as a threatened or endangered species, but is a protected tree under the Forest Act of South Africa (1941) (Coates

Ibrahim Roza Monument, Bijapur, Karnataka (trunk girth 10 m; 360 years old).

A massive specimen, Botanic Garden, CSIR-NBRI, Lucknow (trunk girth 12 m; height 25 m; 160 years old).

Palgrave et al., 1985; Palmer and Pitman, 1972).

The specimens of *Adansonia digitata* existing in India are very old. No new plantation is being made except in botanical gardens. Although the species produces viable seeds, systematic propagation has not been conducted, resulting in restricted availability and rarity. CSIR-NBRI Botanic Garden has been maintaining the following species: *A. digitata, A. rubrostipa* and *A. za* as part of an ex situ conservation programme (Anon., 2012) and they provide seedlings to others.

It is therefore extremely important to instigate proper conservation measures for this tree species wherever they exist at various locations in India. Beginning large scale propagation for raising sufficient population in a strategic way is also recommended to meet the shortage of plants in the nursery trade. Subsequently, exchange of seedlings amongst the parks and gardens, botanic gardens and other sanctuaries is suggested for proper ex situ conservation. It is also recommended that *Adansonia digitata* be declared a 'heritage tree' to protect this historic and benevolent tree species in India.

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About the Authors

R.K. Roy

S. Kumar

A.K. Goel

Dr. R.K. Roy is the Senior Principal Scientist (Horticulture) at the Botanic Garden, Floriculture and Landscaping Division, National Botanical Research Institute, Rana Pratap Marg, Lucknow 226001, India. His research interest is in ornamental horticulture; exploration, collection, ex situ conservation of rare, endangered and ornamental plant species; breeding of new cultivars of ornamentals and garden designing. Email: roynbri@rediffmail.com (Corresponding author)

Dr. Satish Kumar is Technical Staff having a specialization in Agronomy. He is currently looking after the maintenance of germplasm collections of ornamentals. Email: satish_agron@yahoo.co.in

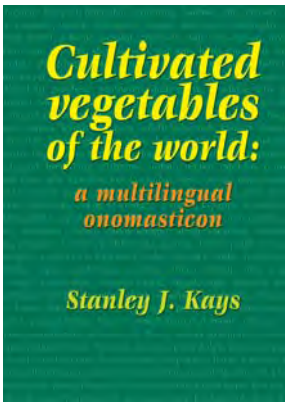
Dr. Anil K. Goel is serving as a Chief Scientist & Head in the Botanic Garden & Floriculture Division at CSIR-National Botanical Research Institute, Lucknow, India. He has research & development experience of over 35 years in the areas of plant taxonomy, conservation, ethnobotany as well as medicinal plants.
Email: akgoelofcsirnbri@gmail.com

New Books, Websites

BOOK REVIEWS

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

Cultivated Vegetables of the World: a Multilingual Onomasticon. Stanley J. Kays. 2011. Wageningen Academic Publishers, Wageningen, The Netherlands. 828p. ISBN 978-90-8686-164-4 (hardback). ISBN 978-90-8686-720-2 (e-book in PDF). € 135. www.WageningenAcademic.com/world-vegetables



Being a French speaking person, I am often challenged to properly identify vegetable names in English or in other languages when I travel abroad.

When I go to a restaurant in Canada, England, Australia or New Zealand, and ask for a side dish of "aubergine", the French name for *Solanum melongena* L., I stand a good to slight chance of being understood by the waiter. However, in the United States I would be met with "Huh?" until I request "eggplant" instead. Though botanically correct, "a side dish of *S. melongena* please…" would most likely cause a furrowed brow and an inquisitive glance from the waiter, rather than the appearance of a tasty dish for me to eat. From this example you can see that it is a challenge for those who travel to use crop plant names appropriate to the location.

To share information and properly communicate, we need a Rosetta stone or a lexicon of translated food terms. Specialized terminology lexicons are an essential tool for sharing knowledge of people and cultures. Stanley J. Kays has provided just such a cryptic reference. The ambitious glossary of translated vegetable crop names entitled: "Cultivated Vegetables of the World: a Multilingual Onomasticon", published in 2011 by Wageningen Academic Publishers, provides this information in grand style.

This 828 page book presents an impressive translation work of more than 402 vegetable crop names, in no less than 370 languages and dialects. The book, divided into 8 chapters, lists the common vernacular names of cultivated vegetable crops according to their binomial taxonomy, based on the International Code of Botanical Nomenclature (Chap. 1). It also provides a list of the different vegetable crop names in alphabetical order (Chap. 2) and a standardized list of accepted synonyms of scientific names for these crops (Chap. 3). Not only does this listing use accepted taxonomic standards for vegetable crop nomenclature, but it also refers to accepted codification for the different languages and dialects according to the International Organization for Standardization. Appendices provide a comprehensive enumeration of the unfamiliar diacritics, Afro-Roman and other unique characters used by the different languages and a thorough explanation of the phonetic transcription and transliteration of Chinese and other logograms into the Latin alphabet. As an extra tool for categorizing the different crops, the book enumerates crops by their English or Latin names based on their edible plant part or parts consumed (Chap. 4), or by their culinary preparation methods (Chap. 5). It also gives information on the number of speakers of a particular language, its classification and world distribution (Chap. 6), the language's synonyms (Chap. 7) and the names of the different dialects used (Chap. 8).

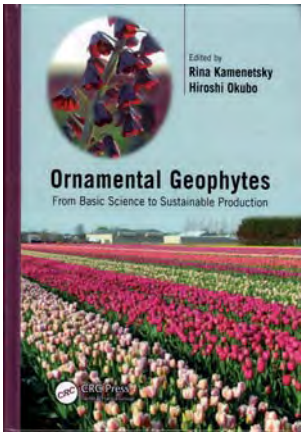
Interestingly, the book presents a very comprehensive definition of a vegetable crop, one horticulturists could also adopt. Indeed, for most people, a vegetable crop is a category of plants classified chiefly by their culinary uses or cultural traditions. Usually the term "vegetable" refers to a plant cultivated for the consumption of its edible parts, normally excluding sweet fruits, and dried seeds or nuts. Kay's definition is much more encompassing, including crops that are "(1) herbaceous or largely herbaceous plants or plant parts; (2) consumed by humans; (3) eaten raw, cooked or preserved; and (4) typically eaten as part of the main course or appetizer, rather than dessert." The list of translated crop names omits non-cultivated species, lower organisms like fungi and ferns, most trees and shrubs and plants grown in or gathered from sea water (sea weeds).

This book is not intended to be read from cover to cover but contains an immense and unique source of information useful to a very wide audience. Indeed it will be invaluable for those who need to communicate, without confusion, vegetable crop names and will therefore be of use to "… university and governmental researchers, libraries worldwide, agriculture organizations, agricultural scientists, embassies, international travelers, vegetable growers, shippers, produce buyers, grocery store managers, gourmet restaurants, chefs, and gardeners."

In this day and age of cloud computing, internet access and Google translation, my only criticism of this book is that it is actually printed on paper… Such a wealth of information would have made a fantastic intelligent-phone app or a most useful website. I encourage the author to develop this information for digital applications. Such terminology databases, like the "Agriculture Terminology Bank of Canada," have largely been moved to the Internet (see TermiumPlus at www.termiumplus.gc.ca) and can be accessed from anywhere instantly. The almost two kilograms this book weighs will certainly limit the day to day use of this extremely rich source of vegetable crop name terminology.

Reviewed by Yves Desjardins, Laval University, Canada

Ornamental Geophytes: From Basic Science to Sustainable Production. Rina Kamenetsky and Hiroshi Okubo (eds.). 2012. CRC Press (Taylor & Francis Group), Boca Raton, Florida, USA. 597p. Print ISBN 978-1-4398-4924-8, eBook ISBN 978-1-4398-4925-5. $139.95/£89.00. www.crcpress.com



Ornamental geophytes, often referred to popularly, but inaccurately, as "flowering bulbs", belong to almost 800 botanical genera and include well-known and beloved plants such as tulip, lily, narcissus, gladiolus, hyacinth, crocus, and iris. Geophytes are characterized by regenerative buds located in underground storage organs such as bulbs, corms, tubers or rhizomes. These plants originate from various climatic zones, and their life cycles often include defined periods of dormancy and active growth. In view of their importance in the world flower trade, it is no wonder that the horticultural scientists who labor in this field are so well organized and prolific in the preparation of books, treatises, manuals, and symposia on the science and technology that undergird this industry.

Ornamental Geophytes: From Basic Science to Sustainable Production edited by Rina Kamenetsky and Hiroshi Okubo is a new release from CRC press that is a worthy successor to *The Physiol-*

ogy of Flower Bulbs edited by De Hertogh and Le Nard in 1993. This new book addresses the recent advances in geophyte science by reviewing the current knowledge and its impact on the productivity and sustainability of the bulb industry. In the last 20 years, the general approach to plant research and world horticultural production changed in rather dramatic ways. The latest advances in geophyte science reflect the main changes in plant science and horticulture: (1) the demand for sustainable and environmental-friendly production, (2) the wide-spread employment of new molecular technologies, and (3) the globalization of production and marketing chains. Thus, a collective effort to analyze the current status in geophyte science, technology and production systems was essential.

The new treatise, published in September 2012, consists of 20 chapters, coauthored by 40 leading international experts in the field. The first chapter on "Globalization of the Flower Bulb Industry" by A.A. De Hertogh and co-authors summarizes the history and current status of world bulb production, especially in the main production areas, such as The Netherlands, the United States, and France. In addition, the research and development in the new producing regions of East and Southeast Asia, Brazil, New Zealand, South Africa and Turkey are highlighted in individual chapters. The book covers the taxonomy and ecology (2 chapters), botany and development (2 chapters), physiology of flowering and dormancy (2 chapters), breeding and genetics (3 chapters), production chains and technology (4 chapters), and sustainable production and post-harvest of ornamental geophytes (2 chapters). Recent advances in phylogeny, physiology and breeding owe greatly to the employment of new methods of molecular and biochemical analyses. Molecular technologies have also increased the ability to detect and identify pests and pathogens, a major benefit for clean plant programs.

I was particularly impressed with the following 5 chapters: "Taxonomy and Phylogeny" by A.W. Meerow; "Breeding and Genetic" by J. van Tuyl, P. Arens and A. Marasek-Ciolakowska, which includes some startling photographs of chromosome paintings; "Florogenesis" by R. Kamenetsky, M. Zaccai and M.A. Flaishman; "Dormancy" by H. Okubo; and "Postharvest" by M. Reid and C.-Z. Jiang. A special chapter by G. Chastanger and co-authors is dedicated to environmental protection and integrated management. In sustainable production of bulbs and flowers, the development of effective pest and disease control systems with reduced pesticide inputs is one of the vital questions that will require additional research. The production chain and systems are reviewed in detail by W.B. Miller.

The final chapter by R. Kamenetsky, G. Chastanger and H. Okubo is of particular importance, as it points to future trends and research challenges in geophyte science, production technologies and conservation of natural resources. This chapter is geared towards policy makers to assist them in allocating resources necessary to conduct research in ornamental geophytes, to transfer this knowledge to the industry, and to develop truly sustainable production. The book contains two indices: one based on family, genera, and species, and the other a general one on subject matter. There are color inserts for a number of the black and white figures within the text, but I would have been happier if they had included captions. Clearly this book will be a basic reference work in the industry and a must-have volume for researchers, students and horticulturists.

Reviewed by Jules Janick, Purdue University, USA

NEW JOURNAL

The following message reached us from Iran:

International Journal of Horticultural Science and Technology (IJHST), a quarterly multidisciplinary peer reviewed journal dedicated to increasing the depth of the subject across disciplines with the ultimate aim of expanding knowledge of horticulture. Info: Prof. Morteza Khosh-Khui, Editor-in-Chief, Department of Horticultural Science, College of Agriculture, Shiraz University, Shiraz, Iran, Email: mkhoshkhui@yahoo.com, Web: ijhst.ut.ac.ir

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

Fascination of Plants Day, 18 May 2013. Info: Prof. Trine Hvoslef-Eide, Master coordinator, EPSO Coordinator for Fascination of Plants Day 2013, Department of Plant & Environmental Sciences/Head of Imaging Centre Campus Ås, Norwegian University of Life Sciences (UMB), Norway, Phone: 0047 64 96 56 36, Email: trine.hvoslef-eide@umb.no or Dr. Karin Metzlaff, EPSO Executive Director, European Plant Science Organisation, Email: Karin.metzlaff@epsomail.org, Web: www.plantday12.eu

9th European Conference on Precision Agriculture, 7-11 July 2013, Lleida, Catalonia, Spain. Info: Mariona Puigdevall, Fundació Universitat de Lleida, C. de Jaume II, 67 bis, 3a planta, Campus de Cappont, 25001 Lleida, Spain, Phone: +34 973 00 35 57, Fax: +34 973 00 35 52, Email: ECPA2013@udl.cat, Web: www.ecpa2013.udl.cat

International Training and Study Tour on Technology Advances in Agricultural Production and Fertilization, 19-30 August 2013, Alabama, Tennessee, Georgia, Missouri, Illinois, Arkansas and Washington, D.C., USA. Info: Training and Workshop Coordination Unit, IFDC, P.O. Box 2040, Muscle Shoals, Alabama 35662, USA, Phone: +1 (256) 381-6600, Telefax: +1 (256) 381-7408, Email: training@ifdc.org, Web: www.ifdc.org

7th EPSO Conference "Plants for a Greening Economy", 1-4 September 2013, Porto Heli, Greece. Info: Dr. Karin Metzlaff, Executive Director, European Plant Science Organisation (EPSO), Rue de l'Industrie 4, 1000 Brussels, Belgium, Phone/Fax: +32-(0)2-21362-60 / 69, Email: Karin.Metzlaff@epsomail.org, Web: www.epsoweb.org/7th-epso-conference-1-4-september-2013-greece

3rd International Conference on Neglected and Underutilized Species (NUS) for a Food-Secure Africa, 23-25 September 2013, Accra, Ghana. Info: Email: nus2013@bioversity.org, Web: www.nus2013.org

11th African Crop Science Society Conference, 14-17 October 2013, Yaounde, Cameroon. Info: Dr. Leke Walter Nkeabeng, Vice-President ACSS Council, Faculty of Agronomy and Forestry Engineering, Chairman LOC Cameroon, Institute of Agricultural Research for Development (IRAD), P.O. Box 2123, Messa Yaounde, Cameroon, Phone: +23779704342(C) or +237 94035711(C), Email: lekwat@yahoo.com or acss2013yde@gmail.com, Web: www.acssconference.com/index-2.php

Fruits and Roots: A Celebration and Forward Look, 6-7 November 2013, East Malling, Kent, UK. Info: Russell Millman, Administrator, Association of Applied Biologists, Warwick Enterprise Park, Wellesbourne CV35 9EF, UK, Phone: +44 2476 575195, Fax: +44 1789 470234, Email: russell@aab.org.uk, Web: www.aab.org.uk

2nd Global Conference on Entomology, 8-12 November 2013, Kuching, Sarawak, Malaysia. Info: Dr. V. Sivaram, Department of Botany, Bangalore University, Bangalore – 560056, India, Phone: +91(080) 22961315, Fax: +91-80-23181443, Email: info@gce2013.com, Web: www.gce2013.com

Section Ornamental Plants

24th Int'l EUCARPIA Symposium – Section Ornamentals "Ornamental Breeding Worldwide"

Participants of the symposium.

The meeting entitled "Ornamental Breeding Worldwide" was held under the auspices of ISHS and EUCARPIA on 2-5 September 2012 in Warsaw, Poland. The symposium was organized by the Research Institute of Horticulture, Skierniewice, with the participation of the Horticulture Science Committee of the Polish Academy of Sciences and the Polish Society for Horticulture Science. ISHS was represented by Dr. Jaap van Tuyl (The Netherlands), who, in a special presentation, informed the audience about this organization, showing its different activities. The venue for the symposium was a historical building of the Central Agriculture Library. The symposium logo, presenting a flowering pot, was inspired by a local folk art (Łowicz County) paper cutting.

The symposium was attended by more than 150 participants from 25 countries, including representatives of 20 companies engaged in breeding ornamental plants. Thanks to the support of the Ornamental Plants Section of Eucarpia, represented by Dr. Jaap van Tuyl, 21 young researchers obtained grants enabling them to participate in the symposium. The symposium was accompanied by an exhibition of ornamental plant cultivars supplied by Polish breeders.

Clematis exhibition.

The symposium had seven thematic sessions: Role of biodiversity, Distant hybridization, Mutation breeding and polyploidy, Molecular markers, Genetic Engineering, Breeding for resistance and Breeding for ornamental traits and longevity. They were preceded by a General Session, during which Dr. Jaap van Tuyl reviewed recent ornamental plant breeding activity worldwide and the Secretary of CIOPORA, Dr. Edgar Krieger, presented new trends in the protection of breeder's rights.

Key lectures were delivered by leading scientists working on the methodology of ornamental plant breeding – Professors Masahiro Mii (Japan), Thomas Debener (Germany), Paul Arens (The Netherlands), Dr. Yoshikazu Tanaka (Japan), as well as the Polish scientists – Professors Stefan Malepszy (the lecture was presented by Grzegorz Bartoszewski), Krystyna Górecka and Anna Majewska-Sawka.

Although all very interesting, most visually attractive were the lectures by Professor Mii and Dr. Tanaka, who extensively described their new breeding materials obtained with the help of biotechnology.

Dr. Tanaka, representing the breeding companies Suntory (Japan) and Florigene (Australia) delighted the audience with pictures of entirely new creations of roses, carnations and chrysanthemums with blue flowers, resulting from the introduction of a gene responsible for the

Dr. Jaap van Tuyl.

Poster session.

production of the delphinidin pigment. After the lecture, we all smelled the perfume prepared from the extract of a transgenic blue rose 'Applause'. Very inspiring also were pictures depicting novelties in flower morphology and in early flowering.

Prof. Mii presented the research conducted at Chiba University showing a number of new genotypes of *Cosmos, Kalanchoe, Primula, Petunia* and *Begonia* obtained from generative and somatic hybridization.

In total, 38 oral reports and 81 posters were presented. Fourty-nine pre-reviewed scientific papers presented at the symposium were published in *Acta Horticulturae* 953 prior to the symposium.

The participants of the symposium took part in a guided coach tour to Warsaw, which ended with a live Chopin piano concert at the Lazienki Royal Gardens. The optional post symposium one-day tour was organized to the Polish companies involved in ornamental plant breeding and propagation, namely, Clematis Container Nursery, Ornamental Plant Nursery Kurowscy, and Norwa In Vitro Laboratory.

The members of the Scientific Committee were Thomas Debener (Germany), Johan Van Huylenbroeck (Belgium), Antonio Mercuri (Italy), Masahiro Mii (Japan), Jaap van Tuyl (The Netherlands) and Alexander Vainstein (Israel), and from Poland were Małgorzata Korbin, Stefan Malepszy, Marian Saniewski and Szczepan Marczyński. I would like to express special gratitude to Dr. Jaap van Tuyl, who helped us many times with his valuable advice and to Dr. Dik de Vries (The Netherlands) who voluntarily reviewed several manuscripts submitted to *Acta Horticulturae*.

We are especially indebted to the local Organizing Committee – Dariusz Sochacki, the secretary, and Eleonora Gabryszewska, Małgorzata Podwyszyńska, Bożena Matysiak, Danuta Kucharska, Barbara Michalczuk, Jadwiga Treder and Aleksandra Trzewik, who worked very hard to ensure the participants enjoyed themselves as much as possible.

Teresa Orlikowska

Contact

Dr. Teresa Orlikowska, Symposium Convener, Research Institute of Horticulture, Konstytucji 3 Maja 1/3, 96-100 Skierniewice, Poland, email: Teresa.Orlikowska@inhort.pl

Seventh Int'l Symposium on Light in Horticultural Systems

Section Ornamental Plants – Commission Horticultural Engineering – Commission Protected Cultivation

The 7th International Symposium on Light in Horticultural Systems was held 14th to 18th of October 2012 in Wageningen, The Netherlands. The Conveners were Dr. Silke Hemming and Dr. Ep Heuvelink, both from Wageningen University and Research Centre.

The Netherlands is well known for its innovative horticultural sector, with 10,000 ha of modern greenhouse production. Approximately 25% of that area is currently equipped with artificial light. Light plays an important role in market-oriented greenhouse production. Products have to be ready for the market on time with the desired volume and quality. In order to meet these requirements, an optimal use of light as one of the most important production factors is of utmost importance. Natural sunlight is free and its utilization in greenhouse horticulture is necessary for sustainable crop production. The addition of supplementary artificial light however, will remain necessary in several regions of the world. By manipulating light we are able to control and steer crop growth and development. Changing the light factor has a large impact on the total production system: microclimate and energy consumption are influenced, costs and benefits are affected. Research

Participants of the symposium.

Cucumber production with LEDs.

on light in horticultural systems is necessary for sustainable and market-oriented greenhouse production in the future. The relation between light, microclimate, energy consumption in the greenhouse and growth and development of the crop still raises many questions. During ISHS Lightsym2012 the participants exchanged their ideas and research results on the newest insights into the role of light in intensive horticultural systems.

Two hundred and sixty-five participants from 33 countries attended ISHS LightSym 2012. During the symposium 7 keynote speakers gave summary presentations on the topic. The symposium started with Dr. Cary Mitchell (Purdue University, West Lafayette, USA) who gave an overview on "Plant Lighting in Controlled Environments for Space and Earth Applications", followed by Dr. Eiji Goto (Plant Factory Research and Development Center, Chiba University, Japan) who shared his newest research results on "Plant Production in a Closed Plant Factory with Artificial Lighting". Dr. Irene Vänninen (MTT Agrifood Research Finland, Jokioinen, Finland) pointed out new possibilities with artificial light in her keynote lecture on "Prospecting the Use of Artificial Lighting for Integrated Pest Management". Dr. Hans Gagnar Gislerød (Norwegian University of Life Sciences, Ås, Norway) looked at "Light and Energy Saving in Modern Greenhouse Production" and Dr. Esteban José Baeza Romero (IFAPA Research and Training Institute for Agriculture of Andalucía, Spain) pointed out the importance of natural light and the "Light Transmission of Greenhouse Covers". Dr. Wim van Ieperen (Wageningen University and Research Centre, The Netherlands) gave an overview on "Plant Morphological and Developmental Responses to Light Quality in a Horticultural Context" and finally Dr. Hendrik Poorter (Forschungszentrum Jülich, Jülich, Germany) presented an enlightened view on the role of Meta-Phenomics and "The Effect of Light on the Growth of Horticultural Plant Species".

Discussions in poster groups.

Forty-two oral speakers and 4 company presentations covered the topic of Light in Horticultural Systems. Moreover, 117 posters were presented in a new way. Researchers were given 5 minutes each to present their poster to small groups of participants, followed by 5 minutes of group discussion. This new way of presenting posters gave more attention and importance to posters and resulted in inspiring discussions. It was notable how many companies were interested in ISHS Ligthsym 2012, evidenced not only by the many sponsors but also by a large group of participants. The main sponsors were given the opportunity to inform participants about their products in an exhibition and a short introduction in one of the plenary sessions.

LED lighting was an important topic during the symposium. Practical application in greenhouses is just starting. However, more knowledge on LED lighting is needed and their efficiency still has to be increased before they are widely adopted commercially. The development and application of the right measurement methods in research and greenhouse application is also needed. More information on the interaction of LED with the microclimate is desirable. Effects of the LED spectrum on different crops have to be studied further. Until now the use of LEDs as supplementary lighting in greenhouses cannot be considered to be economically feasible. Different researchers covered the subject of plant production in a closed environment with artificial light only. Other presentations reported on the possibilities of continuous lighting (no dark period) and the effects on crops. Knowledge gaps were discovered in the field of artificial light and its effect on plant pests and diseases and in the field of light influence on postharvest quality of products. Recent developments showed that the timely use of artificial light of specific spectrum can decrease diseases substantially. Research on photoselective greenhouse coverings and diffuse light continues. An important conclusion of the symposium was that light is only one of the factors influencing the whole horticultural production system. Optimising the sustainability and economics of a production system is important to produce healthy products that meet market and consumer requirements. All papers are published in *Acta Horticulturae* 956.

The 8th International Symposium on Light in Horticulture will be organised by Michigan State University in spring 2016 and the convener will be Dr. Erik Runkle.

Silke Hemming

Contact

Dr. Silke Hemming, Wageningen University and Research Centre, Droevendaalsesteeg 1, 6708 PD Wageningen, The Netherlands, email: silke.hemming@wur.nl

Section Ornamental Plants – Commission Quality and Postharvest Horticulture

Tenth Int'l Symposium on Postharvest Quality of Ornamental Plants

Participants of the symposium.

The X International Symposium on Postharvest Quality of Ornamental Plants was organized on October 16-19, 2012 in Porto de Galinhas, Pernambuco, Brazil and was attended by about 85 participants. More than half of these were graduate students from various universities in Brazil. The symposium was held in a large resort hotel next to the beach on the Atlantic Ocean.

The first day started with an overview of Brazilian floriculture, by Dr. Ferreira de Castro from Brazil, who showed that there are approximately 5000 cut flower farms in Brazil, with an average size of about 2 hectares. The industry provides about 90,000 direct jobs and has an estimated value of about $ 300 million per year. Of this industry, about 75% is located in Sao Paulo state.

The second invited lecture was given by Prof. Serek from Germany who presented the latest news on chemicals that interact with ethylene receptors. She acknowledged her collaboration with Prof. Sisler, who was 82 years old at the time of the symposium.

Several other presentations on treatments of various cut flowers (such as *Cestrum*) and pot plants (*Hydrangea*) were given after these invited lectures, by researchers from Denmark (Dr. Lütken) and Israel (Dr. Meir).

ISHS medal awarded to Co-Conveners Prof. Fernando Finger (left) and Prof. Vivian Loges (right) by Prof. Margrethe Serek (center), Chair of ISHS Section Ornamental Plants.

The third invited lecture on day one of the meeting was given by Dr. Spinarova from Germany, who discussed the occurrence of cavitations (the spontaneous change from water to water vapor in xylem conduits) in various cut flowers and the consequences of this phenomenon for flower quality.

During the second day a special colloquium was held on postharvest handling of tropical flowers in Brazil, by Prof. Loges from Brazil, followed by an invited lecture on programmed cell death in cut flowers, by Dr. van Doorn (USA and The Netherlands).

The oral session presentations included work on flower opening in cut *Iris* flowers and leaf blackening in cut *Leucadendron* flowers, by scientists from Turkey (Dr. Çelikel) and Israel (Dr. Philosoph Hadas), respectively.

This was folllowed by an invited lecture given by Prof. Maciel from Venezuela, on the quality of cut flowers from the neotropical Zingiberales. A distinction was made between subtropical crops such as *Protea, Strelitzia* and *Cymbidium*, and tropical ones such as *Dendrobium, Anthurium*,

Technical visit to the rainforest of Saltinho reservation, Tamandaré, Pernambuco, Brazil.

Opening ceremony. From left to right: Dr. Ana Cecilia de Castro – EMBRAPA, Brazil, Dr. Wouter van Doorn – Chair of ISHS Working Group Quality of Ornamentals, Co-Convener Prof. Fernando Finger – Federal University of Viçosa, Brazil, Prof. Margrethe Serek – Chair of ISHS Section Ornamental Plants, and Co-Convener Prof. Vivian Loges – Federal Rural University of Pernambuco, Brazil.

bromeliads (including ornamental pineapple) and species in the Zingiberales. The latter include *Costus, Calathea, Musa, Zingiber, Heliconia*, and *Realmina*.

The final lectures on day two were about the chilling injury symptoms in *Heliconia* species, presented by Dr. Costa from Brazil, and storage of cut roses by Dr. Dole from the USA.

The third day started with a special colloquium on ethylene resistance in ornamental *Capsicum* plants, by Prof. Finger from Brazil. The plants show leaf abscission as a response to ethylene. The degree of leaf abscission was highly correlated with fruit size parameters.

Dr. Junqueira from Brazil gave an invited lecture about the socioeconomic aspects of floriculture in Brazil, with emphasis on the role of domestic and international markets. It became clear that Brazil produces predominantly for its internal market.

Oral presentations were on storage of cut *Iris versicolor* flowers, by Dr. Tahir from India, and gravitropism in cut shoots by Dr. Philosoph Hadas from Israel.

The poster sessions were held during the coffee breaks, from the first day of the symposium onward. About 40 posters were presented.

At the business meeting two proposals for the next symposium were discussed: India and Turkey. A large majority of votes went to Turkey. Dr. Fisun Çelikel will organize the next meeting, to be held in 2015. Additionally, the position for Chair of the ISHS Working Group Quality of Ornamentals was open for (re-)election. Dr. van Doorn was available for re-election and Dr. Meir was a candidate. The majority of the votes went to the former.

The last day of the symposium was spent visiting a national park with a relatively undisturbed original Atlantic forest, followed by a visit at Carneiros wetlands at the intersection of a river and the ocean.

Wouter van Doorn and Fernando Finger

Contact

Prof. Fernando Luiz Finger, Depto. de Fitotecnia, UFV, 36570-000 Viçosa, MG, Brazil, email: ffinger@ufv.br, Phone: +553138991128

Section Pome and Stone Fruits

Biostimulants in Agriculture: A New Field of Research for Plant and Crop Scientists, an Opportunity for Sustainable Agriculture

BIOSTIMULANTS: WHAT'S BEHIND THE NAME?

A "concept", many products, a market: elicitors, phytostimulants, biostimulants, phytoprotectants, biofertilizers, bioactivators, soil enhancers and other such products. What are they? Are they all the same? What are they doing? What aren't they doing? How do they work? Understanding the differences between these product categories, their efficacy and more importantly their tentative mode of action in the field, is really worth the effort. Without a doubt some of these products will definitely make their way through into high-tech, sustainable agriculture of the future. And this is probably only the start of something bigger that will happen when molecular biology and agronomy have become efficient partners in advancing research. In the meantime, biostimulants are increasingly popular among growers even if their mechanisms of action on the crop or the soil remain poorly documented. The paucity of results on their action also explains why their

Opening speech by Jean Pierre Leymonie, Director of New Ag International.

705 delegates attended the congress.

use in the field is not matched with outstanding effects. Under certain conditions, some may enhance crop stress tolerance, yield and/or quality, while in other conditions they do not. The question that arises is why? Answering these questions was the driving force for New Ag International to organize the first World Congress on the Use of Biostimulants in Agriculture in November 2012 in Strasbourg, France. The meeting attracted more than 700 delegates from 60 countries. Participants came from industry, academic and government circles. The event was sponsored by the leading producers of biostimulants and was supported by ISHS, INRA and IBMA.

THE MARKET: 200-400 MILLION EUROS IN EUROPE, PROBABLY 800 MILLION WORLDWIDE

The lack of a regulatory framework makes it difficult to collect reliable statistics as the definition of biostimulant products currently varies from one country to another. Many countries don't even have an official recognition of this product category. It is the classic chicken-and-egg paradox. At this stage, the data are qualitative rather than statistical. The biostimulants market is growing quickly, driven by economic and socio-political factors. A recently conducted informal survey indicated that more than 5.5 million hectares are treated with biostimulants in Europe (defined as the European Economic Area) every year. However, these companies account for only a portion of the entire market, so the total area is likely to be much higher. At the same time, multiple applications to the same area are counted separately in these approximations. Statistics are too fragmentary and definitions too variable to accurately estimate the value or volume of the European biostimulant market. Some gross estimates value the market from EUR 200 million to EUR 400 million. The market is growing steadily at > 10% per year with predicted growth in the same range in the foreseeable future. Growth may be somewhat higher in Latin America (key countries being Argentina, Brazil, Columbia, and Mexico), where it is imperative to avoid competition between food crops and energy crops. Growth in Asia is at least as strong, if not stronger than in Europe, depending on the country. North America is a relatively mature market, but the growth rates are still quite good.

ARE BIOSTIMULANTS A SCIENCE-BASED TECHNOLOGY?

Browsing the scientific literature in databases such as Scopus or ISI-Web of Knowledge reveals that only a relatively small number of published scientific papers use the term "biostimulant". A closer look at the available literature reveals that compounds and substances that are considered "biostimulants" by the industries producing them are not cited as such in the scientific literature. In a remarkable 38-page survey of the literature on biostimulants entitled "The Science of Plant Biostimulants – A bibliographic analysis" ordered by the European Commission (Contract 30-CE0455515/00-96, "Ad Hoc Study on Bio-Stimulants Products") in March 2012, Prof. Patrick du Jardin defined biostimulants. According to his definition, these products were classified into eight main categories: humic substances, complex organic materials, beneficial chemical elements, inorganic salts including phosphites, seaweed extracts, chitin and chitosan derivatives, antitranspirants, free amino acids and other N-containing substances. However, several major classes of compounds and agents were not covered in Du Jardin's report, despite the fact that they are called biostimulants. In particular, microorganisms are occasionally described as biostimulants (in composts, waste-derived products, etc.). Some also call them biofertilizers as they are generally applied to soils to affect the plant root system. As rightly pointed out by the author, *"These categories are not mutually exclusive and should not be strictly opposed to one another"*. For example "complex organic materials" may contain "humic substances" as well as "free amino acids", or, "antitranspirants" may include "film-forming compounds", but also "chitosan".

SCIENTIFIC VERSUS INDUSTRY-BASED DEFINITIONS OF BIOSTIMULANTS

With more scientific efforts to unveil the mechanisms of action of biostimulants, the current gap between science and industry will hopefully be closed. At present most biostimulants are described based on their effects on plant growth and productivity (e.g. a biostimulant may protect the plant from drought stress). This definition would be partly acceptable to the scientific community should a biostimulant be a single, well characterized molecule. For example, this is the case for chitosan: a well characterized molecule triggering an array of different biological effects when applied to a plant. But most biostimulants are complex mixtures of molecules that have an effect on plant growth and productivity, independent of the nutrients eventually present in their formulation (i.e. they are biostimulants). The fact that a "cocktail" of molecules elicits an effect on plants and crops is certainly intriguing for most scientists working in crop science and also appealing for those working on basic plant sciences. But the obvious questions arising are: HOW does a biostimulant that is not well characterized at the chemical level work? Are biostimulants working because they contain a yet unknown

bioactive molecule? Or are biosimulants working because of the synergistic action of several bioactive molecules? In other words, while the focus of industry-based research is very often on the effects of biostimulants, the academic research would expect to see more data on their mechanisms of action.

BIOSTIMULANTS: FROM FIELD TRIALS TO GENOMICS

The gold standard to assess the effects of a biostimulant is to conduct field trials. Using this approach researchers can verify if a biostimulant is triggering the desired effects and evaluate in which crops it is more efficient. This is certainly enough for claiming the efficacy of a product. But field trials are extremely time consuming, mostly because they cannot be based on a single year of experimentation, as the results strongly depend on the climate. Only after several years of consistent results in different environments (and possibly on different crops) will it be possible to scientifically certify that a biostimulant triggers a response and can be described safely on the label. An exciting outcome of the World Congress on the Use of Biostimulants in Agriculture was the widespread interest of industry in new experimental approaches taking advantage of the knowledge of plant genomes. Indeed, the use of genomic tools to evaluate biostimulants has been pioneered since 2007 by companies such as Valagro (Italy). Using microarrays, high-tech devices that are slightly bigger than a USB drive but contain a "chip" able to detect several thousand different gene sequences, this company was able to detect the changes in the transcriptome triggered by different biostimulants and quantify changes in response to an external stimulus. Since each gene has a specific known function, the analyzing of their expression as affected by a specific biostimulant provided evidence to document and predict for the first time their mode of action and their ability to improve efficacy.

BIOSTIMULANTS AND SUSTAINABLE AGRICULTURE

One aspect often neglected in the use of biostimulants in agriculture is their great potential in low-input, sustainable agriculture. Most biostimulants are usually of natural origin and display low toxicity. They elicit their effects by enhancing the plant's physiological processes making them more resistant to stress conditions, enhancing nutrient uptake and use, and improving plant resistance to pests and diseases. The use of biostimulants can therefore help meet the need for low-input agriculture technologies to use less fertilizers, less water and less pesticides. More research is required to evaluate the impact of biostimulants on the sustainability of agriculture, in particular in the context of climatic changes, but it is unquestionable that the availability of a wealth of new products that can enhance the efficiency of plant growth under stress conditions may be of great importance.

ISHS President António A. Monteiro (left) handing out the ISHS certificate to Convener Jean Pierre Leymonie (right).

TOWARDS A SPECIFIC LEGISLATION IN EUROPE AND ELSEWHERE?

As reported in the document "From Europe 2020: A strategy for smart, sustainable and inclusive growth" (Communication from the European Commission, 2010), Europe will put forward three mutually reinforcing priorities: (1) Smart growth: developing an economy based on knowledge and innovation; (2) Sustainable growth: promoting a more resource efficient, greener and more competitive economy and (3) Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion. In this context, the biostimulants sector can certainly contribute to all three of these policy objectives.

Today, depending on the country, biostimulants are considered either as fertilizers or as plant protection products or even as PGR's (Plant Growth Regulators). This is a source of confusion in the market. The European Biostimulants Industry Consortium (EBIC) advocates that a regulatory line be drawn between abiotic and biotic stress to facilitate implementation and to prevent confusion in the marketplace. A specific legislation agreed by all stakeholders is now under study by the European Commission in Brussels (DG Enterprise) for approval in 2015. This law will propose the following definition of a biostimulant: *"A plant biostimulant is a material which contains substance(s) and/or microorganisms whose function, when applied to plants or the rhizosphere, is to stimulate natural processes to improve nutrient uptake, nutrient use efficiency, tolerance to abiotic stress, and/or crop quality, independently of its nutrient content."* It will be included in the frame of the likely extension of the Fertilisers Regulation, but will also necessitate amending the definition of Plant Protection Products (PPP) to avoid overlap. In Brussels, the proposal of DG Entreprise for an amendment to art.2.1.(b) of Reg 1107/2009 (PPP) is as follows: "active substances…: influencing the life processes of plants, such as substances influencing their growth other than as nutrients or stimulating natural processes to benefit nutrient uptake, nutrient efficiency, tolerance to abiotic stress and/or crop quality". There is little doubt that if this legislation passes, which today seems very likely, it will inspire many other legislators around the world.

THE FUTURE OF BIOSTIMULANTS REQUIRES ADDITIONAL RESEARCH EFFORTS, BOTH FROM INDUSTRY AND ACADEMIC INSTITUTIONS

One of the "take home" messages from the first World Congress on the Use of Biostimulants in Agriculture was the importance of scientific research in this field. Thanks to the initiative of some companies, serious research has been conducted in recent years and biostimulants are no longer considered to be "snake oil". There is solid scientific evidence behind many products on the market, although a reliable legislative framework is required to give more guarantees to both producers and customers. However, after this first exciting meeting, the need for additional scientific data on biostimulants is even more evident. Not only private companies should make research on biostimulants a priority in their industrial strategies, but national and international institutions should also start to consider this field of research a priority for the growth of economy in the context of sustainability of agricultural systems and the unavoidable climatic changes.

Jean Pierre Leymonie and Pierdomenico Perata

Contact

Jean Pierre Leymonie, Convener, Managing Director, New Ag International, France, email: newag@newaginternational.com

Pierdomenico Perata, Chairman of the Scientific Committee, Professor of Plant Physiology, Institute of Life Sciences, Scuola Superiore Sant'Anna, Pisa, Italy, email: p.perata@sssup.it

Tenth Int'l Symposium on Orchard Systems, Rootstocks and Environmental Physiology

The delegates with the Mostertsdrift vineyard in the background.

The 10th International Symposium on Orchard Systems, Rootstocks and Environmental Physiology was held in Stellenbosch, South Africa, from 2-6 December 2012. The symposium was hosted by the University of Stellenbosch and convened by Prof. Karen Theron in collaboration with FruitgroScience. The three ISHS Working Groups in Section Pome and Stone Fruits i.e., Orchard and Plantation Systems, Rootstock Breeding and Evaluation, and Environmental Physiology of Fruit Crops, have organised such combined symposia successfully in the past. The aim of the symposium was to bring together international scientists and other stakeholders involved in diverse aspects of fruit tree orchards and to provide a platform to discuss the advances in tree fruit orchard systems, rootstocks and fruit tree physiology. This was the first time that this symposium was held in a deciduous fruit production area that receives marginal winter chilling. The symposium was attended by 140 delegates from 27 countries.

As Stellenbosch is situated in the Cape Winelands, surrounded by fruit growing areas, predominantly pome and stone fruit, but also citrus, blueberries, and Mediterranean fruit crops e.g. persimmon, olive, pomegranate and fig, delegates were exposed to a variety and diversity of fruit crops in the presentations as well as during field trips. The exposure to wine and environmental physiology started on the first evening when delegates were informed about the Mostertsdrift experimental vineyard planted directly next to the STIAS conference venue. The vineyard layout is unique and the vines are planted in rows that fan out from a central point, in this way representing almost all possible row-direction combinations. Vines are harvested and processed separately to evaluate the effect of row direction on wine chemistry and taste.

4th leaf 'African Delight' orchards on V-system (5 x 0.5 m) on GF677 rootstock.

On Wednesday 5 December, delegates travelled to the EGVV (Elgin-Grabouw-Villiersdorp-Vyeboom) region for the Pome Fruit Technical Field Day. After a brief introduction to the Crop Production Research Programme of the deciduous fruit industry and the challenges of producing apples in areas with inadequate winter chilling and hot summer climates, delegates visited 6 orchards where technical advisors of Two-a-Day, Techways and Prophyta explained the current thinking regarding apple orchard design in South Africa. From the rigorous debate that ensued, it became evident that the basal dominance of apple trees prevalent in the EGVV region presents unique tree training challenges to South African fruit producers. The high yields attained under these conditions are testimony to the strong technical expertise available to the South African apple industry. Two recently planted orchards forming part of the "Orchard of the Future" programme of the deciduous fruit industry were visited to give delegates a glimpse of the future direction of orchard system design in South Africa. These orchards are some of only a few high density apple orchards on dwarfing rootstocks in South Africa and address key questions such as how to profitably farm 'Granny Smith' under South African conditions on dwarfing rootstocks and under hail nets.

Mr. Graeme Krige, technical advisor at Two-a-Day and pome field day organiser, in the "Orchard of the Future" at Oakvalley Estate. This 'Granny Smith' orchard on CG222 rootstock was planted in winter 2012 at a 3.5 x 1.2 m spacing and is completely enclosed within a white hail net cover.

Some delegates visiting the CG rootstock mother blocks at Riviersonderend.

A second group of delegates went on a trip through some of the important stone fruit production regions in South Africa. The first stop was at the SAPO (South African Plant Improvement Organisation) foundation nursery near Riviersonderend where delegates had a look at the foundation and mother blocks for pome and stone fruit rootstocks used in industry. Especially the propagation of the Geneva Cornell rootstocks received attention. Delegates then enjoyed a traditional South African 'braai' at the waterfall close to the nursery. After the early lunch, Japanese plum orchards near Robertson (in the Breederiver valley) were visited to look at some rootstock trails on 'African Delight' and 'African Rose' planted on a V-System, as well as other highly productive Japanese plum orchards. From Robertson the group went to Worcester to Excelsior farm – a new stone fruit farm planted to Japanese plums, peaches, nectarines and low-chill cherries. Delegates looked at 2nd leaf 'Arctic Star' nectarine orchards planted on different rootstocks in high pH soils. A 3rd leaf cherry orchard ('Royal Lee' and 'Mini Royal') on Gisela6 rootstock was also visited. Delegates discussed pruning, manipulation and yield potential.

Karen Theron, Wiehann Steyn and Hannes Laubscher

Contact

Prof. Karen Theron, Dept. of Horticultural Science, Stellenbosch University, Stellenbosch 7600, South Africa, email: kit@sun.ac.za

Seventh Int'l Symposium on Irrigation of Horticultural Crops

Section Pome and Stone Fruits – Section Vine and Berry Fruits – Commission Irrigation and Plant Water Relations

The 7th International Symposium on Irrigation of Horticultural Crops was held in Geisenheim, Germany, July 16-20, 2012. The symposium was opened by the Convener Dr. Peter Braun on Monday, July 16, 2012 with greetings from Ingmar Jung, Vice Minister of Higher Education, Research and the Arts, and Dr. Hans R. Schultz, Director of Geisenheim Research Centre. The Organizing Committee for the symposium included: Peter Braun, Hans R. Schultz, Manfred Stoll, Jana Zinkernagel, and Sabine Rasim.

The symposium was attended by about 160 participants representing the "Water Relations", "Water Supply and Irrigation" and "Saline Water Management and Water Reuse in Horticulture" Working Groups from the "Irrigation and Plant Water Relations" Commission. Approximately, 55 non-members of the ISHS attended the symposium. The main themes of the symposium and the keynote speakers included: (1) Evapotranspiration and canopy processes (Jochen Schenk), (2) Irrigation scheduling (Amos Naor), (3) Water quality/water re-use and salinity, (4) Modelling and climate change, (5) Remote sensing (Hamlyn Jones), and (6) Water/carbon footprint and socio-economic consequences (Brent Clothier).

The first invited speaker, Brent Clothier, presented his lecture on "Minimising the carbon and water footprints of food products for multiple benefits." Dr. Clothier presented a fascinating talk on the integration of economics and ecology with emphasis on carbon footprints (i.e. metrics of life-cycle greenhouse-gas emissions). This topic is becoming increasingly important in horticulture due to the interest by supermarkets to sell "eco-verified" products in relation to sustainability. This was the first of several presentations on carbon and water footprints in the session of "Water/carbon footprints and socio-economic consequences". The other papers and posters discussed the carbon and/or

water footprints of apples, olives, grapevines, etc. Several presenters emphasized that carbon and water storage in the soil is as important as the volume of water that vaporizes into the atmosphere.

After the welcome and keynote speech on footprints, the symposium changed focus to emphasize "Evapotranspiration and canopy processes" as well as "Remote sensing". Plant water relationships are always a popular topic in the symposium, and many papers and posters presented evaluations of instrumentation and the responses of crops to the environment. Many papers and posters on sap flow measurements for a range of crops were discussed in the symposium. Several of the presenters showed relationships with stem and leaf water potential measurements, and of course with evapotranspiration. The use of combinations of dendrometers, sap flow sensors, stem and leaf water potential, stomatal conductance, and remote sensing by hand held infrared thermometers, hyperspectral imaging of leaves, and high resolution satellite imagery were discussed for use on several horticultural crops. After a presentation by Alan Lakso, the session had an excellent discussion about physiological and morphological differences between grapevines and apples and the impact on evapotranspiration. At the same time as the "Evapotranspiration and canopy processes" session, there were joint sessions on "Remote sensing" and on "Water quality/water re-use and salinity". The presentations provided an introduction to topics that later received considerable attention in the symposium. The "Remote sensing" session covered hyperspectral imaging as well as high resolution satellite imagery. In the "Water quality/water re-use and salinity" session, papers on nutrient uptake and application of treated waste water were presented.

In the late afternoon of the first day, the symposium included an interesting tour of the Monastery Eberbach and a visit to the Steinbergkeller (Hessian State Winery).

During the morning of the second day, Amos Naor presented a keynote paper updating attendees with the latest information on irrigation scheduling in Israel. This was followed by papers on the role of rootstocks in water use efficiency and using irrigation to manipulate hormonal profiles of grapevines to improve winegrape quality. The "Irrigation scheduling" session continued with presentations on regulated deficit irrigation (RDI), new instrumentation that uses thermal diffusivity and vapour pressure deficit to quantify stress. In addition, papers were presented on indices for scheduling irrigation in hedgerow olive orchards and irrigation strategies to minimize drought-induced yield reduction in pear trees. Other topics covered in the session included irrigation effects on daily growth patterns of young pear fruit, canopy effects and fruit transpiration implications for fruit quality, deficit irrigation impacts on peach and nectarine, effects of excess soil moisture on fruit yield, leaf physiology, and spectral reflectance of tomato, irrigation effects on yield and quality of carrots and other vegetables, effects of deficit irrigation on pomegranate, and irrigation and water quality impacts on grapevines.

Joint sessions on "Evapotranspiration and canopy processes" and on "Irrigation scheduling" were held in the early afternoon of day 2. The sessions included interesting presentations on irrigation and pear growth, the relation between transpiration and fruit quality, and both deficit irrigation and excess irrigation effects on tree fruit and tomatoes. In the late afternoon, there were sequential sessions on "Evapotranspiration and canopy processes" and on "Water quality/water re-use and salinity". The topics included the effects of irrigation on yield, economics, and nutrition of vegetable crops and pomegranate trees and long-term salinity effects on grapevines.

On the third day of the symposium, attendees participated in one of three field trips to view irrigation practices for (1) fruits, (2) vegetables, or (3) viticulture. Figures 2 and 3 are photos from the viticulture tour where irrigation management practices by growers in Germany could be observed. All of the field trips were interesting and informative.

During the fourth day, the morning sessions were devoted mainly to "Remote sensing". Hamlyn G. Jones presented an informative keynote address on remote sensing of plant stresses for crop management. The paper emphasized ways in which thermal and spectral remote sensing can be used to diagnose and monitor effects of environmental stresses on plants. This presentation was followed by several papers on remote monitoring and remote sensing of vineyards and orchards, combined remote sensing and weather station monitoring for determining actual crop evapotranspiration, and advances in use of near infrared spectroscopy for plant water stress modelling. The afternoon sessions were devoted to presentations on "Modelling and climate change". Several papers on modelling for crop growth and production and on climate change impacts on evapotranspiration and irrigation were presented. This session generated considerable discussion about the implications of climate change and how modelling helps to understand the impacts.

A wonderful symposium dinner was held at the Monastery Johannisberg on Thursday evening.

On the last day of the symposium, there were morning sessions on "Evapotranspiration and canopy processes" and on "Irrigation scheduling". An invited keynote address was presented by Jochen Schenk on the current state of knowledge on the formation and repair of xylem embolisms and the implications for irrigation of perennial crops. This presentation was followed by papers on control of stomata by rootstock source signals under water stress, a new water potential sensor for woody plants, effects of water stress on strawberry fruit quality, soil water dynamics under irrigation, spatial variation of soil water and its effect on yield,

Figure 1. The main conference room at the Geisenheim Research Centre.

Figure 2. The viticulture tour group learning about the design of the irrigation system in a local vineyard.

Figure 3. The viticulture group on a winery tour.

Figure 4. Geisenheim Research Centre CO_2 augmentation research plots.

and a comparison of grapevine water status measurements.

After completion of the symposium agenda on Friday morning, the organizing committee arranged for a short tour of the Geisenheim Research Centre CO_2 augmentation plots (Fig. 4). The CO_2 augmentation research plots were interesting and are surely important for studies on the effect of enhanced CO_2 concentrations on plants.

Since 01.01.2013 the Geisenheim Research Centre and the University part have merged with the new Geisenheim University.

During the symposium business meeting, it was agreed that the 8th International Symposium on Irrigation of Horticultural Crops will be organized by Dr. Jordi Marsal and it will be held in Barcelona, Spain during June 2015.

Richard L. Snyder and Peter Braun

Contact

Dr. Richard L. Snyder, University of California, 1 Shields Avenue, 243 Hoagland Hall, Davis, CA 95616-8627, USA, email: rlsnyder@ucdavis.edu
Dr. Peter Braun, Research Centre Geisenheim, Dept. of Pomology, Von Lade Str. 1, D-65366 Geisenheim, Germany, email: braun@hs-gm.de

Section Tropical and Subtropical Fruits

Fifth Int'l Symposium on Persimmon

The Fifth International Symposium on Persimmon (FISP) was held in Wuhan City (Hubei Province, China) and in Gongcheng Yao Autonomous County (Guilin City, Guangxi Zhuang Autonomous Region, China) from October 20-26, 2012. The event was hosted by the Chinese Society for Horticultural Science (CSHS) and the Huazhong Agricultural University (HZAU), in collaboration with the National Natural Science Foundation of China, the People's Government of Gongcheng Yao Autonomous County and the Guilin University of Electronic Technology, and was organized under the auspices of the International Society for Horticultural Science (ISHS). The FISP Scientific Committee accepted 87 contributions. The symposium was attended by 150 participants from 16 countries, including Australia,

Opening ceremony.

Keynote speech by Maria Luisa Badenes.

Group photo in Wuhan.

Brazil, China, Israel, Italy, Japan, Korea, New Zealand, Portugal, Spain, Thailand, Turkey, and others.

During the opening ceremony, the welcoming address was presented by Dr. Edgardo Giordani (Professor of Florence University, Italy, and former Chairman of the ISHS Persimmon Working Group). Mr. Guoliang Zhang (Science and Education Department of the Ministry of Agriculture, China), and Professor Xianlong Zhang (Vice-President of Huazhong Agricultural University, and Chairman of FISP Organizing Committee) also gave speeches to welcome the delegates. After the inaugural session, Professor Zhengrong Luo, Convener of FISP, presented a keynote presentation entitled "Recent Advances of Persimmon Research and Industry in China". Afterwards, Professor Maria Luisa Badenes, from Spain, presented her work on "The Persimmon Breeding Program at IVIA: Alternatives to Conventional Breeding of Persimmon". The last keynote speech was presented by Professor Keizo Yonemori, from Japan, and focused on "Current Opinions on Proanthocyanidin and Its Biosynthesis of Persimmon (*Diospyros kaki* Thunb.)".

During the first three days of the symposium, 13 plenary lectures (including 3 keynote speeches), 26 oral presentations and 48 posters were presented. They covered the theme of this symposium, "History, Genetic Diversity and Industry", and the following five topics:

- Origin, evolution and cultivation history
- Genetic diversity and utilization in genetics research and breeding
- Standard cultivation for safe and high quality production
- Fruit de-astringency, storage, transportation and logistics
- Various innovative products R&D with marketing system

On the afternoon of October 23, the delegates visited the persimmon repository of HZAU, which is divided into two sections: the persimmon field genebank and the demonstration plots. The persimmon field genebank contains 124 genotypes of 5 *Diospyros* species, including *D. oleifera, D. glaucifolia, D. lotus, D. rhombifolia* and *D. kaki*. The demonstration plots are mainly used for cultivar screening and investigation of high-quality production technology. The delegates were able to discuss controversial topics and exchange ideas during this visit.

On October 24, the delegates headed to the next venue by express railway and coach, and reached Guilin in the evening. Guilin University of Electronic Technology, a sponsor of FISP, offered a hearty and warm reception with a welcoming banquet. The next day delegates took a cruise on the Lijiang River, the essence of beautiful scenery, and left for the other venue of this symposium, Gongcheng Yao Autonomous County. The first stop in Gongcheng was a visit to Gongcheng Fenghuayuan Food Ltd. Company, which produces a de-astringent fruit. The persimmon remains crispy and retains good flavor after the de-astringency process, which involves a carbon dioxide treatment in a large sealed container equipped with a temperature and gas concentration control system, followed by vacuum packaging. The People's Government of Gongcheng Yao Autonomous County hosted a welcoming banquet for the delegates highlighted by Yao Autonomous' traditional singing and dance show during the dinner, a show reflecting the special ethnic custom and hospitality of the local people. This was followed by an exhibition held in the Gongcheng Gymnasium with products of fresh fruits, dried persimmons, machinery for onsite processing and various art works related to persimmon.

The last day of this symposium started with the opening ceremony of the "Gongcheng Persimmon Festival". The delegates not only

Visiting the persimmon repository in HZAU.

Visiting the enterprise and exhibition in Gongcheng.

experienced picking, peeling and making dried persimmon but also enjoyed a traditional Yao ethnic performance. After the persimmon festival, the business meeting of the Persimmon Working Group took place, managed by Professor Edgardo Giordani. The proposal of holding the Sixth International Persimmon Symposium in 2016 in Valencia was submitted by the Spanish delegation, and approved by the participants. Professor Zhengrong Luo, convener of this symposium, was recommended as the Chairman of the Persimmon Working Group for the next four years.

This symposium discussed the current industry status, the limits and bottlenecks and also the developing trends and bright future of persimmon. The delegates visited genetic resource collections containing many genotypes and large scale orchards, enjoyed the beautiful scenery and historic relics covering thousands of kilometers, experienced different means of transportation and unique ethnic customs, and established friendships with researchers and professionals from different countries.

The Organizing Committee acknowledges all presenters and delegates, particularly those involved in administration and sponsorship. Our special thanks also go to the gracious volunteers, without whom none of this would have been possible.

Zhengrong Luo, Qinglin Zhang and Hao Geng

Contact

Prof. Dr. Zhengrong Luo, Department of Pomology, Key Lab of Horticultural Plant Biology, Huazhong Agricultural University, Shizishan, Wuhan, 430070, China, Phone & Fax: ++86-27-87282677, email: luozhr@mail.hzau.edu.cn
Dr. Qinglin Zhang and Ms. Hao Geng, Department of Pomology, Key Lab of Horticultural Plant Biology, Huazhong Agricultural University, Shizishan, Wuhan, 430070, China, Phone: ++86-27-87281897, Fax: ++86-27-87282010, email: persimmon@mail.hzau.edu.cn

Tenth Int'l Symposium on Vaccinium and Other Superfruits

This year the 10th International Symposium on Vaccinium and Other Superfruits was held on June 17-22, 2012, in Maastricht, the Netherlands. Because the first Vaccinium symposium in 1969 was also held in the Netherlands, it was felt by the conveners that a special symposium was in order. In addition to the horticultural aspects of Vaccinium breeding, propagation and production (the horticultural track), two extra themes were added: the effect of berry consumption on human health (the health track) and the business aspects of berry production and marketing (the business track). The symposium was held in the well-equipped and ample sized MECC conference centre adjacent to Maastricht University. The location was easily accessible from the airports and the hotel accommodation was close by. The number of participants was 355 and they presented 65 talks and 72 posters. The number of manuscripts submitted was 82 in the horticulture track, 21 in the health track and 7 in the business track. The symposium was under the combined auspices of the ISHS, the IFU (International Federation of Fruit Juice Producers), Maastricht University, and Wageningen University.

Members of the organizing team of the 10th International Vaccinium Symposium, with on the right Dr. Fred Brouns, one of the conveners of the symposium.

The symposium opened with an exciting presentation by Dr. Mary Ann Lila from North Carolina State University entitled: "Stressed for Success: How the Berry's Wild Origins Have Resulted in Multifaceted Health Protections." It was an exemplary talk combining horticultural science with health science and it gave some examples of research on wild indigenous berries (most of them *Vaccinium* species) grown in remote places and used by local populations to maintain their health under harsh conditions.

The morning sessions started with three plenary talks followed by two parallel workshops with the titles "Plants & Fruit Sciences & Technologies" and "Fruit Derived Bioactives and Health". In these we had six 20-minute lectures including discussion. Lunches were buffet style and were conducted in the same location as the posters, so that lunch could be combined with discussions among colleagues. After lunch the two workshops continued with another seven 20-minute lectures. At the end of the day there was an organized hot-topic debate. Three debates were held, with a panel of experts on stage presenting rather controversial propositions, to which people in the auditorium could respond, generating discussion with the panel. The titles of the hot-topic debates were; "Berry health claims substantiation: nutrico- or pharmaco-approach", "Are berries grown in the wild 'healthier' than cultivated berries

The entrance to the Chateau Neercanne where the participants had a wonderful conference dinner and a great closing party.

The convener Dr. Fred Brouns with Dr. Kazimierz Smolarz (left), who attended all 10 international Vaccinium symposia to date, and the representative of the Dutch blueberry growers Dr. Bert Branderhorst (right).

within the same genotype?", "There is NO fruit category classified as SuperFruit: all fruit is SUPER". It was both fun and very interesting to have these debates, because it tempted people to think a little beyond their own specialization.

The different excursions and dinners in the beautiful Limburg (the province in which Maastricht and Venlo are located) landscape were highly appreciated by the participants. People were able to visit the Floriade near Venlo, which is a large scale (55 hectares) exhibit of Dutch horticulture held only once every 10 years. It was also possible to visit Dutch blueberry growers near Venlo, see new techniques for growing berries and also for processing berries into new products. I was personally struck by the experiments to try and grow high bush blueberries in containers in order to create a high tech growth system that is more sustainable and has higher production. The united blueberry growers who had originally invited the Vaccinium Species Working Group to hold their 10th symposium in the Netherlands, had arranged a common exhibit in the middle of the poster and break-out hall. It allowed researchers from all over the world to have discussions directly with the growers and to try their products on the spot. On the 2nd day a business meeting of the Vaccinium Species Working Group was held, chaired by Bill Cline. The next Vaccinium Symposium will be held in Florida (USA) in 2016 and Dr. James Olmstead will be the convener. Dr. Bill Cline from North Carolina State University was re-elected as Chair of the Vaccinium Species Working Group.

We thank all attendees for their participation. A special thanks is also extended to the graduate students from Maastricht University who worked tirelessly as hosts, tour guides and moderators throughout the symposium.

Olaf van Kooten

Contact

Prof. Dr. Olaf Van Kooten, Wageningen University, Horticultural Production Chains Group, PO Box 630, 6700 AP Wageningen, The Netherlands, email: olaf.vankooten@wur.nl

Commission Economics and Management

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

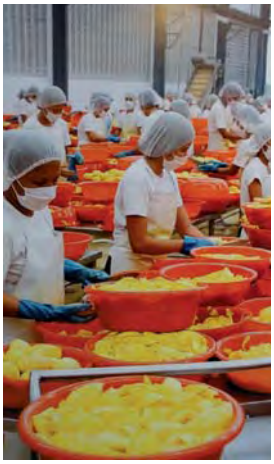
Participants visit a Cebuano mango farm.

Organised by Professor Peter J. Batt from Curtin University in Perth, Western Australia and Professor Sylvia B. Concepcion from the University of the Philippines Mindanao in Davao, the Fourth International Symposium on Improving the Performance of Supply Chains in the Transitional Economies: Re-Engaging with Customers and Consumers attracted 59 delegates from 16 countries. Conducted over 4 days from July 4 to 7 in Cebu, The Philippines, a total of 51 papers were presented. Touching on some of the key issues in supply chain management, the papers discussed a range of issues including consumer behaviour, the emerging demand for organics and Fairtrade products, food safety and quality, and the impact of modern food retailers on traditional food markets. At the farm level, a number of papers discussed issues associated with the establishment of collaborative marketing groups, barriers to the adoption of quality management systems and the various challenges smallholder producers faced in building enduring long-term relationships in high value food chains.

In her plenary address, Dr. Paule Moustier, Deputy Head of CIRADs MOISA (Markets, Organisations, Institutions and Actors Strategies) research program in Montpellier, France, described how the increasing distance between food production and food consumption was impacting on global supply chains. After numerous food safety incidents, consumers were more actively expressing their concerns about the origin and the manner in which

their food had been produced. For farmers, the concentration and aggregation in modern food manufacturing and retail chains was resulting in increasing marketing power and more unfavourable terms of exchange. More regular interaction between producers and consumers and between buyers and sellers was encouraged to promote trust, the sharing of information, joint investments and risk-taking. However, as trust cannot circumvent all the risks of moral hazards, regular interaction combined with some form of control and certification was desirable. To improve the performance of supply chains, Moustier concluded that it was better to promote the complementarities between short and long chains, and between personal trust and standards, rather than to analyse them as opposing options.

Many of the issues Moustier raised in her plenary address permeated the majority of the papers. In their attempts to interact with modern food buyers, smallholder producers faced a number of economic, institutional and social impediments. While the formation of collaborative marketing groups had been paramount in achieving the capacity to deliver a specified quantity and range of good quality produce, reliably and cost effectively, the ability to do so at the community level was often impaired by the lack of social capital, trust and a limited understanding of business practices. Assuming these could be overcome, the lack of infrastructure, poor transport and logistics, and the lack of technical support, threatened to undermine whatever improvements had been made. The evidence points to the need for an integrated systems-based approach in which farmers are actively involved with both the private and the public sector.



Dried mango processing in Cebu.

The famous Cebu carabao mango.

Cebu is not only one of the Philippines' premium tourist destinations but also one of the most developed provinces. The arrival of the Portuguese explorer Ferdinand Magellan in 1521 not only established Christianity in the archipelago but led to an extended period of Spanish colonization. To experience the diversity of indigenous and imported cultures, delegates were treated to a barrio fiesta, a colourful and upbeat dance show on the beach on Mactan Island.

From a horticulture perspective, Cebu is best known for its dried carabao mango. Delegates were provided with an opportunity to visit both a mango farm and Profood International Corporation, one of the leading manufacturers and exporters of dried fruit and fruit purees.

The next supply chain management symposium will be held in Brisbane, Australia, concurrent with the next International Horticultural Congress, from August 17-22, 2014. On this occasion, drawing on some of the key lessons from this symposium, the theme will be enhancing relationships to minimise risk. For those delegates intending to participate, please register your interest on-line at http://www.ihc2014.org/

Peter J. Batt

Contact

Dr. Peter J. Batt, Horticulture, Curtin University of Technology, GPO box U1987, Perth, WA 6845, Australia, email: p.batt@curtin.edu.au

Eleventh Int'l People Plant Symposium

Commission Landscape and Urban Horticulture – Commission Education, Research Training and Consultancy

The Growing Foundation in partnership with the People Plant Council (PPC) and the International Society for Horticultural Science (ISHS) held the 11th International People Plant Symposium (IPPS) in Baarlow, The Netherlands from September 6 to 8, 2012. This was the first time the IPPS had been held in Europe. Approximately 100 delegates from 16 different countries participated in this 3-day event, which included 45 presentations and workshops and an industry tour of the Viersen-Duesseldorf-Garzweiler-Hornbroich region.

The theme of the symposium was "Diversity: Towards a New Vision of Nature" with each day focusing on one aspect of the theme. The focus on day one was "Health and Well-being" with two keynote speakers: Professor Agnes van den Berg, University of Groningen, The Netherlands, speaking on nature for health and well-being and Jerwin Tholen, KPMG, The Netherlands, speaking on investing in a green environment for worker health. Dr. van den Berg set the tone for the symposium with an excellent review comparing the health benefits of nature and horticulture. Dr. Tholen shared a real-world example of how a very large corporation considered the economics of investing in a green environment for worker health and productivity.

The focus on day two was "Sustainable Business and Society" with keynote speakers Matthijs Schouten speaking on historical and contemporary perspectives of nature as a domain of health and healing and Bram van de Klundert, Waddenfonds, The Netherlands, speaking on perceptions of nature in a changing urban society. The focus on the third day was "Learning from Nature" with the keynote speaker Willem Beekman, education coach, The Netherlands, speaking on nature as the inspiration for personal development. Oral sessions and workshops rounded out the program. Visits to Floriade 2012 in nearby Venlo were also proposed to the delegates.

An *Acta Horticulturae* will be available on these proceedings in the near future.

Prof. Dr. David Aldous, Dr. Annette Beerens, Prof. Dr. Candice Shoemaker, Prof. Emeritus Paula Relf and Prof. Dr. Norman Goodyear at the 11th International People Plant Symposium (IPPS) in Baarlo, The Netherlands.

Delegates discussing a horticultural therapy topic in a workshop.

Filming for an educational documentary titled "Healing Nature: Living and Working in Resonance with Nature" was done during the symposium and is now available on DVD (see www.ipps2012.com for trailer of the dvd and more information).

The convener's goal was to bring together individuals and groups from a vast array of sectors, all with a common interest in nature, health, horticulture, horticultural therapy and therapeutic horticulture. The natural setting of the conference location, Castle 'De Berckt', offered an inspiring and pleasant environment that suited the theme of the symposium and fostered interaction during and after each day's program. Feedback from participants indicated they were extremely satisfied with the program. Participants are looking forward to the opportunity to meet in Brisbane, Australia in 2014 as part of the International Horticultural Congress.

Annette Beerens

Contact

Ms. Annette Beerens, Biesseltsebaan 30-42, 6561 KC Groesbeek, The Netherlands, email: growingfoundation@gmail.com, web: www.ipps2012.com
Prof. Dr. Candice Shoemaker, 2021 Throckmorton, Department of Horticulture, Forestry and Recreation Resources, Kansas State University, Manhattan, KS 66506, USA, email: cshoemak@ksu.edu

Second Asia Pacific Symposium on Postharvest Research, Education and Extension (APS 2012)

The APS 2012 was held at Yogyakarta, Indonesia on 18-20 September 2012. The symposium was organized by the Faculty of Agricultural Engineering and Technology, the Bogor Agricultural University (IPB), Bogor, Indonesia, under the auspices of the International Society for Horticultural Science (ISHS) - Commission Quality and Postharvest Horticulture, Commission Education, Research Training and Consultancy, and Commission Economics and Management. The co-organizers were the Indonesian Agency of Agricultural Research and Development, the Ministry of Agriculture, the Gajah Mada University, and the Swiss German University, all from Indonesia.

The Vice Minister of Agriculture, Republic of Indonesia, Dr. Rusman Heriawan, presented his keynote address after Prof. Dr. David E. Aldous, Chair of the ISHS Commission Education, Research Training and Consultancy, welcomed the participants and outlined the updated activities of ISHS. In his address, Dr. Rusman Heriawan emphasized the importance of the Global GAP that provides international acceptance of exported products from a producing country, such as fruits, vegetables, ornamental plants and flowers, that will also provide higher income for the producers who will gain better prices from the market, thus strengthening further the country's economic development.

The symposium was attended by 104 participants comprised of prominent scientists, exporters, equipment manufacturers, farmers, extension workers, and decision makers from 10 countries. Fifty- three oral papers were presented, including 9 keynote papers, and 35 poster presentations were on display along with postharvest research instruments, farmer and processing industry produce.

Prof. Steven J.R. Underhill from the University of the Sunshine Coast, Australia, described the export-oriented chains in Fiji that involve a much more structured approach to postharvest handling, based on trader and exporter-led interventions to improve product quality and supply uniformity. Dr. Rosa Rolle reviewed FAO activities and initiatives partnering with

From left to right: Dr. Sam Herodian, Dean of the Faculty of Agricultural Engineering and Technology, IPB, Dr. Sirichai Kanlayanarat, Chair of the ISHS Commission Quality and Post Harvest Horticulture, Dr. Rusman Heriawan, Vice Minister of Agriculture as the keynote address speaker, Prof. David E. Aldous, Chair of the ISHS Commisison Education, Research Training and Consultancy, Dr. Yusdar Hilman, Chair of the Organizing Commitee, and Prof. Hadi K. Purwadaria, Chair of the Scientific Committee, at the opening ceremony.

Some of the keynote speakers.

Cultural performances at the APS 2012 welcome and dinner.

Participants buying salak fruits from women farmers.

renowned institutions in the region, to develop and to tailor Training of Trainer Programmes to address quality management, safety assurance and postharvest loss reduction in horticultural supply chains. Prof. Dennis R. Heldman, from the Ohio State University, USA, demonstrated the relative impact of key parameters on time to cool different agricultural products in the cold chain supply and distribution of agricultural and horticultural products. Prof. Haruhiko Murase from the University of Osaka Prefecture discussed various advantages of plant factories, including no heating requirement during winter nights, no use of agricultural chemicals, reducing required irrigation water by reusing collected dew condensation, reducing the use of fertilizer per production volume, and no need for washing after harvest. Prof Naoshi Kondo from the University of Kyoto outlined the commercial robotic system in postharvest handling of horticultural products.

The day before the symposium started, Training for Trainers on Horticultural Business Management was carried out by Prof. Dr. David E. Aldous and Dr. Sirichai Kanlayanarat. Twenty-one participants included extension workers, local agricultural officers, academics, and private sector practitioners.

On the last day, participants visited the salak

Participants, resource persons, and organizer of Training for Trainers on Horticultural Business Management.

(*Salacca edulis*) fruit orchard practicing GAP. Salak originates from Indonesian and has been introduced to various Asia Pacific countries. After that, they visited Borobudur temple, a historic Buddhist precinct that is one of the old seven wonders of the world. The welcome and cultural dinner offered participants a taste of Indonesian culinary food and traditional dances from various provinces in Indonesia as well as traditional gamelan music.

The Proceedings of APS 2012 will be published in *Acta Horticulturae*, and will be available from ISHS.

Hadi K. Purwadaria

Contact

Prof. Dr. Hadi K. Purwadaria, Faculty of Agricultural Engineering, Bogor Agricultural University, PO Box 220, 16002 Bogor, Indonesia, email: tpphp@indo.net.id

From the Secretariat

New ISHS Members

ISHS is pleased to welcome the following new members:

NEW INDIVIDUAL MEMBERS:

Albania: Dr. Agim Boja; **Australia:** Mr. Joof Alberts, Ms. Doris Marcsik, Mr. Paul Mobilio, Ms. Becky Wang, Ms. Xi Yu; **Belgium:** Mr. Paulo Moraes; **Brazil:** Ms. Maria Tereza Albuquerque, Prof. Dr. Joston Assis, Everton Gomes da Costa, Prof. Dr. Arno Rieder; **Canada:** Dr. Darby McGrath, Mr. Hubert Philion, Alain Raquepas, Dr. Victoria Surrage, Mr. Bill Vermeer; **Chile:** Mr. Pedro-Pablo Diaz, Mr. Jorge Esquivel Manterola, Mr. Ignacio Serra Stepke; **China:** Ms. Li Ren, Prof. Dr. Xiao-Hui Shen; **Chinese Taipei:** J.M. Hsieh, Y.S. Lin, P.F. Ting, J.S. Wu; **Costa Rica:** Mr. Leslie Medina; **Czech Republic:** Chingiz Bazarsadaev; **Egypt:** Ms. Neama Abdalla, Dr. Hassan El-Ramady; **France:** Ms. Leyla Ramade; **Georgia:** Prof. Dr. Zviad Bobokashvili; **Germany:** Leo Blum, Prof. Dr. Stehle Dekan, Dr. Rudolf Faby, Prof. Dr. Eckhard George, Dr. Ulrike Gossen, M. Hannen, Kristina Kornmesser, Dr. Andreas Mager, Dr. Svea Pacyna-Schürheck, Mr. Karl Schmitz, Prof. Dr. Ulrich Schurr; **Greece:** Mr. Stelios Kostopolos; **India:** Dr. M.R. Dinesh, Prof. Dr. Vineet Mishra; **Iran:** Prof. Dr. Saeed Ghaemmaghami; **Israel:** Dr. Eran Barak; **Italy:** Stefano Casalini, Dr. Michele Di Cataldo, Dr. Alice Gabaldo, Dr. Simona Monticelli; **Japan:** Prof. Masahiro Toyoda; **Jordan:** Mr. Rabih Alaraj; **Korea (Republic of):** Dr. Kwang Sik Kim, Mr. Junewoo Lee, Ms. Fan Zhang; **Malaysia:** Mr. Maclin Dayod, Prof. Dr. SwamyB Kaki; **Mexico:** Alberto Gameros, Mr. Hiram Ibarra, Prof. Dr. Porfirio Juarez-Lopez, Mr. Jose Sanchez; **Netherlands:** Dr. Hans de Wild; **New Zealand:** Dr. Armin Werner; **Nigeria:** Dr. Chiedozie Egesi, Prof. Cosmas Muoneke; **Norway:** Hanne Larsen, Ms. Irèn Lunde Knutsen; **Oman:** Mr. Adil Al-Mahdouri; **Peru:** Ms. Daniela Silva-Rodriguez Bonazzi; **Philippines:** Richard Skandalaris; **Romania:** Ms. Nicoleta Godeanu, Dr. Cristina Elena Tota; **Singapore:** Mr. Jeff Poh; **South Africa:** Mr. Chris Aggenbacht, Mr. David Farrell, Dr. Tertia Grove, Dr. Cheryl Lennox, Dr. Nhlanhla Mathaba, Elmarie Rabie, Nico Roets; **Spain:** Mr. Jose Lopez Martinez, Dr. Nieves Vidal; **Sri Lanka:** Mr. Helarisi Abeyruwan; **Sweden:** Mr. Olle Magnusson; **Switzerland:** Heinrich Gubler, Dr. Walter Müller, Mr. Patrick Rota; **Thailand:** Mr. Dumrong Jirasutus; **Tonga:** Luseane Taufa; **Turkey:** Mr. Hakki Bahar, Ms. Sevcan Duman, Dr. Fatih Celebi Oduncuoglu, Mr. Ozbek Ozsahin, Dr. Hayri Saglam; **United Arab Emirates:** Ms. Hana AL Zarooni; **United Kingdom:** Mr. Malcolm Catlin, Mr. Gordon Hanks, Elisavet Kiaitsi, Dr. Audrey Litterick, Ms. Lauren Mullany, Jane Oputa, Dr. Emma Skipper, Mr. John Stanley; **United States of America:** Dr. Elena Aguaron, Terence Bates, Ms. Pamela Bond, Prof. Christine Coker, Sherod Craig, Mr. Ejay Dehal, Dr. Dan Denney, Mr. Dennis Duncan, Mr. Don Dwyer, Mr. Chris Eckert, Mr. Mark Ferguson, Ian Godfrey, Dr. Ricardo Goenaga, Mr. Carl Halterman, Mr. Martin Hanni, Dr. Jinsheng Huang, Mr. Joseph Kasukurthi, Dr. Jason Londo, Steven McCulloch, lonnie mesick, Dr. Susan Raftery, Mikeal Roose, Herman Sanchez, Mr. Chokdee Siawsolit, Dr. Sven Verlinden.

THE DOYEN OF ISHS COUNCIL

Carlos Portas

Prof. Carlos Portas has been an ISHS member since 1966, and a Council representative of Portugal since 1976. His participation in the Council meeting at Fortaleza, Brazil (August 2012) was his 17th attendance at such meetings.

In 1981, at Antibes (France), Prof. Portas was nominated Chairperson of the Working Group Vegetables for Processing; in 1990, in Florence (Italy), he was nominated Chairperson of Section Vegetables (2 terms) and he was deeply involved in the establishment of 4 new ISHS Working Groups. He was awarded with the ISHS Golden Pin in 1992 at Montevideo, Uruguay, due to his work in Central/South America and became an ISHS Honorary Member at Seoul, Korea, in 2000. Prof. Portas has attended 12 International Horticultural Congresses.

As written in the dedication to him in *Acta Horticulturae* 916, *"Professor Carlos Portas, the Founding Father of horticultural science in Portugal (…) had devoted his long career to Horticulture. He established the Portuguese Horticultural Association, stimulated the cooperation between the Portuguese and Spanish societies of horticulture, and is a longtime member of the ISHS Council representing Portugal. He has been a passionate proponent of international cooperation in all facets of horticulture. The 28th International Horticulture Congress is the visible outcome of his efforts that have energized an enthusiastic team of horticultural scientists from Portugal and Spain".*

For us, as members of the Portuguese Horticultural Association (APH), it has been a pleasure to share with Prof. Portas the Portuguese representation on the ISHS Council during the last 15 years and to share all his deep knowledge about horticulture, specifically vegetables. His enthusiasm is contagious and an example for young scientists.

We wish Prof. Carlos Portas a good retirement from many of his activities and hope to see him again at future ISHS events.

Maria Elvira Ferreira and Isabel de Maria Mourão,
Council members of ISHS and
Board members of APH

In Memoriam

JACKY GANRY (1946-2013)

It is with deep sadness that we must report the death of Dr. Jacky Ganry, on 4 February, at St Gely du Fesc, France. Jacky was a very special person within the family of horticultural scientists. While a man of Europe, his research career focused on tropical and subtropical horticulture and was often conducted in the tropics. His successes as a researcher were largely with banana, for which he and his colleagues at CIRAD laid the groundwork for integrated pest management, the development of protocols for determining optimum harvest maturity, and perhaps most importantly, assembled the plant materials, techniques and protocols needed for modern banana breeding. This pioneering work with banana must be viewed within the context that banana and plantains combined account for more than 100 million tons of production annually, making them among the most important of the world's food crops.

Jacky commenced his scientific career as a plant ecophysiologist working in Guadeloupe with CIRAD's Institute for Fruit and Citrus during the 1970s and early 80s. It is here that he achieved a major success in the forecasting and management of Sigatoka diseases of banana that remains in use across Africa and the Caribbean. In 1983 he returned to France to head up the Banana Program for CIRAD-IRFA at Montpellier where he, together with colleagues around the world, developed the multidimensional approach to the genetic improvement of banana that is used today to produce banana hybrids. During this period Jacky was deeply involved with the conceptualization and 1986 launch of the International Network for Improvement of Banana and Plantain (INIBAP) and later of CARBAP for Central Africa. These initiatives, and the eventual development and launch of ProMusa, considered to be the first truly global program in agricultural research, are evidence of Jacky's vision of a world where horticulture has a key role to play in improving the lives of smallholder farmers. When remembering Jacky it is important to note that it was an alliance between ISHS and ProMusa that led to the formation of the ISHS Section on Banana and Plantain in 2006.

When CIRAD established the Department for Fruits, Vegetables and other Horticultural Crops in 1993 (CIRAD-FLHOR), Jacky became the Deputy Director for Research, a position that he held for more than 13 years. With each assignment, Jacky became more engaged with international development at the level of determining policies and research priorities that would have the greatest impact on reducing poverty and improving health and nutrition across the developing world. Thus, in 2007 he was appointed CIRAD's Officer for International Cooperation in Horticultural Science and after that (2010) Senior Officer in the Directorate for European and International Relations.

Jacky took a special interest in the CIRAD-FHLOR journal *Fruits* and served as Scientific Director from 1998 until his death. He had deep affection and great ambitions for this journal that has proved especially important to researchers working on tropical and subtropical fruits around the world. He was very pleased when *Fruits* was recognized by ISHS as a journal of special value to international horticultural science. In his last Editorial, appearing in the February issue, Jacky reflected positively on a recent UN report on the *State of Food Insecurity in the World* that documented the increasing production and consumption of fruits and vegetables relative to some key staple crops in many parts of the world, a trend deemed to be related to increasing recognition of the health benefits that come from a more balanced diet. Always an optimist, Jacky viewed this reference to horticulture in a focal UN report as a sign of an "emerging awareness (by) the international community of the need to integrate (horticulture) in the global food security agenda…"

As a member and strong contributor to ISHS since 1994, Jacky Ganry served as a Council Member for France, contributed to scores of ISHS symposia over several decades, and was on the ISHS Executive Committee as Chair of the Section on Tropical and Subtropical Fruits from 2006 to 2010. In 1996 he was asked by the ISHS Council to craft an overview of horticultural research worldwide. This paper was presented at the ISHS-ASHS World Conference on Horticultural Research in Rome in 1998. It called attention to the dearth of R&D on horticultural crops in developing countries and urged ISHS to address this global challenge. ISHS President Silviero Sansavini asked Jacky to head up a Committee for Research Cooperation that ultimately evolved into a high level panel of international development experts that advised the ISHS President and Board in the years leading up to the establishment of the Global Horticulture Initiative (GlobalHort) in 2006.

GlobalHort was strongly supported in its earliest days by CIRAD, ISHS and the World Vegetable Center (AVRDC) and was formally launched by these partners at Montpellier in 2006. Jacky and other leaders and decision makers at CIRAD have provided strong support for GlobalHort since its inception but it was Jacky who emerged as a spiritual leader of this Initiative. He will be profoundly missed by the GlobalHort team.

As was expected, the news of Jacky's death resulted in an avalanche of messages to the ISHS Secretariat expressing sorrow and sympathy but also admiration and appreciation for his service to horticultural science. To those of us who were privileged to know Jacky well, it will be his energy, enthusiasm, curiosity, and deep love for horticulture that will be most cherished. Jacky was a good friend, who enjoyed a lengthy conversation – opportunities to sail away from horticulture and to appre-ciate his great culture, broad field of interests and fine sense of humour. While a man of diminutive stature, Jacky will forever stand tall as a model for productive and unselfish service to our profession.

Norman Looney, Past President of ISHS and
Board Chair of GlobalHort
António Monteiro, ISHS President

CARMINE DAMIANO (1943-2013)

In Rome, on February 23rd, at the age of 70, Dr. Carmine Damiano passed away. Dr. Damiano was an active member of the ISHS, being one of the promoters of the Biotechnology and Molecular Biology Commission of which he was Chair for many years. After graduating in Agriculture from Naples University in 1967, he spent almost all his scientific career at the Fruit Research Institute in Rome. He began as a researcher in 1972 and in 1984 moved to the Ornamental Research Institute of San Remo for 4 years as the director of the Propagation Department. In 1988 he returned to Rome as director of the Propagation Department of the Fruit Research Institute, a position he maintained until 2008 when he was nominated director of the Institute.

Dr. Damiano dedicated almost all his research activity to fruit trees, nursery and propagation. He soon became well known nationally and internationally, particularly for in vitro propagation. His work with in vitro propagation of fruit trees began in the 70s when he went to Gembloux (Belgium) to work with Philippe Boxus. From that stage a strong, fruitful and lifetime cooperation and friendship was born. In just a few years, Damiano became an internationally recognized expert on in vitro propagation and in vitro lab planning. Many young researchers

from countries of Africa, Asia and South America came to Rome to work in Damiano's lab and many in vitro propagation labs were planned by him in these countries. In the second half of his research activity he successfully worked on in vitro conservation and cryopreservation of fruit genetic resources.

In Italy Dr. Damiano was a member of the Agriculture Science Committee of the National Research Council and in Europe he actively participated in COST programs, being the Italian delegate of the COST Committee "Agriculture, Biotechnology on Food Science".

We'll remember him for the scientific discipline of his research activities, for the passion with which he participated in discussions during scientific meetings, and for the care he displayed for the young scientists working in his lab, many of whom play important roles in the scientific community today. Carmine always believed in the importance of sharing knowledge within the community of scientists. His participation in both SOI and ISHS was, for him, an important part of his duties and pleasures.

Carlo Fideghelli, former Director of the Istituto Sperimentale per la Frutticoltura di Roma, Italy
Paolo Inglese, President of SOI, Italy

ANGELO RAMINA

Angelo Ramina passed away on the 2nd of January after a short and very aggressive disease. He was Professor of Fruit Science and Plant Physiology at the University of Padova, Italy.

Angelo Ramina was a leading scientist in his research field, studying the basic production cycle of fruit trees from the physiological, biochemical and molecular point of view. He was involved for several years in studies aimed at elucidating the mechanism governing processes related, in particular, to fruit abscission and ripening, studied in depth at the physiological and molecular level. His contribution to the advancement of basic knowledge of these processes is clearly demonstrated by the number of his high-impact scientific publications.

Angelo was recognized internationally for his high scientific stature, demonstrated by his many international relationships with leading scientists. He was a pioneer in opening new research areas and a charismatic figure. He attracted a growing number of co-workers to his well-known laboratory of physiology and molecular biology of fruit crops and was highly sought after by those wishing to train under his brilliant supervision. These people will now feel a great responsibility to continue the valuable work that Angelo established.

Angelo Ramina was a partner in many Italian as well as international initiatives and symposia (including ISHS events) in the field of higher university education, research and science.

His scientific thoughts now live on in his recent books dealing with general arboriculture, of which he was an enlightened and enthusiastic co-author.

It will be difficult to fill the void left by the loss of his highly intellectual profile in teaching and research. Angelo was curious and addressed research with dedication, passion and scientific methodological rigour. We must heed the message of his life to continue to press forward in our studies.

Guglielmo Costa, Full Professor, Department of Agricultural Science, University of Bologna, Italy

Calendar of ISHS Events

For updates and more logon to 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/

YEAR 2013

- April 21-26, 2013, Santiago (Chile): **IX International Symposium on Grapevine Physiology and Biotechnology.** Info: Dr. Manuel Pinto, Instituto de Investigaciones Agropecuarias, Centro La Platina, Santa Rosa 11610, Santiago, Chile. Phone: (56) 27575164, Fax: (56) 27575164, E-mail: mpinto@inia.cl Web: http://www.grapevine-chile2013.cl/en/
- April 29 - May 2, 2013, Kusadasi (Turkey): **II International Symposium on Discovery and Development of Innovative Strategies for Postharvest Disease Management.** Info: Dr. Pervin Kinay, Ege University Faculty of Agriculture, Department of Plant Protection, 35100 Bornova IZMIR, Turkey. Phone: (90)232-388 4000, Fax: (90)232-374 48 48, E-mail: pervin.kinay@ege.edu.tr or Dr. Samir Droby, Aro, The Volcani Center, P.O.Box 6, 50250 Bet Dagan, Israel. E-mail: samird@volcani.agri.gov.il or Dr. Michael Wisniewski, Usda-Ars, 2217 Wiltshire Road, Kearneysville, WV 25430, United States of America. E-mail: michael.wisniewski@ars.usda.gov Web: http://www.pdm2013.org
- May 27-31, 2013, Murcia (Spain): **VI International Symposium on Almonds and Pistachios.** Info: Dr. Federico Dicenta, CEBAS-CSIC, PO Box 164, 30100 Espinardo (Murcia), Spain. Phone: (34)968 396 339, Fax: (34)968 396 213, E-mail: fdicenta@cebas.csic.es E-mail symposium: almond.pistachio.2013@cebas.csic.es Web: http://www.cebas.csic.es/almond_pistachio_2013/
- June 2-7, 2013, Coimbra (Portugal): **VIII International Symposium on In Vitro Culture and Horticultural Breeding.** Info: Prof. Dr. Jorge Canhoto, Department of Life Sciences, University of Coimbra, Arcos Do Jardim, Ap. 3046, 3001-401 Coimbra, Portugal. Phone: (351)239855210, Fax: (351)239855211, E-mail: jorgecan@ci.uc.pt E-mail symposium: IVCHB2013@uc.pt Web: http://www.uc.pt/en/congressos/IVCHB2013/
- June 3-7, 2013, Trani (Italy): **XI International Controlled and Modified Atmosphere Research Conference - CaMa2013.** Info: Dr. Giancarlo Colelli, Dip. Pr.I.M.E. Univ. Di Foggia, Via Napoli 25, 71100 Foggia, Italy. Phone: (39) 320 4394535, E-mail: g.colelli@unifg.it Web: http://www.cama2013.org
- June 3-7, 2013, (Dominican Republic): **X International Mango Symposium.** Info: Juan Jose Espinal, Jose Amado Soler No. 50, Ensanche Paraiso, Santo Domingo, Dominican Republic. Phone: (1)809-5655603, Fax: (1)809-5444727, E-mail: jespinal@cedaf.org.do E-mail symposium: xmango2013@gmail.com Web: http://www.cedaf.org.do/eventos/xmango2013/en/index_en.html
- June 4-7, 2013, Gent (Belgium): **IX International Workshop on Sap Flow.** Info: Dr. Kathy Steppe, Laboratory of Plant Ecology, Ghent University, Coupure links 653, 9000 Ghent, Belgium. Phone: (32)9-2646126, Fax: (32)9-2244410, E-mail: kathy.steppe@ugent.be E-mail symposium: secretariat@sapflowworkshop.info Web: http://www.sapflowworkshop.info
- June 9-14, 2013, Columbia, Missouri (United States of America): **I International Symposium on Elderberry.** Info: Mr. Andrew Thomas, University of Missouri, Southwest Research Center, 14548 Highway H, Mt. Vernon, MO 65712, United States of America. Phone: (1)417-466-2148, Fax: (1)417-466-2109, E-mail: thomasal@missouri.edu Web: http://muconf.missouri.edu/elderberrysymposium

- June 17-19, 2013, Montreal, Quebec (Canada): **International Symposium on Medicinal Plants and Natural Products.** Info: Dr. Jalal Ghaemghami, PO Box 320172, West Roxbury, MA 02132, United States of America. Phone: (1)3393686838, Fax: (1)3393686838, E-mail: jalal@shmen.org or Prof. Dr. Alain Cuerrier, 4101, rue Sherbrooke Est, Montréal Québec, Canada. E-mail: alain_cuerrier@ville.montreal.qc.ca E-mail symposium: antigua-ishs@shmen.org Web: http://www.montrealishs.org/
- June 17-20, 2013, Matera (Italy): **VIII International Peach Symposium**. Info: Prof. Cristos Xiloyannis, Dip. Scienze dei Sistemi Colt., For., Amb., Viale dell'Ateneo Lucano, 10, 85100 Potenza, Italy. Phone: (39)3293606262, Fax: (39)0971205378, E-mail: cristos.xiloyannis@unibas.it or Prof. Dr. Paolo Inglese, Department DEMETRA, Università degli Studi di Palermo, Viale delle Scienze, ED. 4, 90142 Palermo, Italy. Phone: (39)09123861234, Fax: (39)09123860820, E-mail: paolo.inglese@unipa.it Web: http://www.unibas.it/peach2013/home.html
- June 17-21, 2013, Leiden (Netherlands): **International Symposium on Growing Media and Soilless Cultivation.** Info: Erik Van Os, Aan de Rijn 2, 6701 PB Wageningen, Netherlands. Phone: (31)317483335, Fax: (31)317425670, E-mail: erik.vanos@wur.nl or Wim Voogt, Violierenweg 1, 2665MV Bleiswijk, Netherlands. Phone: (31)174 485687, E-mail: wim.voogt@wur.nl or Mr. Chris Blok, Wageningen UR Greenhouse Horticulture, Violierenweg 1, 2665 MV, Bleiswijk, Netherlands. Phone: (31)317485606, E-mail: chris.blok@wur.nl E-mail symposium: Grosci2013.symposium@wur.nl Web: http://www.grosci2013.wur.nl/
- June 23-27, 2013, Plasencia (Spain): **VII International Cherry Symposium.** Info: Dr. Margarita López Corrales, SIDT, Finca La Orden, Guadajira, 06187 Badajoz, Spain. E-mail: margarita.lopez@juntaextremadura.net or Dr. Manuel Serradilla Sanchez, Finca la Orden - Valdesequera, A-V KM 372, 06187 Badajoz, Spain. E-mail: manuel.serradilla@juntaextremadura.net or Dr. Maria Josefa Bernalte García, INTAEX, Carr. de Cáceres sn, 06074 Badajoz, Spain. Phone: (34)924012699, Fax: (34)924012674, E-mail: bernalte@unex.es E-mail symposium: cherrysymposium2013@gmail.com Web: http://www.cherry2013.com/
- June 24-27, 2013, Orlando, Florida (United States of America): **IV International Symposium on Tomato Diseases: Economically, Environmentally, and Socially Sustainable Tomato Disease Management.** Info: Assist. Prof. Mathews L. Paret, Plant Pathology Department, North Florida Research and Education Center, University of Florida, 155 Research Road, Quincy Florida FL-32351, United States of America. Phone: (1)8508757154, Fax: (1)8508757188, E-mail: paret@ufl.edu Web: http://nfrec.ifas.ufl.edu/4istd/index.shtml
- July 1-5, 2013, St. Augustine (Trinidad and Tobago): **III International Conference on Postharvest and Quality Management of Horticultural Products of Interest for Tropical Regions.** Info: Dr. Majeed Mohammed, 22 Pine Drive, Homeland Gardens, Cunupia, Trinidad and Tobago. Phone: (1)868-671-2332, Fax: (1)868-645-0479, E-mail: mohd2332@hotmail.com E-mail symposium: ISHS.PostHarvest2013@sta.uwi.edu Web: http://sta.uwi.edu/conferences/13/postharvest/index.asp
- NEW July 2-5, 2013, Zürich (Switzerland): **XIII International Workshop on Fire Blight.** Info: Dr. Brion Duffy, Agroscope Changins-Wädenswil, Schloss 1, Postfach, 8820 Waedenswil, Switzerland. Phone: (41)447836111, Fax: (41)447836341, E-mail: brion.duffy@acw.admin.ch E-mail symposium: fireblight2013@agroscope.admin.ch Web: http://www.fireblight2013.org
- July 15-19, 2013, Beijing (China): **VI International Symposium on the Taxonomy of Cultivated Plants.** Info: Prof. Zhang Qixiang, Nat'l Engineering Res.Center Floriculture, Beijing Forestry University, No.35, Qinghua East Road-Haidian Dist., Beijing 100083, China. Phone: (86)1062338005, Fax: (86)1062336321, E-mail: zqx@bjfu.edu.cn or Dr. Xiaobai Jin, Institute of Botany, Chinese Academy of Sciences, 20 Nanxincun, Xiangshan, 100093 Beijing, China. Phone: (86)1062591431, Fax: (86)1062590348, E-mail: jinxiaobai@hotmail.com E-mail symposium: istcp2013@gmail.com Web: http://www.istcp2013.org
- July 17-20, 2013, College Station, TX (United States of America): **I International Symposium on Pecans and Other Carya in Indigenous and Managed Systems.** Info: Dr. L.J. Grauke, USDA ARS , Pecan Breeding & Genetics, 10200 FM 50 Rd., Somerville, TX 77879-5764, United States of America. Phone: (1)979-272-1402, Fax: (1)979-272-1401, E-mail: lj.grauke@ars.usda.gov or Dr. Leonardo Lombardini, Department of Horticultural Sciences, Texas A&M University, College Station, TX 77843-2133, United States of America. Phone: (1)9794588079, Fax: (1)9798450627, E-mail: l-lombardini@tamu.edu Web: http://www.ars.usda.gov/meetings/pecans2013/index.htm
- July 20-23, 2013, Taiyuan, Shanxi Province (China): **VII International Walnut Symposium.** Info: Prof. Jianbao Tian, Pomology Institute of Shanxi, Academy of Agricultural Sciences, Shanxi, Taigu, 030815, China. Phone: (86)0351-7073034, Fax: (86)0354-6215001, E-mail: tianjb-001@163.com Web: http://www.iws2013.org/English/en_index.aspx
- July 28-31, 2013, Orlando, FL (United States of America): **XII International Symposium on Plant Bioregulators in Fruit Production.** Info: Dr. Steven McArtney, NCSU, 455 Research Drive, Mills River, NC 28759, United States of America. Phone: (1)8286843562x115, Fax: (1)8286848715, E-mail: steve_mcartney@ncsu.edu or Dr. Timothy Spann, University of Florida - IFAS, Citrus Research and Education Center, 700 Experiment Station Road, Lake Alfred, FL 33850, United States of America. Phone: (1)8639561151, Fax: (1)8639564631, E-mail: spann@ufl.edu Web:http://www.pgrsa.org/index.php/conference
- NEW August 11-14, 2013, Fort Collins, Colorado (United States of America): **II International Symposium on Plant Cryopreservation.** Info: Dr. Steve Wallner, Colorado State University, Dept of Hort LA CSU, Ft. Collins CO, 80525-1173, United States of America. E-mail: swallner@colostate.edu or Dr. David Ellis, International Potato Center, CIP, Avenida La Molina 1895, Lima, Peru. Phone: (51)13175337x3056, Fax: (51)13175326, E-mail: d.ellis@cgiar.org or Dr. Maria M. Jenderek, USDA-ARS, NCGRP, 1111 S. Mason Street, Fort Collins, CO 80521, United States of America. Phone: (1)970 495 3256, Fax: (1)970 221 1427, E-mail: maria.jenderek@ars.usda.gov Web: http://col.st/RlEtRA
- NEW August 19-21, 2013, Portland, OR (United States of America): **I International Symposium on Horticulture Economics, Marketing and Consumer Research.** Info: Dr. Jennifer Dennis, 625 Agriculture Mall Dr., 320 Horticulture Building, West Lafayette, IN 47906, United States of America. Phone: (1) 765-494-1352, Fax: (1) 765-494-0391, E-mail: jhdennis@purdue.edu E-mail symposium: tgoodale@purdue.edu Web: http://tulip.hort.purdue.edu/ismcrh
- August 25-30, 2013, Hannover (Germany): **VI International Symposium on Rose Research and Cultivation.** Info: Prof. Dr. Thomas Debener, Leibniz University of Hannover, Institute for Plant Genetics, Herrenhäuser Straße 2, 30419 Hannover, Germany. Phone: (49)5117622672, Fax: (49)5117629292, E-mail: debener@genetik.uni-hannover.de E-mail symposium: roses2013@genetik.uni-hannover.de Web: http://www.rosesymposium2013.uni-hannover.de/
- August 28-30, 2013, Villenave d'Ornon, Bordeaux (France): **VI International Phylloxera Symposium.** Info: Nathalie Ollat, INRA, Institut des Sciences de la Vigne et du Vin, 210, chemin de Leysotte, 33883 Villenave d'Ornon, France. Phone: (33)5 57 57 59 30, Fax: (33) 5 57 57 59 03, E-mail: ollat@bordeaux.inra.fr E-mail symposium: phyllox2013@bordeaux.inra.fr Web: https://colloque.inra.fr/phyllox2013
- September 2-6, 2013, Queretaro (Mexico): **59th Annual Meeting of Interamerican Society for Tropical Horticulture.** Info: Dr. Carlos Alberto Núñez Colín, Inst. Nacional de Investigaciones Forestale, Agrícolas y Pecuarias (INIFAP), KM 6,5 Carr Celaya-San M.

de Allende, Aprdo postal 112, Guanajuato, Celaya, 38110, Mexico. Phone: (52)4616115323x113, E-mail: lit007a@gmail.com E-mail symposium: lixam2013@iasth.org

- September 2-5, 2013, Cranfield (United Kingdom): **VI International Conference on Managing Quality in Chains MQUIC2013.** Info: Prof. Dr. Leon Terry, Plant Science Laboratory, Cranfield University, Bedfordshire, MK43 0AL, United Kingdom. Phone: (44) 7500766490, Fax: (44) 1525 863277, E-mail: l.a.terry@cranfield.ac.uk E-mail symposium: mquic-2013@cranfield.ac.uk Web: http://www.mquic2013.com
- September 3-6, 2013, Olomouc (Czech Republic): **II International Symposium on Plum Pox Virus.** Info: Dr. Milan Navratil, Dept of Cell Biology and Genetics, Faculty of Science, Palacký University, Slechtitelu 11, 78371 Olomouc, Czech Republic. Phone: (420)685227646, Fax: (420)685221357, E-mail: milan.navratil@upol.cz Web: http://www.isppv2013.upol.cz
- September 9-13, 2013, Naivasha (Kenya): **I International Symposium on Ornamentals in Africa.** Info: Dr. Arnold Opiyo, Horticultural Association of Kenya (HAK), PO Box 562, 20100 Nakuru, Kenya. Phone: (254)723119044, Fax: (254)512111113, E-mail: aopiyo@hotmail.com Web: http://hakenya.net/index.php/ishs-symposium
- September 12-14, 2013, Kolkata (India): **IV International Conference on Landscape and Urban Horticulture: Impact of Landscape Horticulture on Development of Urban Economy with Green Environment.** Info: Nilimesh Royhowdhury, Faculty of Horticulture, BCKV, PO Mohanpur, Nadia, West Bengal 741252, India. E-mail: nilimesh59@rediffmail.com or P.K. Chattopadhyay, Faculty of Horticulture, BCKV, PO Drishiviswavidyalaya, Mohanpur, West Bengal, 741252, India. E-mail: profpkc@rediffmail.com or Prof. Dr. Sisir Kumar Mitra, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur 741252, West Bengal, India. Phone: (91)3325823017, Fax: (91)3325828460, E-mail: sisirm@vsnl.net Web: http://www.bckv.edu.in/news_details.php?nID=9bf31c7ff062936a96d3c8bd1f8f2ff3f
- September 20-24, 2013, Taian (Shandong Province) (China): **III International Symposium on Pomegranate and Minor Mediterranean Fruits.** Info: Prof. Dr. Zhaohe Yuan, Shandong Institute of Pomology, 64 Longtan Rd., Tai'an, Shandong Province 271 000, China. Phone: (86)538-8334070, Fax: (86)538-8225563, E-mail: zhyuan88@hotmail.com Web: http://www.pomegranate2013.com
- NEW September 25-29, 2013, Trento (Italy): **III International Symposium on Molecular Markers in Horticulture.** Info: Riccardo Velasco, Istituto Agrario San Michele all'Adige, Via E. Mach, 1, 38010 S. Michele all'Adige, Italy. E-mail: riccardo.velasco@iasma.it Web: http://eventi.fmach.it/Molecular-markers-2013
- October 6-11, 2013, Jeju (Korea (Republic of)): **Greensys 2013 - New Technologies for Environment Control, Energy-saving and Crop Production in Greenhouse and Plant Factory.** Info: Prof. Jung-Eek Son, Department of Plant Science , Seoul National University, 599 Gwanak-ro, Gwanak-gu, Seoul 151-921, Korea (Republic of). Phone: (82)28804564, Fax: (82)28732056, E-mail: sjeenv@snu.ac.kr or Prof. Dr. Yong-Beom Lee, Dept. Environmental Hortic., The University of Seoul, Jeonnong Dong Dongdaemun Ku, 130-743 Seoul, Korea (Republic of). Phone: (82)2-2210-2385, Fax: (82)2-2217-0158, E-mail: hydropo@uos.ac.kr E-mail symposium: info@greensys2013.org Web: http://www.greensys2013.org
- October 9-12, 2013, Debrecen (Hungary): **II European Congress on Chestnut.** Info: Dr. László Radócz, 138 Böszörmenyi Street, 4032 Debrecen, Hungary. Phone: (36)52508459, Fax: (36)52508459, E-mail: radocz@agr.unideb.hu or Dr. Milan Bolvansky, Institute of Forest Ecology SAS Zvolen, Branch of Woody Plants Biology, Akademická 2, 949 01 Nitra, Slovak Republic. Phone: (420)376943368, E-mail: milan.bolvansky@sav.savzv.sk or Prof. Dr. Mihai Botu, University of Craiova, SCDP Valcea, Str. Calea Traian nr. 464, 240273 Rm. Valcea, Romania. Phone: (40)250740885, Fax: (40)250740885, E-mail: stpomvl@onix.ro Web: http://www.chestnut-debrecen.eu
- NEW October 14-16, 2013, Lima (Peru): **International Symposium on Medicinal Plants and Natural Products.** Info: Dr. Jala Ghaemghami, PO Box 320172, West Roxbury, MA 02132, United States of America. Phone: (1)3393686838, Fax: (1)3393686838, E-mail: jalal@shmen.org or Prof. Dr. Roberto Ponugal, Universidad Global Peru, Av. Camina Real L126, Urb. Quispicanchis, Cuzco, Peru. E-mail: antigua-ishs@shmen.org Web: http://www.peruishs.org
- NEW October 17-19, 2013, Nanchang (China): **XIII International Asparagus Symposium.** Info: Prof. Chen Guangyu, Jiangxi Academy of Agricultural Sciences, 330200 Nanchang, Jiangxi Province, China. Phone: (86)7917090308, Fax: (86)7917090001, E-mail: genebksh@hotmail.com E-mail symposium: asparaguschina@vip.sina.com
- October 20-25, 2013, Valparaíso (Chile): **II International Symposium on Organic Matter Management and Compost Use in Horticulture.** Info: Dr. Rodrigo Ortega, Avenida Santa Maria 6400, Vitacura, Santiago, Chile. Phone: (56)2-3531330, Fax: (56)2-3531228, E-mail: rodrigo.ortega@usm.cl E-mail symposium: ish-s2013chile@usm.cl Web: http://www.compost-for-horticulture.com
- October 28-31, 2013, Avignon (France): **II International Symposium on Organic Greenhouse Horticulture.** Info: Nicolas Sinoir, ITAB, 149 rue de Bercy, 75595 Paris Cedex 12, France. Phone: (33)467062370, E-mail: nicolas.sinoir@itab.asso.fr or Jérôme Lambion, GRAB, BP 11283, 84911 Avignon Cedex 9, France. Phone: (33)490840170, Fax: (33)490840037, E-mail: jerome.lambion@grab.fr Web: http://www.amiando.com/OGH_Symposium2013.html
- NEW October 28-31, 2013, Palermo (Italy): **VIII International Congress on Cactus Pear and Cochineal.** Info: Prof. Dr. Paolo Inglese, Department DEMETRA, Università degli Studi di Palermo, Viale delle Scienze, ED. 4, 90142 Palermo, Italy. Phone: (39)09123861234, Fax: (39)09123860820, E-mail: paolo.inglese@unipa.it or Prof. Dr. Innocenza Chessa, Dept. Of Economic & Woody Plants, University of Sassari, Via E. de Nicola 9, 07100 Sassari, Italy. E-mail: chessa_i@uniss.it E-mail symposium: cactus2013@unipa.it Web: http://www.soishs.org/cactuspear/
- NEW November 4-8, 2013, Tbilisi (Georgia) and Yerevan (Armenia): **International Symposium on Fruit Culture and its Traditional Knowledge along Silk Road Countries.** Info: Dr. Gagik Santrosyan, National Agrarian University, 74 Teryan Street, Yerevan, Armenia. Phone: (374)10528677, E-mail: g.santrosyan@asau.am or Dr. Aleksandr Kalantaryan, Head of Development Division, Raed Piu, 37 Mamikonyants street. ap.49, 00010 Yerevan, Armenia. Phone: (374)94 237805, E-mail: alikjan@gmail.com or Dr. David Bedoshvili, Agricultural University of Georgia, 13.Km Alley David Aghmashenebeli, Tbilisi 0131, Georgia. Phone: (995)577210905, E-mail: d.bedoshvili@agruni.edu.ge Web: http://www.silksym.com
- NEW November 19-22, 2013, Tauranga (New Zealand): I International Symposium on Bacterial Canker of Kiwifruit (Psa). Info: Dr. David J. Tanner, General Manager - Science & Innovation, ZESPRI International, PO Box 4043, Mt Maunganui South, New Zealand. Phone: (64)75727665, Fax: (64)75748031, E-mail: david.tanner@zespri.com
- December 4-7, 2013, Vientiane (Laos): **II Southeast Asia Symposium on Quality Management in Postharvest Systems.** Info: Dr. Antonio Acedo Jr, Postharvest Technology Division, Department of Horticulture, Visayas State University, 6521 Leyte Baybay, Philippines. Phone: (63)53-5637135), Fax: (63)53-3352752, E-mail: junacedo@yahoo.com or Dr. Sirichai Kanlayanarat, King Mongkut's University of Technology, Thonburi, Division of Postharvest Technology, Thungkhru, Bangkok 10140, Thailand. Phone: (66)2 470 7720, Fax: (66)2 452 3750, E-mail: sirichai.kan@kmutt.ac.th E-mail symposium: sea2013.ishs@gmail.com Web: http://www.kmutt.ac.th/SEAsia2013

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Chronica Horticulturae
Author Information

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

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

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

Issues. Articles of a broad focus that often involve controversial topics related to horticulture, including broad social issues and economic development, are appropriate for this section. These articles are intended to stimulate discussion. Often, guest writers are asked to contribute articles.

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

Horticultural Science News. Shorter current articles about particular topics including horticultural commodities and disciplines are welcome.

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

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

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

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

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Yves Desjardins, Science Editor, **yves.desjardins@fsaa.ulaval.ca**
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