

*A publication of the International Society for Horticultural Science*

# Chronica Horticulturae



## **Horticultural highlights**

IHC2018 and ISHS General Assembly

## **Symposia and workshops**

ISHS Summer School on Pre- and Postharvest Physiology of Temperate Fruit Crops • Horticultural Product Quality • Horticultural Crop Wild Relatives • Soil and Substrate Disinfestation • Processing Tomato • Carrot and other *Apiaceae*

Volume 58

•  
Number 4  
2018

# Chronica Horticulturae



**Chronica Horticulturae® Volume 58 – Number 4; December 2018;**  
**ISSN: 0578-039X (print), 2506-9772 (electronic).**

Published quarterly by the International Society for Horticultural Science, Leuven, Belgium. Lay-out and printing by Drukkerij Graphius, Gent, Belgium. ISHS© 2018. All rights reserved. No part of this magazine may be reproduced and/or published in any form, photocopy, microfilm or any other means without written permission from the publisher. All previous issues are also available online at [www.ishs.org](http://www.ishs.org). Contact the ISHS Secretariat for details on full colour advertisements (1/1, 1/2, 1/4 page) and/or mailing list options.

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## Fruits – International Journal of Tropical and Subtropical Horticulture

*Fruits – International Journal of Tropical and Subtropical Horticulture* accepts original research articles and reviews on tropical and subtropical horticultural crops. The Journal is available in print + online. Additional information can be viewed on [www.ishs.org/fruits](http://www.ishs.org/fruits).

## Scripta Horticulturae

*Scripta Horticulturae* is a series from ISHS devoted to specific horticultural issues such as position papers, crop or technology monographs and special workshops or conferences.

## PubHort – crossroads of horticultural publications

PubHort is a service of ISHS as part of its mission to promote and to encourage research in all branches of horticulture, and to efficiently transfer knowledge on a global scale. The PubHort platform aims to provide opportunities not only to ISHS publications but also to other important series of related societies and organizations. The ISHS and its partners welcome their members to use this valuable tool and invite others to share their commitment to our profession. The PubHort eLibrary portal contains over 78,000 downloadable full text scientific articles in pdf format, and includes *The Horticulture Journal*, *Journal of the American Pomological Society*, *Journal of the International Society for Mushroom Science*, *Proceedings of the International Plant Propagators' Society*, *Journal of the Interamerican Society for Tropical Horticulture*, etc.

Additional information can be viewed on the PubHort website [www.pubhort.org](http://www.pubhort.org).

Cover photograph: The First ISHS Summer School involved a series of lectures and field visits, including visiting hop gardens. Read more about the summer school on p.35. Photo by Arju Ali Kahn.



A publication of the International Society for Horticultural Science, a society of individuals, organizations, and government agencies devoted to horticultural research, education, industry, and human well-being.

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# ➤ Scientific structure for the future

Jill Stanley, ISHS Vice-President and Scientific Co-ordinator



➤ Jill Stanley

## ISHS international meetings bring value to horticultural researchers

The ISHS hosts about 45 international scientific symposia per year. These symposia play a vital role for researchers around the world by enabling face-to-face networking with colleagues who study the same field. This allows scientists to keep up to date with the latest advancements in their field of expertise, while having the opportunity to experience new cultures and regional hospitality. The symposia organised under auspices of ISHS compose the majority of world-wide symposia relevant to horticultural researchers. Of particular value are the symposia series, recurring every two, three or four years on a particular topic area. Scientists form great friendships and bonds at these meetings because they have the opportunity to meet periodically during their careers with a small group (often 100 to 200) of like-minded people. The symposia are organised within a Section or Commission, although more typically within a Working Group, and up until this year, the Working Groups were clustered within Sections, based on crop types, or Commissions, based on disciplines. These 22 Sections and Commissions were each led by a Chair, who was elected by members of the Section or Commission every four years. The Chairs formed the Executive Committee, and were responsible for leading the scientific programme of ISHS, under the direction of the ISHS Vice-President, who is designated in the bylaws as Chairperson of the Executive Committee. This structure was in place for about 25 years. Over the years, some Sections were split when the Section became too large, e.g., Section Fruit split into multiple crop Sections; and new Commissions were initiated when a new area of interest was identified, e.g., Commission Fruits and Vegetables and Health.

## The restructuring process

The previous Board (2014-2018), along with the previous Executive Committee, realized that serious scientific reorganization was needed for the ISHS. Many points needed to be considered and/or rectified:

- Some research areas had become less important than in the past, whilst others had become more important; the meetings

of some Sections and Commissions were losing attention whilst others were bustling with members and presentations.

- Some research topics were overlapping more than before.
- New areas of horticultural science that justified greater focus, effort and visibility were emerging.
- Some existing Working Groups did not quite fit into previous Sections or Commissions. For example, the Working Group Environmental Physiology and Developmental Biology was placed in Section Pome and Stone Fruits. Researchers working on other crops did not feel that this Working Group was relevant to their work, so they avoided attending the meetings although they would have been welcome to join in.

Therefore, with the aim of a full review in mind, the Board and the Executive Committee, led by the then ISHS Vice-President, Prof. Dr. Silvana Nicola, held multiple brainstorming discussion sessions in 2015 and 2016. Prof. Silvana Nicola, with assistance from Dr. Jill Stanley, then ISHS Secretary, considered the deliberations of the joint group and developed a draft scientific structure, which proposed a restructuring that would have fewer groups, now termed "Divisions" instead of numerous Sections and Commissions. At their meeting in September 2017, the Board made a few minor changes and this was presented as a starting point to the Executive Committee a few days later. The Executive Committee refined the plan, and each Working Group was identified within the new Divisions. The relevant Section and Commission Chairs worked with Silvana to finalise the definitions of each Division, and find the home for a few outstanding Working Groups. A brief description of each Division is shown (Table 1). Subsequently, the election process for Division Chairs was carried out and the new Chairs began their four-year term in August.

In addition, the Board and Executive Committee decided in August 2018, in Istanbul, Turkey, just prior to the XXX International Horticultural Congress, that three Commissions would be established in addition to the Divisions. Two of these were designated as Commissions because their Chairs were elected in association with an external col-

laborating organisation. Commission Cultivar Registration is linked to the Royal Horticultural Society in the UK, whereas Commission Banana is linked to ProMusa. The third Commission, Agroecology and Organic Horticulture, was established to ensure this area of horticulture continues to have a profile, yet it does not have sufficient Working Groups and activities to exist separately as a Division.

## What are the major changes?

One Division that shows a new emphasis is the Division Horticulture for Development. The decision to create a new Division focused on development was made because this is an area of increasing global importance, particularly research, education and training that would empower farmers to improve their livelihoods in developing countries. This new Division encompasses symposia from Commissions Economics and Management and Education, Research Training and Consultancy, and Working Groups may be established over time. The other significant change is the clustering of Working Groups that are associated with physiology and plant-environment interactions. Previously, some of these Working Groups were associated with a particular crop type, mainly for historical reasons related to splitting a larger group. This will make it clear that the symposia are open to all relevant crops.

Other minor but important changes are:

- An increase in emphasis on precision horticulture and big data management.
- Merging Commission Plant Genetic Resources and Commission Molecular Biology and In Vitro Culture to form the Division Plant Genetic Resources and Biotechnology. Breeding spanned both these topic areas, and in any case, the two are intricately inter-related.
- A reshuffling of the fruit and nut crops.
- An increase in emphasis on vertical farming systems, although this was divided into plant-based research (Division Protected Cultivation and Soilless Culture) and equipment-based research, e.g., lighting (Division Precision Horticulture and Engineering).
- The dissolution of Commission Plant Protection. This decision does not indicate that this research is considered to be unimportant. When the Working Groups

■ Table 1. A list of the new ISHS Divisions and a brief description of their scope.

Division name	Scope
Horticulture for Development	Aspects related to sustaining lives, livelihoods and rural development, education and training
Horticulture for Human Health	Horticulture for human health and wellbeing, encompassing medicinal and aromatic plants, fruit and vegetables for health, including functional food and nutraceutical properties
Landscape and Urban Horticulture	Landscape horticulture and ecology and with the impacts and roles of horticulture in a metropolitan context
Ornamental Plants	Ornamentals and floriculture
Physiology and Plant-Environment Interactions of Horticultural Crops in Field Systems	Biology, physiology, and management of horticultural crops in conventional and organic systems. Themes are centered on crop physiology, water relations, irrigation, nutritional requirements, fertilization, abiotic stresses, stress mitigation, cropping systems, root-soil interactions and soil health
Plant Genetic Resources and Biotechnology	Collection, characterization and conservation of plant genetic resources, breeding, in vitro culture, micropropagation and molecular biology
Postharvest and Quality Assurance	Postharvest physiology and pathology, technology and processing of horticultural products and with quality management and assurance in horticulture
Precision Horticulture and Engineering	Horticultural engineering, automation in horticulture and machinery, precision horticulture, big data management and modelling, controlled environment horticulture engineering and artificial lighting
Protected Cultivation and Soilless Culture	Horticulture under cover and netting, in a greenhouse environment or in an advanced controlled environment, either in soil or in soilless culture
Temperate Tree Fruits	Tree fruit crops typically grown in temperate or Mediterranean climates
Temperate Tree Nuts	Tree nut crops typically grown in temperate or Mediterranean climates
Tropical and Subtropical Fruit and Nuts	Tree fruit and nut crops typically grown in tropical and subtropical climates
Vegetables, Roots and Tubers	Vegetables, roots and tubers
Vine and Berry Fruits	Vine and berry crops

were examined, they related to plant diseases of specific crops, so it made sense to align them with Divisions specific to those crops. In addition, this will be more efficient and relevant in keeping the door open, to react quickly to specific new diseases that emerge, so they can be sorted out at a meeting related to the corresponding crop.

- Merging of Section Medicinal and Aromatic Plants and Commission Fruits and Vegetables and Health to form the Division Horticulture for Human Health. This was due to a significant overlap in interests.
- Merging the two Sections on vegetables. These two sections were initially one and were split because of the large interest and tremendous activity. Because many Working Groups were found, however, to be dealing with topics that could better fit into other new Divisions, it was thought more appropriate to have a sole Division for all vegetables, including roots and tubers. Working Groups on specific topics (e.g. grafting) were then allocated to other Divisions, e.g. Division Protected Cultivation and Soilless Culture, due to their scope. Some other Working Groups were either dissolved because of lack of activity or merged.

- An increase in emphasis on quality assurance in the Division Postharvest and Quality Assurance.

- Merging Commission Plant Substrates and Soilless Culture and Commission Protected Cultivation to form the Division Protected Cultivation and Soilless Culture. Merging them was seen as a better systems approach given there were some overlapping themes.

Clearly, these decisions need to be monitored over the next few years. Some modifications may be needed along the way where issues are identified. However, members can be assured that the Working Groups and associated symposia are continuing as usual, where meetings are well attended and have sufficient membership interest to be viable. Please read the details about the Division Chairs and Vice-Chairs in the last issue of *Chronica Horticulturae* (58(3)), and the upcoming symposia related to each Division can be found on our website, under the heading “Science”: <https://www.ishs.org/scientific-structure>.

### Continued focus on Symposia 2.0

The concept of Symposia 2.0 was also developed during the term of the last Board, with details in *Chronica Horticulturae* 55(3). The

basic philosophy is to add value to the symposia. This could be through:

- Adding workshops or training sessions to the symposia.
- “Rescuing” smaller symposia so they can be viable, either by clustering symposia together or associating the smaller symposia with regional congresses or the International Horticultural Congress.
- Creating workshops or sessions particularly relevant to industry members should be an additional focus.
- Encouraging students and early career scientists, through student sessions and through the Young Minds Awards.

The Board would also like to see greater promotion of our symposia by attendees tweeting about important results they hear about at symposia. You can find the hashtag for each symposium on our website. Just go to the calendar and find the relevant symposium. You can also tweet the ISHS twitter name @ishs\_hort.

The new Board fully supports the changes to the scientific structure and looks forward to working with the new Executive Committee to ensure that your symposia provide good value for all members. 🟢

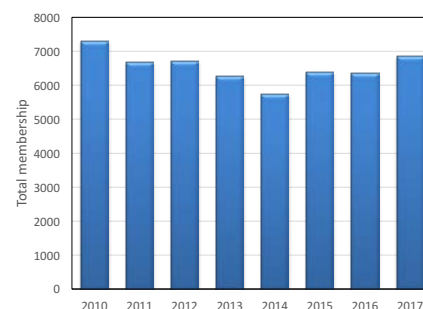
# ➤ 2014-2018 Board report to the General Assembly – Istanbul, Turkey

Roderick A. Drew, President of ISHS 2014-2018

As required by the Statutes of ISHS, the ISHS President for the period 2014-2018 convened the General Assembly on August 15, 2018, during the XXX International Horticultural Congress, in Istanbul, Turkey.

The major purpose of the General Assembly is to inform ISHS members about the activity of the Society during the four-year period between congresses. It is an opportunity to announce the location of the forthcom-

ing congresses (IHC2022, 14-20 August 2022, Angers, France and IHC2026, 23-28 August 2026, Kyoto, Japan); to thank the outgoing President, Board and Executive Committee members, ISHS Executive Director and staff in Leuven for their commitment to ISHS; to thank the IHC2018 Committees and PCO staff members for their contributions to IHC2018; to present the ISHS awards; to proclaim the names of the new elected officers of the Society and finally to install the new President and Board in office. President for 2014-2018, Roderick Drew, gave the Board's report. He presented a summary of the most important achievements of the ISHS during the past four years, followed by an overview of IHC2018. He then proposed amendments to ISHS Statutes (reported later in this issue of *Chronica Horticulturae*) before announcing venues for IHC2022 and IHC2026. ISHS awards for the period 2016-2018 were then announced and presented before the outgoing President handed over to the incoming President and Board. Since most of these activities are reported in the last issue, *Chronica Horticulturae* 58(3), this article will focus on the report about the actions and achievements of the Board and the Society, which was formally



■ Figure 1. Individual membership of ISHS 2010-2017.

accepted by the General Assembly, as was required.

## Membership

Individual membership of ISHS peaked at 7346 in 2009 and then decreased to 5746 by 2014, following a trend in many scientific societies worldwide. The outgoing Board was very concerned about individual membership and membership of students and young scientists. Consequently, we appointed one member of the Board, Prof. Jens Wünsche, to the position of Innovation, Outreach and Strategy. As a result of our new initiatives

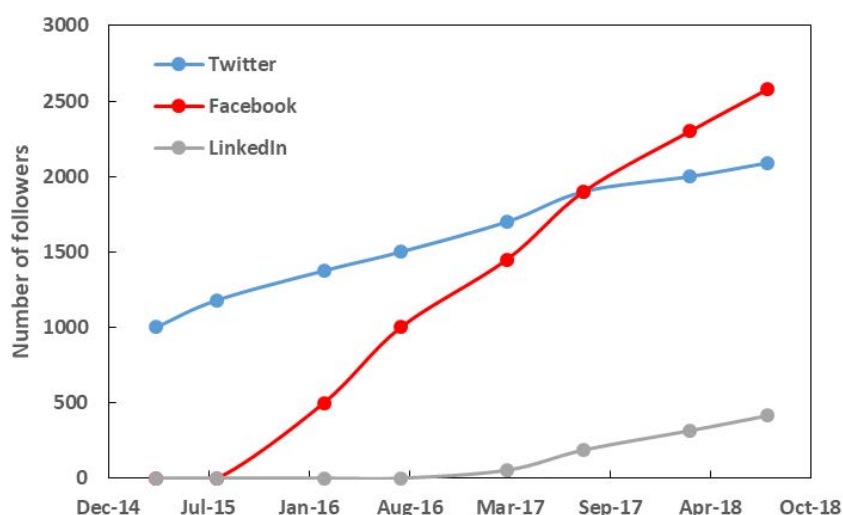


➤ Rod Drew, ISHS President 2014-2018.



➤ The 2014-2018 ISHS Board. From left to right: Yüksel Tüzel, President of IHC2018; Jens Wünsche, Responsible for Innovation, Outreach and Strategy; Jill Stanley, Secretary; Ryutaro Tao, Treasurer; Silvana Nicola, Vice-President; Yves Desjardins, Responsible for Publications; Rod Drew, President; Jozef Van Assche, Executive Director.





■ Figure 2. Number of followers of ISHS on social media, 2014-2018.

and outreach programs, we have reversed this trend and ISHS had 6862 members in 2017 (Figure 1). Student membership also increased significantly between 2014 and 2017. Of concern is still the large number of lapsed members each year.

For many years there has been discussion on the need to enlist corporate members, who would become partners for ISHS developments. Our Board acted on this need and set a target of 10 world players in the horticulture and horticultural science community. Much careful discussion with major commercial companies has led to our first corporate members: Bayer Crop Science, Greenyard, Beaulieu Technical Textiles, and Hishtil. Dis-

cussions are continuing with other leading international companies. Valuable contacts have been made during ISHS participation at events such as Fruit Logistica in Berlin and HortiAsia in Bangkok. ISHS Executive Director, Jozef Van Assche, has played a major role in discussions, negotiations and enlistment of these corporate members.

## Social media

We have expanded the use of and following of ISHS on social media via Facebook, Twitter and LinkedIn on an initiative by Dr. Jill Stanley and Mr. Peter Vanderborght. Twitter now has >2000 followers, Facebook >2500 followers and LinkedIn >400 followers (Figure 2).

■ Table 1. *Acta Horticulturae* – statistics for 2014-2017.

Year	Total no. pages	Average no. pages	Total no. articles	Average no. articles	No. Actas
2014	17,342	385	2278	50	45
2015	17,856	397	2390	53	45
2016	14,297	318	2067	46	45
2017	15,616	390	2194	55	40

## Publications

The outgoing Board has made a significant contribution to ISHS publications, with contributions from Prof. Yves Desjardins (ISHS Board member responsible for Publications), Mr. Peter Vanderborght, Dr. Jill Stanley, Prof. Jens Wünsche, Dr. Rémi Kahane and the ISHS Secretariat.

*Chronica Horticulturae* has been upgraded with a changed style, and innovative content has been added. Student and young scientist participation has been encouraged, and included recognition via awards and research reports. Another new feature has been interviews of ISHS Fellows and Honorary Members.

*Acta Horticulturae* continues to play a vitally important role for ISHS in the recording and availability of presentations from all symposia and congresses and in the income and financial stability of the Society. The contribution of *Acta* is presented in Table 1.

ROSA – the Responsive Online System for *Acta Horticulturae* submission and review – and Editorial Manager software have been implemented. They have enabled a more efficient system for reviewing and editing manuscripts and facilitated the publishing of the *Acta* and ISHS journals. CrossRef has allowed sourcing and traceability of content and adds to the value of our publications.

A major contribution of the outgoing Board was the purchase of two journals (eJHS and Fruits). They have allowed the publication of refereed articles of a high standard and maintained their financial viability. The impact factor for these journals has increased steadily. The development of these journals was greatly facilitated by Prof. Yves Desjardins, who pursued this initiative over eight years as the member of the Board responsible for Publications, Prof. Jens Wünsche, who has been the Editor in Chief of eJHS, Dr. Rémi Kahane, who has been Editor in Chief of Fruits, and Dr. Kim Hummer, who has been ISHS Science Editor.



› The organizing team of IHC2022, Angers, France.



› The organizing team of IHC2026, Kyoto, Japan.

■ Table 2. Balance sheet for ISHS 2014-2017.

	2014	2015	2016	2017
<b>ASSETS</b>				
<b>Current assets</b>				
Cash and deposits	1,571,983	1,561,549	1,626,531	1,763,343
Accounts receivable/prepayments	40,765	48,584	56,756	48,313
Inventories	32,694	32,727	36,549	33,883
<b>Total</b>	<b>1,645,442</b>	<b>1,642,860</b>	<b>1,719,836</b>	<b>1,845,539</b>
<b>Long term assets</b>				
Property, plant and equipment	6,860	3,345	10,892	11,161
Intangible fixed assets	6,010	49,838	62,110	50,382
<b>Total</b>	<b>12,870</b>	<b>53,183</b>	<b>73,002</b>	<b>61,543</b>
<b>Total assets</b>	<b>1,658,312</b>	<b>1,696,043</b>	<b>1,792,838</b>	<b>1,907,082</b>
<b>LIABILITIES AND EQUITY</b>				
<b>Current liabilities</b>				
Accounts payable & accrued charges	563,800	604,472	637,209	741,591
<b>Equity</b>	1,094,512	1,094,571	1,155,629	1,165,491
<b>Total liabilities and equity</b>	<b>1,658,312</b>	<b>1,699,043</b>	<b>1,792,838</b>	<b>1,907,082</b>

We have developed a new lay-out and format for *Acta Horticulturae*, *Chronica Horticulturae*, *Scripta Horticulturae* and the new journals. The changes bring consistency of style across our publications, which is good for the ISHS image and marketing.

ISHS has released a new book entitled “Principles of Modern Fruit Science”, a textbook aimed at enhancing our understanding of the principles of plant science. It was edited by Prof. Silvero Sansavini (a past President of ISHS) and colleagues.

### Student and youth outreach

The outgoing Board has undertaken a large and successful program of outreach to students and young scientists under the leadership of Prof. Jens Wünsche. The new awards

for oral and poster presentations by young scientists at every symposium have been very well received by young scientists and their subsequent research reports have provided valuable recognition of their contributions. A highlight of these awards was their distribution across a wide range of countries. Other successful initiatives were the ideas contest (Harnessing the Creativity of Young Minds) and the questionnaire (Harnessing the Opinions of Young Minds), having >1000 respondents from >100 countries. Other excellent initiatives were the first European Conference of Post Graduate Horticulture Scientists and the first ISHS Summer School for young minds (reported later in this issue of *Chronica Horticulturae*).

■ Table 3. Profit and loss account for ISHS 2014-2017.

	2014	2015	2016	2017
<b>Revenues</b>				
Contribution members (dues)	290,508	332,055	453,822	439,769
Sales	898,761	905,206	816,127	854,112
Other income	52,347	48,121	91,805	71,440
<b>Total</b>	<b>1,241,616</b>	<b>1,285,382</b>	<b>1,361,754</b>	<b>1,365,321</b>
<b>Expenses</b>				
Costs books	212,501	242,265	187,021	215,373
Personnel costs	628,960	619,887	622,232	671,438
Office costs	207,242	198,619	114,619	143,933
Depreciation	9,478	10,774	10,675	16,023
General management costs	301,788	206,777	301,384	273,347
Changes in provisions	(17,387)	7,000	64,766	35,344
<b>Total</b>	<b>1,342,582</b>	<b>1,285,322</b>	<b>1,300,697</b>	<b>1,355,458</b>
<b>Result: revenues over expenses</b>	<b>(100,966)</b>	<b>60</b>	<b>61,057</b>	<b>9,863</b>

## ISHS finances 2014-2017

At the beginning of our term, the outgoing Board faced global economic conditions that were and continue to be unstable, and in 2014 we had a 100,000 Euro deficit of expenditure over income. Our decisions, for example to reduce postage costs and increase membership fees, have led to stabilisation and an improved financial position (Tables 2 and 3; Figure 3). By 2015, we had no deficit and in 2016 we posted a 100,000 Euro profit of income over expenditure. This has allowed us to undertake new initiatives without using ISHS reserves. As a result, the value of our ISHS assets has steadily risen from 1.65 million Euro in 2014 to 1.9 million Euro in 2017. We are indebted to Prof. Ryutaro Tao (ISHS Treasurer) and Dirk Van Holderbeke (ISHS Secretariat) for their careful overseeing and control of our finances.

### IHC2018

IHC2018 was very successful and was a tribute to the significant voluntary contributions by Prof. Yüksel Tüzel (IHC2018 President), Steering, Organising and Scientific Committee members, Dekon Group (Professional Conference Organiser), plenary and keynote speakers and all presenters, Bayer Crop Science (Platinum sponsor) and all other sponsors, and all others who contributed during the previous eight years. The Congress was attended by approximately 1800 delegates from 90 countries. The program included symposia, tailor-made workshops including a youth workshop, training sessions, a regional summit (East Europe - Central Asia Summit), and a special issue of *Chronica Horticulturae* on horticulture in Turkey. More information on IHC2018 is available in this issue of *Chronica Horticulturae*.

### Scientific activity

Under the leadership of ISHS Vice-President, Prof. Silvana Nicola, we have maintained a very active scientific program including an average of 45 symposia per year in 2014-2018 and the introduction of the new Symposia 2.0 format.

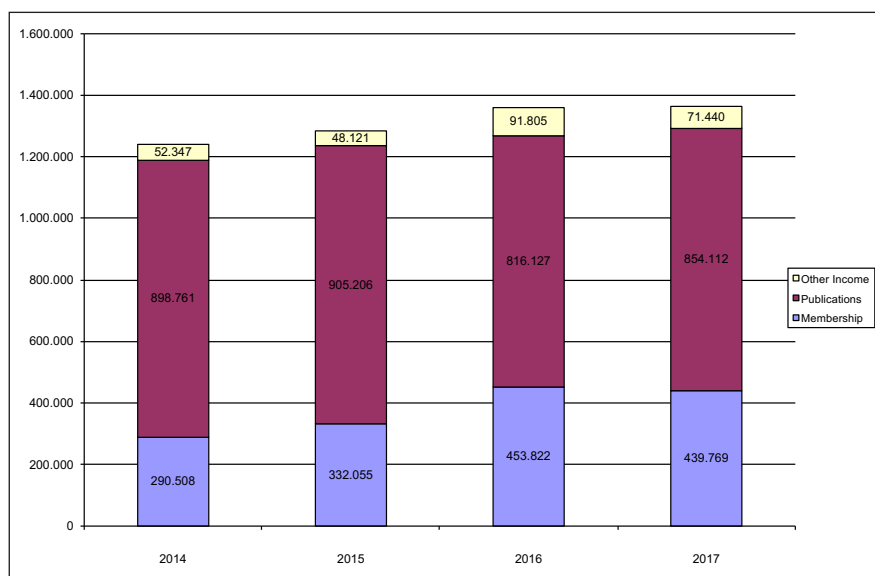
The outgoing Board took on a new initiative to make a major change in the structure of the ISHS Executive Committee (details in the Editorial of this issue of *Chronica Horticulturae*). The Board worked with the Executive Committee in joint meetings in 2015, 2016 and 2017. As a result, the newly elected Executive Committee has 14 Divisions that replaced the previous 22 Sections and Commissions.

### Proposed amendments to ISHS Statutes

The outgoing Board recommended replacing Sections and Commissions by Divisions, and



➤ Rod Drew, ISHS President 2014-2018, presenting the ISHS Ceremonial Mace to Yüksel Tüzel, ISHS President 2018-2022.



■ Figure 3. ISHS income 2014-2017.

that the composition of the Board be restructured to represent a member from each continent where the President is elected at large. The Board composition reflects the changes in ISHS membership geographic distribution.

- **Before:** There will be at least one Board member from each of the geographical regions: (i) Africa-Oceania, (ii) The Americas, (iii) Asia, and (iv) Europe. The other Board member will be elected at large.
- **Presently:** There will be at least one Board member from each of the geographical regions: (i) Africa, (ii) Oceania, (iii) N. America (including Caribbean and C. America), (iv) S. America, (v) Asia, and (vi) Europe.

These changes were approved by the ISHS Council in Quebec in August 2016, in Istanbul in August 2018, and were approved unanimously by the General Assembly at IHC2018 in Istanbul.

### Future International Horticultural Congresses

IHC2022 will be held from 14 to 20 August

2022, in Angers, France. The IHC2022 President, Dr. François Laurens, and the organising team presented information and preliminary plans for the Congress including a presentation of Angers and surrounding horticultural industries and research facilities ([www.ihc2022.org](http://www.ihc2022.org)).

The President of IHC2026, Prof. Ryutaro Tao, and his team presented an overview of Kyoto, Japan and the support of the Japanese Society for Horticultural Science to convene the Congress from 23-28 August 2026 in Kyoto.

### ISHS Executive Committees and awards

The outgoing Section and Commission Chairs were thanked for their contributions to ISHS in the previous four years and the incoming Chairs of the new ISHS Divisions were announced. Full details are available in an article in the last issue of *Chronica Horticulturae*.

ISHS awards for new Honorary Members, Fellows and Horticulture Innovation were

presented. Full details are available in an article in the last issue of *Chronica Horticulturae*.

### ISHS Presidents and Boards

The outgoing President thanked the outgoing Board, the Executive Director Jozef Van Assche and all the staff at the ISHS Secretariat in Leuven for their outstanding contribution to ISHS from 2014 to 2018. He then invited the incoming President, Prof. Yüksel Tüzel, to take over chairing the meeting and to introduce her new Board. During a handover ceremony, the ISHS Ceremonial Mace was handed over to the incoming President, who then introduced her new Board and outlined her vision for the future of ISHS. Full details are available in an Editorial and article in the last issue of *Chronica Horticulturae*.

To conclude, the incoming President paid tribute to the outgoing President and Board and thanked all of them for the hard work. ●

# Canopy

## SS1 SunScan

### LAI and PAR Mapping

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- Direct display of Leaf Area Index (LAI)
- Useable in changeable sky conditions
- Wireless-linked reference sensor

Delta-T Devices



# ➤ Council and General Assembly approve amendments to the ISHS Statutes

At its meetings on 15 August 2018, the General Assembly of the ISHS approved the amendments to the ISHS Statutes as discussed by Council on 23-24 August 2016 and 10-11 August 2018.

Articles related to the Board elections and to geographical balance and Articles related to 'Sections and Commissions' to become 'Divisions'.

3.3. The Society will establish **Divisions** according to commodities within horticulture and according to subjects of horticultural science and technology, that range across several commodity sectors. **In addition, the concept of 'Commission' will be used for 'special ad hoc commissions' only.**

6.5., 10.1., 11.1., 11.2., 13.2. **To change the words 'Sections and Commissions' to 'Divisions'.**

8.6.1. The quorum for a Council meeting is reached:

- if one third of the Country/region representatives, entitled to vote, are present or represented
- and if at least one representative of each of the geographical regions **(i) Africa, (ii) Oceania, (iii) N. America (including Caribbean and C. America), (iv) S. America, (v) Asia, and (vi) Europe** ~~(i) Africa-Oceania (ii) The Americas, (iii) Asia, and (iv) Europe~~ is present or represented.

9.1. The Board consists of not less than five, nor more than nine, members who are elected by the Council and confirmed by the General Assembly. In addition, the Executive Director and the Congress President are *ex officio*, non-voting members.

15.2. At that Council meeting there must be 50% of the voting member countries present, or by proxy, in accordance with the geographical divisions specified in the Rules of Procedure. There must be a two-thirds majority of the votes of this Council in making the recommendations.

In addition, the amendments will only be adopted with the support of:

- either twenty individual members
- or six institutional members distributed over the ~~six~~ **four** geographical regions **(i) Africa, (ii) Oceania, (iii) N. America (including Caribbean and C. America), (iv) S. America, (v) Asia, and (vi) Europe** ~~(i) Africa-Oceania (ii) The Americas, (iii) Asia, and (iv) Europe.~~



**eJHS**  
European Journal of Horticultural Science

**FRUITS**  
International Journal of Tropical and Subtropical Horticulture

eJHS and Fruits provide a new and fresh alternative to ISHS members and all others wishing to publish their research in a high profile international horticultural journal with rising impact. We warmly invite your article submissions.

Check out [www.ishs.org/ejhs](http://www.ishs.org/ejhs) and [www.ishs.org/fruits](http://www.ishs.org/fruits) for more details.

## > Georg Noga

### Position or previous position

Professor Emeritus, University of  
Bonn, Germany

### ISHS honour

ISHS Honorary Member

### 1. Tell us a bit about yourself (hometown, current locale, family, hobbies, community involvement).

I was born in 1952 in Ratibor, Oberschlesien, moved with my parents at the age of six to the western part of Germany, and grew up in a small city (west of Hannover) surrounded by agricultural land. As a young boy, during school holiday periods, I earned some money on farmers' fields by crawling on all fours along the rows and thinning young sugar-beet seedlings. This made me proud on the one hand, since I earned my own money, but on the other hand this was a very demanding job, resulting in awful back pains at the end of the day. This is probably the reason why – in my later career – I found thinning of fruit trees much more attractive.

Originally I wanted to become a medical doctor. After finishing high school, I had to join mandatory military services in the German army starting as tank grenadier and being promoted to Lieutenant later on. Luckily, I received the chance in the last six months of my two-year service to transfer to the medical corps, providing me with good training as a professional nurse. These were the best prerequisites for my intended medical studies. Fortunately, with respect to my later horticultural career, I was not successful with my medical study application in the first run and therefore I decided to start out with food and nutrition sciences at the University of Bonn. Since I liked this subject, I carried on and received my major diploma in nutrition sciences. In my final oral exams, the director of the Institute of Nutrition Sciences offered me a position as a graduate student, and I accepted this totally unexpected offer. The topic I was supposed to work on was to elucidate and measure exothermy in humans as dependent on different diets and to find out – in simple terms – why certain individuals can eat a lot without being afraid of gaining weight. Forty years later, this still is a



> Welcome of Georg Noga (left) and Georg Ebert (third from left, Head of Research Division, Compo Expert Co. Ltd., Münster, Germany) by the Director (second from left) and staff of Najran Horticulture Development Research Center, Najran, Kingdom of Saudi Arabia, in 2006, in context with an FAO Expert Mission.

hot topic! However, after getting started and talking with experts in this field, I reached the conclusion that this would be “mission impossible” since it was supposed to be a one man show – with no major experience and active support from the institute.

### 2. What got you started in a career in horticultural science?

By chance, one month later, I received a letter of invitation from Prof. Dr. Fritz Lenz, who had just taken over directorship of the Institute of Fruit and Vegetable Crops at Bonn University. Dr. Lenz was well known internationally for his photosynthesis expertise, and he had established excellent facilities for CO<sub>2</sub> gas exchange and transpiration measurements as well as for nutrient element analyses in his institute. He attracted many outstanding scientists like the late Shaul P. Monselise from Israel, Alan Lakso, Ted DeJong and James Flore from the USA, and many other real photosynthesis experts. There were unique opportunities for scientific interaction, even though my PhD work was on “Rough peelness and retarded color formation in the Satsuma mandarins in West Turkey” comprising two central parts: one on chemical analyses (chlorophylls, carotenoids) and one on tree and fruit physiology. In this context, I developed an HPLC method for separation and identification of citrus peel carotenoids. At that time, the first HPLC machines had just become available and by size occupied a whole lab. The physiological part of my study focused on plant hormones

and growth regulators, at a time when, in the early 80s, one thought that they were the clue to solving many problems in plant production and crop management. At least, this period gave me a good insight and understanding of the role, use and physiological implications of growth regulators. Besides, in context with my PhD work, I had the opportunity to conduct field experiments with citrus at Ege University, Izmir, Turkey, to further develop TLC and HPLC based carotenoid analyses together with Dr. Jeana Gross at Hebrew University in Jerusalem, and to interact with Prof. Monselise and Prof. R. Goren. These were real exciting times, especially as a young PhD student to be given the unique chance of interacting with and benefiting from such outstanding scientists.



> Former ISHS Treasurers Rob Bogers (left), Richard H. Zimmerman (second from right) and Georg Noga (right) as well as Dr. Jung-Myung Lee (second from left) at the get-together of the Lisbon Congress (IHC2010). In the background: Rod Drew.





➤ Georg Noga (center), Walter Müller (former Internal Auditor of ISHS, left) and Jozef van Assche (Executive Director of ISHS, right) inspecting the impressive *Amorphophallus titanum* plant with world record flower organ (in the back) in the Botanical Gardens of Bonn University in 2009 after a KoGa Advisory Board meeting.



➤ Welcome of DGG-President Prof. Christian Ulrichs (fourth from left) and DGG members by Prof. Ulrich Schurr (center, red sweater) at Juelich Research Center, Germany, for demonstration of the phenotyping facilities. The visit was part of the post-congress program, when Georg Noga and his team were hosting the Annual Meetings of the German Horticulture Society (DGG) in 2013.

### 3. Give a brief overview of your career/achievements.

After finishing my PhD under the guidance of Prof. Lenz in early 1981, he strongly encouraged me to spend a postdoc with Dr. M.J. Bukovac, distinguished full professor at Michigan State University and member of the National Academy of Sciences. Luckily, I was awarded a research grant by the German Science Foundation (DFG) to elucidate the physiological basis of fruit thinning chemicals. I also used the opportunity of my postdoc to study the mechanisms for uptake of pesticide active ingredients and the role of surfactants, one of the special research topics of John Bukovac. I learned a lot from him, for example good hypothesis based research and facts of life, such as “There is no reason not to be as precise as possible” or: “Whatever you do, always have a plan B ready in case something does not work or goes wrong.” He also taught me that in addition to becoming a good researcher or scientist I should not neglect to further develop skills for managing private affairs and my personal future including my economical situation. He was like a father and a fantastic mentor – for science and life. I am very grateful to him.

After returning from the US, I accepted an offer from Prof. Lenz and took over a tenure track administration/management oriented position. Mainly in the evenings, after regular office hours and on weekends, I devoted my extra time to elucidating the biological side effects of adjuvant application. With significant financial support from industry, I established methods and equipment for measuring pigments and carbohydrates (HPLC), ethylene, ABA, CO<sub>2</sub> and O<sub>2</sub> (GC), and proteins (gel electrophoresis). Even today I am very grateful to Prof. Lenz for providing me with

as much operational freedom as possible to allow me to achieve my individual research goals and build up my own group. In 1990, I completed my “Habilitation” thesis, and became head of the Postharvest Division in the Institute of Prof. Lenz. In 1995, I accepted an invitation from Stuttgart-Hohenheim University to become Chair of the Specialty Fruit Crop Institute and head of Bavendorf Fruit Research Station at Lake Constance. Collaboration with extension services and fruit growers broadened my mind, and I learned how to align or bridge specific interests of science and industry. In 1998, I was invited to take up a chair back in Bonn, and became head of the Institute after retirement of Fritz Lenz. Twenty years later, I am looking back on 40 challenging but also highly rewarding years as a horticulturist, bridging the sometimes diverging or even contradictory views and interests of academia, horticultural practice, consulting and executive management. As a plant/fruit physiologist and head of an internationally oriented, highly dedicated research team, I have been privileged to do pioneer research in elucidating and understanding central plant defense mechanisms in fruit and vegetable crops. In the last decade of my research I very much enjoyed engagement in interdisciplinary research and development clusters (CropSense, BioSc) together with leading groups of the ABCJ (Aachen, Bonn, Cologne, Juelich) region, to contribute to the development of non-invasive techniques for sensing and differentiating biotic and abiotic stresses in plants. Special emphasis was also given to the implications of stress for health benefits, e.g. enhancing the content of vitamins and secondary metabolites in fruits and vegetables. Overall, the outcome of my research

resulted in five patents and more than 150 refereed scientific publications in international journals.

### 4. What do you consider your greatest achievement to be?

First of all, I suppose, I have found great satisfaction in providing leadership to and motivation of my team(s), identifying the strengths and weaknesses of each individual thoroughly and making efficient use of the positive attributes, experiences and strengths. This has laid the foundation for driving the positive developments and to stand up with my institute to the various challenges and tests in a highly competitive and dynamically changing environment.

In 2002, with the Federal State of Rhineland-Palatinate as a partner, on my initiative, we established KoGa (Center of Competence for Horticulture) at Bonn University. In 2009, Juelich Research Centre (FZJ) with a strong focus on development of innovative technologies, and, in 2012, the Chamber of Agriculture for North Rhine-Westphalia (LWK-NRW), joined the consortium. KoGa is a unique consortium in Germany providing a rapid transfer of research results into the respective target groups. It also enriches education and training, by allowing students, trainees and young researchers to interact within interdisciplinary research groups very early in their careers.

Since its establishment, KoGa has made important contributions through numerous national and international collaborative projects and project clusters. In 2009, we launched the KoGa/African Research Network Initiative (ARNI) based on the strong involvement of Alexander von Humboldt (AvH) fellows, where I had the pleasure to



have been selected as host for their repeated postdoc stays in Bonn. We identified joint research priorities, focusing on environmental issues that constrain food production in African countries.

It is an endorsement of all our hard work and also fills us with pride that the Humboldt Foundation – inspired by the KoGa-ARNI concept and taking this as a model – established AGNES, the African-German Network of Excellence in Science. Together with my colleagues Hassan Ali-Dinar and Clement Adebooye, I had the honour and pleasure to be invited to be one of the founding members of AGNES in the constitutive meeting in 2011 in Nairobi.

Another highlight was when my friend and Humboldtian, Isaac Aiyelaagbe, was elected as member (representing Africa) of the new ISHS Board of Directors recently in the ISHS Council meeting prior to the IHC2018 in Istanbul.

I always loved networking and bringing things forward for the benefit of the community. I am pleased that apparently some of these contributions were acknowledged. It definitely was a great honor, when in 2013 I was awarded the status of Honorary Member of the Italian Society for Horticultural Science (SOI), in 2016 ISHS Honorary Membership, and in December 2017 the Gold Medal of the Fruit and Vegetable Growers Association of Rhineland. I am very much honoured to have been granted these great awards and dedicate these to the staff of my institute, who backed up my various involvements through all the years and made my engagement for society and industry possible.



► Georg Noga receiving the Tenhaeff Gold Medal for extraordinary services from the President of the Fruit and Vegetable Growers Association Rhineland, North-Rhine Westfalia, Germany, in 2017.



► Visit of the Tropical Greenhouse of Prof. Jens Gebauer, Kleve University, Germany, as part of a KoGa-African Research Network Initiative (ARNI) workshop in 2017. From left: Prof. Dr. Clement Adebooye (Humboldt Ambassador for Nigeria), Prof. Dr. Mohamed Fouad Abdalla (AvH Fellow and Pro-Dean, Assiut University, Egypt), Georg Noga and Prof. Dr. Isaac Aiyelaagbe (AvH Fellow and current representative for Africa on the Board of Directors of ISHS, Ibadan University, Nigeria).

## 5. Did you encounter difficulties along your career path and how did you deal with them or how did you turn them into opportunities?

I would not say difficulties, I would prefer the term challenges! This has a positive implication. And there were many challenges along my scientific career. Let me highlight just the first and the last in my career. My PhD, under the scientific guidance of Prof. Lenz, included field trials in Izmir. I had no background in horticulture except for a two-semester lecture that was mandatory in the nutrition sciences study. Therefore, Prof. Lenz proposed and arranged a three-day practical instruction session on the field experimental station in Bornova, Izmir. However, after flying in, he was completely “captured” by the Dean and department chairs and their great Turkish hospitality. And I was waiting impatiently on the experimental station for three whole days looking for shade under the citrus trees at outside temperatures of about 40°C. Then, about an hour before boarding the aircraft, Prof. Lenz finally showed up on the field station. He was followed by four department chairs who kept reminding him that it was time to go to the airport. Lenz looked at one of the citrus trees and recommended finding out where specifically rough peel and color deficient fruits were located. Then he left. From that moment I knew that I was on my own and that it was up to me to design and develop the thesis – independently and

under my own responsibility. This was a very valuable experience and I am grateful that I made it at the beginning of my career path! The other major challenge was about two years ago, at the end of my career. In times when in the industrialized countries horticultural departments were increasingly being questioned, I had been hearing rumors in my faculty that after my retirement, my institute was also top of the list for closure. I immediately laid aside several of my honorary duties, decided not to stand for another term as candidate for the ISHS Board and devoted all my time and energy to preparing a turnaround of the tentative faculty decision. It took extraordinary efforts (about a year) to convince individuals/colleagues and faculty. Due to an increasing number of students in horticulture, the strong involvement of our institute in strategically important interdisciplinary projects, excellent support from regional horticultural industry and great performance of the institute, we successfully persuaded the faculty to refill my position.

## 6. Tell us about one funny/exciting/interesting experience that happened to you during your career.

A funny experience I recall was a very painful one – at least for me. During my Hohenheim/Bavendorf period, I had been invited to give a presentation to 200 growers in South Tirol, Italy. Unfortunately, the day before I suffered from awful back pain due to a pro-

lapsed disc. I could not move at all or bend my back. Not giving my presentation was a no go! So I asked two of my PhD students, Michaela Schmitz and Guido Schnabel, both full professors now, to lay me in a horizontal position in the trunk of a station wagon and to transport me over the Alps to Tirol. You should have seen their incredulous looks! However, they followed my instruction, unloaded me in Bozen-Meran, put me in the vertical position in front of the microphone in the big conference hall, and I gave my presentation, followed by great applause by the audience.

### 7. What made you become a member of ISHS and why did you keep the membership? What contribution or role has ISHS played in your career?

In 2000, when I was elected Vice-President of the German Society of Horticultural Science (DGG), my colleague Manfred Schenk, University of Hannover, served as President of DGG. The two of us were invited to represent Germany as delegates at ISHS Council meetings. Application for ISHS membership was a long overdue act then. I recognized the potential, outreach and fantastic services that ISHS provides to its members, especially when compared to our relatively small DGG. I made so many friendships in ISHS and I felt like being part of a family I could always count on. When elected as President of DGG, the Society was going through a critical period with enormous challenges: progressively declining membership, and we were confronted by the fact that no more manuscripts were coming in to "Gartenbauwissenschaft", the DGG owned journal, in which the majority of articles were written in German. Inspired by the positive development of ISHS, the idea matured to strengthen DGG by boosting internationalization through

- establishing a closer partnership with ISHS;
- giving the stranded scientific journal "Gartenbauwissenschaft" a new design and orientation and renaming it to "European Journal of Horticultural Science" (eJHS) with articles in the English language only.
- the initiative to launch together with our friends in ISHS the "International Symposium on Horticulture in Europe (SHE)" in Vienna. It is a well-established symposium series now.

Since the start of my membership over all the years until most recently, I was given the opportunity to serve ISHS and to give something back in return for all the continuous support, friendship and hospitality I have received: German delegate in ISHS Council (2000-2004), Internal Auditor of ISHS (2004-2010) and member of the ISHS Board of Directors (2010-2014) – probably the highlight of my career. From 2014-2018, I contributed as Internal Auditor of ISHS, first with Geoff Dixon and then with Rob Bogers, both experts in finances and real good friends.

### 8. What advice would you give to young people interested in a career in horticulture/horticultural science?

You should have a great interest in plants and curiosity to discover and explore their diversity, structure, role and function as well as their potential use. This should go along with strong determination, passion and commitment, with other words: Go for what you are burning for! If you pursue a career in horticulture, you have to really enjoy what you do. This is the best prerequisite for finding your way. You don't necessarily have to follow the mainstream. Try to find out your own priority field or niche. Fascination paired with curiosity will certainly help you to move forward from the descriptive approach to elucidating and understanding

the often very complex phenomena. Here, ISHS with its profound data base, vast literature collection, symposia and contacts is a fantastic supporter and partner!

### 9. What are the most interesting new roles or opportunities you see emerging in the future within horticultural science?

First in line is to combat climate change and to develop sustainable solutions for feeding the world in order to secure the basis of life for future generations. In this context, there are (too) many new opportunities that are emerging but also challenges, such as digital farming and precision horticulture, including precision irrigation systems, introduction and implementation of advanced sensor technologies and pesticide application devices to compensate for increasing restrictions for use of pesticides and inorganic fertilizers. Another challenge is to find solutions and alternatives for the growing amounts of plastics used in agriculture/horticulture, where the yearly plastics usage amounts to 6.5 m tons, threatening our environment and health. Availability and affordability of labour is a driving force for robotics in horticultural production, where besides the need for "hightech" developments there is also a need for competence in horticultural science. I am fascinated by the opportunities that vertical farming is providing, where plants can be grown well-protected from adverse climate and being highly resource efficient (water, nutrients) in closed systems in almost any part of the world, even in the desert, and in a more sustainable way. Who else other than horticulturists, embedded in a strong community like ISHS, could provide such fundamental knowledge and expertise on plants, sustainable production processes as well as on produce quality and food safety? ●



## > Did you renew your ISHS membership?

Loton to **[www.ishs.org/members](http://www.ishs.org/members)**  
and renew online!





# ➤ IHC2018 – XXX International Horticultural Congress, Istanbul, Turkey

Yüksel Tüzel, President of IHC2018

## Participation

The XXX International Horticultural Congress (IHC2018) with a theme of “Bridging the World through Horticulture” was held between 12-16 August 2018 in Istanbul, Turkey, followed by a number of daily technical tours on 17 August. It attracted 1761 delegates from 90 countries, as listed in Tables 1 and 2. Turkey, China, USA, South Korea, Japan, South Africa, Taiwan, Italy, Australia and France were the top 10 countries in terms of participant numbers.

## Opening session

IHC2018 welcomed participants with an opening session on “Horticulture from ancient times towards space”, giving insight as to how horticulture transformed from the initial stages of agriculture into businesses and science and how it might be utilized in the future, by involving not only the world but also other planets. Well-known experts with different backgrounds, including archeology, art history and horticultural engineering, shared their knowledge and experiences. The 10,000 year history of horticulture was accompanied by a visual show displaying examples from different centuries. Turkey, being a part of the “Fertile Crescent” where agriculture started, hosts several historical sites and artifacts.

Dr. Ceren Kabukçu, an archeologist from the University of Liverpool, UK, opened the time-



➤ A group of participants from India.

line of events by explaining the first evidence of human food systems. For the majority of our history, humans were hunter-gatherers, relying on wild animals and plants for their subsistence. During the Upper and Epi-Palaeolithic, various groups across Southwest Asia and Europe relied on a range of wild plants for food, including wild nuts, berries, and wetland tubers, in addition to wild legumes and grasses. They also hunted a range of animals, including gazelle, wild goat and sheep, aurochs, wild birds, and turtles. A series of dramatic changes in plant and ani-

mal use and management occurred during the Neolithic period, beginning ~9<sup>th</sup> millennium BC, and included the establishment of the earliest agricultural economies. There are a number of independent major centers of plant and animal domestication across the world, including regions in China, India, Mesoamerica, North America, East and West Africa. One of these centers of domestication is the region known as the Fertile Crescent, which encompasses the Tigris and Euphrates river valleys, Eastern Mediterranean, and lowlands of the Taurus-Zagros ranges. In the



➤ Registration on Sunday.



■ Table 1. Continental distribution of registrants who attended IHC2018.

Region/continent	Number of registrants	Number of countries represented
Africa	127	19
America	201	12
Asia	590	26
Europe	772	34
Australia	71	2



➤ ISHS booth.

origins and establishment of agriculture, several Near Eastern archaeological settlements, some of which are located in Anatolia, provide invaluable insights into the cultural and economic processes involved in the transition from mobile hunter-gatherers to settled farming communities. The current evidence from archaeobotanical research indicates that the act of cultivating plants and/or managing wild fruit/nut bearing trees may have pre-dated the genetic mutations that define agricultural crops. Moreover, this process of the establishment of domestication mutations (e.g., loss of seed shattering on ripening) may have been a long and protracted process, lasting over a millennium. Interestingly, with the establishment of the earliest farming societies, methods to increase yield, such as manuring, were being practiced in the earliest stages of crop farming. Anatolia has been the bridge along the Silk Road between the east and west throughout history. This connection continued during the Ottoman Empire. Prof. Dr. Nurhan Atasoy, a Turkish art historian, spoke about the love of flowers and gardens during the Ottoman period. She focused on many floral species that were transferred to Europe for centuries through Anatolia.

Until the 18<sup>th</sup> century, agriculture progressed with good practices such as soil fertility management and balanced plant/animal production. Because of the difficulties of carrying out agricultural activities, innovations were continually being developed, which led to the Agricultural Revolution. This moved on to the Industrial Revolution, which changed farming processes and societies. The world wars and rise in urban populations surged the demand for food crops, pushing the need for mass production. Intensification was the solution, which resulted in greater inputs into land, e.g. fertilisers. A negative impact on the environment and a reduction in diversity was inevitable. Today we rely on approximately 125 crops, despite there being over 200,000 edible plant species. Since the 1970s, people have been growing and consuming food without sufficient consideration of the environmental impact or the waste produced.

Prof. Giacomelli focused on major challenges as metropolitan cities, consumption patterns, degradation of natural resources and climate change exert effects on recent trends. Urban horticulture, vertical farming, plant factories, or soilless systems address the urban consumers living under land scar-

city. Agricultural science and technology have to address local and global problems of today and the future. Prof. Giacomelli also gave excerpts from their studies targeting horticulture on 'Mars'.

The opening session gave the message for all horticultural scientists: learn from the past, apply your knowledge for today and prepare for tomorrow!

The closing of the opening session included folk dances from different parts of Anatolia which highlighted the diversity of color and style (<http://ihc2018.org/en/VIDEO-GALLERY.html>).

## Scientific program

The overall Congress program featured nine plenary lectures (three at the opening session and six during two colloquia), 39 symposia (24 within the ISHS series) and 11 workshops (Tables 3-5). Some symposia such as Postharvest, Protected Cultivation, Plant Breeding, Fruit Crop Physiology & Production Systems and Water and Nutrient Management had a high number of papers and participants, while some were less well attended.

The colloquia topics were selected following a survey among the scientific committee members and conveners. The two topics



➤ Prof. Nurhan Atasoy, a Turkish art historian, presented “Links between the Turkish-Ottoman and the Western world on floriculture and gardening” during the opening session. She also explained the movement of flower species from east to west.



➤ Dr. Ceren Kabukçu, an archeologist from the University of Liverpool, UK, talked about the “Origins and evaluation of early farming in Southwest Asia” during the opening session.

■ Table 2. Number of participants from each country worldwide.

Country	Number of registrants	Country	Number of registrants	Country	Number of registrants
Albania	2	Hungary	6	Norway	8
Argentina	1	India	35	Oman	2
Australia	48	Indonesia	3	Pakistan	7
Austria	1	Iran	13	Peru	2
Azerbaijan	2	Ireland	1	Philippines	9
Bangladesh	2	Israel	25	Poland	4
Belgium	35	Italy	49	Portugal	11
Bosnia and Herzegovina	1	Japan	68	Romania	21
Botswana	2	Jordan	5	Russia	19
Brazil	30	Kazakhstan	1	Saudi Arabia	9
Bulgaria	3	Kenya	8	Senegal	3
Burundi	1	Korea (Republic of)	95	Serbia	3
Canada	20	Kosovo	1	Singapore	2
Chile	12	Kuwait	3	Slovenia	3
China	187	Latvia	7	South Africa	64
Colombia	5	Lebanon	24	Spain	34
Costa Rica	1	Macedonia	1	Sri Lanka	1
Cote d'Ivoire	1	Madagascar	1	Sweden	10
Croatia	2	Malaysia	2	Switzerland	5
Cyprus	2	Mali	2	Taiwan	61
Czech Republic	4	Malta	2	Tanzania	1
Denmark	5	Mauritius	2	Thailand	30
Ecuador	4	Mexico	31	Tunisia	5
Finland	2	Mongolia	3	Turkey	379
France	45	Morocco	7	Uganda	3
Georgia	1	Mozambique	1	United Kingdom	24
Germany	33	Nepal	1	USA	89
Ghana	2	Netherlands	30	Uruguay	5
Greece	13	New Zealand	23	Uzbekistan	3
Hong Kong	1	Nigeria	15	Venezuela	1

➤ Prof. Gene Giacomelli, USA, presenting his keynote on “Horticultural science and engineering critical for our future on earth and in space” at the opening session.



■ Table 3. Summary of titles, speakers and chairs of colloquia.

Colloquia	Title of presentation	Invited speakers	Chair
C1. Future Technologies in Horticulture	Challenges of horticulture in future cities Future technologies in horticultural value chains Technologies for meeting the challenges of the future – the role of a research cooperation strategy	Maria Boey Spyros Fountas Lukas Bertschinger	Yves Desjardins
C2. Innovations: Best Practices in the World	Success story on vertical farming Agroecology and organic agriculture in Latin America The game changer: re-orienting African agriculture	Christine Zimmerman-Loessl Roberto Ugás Lusike Wasilwa	Jill Stanley

■ Table 4. Symposium titles, conveners, number of days, abstract submissions, keynote, oral and poster presentations.

Symposium	Conveners	No. of days	No. of abstracts submitted	No. of key-notes	No. of oral presentations	No. of posters
S1: V International Symposium on Plant Genetic Resources: Sustainable Management and Utilization for Food, Nutrition and Environmental Security	S. Gupta, H. Ilbi, B. Çakır	2	131	3	38	20
S2: II International Symposium on Micropropagation and In Vitro Techniques	M. Lambardi, E.A. Ozudogru, Y.Y. Mendi	2	134	3	33	51
S3: International Symposium on Applied Functional Molecular Biology	B. Çakır, A. Ergül	2	114	3	32	50
S4: XI International Symposium on Banana: ISHS-ProMusa Symposium on Growing and Marketing Banana under Subtropical Conditions	I. van den Bergh, T. Lescot, V. Galán Saúco, H. Gübbük	2	57	5	23	9
S5: VII International on Symposium on Tropical and Subtropical Fruits	S.K. Mitra, H. Jaenicke, M. Akbulut	4	163	2	33	43
S6: International Symposium on Avocado	S.K. Mitra, H. İkten		34	3	13	10
S7: II International Symposium on Jackfruit and Other Moraceae	S.K. Mitra, H. Jaenicke, M. Akbulut		12	1	3	0
S34: II International Symposium on Date Palm	Y. Cohen, H. İkten		25	-	10	1
S8: IV International Symposium on Jujube	M. Liu, F. Stanica, K. Gündüz	1	51	2	14	12
S9: International Symposium on Evaluation of Cultivars, Rootstocks and Management Systems for Sustainable Production of Deciduous Fruit Crops	G. Reighard, B. Morandi, A. Küden	3	125	3	42	51
S10: International Symposium on Understanding Fruit Tree Behaviour in Dynamic Environments	E. Costes, P. Losciale, A. Küden	2	51	2	29	7
S11: International Symposium on Nuts and Mediterranean Climate Fruits: Advances in Breeding and New Strategies of Horticultural Management for Sustainable Production	T. Caruso, L. Ferguson, M. Flaishman, D. Sanal	1	64	1	19	14
S12: III International Berry Fruit Symposium	S. Serce, S. Ercisli	2	103	1	30	27
S13: International Symposium on Viticulture: Primary Production and Processing	Z. Kara, G. Söylemezoğlu, A. Altindisli	2	69	2	34	18
S14: XI International Symposium on Postharvest Quality of Ornamental Plants	F.G. Celikel, S. Meir	2	28	1	21	7
S15: International Symposium on Ornamental Horticulture: Colour Your World	R. Kamenetsky, S. Kazaz, Y. Tüzel	2	110	3	32	40
S16: International Symposium on Tropical and Subtropical Vegetable Production: Tackling Present and Future Global Biotic and Abiotic Stressors	H. Aktas, G.B. Öztekin, S. Ramasamy	2	90	2	23	30



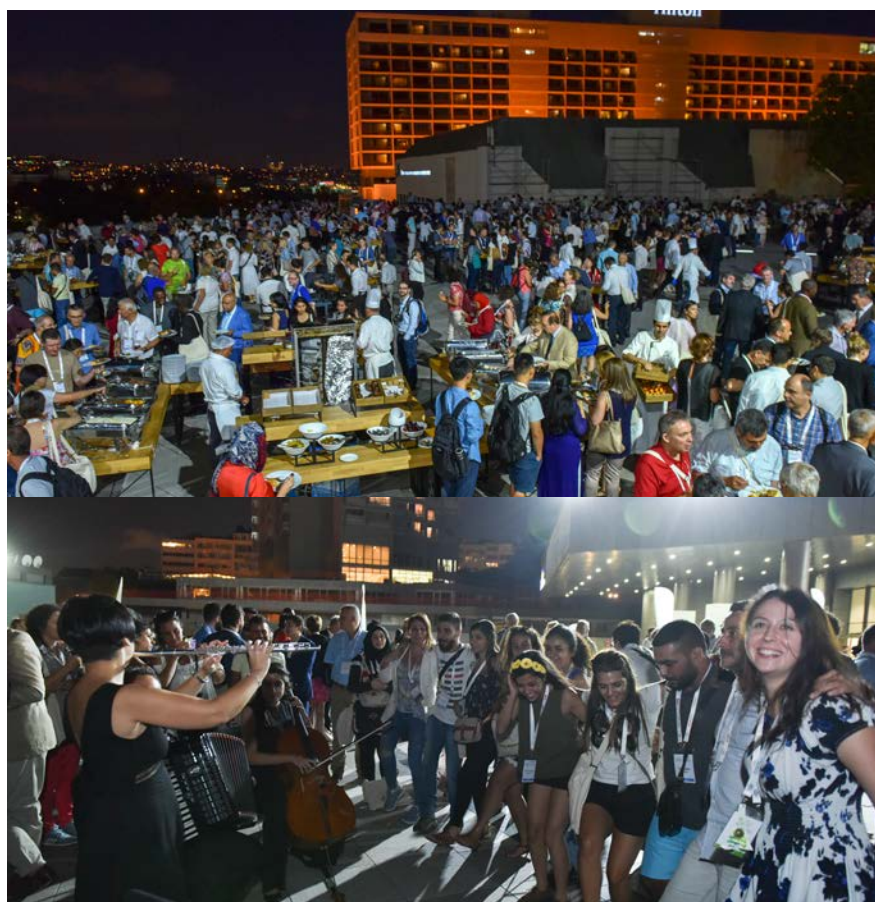
S17: III International Symposium on Innovation and New Technologies in Protected Cultivation	M. Kacira, S. Hemming, F. Boyaci, Y. Tüzel	3	137	3	51	45
S18: II International Symposium on Soilless Culture	Y. Dasgan, A. Gül, M. Raviv	2	73	2	31	21
S19: II International Symposium on Root and Tuber Crops: Value Added Crops for the Next Generation	A.F. Gökçe	2	55	1	22	21
S20: II International Symposium on Plant Breeding in Horticulture	N. Sarı, Y.A. Kacar	3	166	1	47	56
S21: International Symposium on Quality and Safety of Horticultural Products	G. Arkun, K.B. Özer	3	58	2	13	25
S22: FAVHEALTH2018: VII International Symposium on Human Health Effects of Fruits and Vegetables	U. Aksoy, J. Heyes, T. George		35	2	10	14
S27: International Symposium on Fruit and Vegetables for Processing	M.A. Koyuncu		58	1	17	27
S23: II International Symposium on Organic Horticulture for Wellbeing of the Environment and Population	U. Aksoy, M. Dorais, R. Ugas	2	67	1	31	11
S24: XIX International Symposium on Horticultural Economics and Management, VII International Symposium on Improving the Performance of Supply Chains in the Transitional Economies, and II International Symposium on Horticulture Economics, Marketing and Consumer Research	P. Batt, I. Boz	2	65	1	26	10
S25: VII International Conference on Landscape and Urban Horticulture	F. Larcher, J. Ochoa Rego	2	70	1	16	14
S26: IV International Conference on Turfgrass Management and Science for Sports Fields: Bridging the Needs and Research on Turfgrass at the Age of Climate Change	G. Prosdocimi Gianquinto, E. Ervin, S.S. Mutlu		15	-	3	3
S28: II International Symposium on Innovative Plant Protection in Horticulture	D. Hunter, A.P. Ramos, K. Caglayan, F. Can	2	82	2	39	21
S29: International Symposium on Advances in Production and Processing of Medicinal and Aromatic Plants	B. Patil, F. Uysal	3	68	1	21	27
S30: International Symposium on Culinary Herbs and Edible Fungi	A. Peksen, M.K. Soylu		13	-	5	4
S39: VI International Symposium on Saffron Biology and Technology	S. Kırıcı, Y.Y. Mendi		17	-	4	5
S31: II International Symposium on Mechanization, Precision Horticulture, and Robotics	R. Ehsani, S. Aslan	2	37	2	26	6
S32: International Symposium on Strategies and Technologies to Maintain Quality and Reduce Postharvest Losses	M. Erkan	4	171	4	58	70
S33: International Symposium on Water and Nutrient Relations and Management of Horticultural Crops	A. Ben-Gal, E. Fallahi, J. de Haan, C. Rahn, D. Anac	3	131	2	57	41
S35: VIII International Symposium on Seed, Transplant and Stand Establishment of Horticultural Crops (SEST2018)	D. Leskovar, A. Korkmaz, H. Yetişir	2	57	2	21	13
S36: VIII International Symposium on Education, Research Training and Consultancy	R. Kahane, I. Boz	1	10	5 oral presentations and a panel discussion		
S37: International Symposium on Carob: a Neglected Species with Genetic Resources for Multifunctional Uses	H. Gübbük	1	11	-	7	1
S38: X International Symposium on Temperate Fruits in the Tropics and Subtropics	G. Finetto, M.L. Badenes, A. Küden	1	35	1	14	1



➤ Folk dances at the opening ceremony.

■ Table 5. Titles and chairs/organizers for each workshop held during IHC2018.

Workshop	Chairs/organizers
Agroecology and Education: Socio-ecological Resilience to Climate Change	M.C. Dussi
Climate Change: Impact and Mitigation Strategy for the Temperate Fruits in the Tropics and Subtropics	A. Küden
Future of World Horticulture from Youth's Eyes	E. Taskin, H. Voca, S. Madzaric
Phenotyping for Horticultural Crops	R. Pieruschka, S. Fahrner, Y. Tüzel, U. Schurr
Soil and Soilless Organic Systems	U. Aksoy
Superfruits	S.K. Mitra
Sustainable Tea Production	H. Öztürk
Alternatives to Control Postharvest Decay and Losses	M. Erkan
Fruit Juice: from Farm to Glass	M.A. Koyuncu
Biostimulants	Presentations were distributed in various symposia (S23 & S18)
Vertical Farming	Integrated into symposium S18



➤ Welcome reception.

aimed at 1) guiding the world horticultural community for future needs, especially under urban settings and at different scales, and 2) transferring good practices in horticulture from the experiences of scientists in different continents around the world (Table 3). Almost every aspect of horticultural science was covered in the program of IHC2018. Some symposia were merged due to the low number of abstract submissions. Scientific sessions continued for four days with 66 keynote speakers, more than 953 oral and 825 poster presentations. Participants followed the program using an application on their mobile phones and could arrange their own scientific programs. ISHS Young Minds Award winners for each symposium were announced at the end of each symposium by the conveners if there were candidates amongst the participants (Table 6). Aligned with the Congress, two training sessions were organized prior to the Congress on Organic Horticulture and Good Horticultural Practices. Further details are given under the relevant titles. One unique initiative was the “East Europe and Central Asia Summit”, held during the Congress on 14 August 2018, which gathered participants from the region to strengthen cooperation. IHC2018 also welcomed the 54<sup>th</sup> exhibition of “Gardens and Flowers of Istanbul”.





#### ► IHC2018 Steering and Organizing Committees with Turkish Conveners.

### About the Congress organization

The Congress was held as a result of the contributions of various experts working in the field of horticulture. The Steering Committee has been the core decision-making and execution body since 2010. The Local Organizing Committee was composed of participants from various institutions within Turkey (Table 7). DEKON, as the PCO, played an important role in the success of Congress, together with the International Scientific Committee and the conveners. Despite all efforts, political and economic drawbacks affected the number of individuals participating, but not the number of

countries represented. There was a major effort to maintain a high quality, not only in terms of scientific content, but also for social activities, which helps networking for future collaborations.

### Sponsors and exhibitors

Bayer was the Platinum sponsor of IHC2018 and contributed to the scientific program as well as to the training program, Good Horticultural Practices. Gold and Silver sponsors of the Congress were TIM (Turkish Exporters' Assembly)/Aegean Exporters' Association and Anadolu Etap. Turktob (Turkish Seed Association), TIKa, INC NUTFruit, IFOAM, AD

Rossen, Patara and Fitotechniki joined as supporters and/or symposium sponsors. CABI, World Vegetable Center, CCPB, Metos, Taylor & Francis Group, AKIB, Tartes, Licor, Hektaş, CID-Science and Land & Green tech were exhibitors and had display booths.

**Thank you very much to ISHS Board, Executive Committee and Council members and the ISHS Secretariat and to all contributors for realizing this important event in 2018 in Istanbul, Turkey. We will meet in Angers, France, in 2022.**

**Welcome and good luck for IHC2022!** 🟢

■ Table 6. ISHS Young Minds Awards: oral and poster awardees of symposia.

Symposium	Oral Awardee	Poster Awardee
S2: II International Symposium on Micropropagation and In Vitro Techniques	Tugce Ozsan (Turkey); "An effective protocol on artichoke ( <i>Cynara scolymus</i> L.) in vitro rooting"	EunBi Jang (China); "Cytological characteristics of callus and adventitious roots derived from various explants and their phenolics profiling by HPLC in <i>Camellia japonica</i> "
S4: XI International Symposium on Banana: ISHS-ProMusa Symposium on Growing and Marketing Banana under Subtropical Conditions	-	Marimuthu Kumaravel (India); "Induction of somatic embryogenesis in recalcitrant <i>Musa</i> spp. by media manipulation based on the molecular mechanism"
S5: VII International on Tropical and Subtropical Fruits	Usana Nantawan (Australia); "Unravelling the genomics of sucrose-associated sweetness in papaya"	Aina Rabodomanantsoa (Madagascar); "Estimation of tree production by quantitative indicators: the case of lychee in Madagascar"
S6: International Symposium on Avocado	Madeleine Gleeson (Australia); "Transcriptomics of adventitious rooting potential in avocado propagation"	Sakhile Mathe (South Africa); "Girdling as a tool to unravel the 'Hass' avocado skin color problem"
S8: IV International Symposium on Jujube	Zhiguo Liu (China); "A novel, rapid real-time PCR detection of phytoplasma quantification and proliferation activity"	Zhihui Zhao (China); "Free proline with outstanding content in jujube from New Mexico state of USA"
S9: International Symposium on Evaluation of Cultivars, Rootstocks and Management Systems for Sustainable Production of Deciduous Fruit Crops	Benjamin Pitchers (France); "Growing agroforestry systems with apple (GAFA project): preliminary results on the influence of adult walnut trees on growth and branching of two-year-old apple trees" Claire Scofield (New Zealand); "The effect of planar cordon orchard system design on light interception and yield of sweet cherry and apricot"	Seval Taşkın (Turkey); "Pedicels effects on final fruit size in apple"





➤ Yüksel Tüzel, President IHC2018, handing over the responsibility of organizing the next International Horticultural Congress to François Laurens, President of IHC2022.

S10: International Symposium on Understanding Fruit Tree Behaviour in Dynamic Environments	Fares Belhassine (France); "Fruit growth and photosynthesis are differentially affected by local variation in source/sink relations"	Martin Penzel (Germany); "Mechanical thinning of apples reduces fruit drop"
S11: International Symposium on Nuts and Mediterranean Climate Fruits: Advances in Breeding and New Strategies of Horticultural Management for Sustainable Production	Justin Lombardoni (USA); "Evaluation of European hazelnut ( <i>Corylus avellana</i> ) genetic diversity using a genotyping by sequencing approach"	-
S12: III International Berry Fruit Symposium	Max Edgley (Australia); "Physiological mechanisms of postharvest red drupelet reversion in fresh blackberries"	Fa-Pin Chen (Taiwan); "Photosynthetic heat adaptation mechanism in <i>Rubus</i> : a comparison between tropical <i>R. rosifolius</i> and temperate <i>R. idaeus</i> "
S13: International Symposium on Viticulture: Primary Production and Processing	Nan Meng (China); "Accumulation and regulation of norisoprenoid volatiles in wine grape berries ( <i>Vitis vinifera</i> L.)"	Turcan Teker (Turkey); "Effects of two extreme bud load and leaf removal treatments on berry features and yield in 'Sultana' ( <i>Vitis vinifera</i> L.)"
S14: XI International Symposium on Postharvest Quality of Ornamental Plants	Anton Huysamer (South Africa); "Postharvest insect pest control for Western flower thrips, <i>Frankliniella occidentalis</i> , in export <i>Proteaceae</i> cut flowers"	-
S15: International Symposium on Ornamental Horticulture: Colour Your World	Hayato Morimoto (Japan); "Characteristics of <i>Dianthus</i> cultivars starting anthocyanin accumulation in the petals after anthesis"	Elcin Gozde Ergur (Turkey); "How to manipulate hydrangea ( <i>Hydrangea macrophylla</i> ) color?"
S16: International Symposium on Tropical and Subtropical Vegetable Production: Tackling Present and Future Global Biotic and Abiotic Stressors	Rawdzah Mat Ali (Malaysia); "Identification, expression and diversity analysis of pheromone biosynthesis activating neuropeptide (PBAN) in the cabbage butterfly, <i>Pieris rapae</i> (Linnaeus) ( <i>Lepidoptera</i> : <i>Pieridae</i> )"	Hao Wei (Republic of Korea); "Study on optimum relative humidity for graft healing of tomato seedlings"
S17: III International Symposium on Innovation and New Technologies in Protected Cultivation	Tom Williams (United Kingdom); "UV transparent plastic claddings produce warmer crops and improve water use efficiency"	Yuta Iwahashi (Japan); "Environmental conditions influence the oviposition rate of the two-spotted spider mite through host-plant responses"
S18: : II International Symposium on Soilless Culture	Suthisak Saengtharapip (Japan); "Green light penetrates inside crisp head lettuce leading to chlorophyll and ascorbic acid content enhancement"	Paul Cockson (USA); "Characterization of nutrient disorders of dieffenbachia"
S19: II International Symposium on Root and Tuber Crops: Value Added Crops for the Next Generation	Núria Pascual-Seva (Spain); "Using a lysimetric station to determine the irrigation water requirements for chufa crop ( <i>Cyperus esculentus</i> var. <i>sativus</i> )"	Nurten Lokoglu (Turkey); "The effects of storage temperature and packing method on seed yield and quality in purple carrot ( <i>Daucus carota</i> L.)"
S20: II International Symposium on Plant Breeding in Horticulture	Silvia Bruznican (Belgium); "Protoplast regeneration and asymmetric fusion within <i>Apiaceae</i> "	Ko Motoki (Japan); "A candidate mechanism for non-vernalization flowering of cabbage by grafting on radish stocks"

S21: International Symposium on Quality and Safety of Horticultural Products	Melisa Kara (Turkey); "Nitrate, nitrite and chlorophyll contents in parsley and their relations to each other"	-
S22: FAVHEALTH2018: VII International Symposium on Human Health Effects of Fruits and Vegetables	Alex Cheok (United Kingdom); "The effects of <i>Hylocereus</i> (dragon fruit) and <i>Opuntia</i> (cactus pear) on endothelial and vascular function: a systematic review of animal and human studies"	Zhong Xiang Cheah (Australia); "Micronutrient biofortification of sweet corn for human health"
S25: VII International Conference on Landscape and Urban Horticulture	Giuseppina Pennisi (Italy); "Promoting education and training in urban agriculture building on international projects at the Research Centre on Urban Environment for Agriculture and Biodiversity"	-
S26: IV International Conference on Turfgrass Management and Science for Sports Fields: Bridging the Needs and Research on Turfgrass at the Age of Climate Change	-	Stella Aurea Cristiane Gomes da Silva (Brazil); "Establishment phase characteristics of Brazilian native grasses for use in turfgrass"
S27: International Symposium on Fruit and Vegetables for Processing	Lachinee Panjai (Germany); "Postharvest effects of red light on green-stage 1 tomato fruit"	Bianca Zamfir (Romania); "Yield and quality evaluation of processing tomato cultivars obtained at V.R.DS. Buzau Romania"
S28: II International Symposium on Innovative Plant Protection in Horticulture	Upamali Peiris (Australia); "Biocontrol efficacy of nematode trapping fungi <i>Arthrobotrys oligospora</i> and <i>A. dactyloides</i> against root-knot nematodes in ginger" Tlangelani Nghondzweni (South Africa); "Efficacy of selected postharvest agrochemicals in reducing potato tuber soft rot caused by <i>Pectobacterium carotovorum</i> subsp. <i>carotovorum</i> (Pcc) in storage"	-
S29: International Symposium on Advances in Production and Processing of Medicinal and Aromatic Plants	The Luc Thi (South Korea); "Effect of explant type and plant growth regulator on callus formation for potential production of secondary metabolites in <i>Cnidium officinale</i> "	Jekaterina Dorozko (Latvia); "Processing and use of edible petals grown in Baltic States"
S30: International Symposium on Culinary Herbs and Edible Fungi	Perla Hayek (Lebanon); "Using locally available chicken manure as a substitute to horse manure in compost formulas for growing <i>Agaricus bisporus</i> in Lebanon"	-
S31: II International Symposium on Mechanization, Precision Horticulture, and Robotics	Julien Sarron (France); "Is machine learning efficient for mango crop yield estimation when used under heterogeneous conditions?"	-
S32: International Symposium on Strategies and Technologies to Maintain Quality and Reduce Postharvest Losses	Jacqueline Oseko (New Zealand); "Can changes in chlorophyll fluorescence be used to determine chilling injury of cold stored feijoa?"	Kazuki Tsuge (Japan); "The yields, quality, and shelf life of sweet corn grown in warm regions of Japan"
S33: International Symposium on Water and Nutrient Relations and Management of Horticultural Crops	Layla Naim (Lebanon); "Alleviating the adverse effects of salinity stress on tomato crop ( <i>Solanum lycopersicum</i> ) using Lithovit (nanofertilizer) applied through foliar spraying"	Tom Groenvelde (Israel); "Modelling N partitioning in the soil-plant-atmosphere continuum"
S34: II International Symposium on Date Palm	Sarra Cherif (Tunisia); "Characterization and sensory analysis of some Tunisian date cultivars consumed at early maturity stage"	-
S35: VIII International Symposium on Seed, Transplant and Stand Establishment of Horticultural Crops (SEST2018)	Firdes Ulaş (Turkey); "Effects of rootstock with vigorous root system on growth and development of pepper ( <i>Capsicum annuum</i> L.) inbred lines"	-
S38: X International Symposium on Temperate Fruits in the Tropics and Subtropics	Valentina Brailko (Russia); "Morphological, anatomical and physiological features of assimilation apparatus changes in the apricot plants ( <i>Prunus armeniaca</i> L.) infected by <i>Plum pox virus</i> "	-

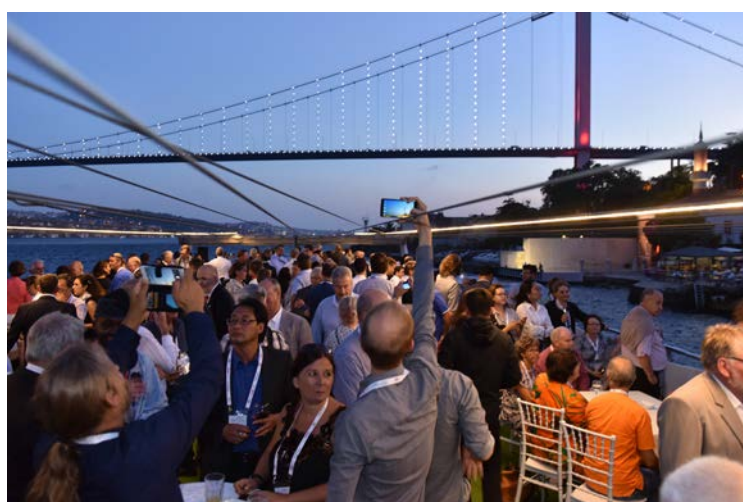




► Presentations from different symposia and poster sessions.

■ Table 7. Members of the Steering and Organizing Committees.

Steering Committee	Portfolio	Affiliation
Yüksel Tüzel	President	Dept. of Horticulture, Ege University
Uygun Aksoy	Chair of the Scientific Committee	Retired – Dept. of Horticulture, Ege University
Gökhan Söylemezoğlu	Chair of the Sponsorship Committee	Dept. of Horticulture, Ankara University
Hüseyin Gazi Kaya	Representative of MAF	General Directorate of Agricultural Research and Policies of Republic of Turkey, Ministry of Agriculture and Forestry (MAF)
Ayşe Gül	Representative of Turkish Society for Horticultural Science	Dept. of Horticulture, Ege University
Organizing Committee	Portfolio	Affiliation
Sahin Anıl	Communication	Retired – Ministry of Agriculture and Forestry
Gökhan Kızılcı	Communication within MAF	Ministry of Agriculture and Forestry
Gülay Besirli Okan Ozkaya Abdullah Ünlü	Sponsorships	Ataturk Horticultural Central Research Institute Dept. of Horticulture, Çukurova University Batı Akdeniz Agricultural Research Institute
Emre Bilen	Website	Ataturk Horticultural Central Research Institute
Yılmaz Boz Murat Deveci Mustafa Erkan Ali İslam Ahmet Korkmaz Mehmet Ali Koyuncu Ali Küden Ayzin Baykam Küden Cengiz Özer Fatih Şen Sedat Serce	Technical tours	Ataturk Horticultural Central Research Institute Dept. of Horticulture, Namik Kemal University Dept. of Horticulture, Akdeniz University Dept. of Horticulture, Ordu University Dept. of Horticulture, Kahramanmaraş Sutçü Imam University Dept. of Horticulture, Süleyman Demirel University Dept. of Horticulture, Cukurova University Dept. of Horticulture, Cukurova University Viticulure Research Institute Dept. of Horticulture, Ege University Dept. of Agric. Genetic Engineering, Ömer Halisdemir University
Zeynel Dalkilic Gölgen Bahar Öztekin	Poster displays	Dept. of Horticulture, Adnan Menderes University Dept. of Horticulture, Ege University



► Gala dinner.



# ➤ IHC2018 East Europe and Central Asia Summit

Rina Kamenetsky Goldstein

A summit for the participants from Central Asian and Eastern European countries was held in the framework of IHC2018 and aimed at facilitation of academic and science-industry collaboration and initiation of ISHS meetings and symposia in these regions.

More than 30 participants from Romania, Serbia, Croatia, Macedonia, Russia, Lithuania, Latvia, Czech Republic, Georgia, Azerbaijan, Kazakhstan, Uzbekistan, Turkmenistan, and Kirgizia took part in the summit.

Summit participants were welcomed by former ISHS President, Prof. Rod Drew, and former ISHS Vice President, Prof. Silvana Nicola, who presented ISHS activity to the forum. The industrial partners of the ISHS were represented by Bayer (Miroslaw Korzeniowski), Beaulieu Technical Textiles (Marc Brouwers) and DLG International Crop Production Center (Jens Kremer), who spoke about possible activity and collaborations in East Europe, Central Asia and Kazakhstan. Prof. Jaroslava Ovesna, Director of Crop Research Institute, Prague, Czech Republic,



➤ Miroslaw Korzeniowski, Crop Manager Horticulture, Bayer Crop Science.

shared her vision on possible tools for science-industry collaboration and research facilities.

Participants discussed the specific requirements for horticultural research and training in their regions. Although horticultural crops are very important, small

farm holders need support in sustainable production technologies and horticultural innovations. All participants agreed that the collaboration in extension, research, and training, as well as industry support, could significantly contribute to the development of horticulture of their countries.

The summit was organized and facilitated by Rina Kamenetsky (Israel), Yüksel Tüzel (Turkey), Silvana Nicola (Italy) and Jozef Van Assche (ISHS Executive Director, Belgium). ●



➤ Participants of the summit.

## ➤ Contact

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# > IHC2018 Workshop on Future of Horticulture from the Youth's Eyes

Suzana Madzaric, Hana Voca and Eren Taskin



> Opening speech by Prof. Uygun Aksoy.

The theme of IHC2018 was “Bridging the World through Horticulture”. It is quite evident that one cannot talk about building any kind of bridges without involvement of youth. Therefore, one of the initiatives to have a focus on young scientists was a workshop “Future of horticulture from the youth's eyes”, which was held during IHC2018.

The workshop was designed according to the views and reflections received from a group of young horticulturist researchers who were interviewed prior to the workshop. The objective of the workshop was to obtain an overall perspective on current hot topics and trends in horticultural science that were important to young scientists, with an emphasis given to future challenges and their possible solutions. The importance of youth networking within ISHS and the creation of possible tools for further collaborations were particularly highlighted through the discussions.

The workshop was opened by Prof. Uygun Aksoy, who has made lifelong and significant contributions to horticultural science and has recognized the importance of young people. During her speech she highlighted that “In order to have sustainability, one of the essential points is to have a younger generation that is coming up to take it further, updating issues and creating different technical, economic or social solutions”.

The need for youth common actions and experience sharing was confirmed with the

participation of more than 40 young scientists from all around the world (represented countries in alphabetical order were: Australia, Bangladesh, Belgium, Bosnia, Chile, China, France, India, Indonesia, Iran, Iraq, Italy, Japan, Kenya, Kosovo, Macedonia, Morocco, Netherlands, Peru, Portugal, South Africa, South Korea, Taiwan, Thailand, Tunisia, Turkey, United Kingdom, USA, and Uzbekistan).

The introductory presentations were given by the workshop conveners Eren Taskin, Hana Voca and Suzana Madzaric, and covered different topics related to future challenges in horticulture (climate change, population, migration, and food system fragility), sustainability of current agricultural practices (Can we apply the same definition and use the same indicators for sustainability assessment in different contexts and realities?) and young people networking in the field of horticulture (Present networks of young professionals in horticulture/agriculture – advantages and potential).

After the presentations in the opening session, the workshop continued with fruitful discussions going beyond the topics previously raised, with exchanges of opinions and challenging questions. Participants discussed urbanization trends at the global level, in terms of how to make horticultural activities attractive to young people again and how to reconnect horticulture to society starting from childhood. The question of “What do we mean by youth involvement in horticulture?” was among the discussed topics, raising debates on “Whether it is enough to make young people stay in rural areas?”



> Participants of the workshop.

or “Should we aim to strengthen young people's skills to enable them to initiate start-up businesses in horticulture outside rural regions?” The role of professionals was discussed, bringing the rapid development of new technologies and social innovations into the forefront, which could serve as a positive impulse for higher involvement of youth in horticulture. Participants agreed that rural areas need higher investment in terms of general infrastructure, which would then allow more people to live there without facing obstacles related to transportation, education, or cultural events. Although there were a lot of common concerns, conveners and participants both enjoyed the overall optimism in the air about the future of horticulture and the world itself.

The workshop served as an excellent platform for the young ISHS community to express their opinions, but it was also an opportunity for the other participants to reflect on their contributions, and learn from each other. Some older colleagues also participated in the workshop, and they warmly welcomed the idea and topics of the workshop, emphasizing that they came to hear the opinions of young people, who will be the future pillars of horticulture and horticultural sciences.

We are looking forward to seeing youth more involved in coming events under the umbrella of ISHS. ●

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# > IHC2018 training course on Good Horticultural Practices

Uygun Aksoy



> IHC2018 training course on Good Horticultural Practices.

The training course on Good Horticultural Practices was organized in Istanbul, Turkey on 11 and 12 August 2018, alongside the XXX International Horticultural Congress. The two-day training course aimed at improving capacity to: identify problems and create solutions at pre- and postharvest stages; develop sustainability of agroecosystems and production chains; develop skills related to legislation, inspection, and certification; build capacity in socio-economic analysis and market strategy; and introduce basic tools and enhance expertise to assess the environmental, and socio-economic performance of GAP implemented in horticultural

value chains. The curriculum was prepared to give a general overview on sustainable systems and agroecosystem management and services, integrated pest and postharvest management of horticultural products, principles, practices and certification of GLOBAL-GAP and markets and consumer attitudes for labelled products. Two case studies, tomato and grape, were selected as examples, since they were major horticultural crops common in participants' countries. These case studies gave practical information and examples on how to manage sustainability in supply chains.

Lecturers were experts from academia and the private sector from different parts of the world: Uygun Aksoy (Ege University, Turkey), Maria Claudia Dussi (Comahue National University, Rio Negro, Patagonia, Argentina), Seda Kızılok (GLOBAL Farm Advisor, Turkey), Mustafa Akyüz (ETKO Certification Body, Turkey), Özlem Uysal Karahan (Ege University, Turkey), Albert Schirring (Bayer, Germany) and Mehmet Kaya (Bayer, Turkey). The training course was attended by 45 horticulturists from various regions of the world: Azerbaijan, Australia, Brazil, Ecuador, India, Indonesia, Iran, Japan, Kenya, Lebanon, The Netherlands, Singapore, Taiwan, Thailand, Turkey and USA. The participants had the chance to ask questions and discuss issues with the experts in order to develop knowledge of GAP relevant to their specific conditions. The training course was also expected to further serve in establishing a forum for networking and exchanging experiences in sustainable horticultural production systems and GAP. ●

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# > IHC2018 training course on Organic Horticulture

Uygun Aksoy

The training course on Organic Horticulture was organized alongside the XXX International Horticultural Congress in Istanbul, Turkey between 12 and 16 August 2018. The training course aimed at delivering a concise package of knowledge as an introductory module on organic horticulture, followed by two workshops, and incorporating the II International Symposium on Organic Horticulture for Wellbeing of the Environment

and Population. Horticultural production continues to be one of the most intensive systems that needs to meet the increasing demand and competitive world market, despite the environmental challenges faced. The rise in demand is closely linked to an awareness among consumers of environmental issues and dietary preferences for fruit and vegetables. The impact of intensive horticultural production

inputs elevates concerns for product and environmental safety, not only for food but also non-food products. Organic horticulture is accepted as one solution to both wellbeing of people and the environment, however, in practice, the definition of what is accepted as organic varies between countries. For example, soilless horticulture can be included as organic in the US and Canada, whereas it is forbidden in the regulation of the European



Union. Organic management systems aim to develop site-specific solutions in horticulture, therefore even if systems are based on the same principles, differences occur in the standards developed depending on the region and crop. The training course focused on newly emerging trends to update the participants from Australia, Azerbaijan, China, Iraq, Philippines, Uzbekistan and Turkey. The issues that were addressed had ecological, agro-technical or socio-economic elements. Within this framework, the program of the introductory module looked to achieve the following: 1) the current state of the art in organic horticulture updated; 2) skills related to legislation, inspection, and certification in the global market developed; 3) capacity in socio-economic analysis and market strategy improved; and 4) the research networks introduced and future trends discussed. The training course was expected to further serve to establish a forum for networking and exchanging experiences in organic horticulture.

The lecturers of the first module were: Prof. Dr. Uygun Aksoy (Ege University and Association of Organic Agriculture Movements, Turkey), Prof. Dr. Roberto Ugas (La Molina University, Lima, Peru and Ex vice president of IFOAM), Dr. Emre Bilen (Central Horticultural Institute, Yalova, Turkey), Levent Yıldız

#### ➤ IHC2018 training course on Organic Horticulture.

(CCPB Certification Body, Kayseri, Turkey), and Muhammed Reza Rezanpaz (Iranian Research Institute of Plant Protection, Iran and IFOAM TIPI member).

The two workshops integrated into a training course on Organic Horticulture were: "Soil and Soilless Organic Systems" and "Agroecology and Education", which were organized on 13 August 2018, with the participation of well-known experts and participants from various parts of the world. The first workshop topic arose through a short survey carried out prior to the congress, asking for hot topics that required discussion. Agroecology is a concept that is more and more integrat-

ed into the field of education on agriculture and related fields. The 15 participants who attended the training course then had the chance to attend the II International Symposium on Organic Horticulture for Wellbeing of the Environment and Population. ●

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## ➤ IHC2018 pre- and post-Congress technical tours

**Sedat Serçe, Murat Deveci, Evren Cabi, Yılmaz Boz, Nihal Dilek Sümer Türeli, Ahmet Korkmaz, Halit Yetişir, Cengiz Özer, Ayzin B. Küden, Ali Küden and Mustafa Erkan**

Within the framework of IHC2018, six technical tours were held: one pre-Congress, one during the Congress and four post-Congress. Very brief notes outlining them are given below.

#### **Pre-Congress technical tour to Cappadocia region (Led by Prof. Sedat Serçe)**

A two-day pre-Congress technical tour took place on Friday 10 and Saturday 11 August 2018 in the Cappadocia region for a delegation of 11 scientists from Australia, Brazil, Italy, New Zealand and USA (Figure 1A). The participants arrived at Nevşehir airport in the early morning on 10 August 2018. The first event of the tour was to visit underground storage facilities. Along with its spec-

tacular scenes, another interesting aspect of Cappadocia is that it is a site with a considerable amount of underground storage facilities. In the Cappadocia region, volcanic layers were formed in the Erciyes and Hasan mountains at depths of 50-300 m. Because man-made caverns are easily constructed and remain firm after their formation, these underground facilities have been used by humans for different purposes throughout history. Currently, the facilities are mostly small and medium-sized warehouses of several galleries, each with 100-1000 t capacity. It is common for these areas to be utilized for storage of food and some primary horticultural products. The participants visited underground facilities operated by the Doğa Seed Company. In addition to potato stor-

age, the facilities are used for other produce such as lemon. The temperature and relative humidity inside these storage facilities do not fluctuate significantly and are stable between 4-10°C at relative humidities of 80-90% year round.

Next, the participants visited Göreme National Park and the Rock Sites of Cappadocia (Figure 1B). Before entering the National Park, the guide briefly explained the geographical and historical background of the region. In a spectacular landscape, entirely sculpted by erosion, the Göreme valley and its surroundings contain rock-hewn sanctuaries that provide unique evidence of Byzantine art in the post-Iconoclastic period. The participants enjoyed the National Park before the transfer to their hotel.





■ Figure 1. A. Participants of the pre-Congress tour. B. Rock formations of Cappadocia.



■ Figure 2. Dolmabahçe Palace in Istanbul.

On the second day of the tour, the group visited Kaymaklı and Derinkuyu underground cities, the remains of a traditional human habitat dating back to the 4<sup>th</sup> century, located about 20 km from Nevşehir province. The group spent the afternoon at the Aladağ Mountains National Park located in Niğde, Kayseri and Adana provinces. The mountain range became a national park in 1995. Aladağ Mountains have the highest summits of the Taurus mountain range and they are one of the most interesting places in Turkey geologically. The participants also observed the Aladağlar Sky Trail Race, as the time of the visit coincided with the first participants finishing the run. The group was finally transferred to their hotel, where they had a chance to attend a Turkish wedding ceremony. During the course of the visit, the participants had an opportunity to observe Turkish horticulture at several sites. The Cappadocia region receives a small amount of annual precipitation and irrigation water is limited in the region. Thus, cropping patterns are based on these phenomena. Potatoes,

grapes, apples and sugar beets are the main crops grown in the region. However, because of the increasing availability of land and irrigation water, there is an increasing trend for the establishment of large, well-maintained commercial orchards in the region.

### Technical tour to the historical Ottoman Palace Gardens and Nezahat Gökyiğit Botanical Garden in Istanbul (Led by Prof. Murat Deveci and Prof. Evren Cabi)

These one-day technical tours were held on Tuesday 14 and Wednesday 15 August 2018. Sixty scientists from different countries joined the tours. Within the scope of the historical Ottoman Palace Gardens, Dolmabahçe Palace (Figure 2) and Yıldız Palace, located on the European side and Beylerbeyi Palace on the Asian side of Istanbul, were visited.

During these trips, information about the history of the palaces and the plants in the gardens were given by professional guides and tour leaders. Then a lunch was served consisting of fish and typical Turkish dishes in a restaurant on the edge of Bosphorus.

In the Nezahat Gökyiğit Botanical Garden, visitors were informed about garden and plant collections, well documented collections of world biological diversity and the rich flora of Turkey by Prof. Dr. Evren Cabi, faculty member of Namık Kemal University and botanist.

After the Nezahat Gökyiğit Botanical Garden visit, the technical tour was completed in front of the Istanbul Congress Center, where

the tour had started, by crossing from the Asian continent to the European continent.

### Technical tour to Central Horticultural Research Institute, Geophytes Center and Thermal Water Springs in Yalova (Led by Dr. Yılmaz Boz and Nihal Dilek Sümer Türeli)

This one-day post-Congress technical tour organized on Friday 17 August 2018, visited the province of Yalova. A delegation of around 40 scientists from several countries including Australia, Brazil, Italy, Japan, Lithuania, New Zealand, United Kingdom and USA enjoyed the tour to Yalova. The first stop was at the Atatürk Central Horticultural Research Institute. Dr. Yılmaz Boz, director of the Institute, gave a short speech to inform the delegation about the institute's research activities and history. Participants then continued to the Turkey Geophyte Collection Garden (Figure 3), which contains 6500 populations (they are considered as populations not species) from 1081 geophytes taxa. During the visit, participants had a chance to see many different plants, as well as the production and research areas and obtain information about several multi-disciplinary research projects. It was explained that the mission of the Geophytes Center is to raise the public's awareness of the importance of preserving the very rich and partly endemic geophytic germplasm of Turkey.

Next stop was the "Yuruyen Kosk", which can be translated as "walking pavilion". This building was the place where Atatürk stayed in Yalova. What is special about this building is that it was moved by Atatürk's order instead of cutting a branch of a monumental tree after its branch started to create a risk for the building. It is open to public as a museum now.

Participants of the tour had their lunch at a restaurant near the sea, where they enjoyed the food and the scenery. After that, the group visited private companies that produce ornamental plants.

Finally, participants of the tour travelled to the town of Termal and enjoyed the natural beauty of it, which is a source of healing with its lush forests, natural vegetation, historical locations and hot springs.



■ Figure 3. Geophytes Center in Yalova.





■ Figure 4. A. Seed processing and seedling propagation and preparation at United Genetics of Turkey in Bursa. B. Historical Grand Mosque of Bursa from the end of the 14<sup>th</sup> century.

During the course of the visit, the participants had a chance to visit governmental and private institutions working in the area of agriculture, in addition to seeing both the research and production side of the horticultural sector.

### Technical tour to vegetable seed and seedling production companies in Bursa, the first capital of Ottomans (Led by Prof. Ahmet Korkmaz and Prof. Halit Yetişir)

This one-day post-Congress technical and touristic tour was held on Friday 17 August 2018 to the Bursa-Karacabey region. A delegation of 51 scientists from Australia, Belgium, Canada, China, France, Germany, Hungary, India, Japan, Norway, Singapore, South Africa, Taiwan, The Netherlands and USA visited two seed and seedling production companies, Agromar and United Genetics of Turkey. During the trip, the Bursa region was introduced and general information about its importance in the horticulture industry and historical background were given. Agromar, a seed (vegetables and field crops) and seedling producer company, was visited first. Information about their facilities and activities were presented by their employees. In addition, a grafting demonstration was performed on seedlings from the *Cucurbitaceae*

and *Solanaceae* families, and a cool-season vegetable seedling production greenhouse was visited. After Agromar, United Genetics of Turkey was visited and lunch with local dishes was served by the company. Following lunch, their seed production, extraction and processing facilities and artichoke seedling production greenhouses were visited (Figure 4A).

After completing the technical tour, the group went to Bursa, the first capital of the Ottoman Empire. In the city center, the Grand Mosque (Figure 4B) and Koza Han were visited and detailed information about these places was given by the professional tour guide. After an hour of free time in the old city center, the group had dinner, including a very famous local meal called Iskender, at a historical restaurant before returning to Istanbul.

### Technical tour to National Collection Vineyard and Thrace Wine Route (Led by Dr. Cengiz Özer)

A one-day post-Congress technical tour, on Friday 17 August 2018, visited the Tekirdağ region. A delegation of 40 scientists from Canada, China, France, Israel, Italy, Japan, Kenya, South Africa, South Korea, Spain, Taiwan and United Kingdom was hosted by the Tekirdağ Viticulture Research Institute (Figure 5). First-

ly, general information about the history, organization and activities of the Institute was given. After that, laboratories, experimental and collection vineyards, and grape and vine sapling production plots of the Institute were visited. The researchers informed the delegates about the studies concerning local grape products, plant health, embryo and meristem culture and the preservation of grapevine genetic resources. Food technology, plant protection, and biotechnology labs, as well as climate controlled plant growing rooms and the grapevine herbarium unit in Ata Oral Technology Center were also visited.

The guests were able to taste a number of new grape cultivars that were obtained by crossbreeding studies at the Viticulture Research Institute. Local grape products, such as grape juice, grape molasses, grape vinegar, stuffed vine leaf and grape seeds, were also available for sampling.

The last visit was to the National Collection Vineyard that included all local grapevine varieties of Turkey, which consists of over 1500 accessions. Turkey has great potential in terms of grapevine genetic resources, having one of the major collections. Then guests were transferred to the grape products processing facility, and this part of the program was completed there, where seven local grape varieties that had been selected



■ Figure 5. Observations at the Tekirdağ Viticulture Research Institute.



from the National Collection Vineyard were sampled.

After a lunch of local specialties, the guests visited the vineyards of the Barbare Winery on the Thrace Vineyard Route and the tour finished with a wine tasting experience.

### Technical tour to fruit orchards and a food factory in Bursa and Bandırma (Led by Prof. Ayzin B. Küden, Prof. Ali Küden and Prof. Mustafa Erkan)

The one-day post-Congress technical tour on Friday 17 August 2018, to the Bandırma and Bursa region, included 43 scientists from

Australia, Canada, China, Colombia, France, India, Israel, Italy, Japan, Kenya, New Zealand, Norway, South Africa, South Korea, Spain, Taiwan, Turkey, United Kingdom and USA. Tour participants visited a very successful fruit growing, storage and tomato processing company in Bandırma and Bursa. After three and a half hours of driving from Istanbul, the group reached Anadolu Etap Company in Gönen, Bandırma (Figure 6A). Following a delicious grilled barbeque offered by the company, participants visited the largest fruit orchards in Turkey, with 1000 ha, and had the chance to view apple, pear, peach, nectarine and plum orchards. After this visit,

participants visited the packing house and storage facilities of the company, which has fully automated calibration and packing machines with controlled atmosphere storage units.

After completing the Anadolu Etap visit, participants visited TAT tomato processing company in Bursa (Figure 6B), which is one of the largest tomato processing companies in Turkey. This company currently engages in activities related to tomato paste, ketchup, mayonnaise and other tomato products and canned vegetables.

The last part of the tour entailed a visit to the Silk Bazaar and Grand Mosque in Bursa city center. The Silk Bazaar, Koza Han, was built in 1491 and was an important stop on the Silk Road and a major trading center for the local silk industry. The Grand Mosque or Ulu Cami was built in the Seljuk style by the Ottoman Sultan Bayezid I, between 1396 and 1399. The mosque has 20 domes and two minarets. Ulu Cami is the largest mosque in Bursa and is a landmark of early Ottoman architecture that contains many elements from Seljuk architecture. Before leaving Bursa, participants enjoyed a delicious Iskender Kebab. ●



■ Figure 6. A. Anadolu Etap Company in Bandırma County. B. TAT processing plant in Bursa province.

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## ➤ IHC2018 – 54<sup>th</sup> Exhibition of “Gardens and Flowers of Istanbul”

Kenan Kaya

IHC2018 hosted the 54<sup>th</sup> exhibition of “Gardens and Flowers of Istanbul”. This was an opportunity to create an awareness of Istanbul’s historically rich and diverse garden and flower culture. In fact, the exhibition was originally prepared for the “Istanbul 2010 European Capital of Culture” programme and since then has been exhibited on 53 different occasions, the latest being “IHC2018 Istanbul”. The illustrations exhibited displayed Ottoman gardens, in which the sounds of water

would have mingled with bird songs, graceful flowers delighted the eye with their colors and patterns, and elegant pavilions looked out over these pleasant scenes.

Growing flowers and breeding new cultivars became a fine art, pursued in Istanbul with as much passion as poetry and music. Ottoman sources recorded the names of 1585 tulip and 1018 rose cultivars and their breeders. In the 17<sup>th</sup> century, Evliya Çelebi, the famous Turkish traveler, writes that there were several thou-

sands of gardens in Istanbul, and around eighty florist shops within the walled city, showing how widespread the love of flowers was during that time.

Even the Ottoman sultans were proud to be described as gardeners and sought to earn the title of “sahib-i tohum” (possessor of the seed) granted to breeders of new cultivars. As early as 1640, the establishment of the post of “Chief Florist” and “Flowers Council” reflected the importance attached to flowers



➤ 54<sup>th</sup> exhibition of “Gardens and Flowers of Istanbul”.

and the endeavor to develop an institutional framework. The “Flower Council” became a regulatory body that evaluated and registered new cultivars. In order to be accepted for registration and be named, cultivars submitted by growers had to meet the criteria set by the Council; 20 criteria had to be fulfilled for tulips and 22 for narcissus.

Both the rose and tulip were imbued with spiritual significance and competed for precedence. The tulip conquered everywhere it went, there is even a saying “God forbid! I love the rose, but not the open bloom, only that which is still a bud! Because the rose bud resembles a tulip.” The tulip was brought to Europe, where it led to the phenomenon known as tulipomania in Holland in the early 17<sup>th</sup> century.

Trees, in particular cypress, plane and fruit trees were as essential to Istanbul gardens and daily life as flowers. Fruits and flowers also competed with vegetables in the rich and diverse Ottoman cuisine.

While gardeners grew real flowers, artists created flower motifs and patterns on every kind of object and material, using diverse decorative techniques, so that flower and fruit motifs became an inseparable part of Turkish everyday life.

As the exhibitors, we hope that this exhibition introduced more people to the little known peculiarities of Istanbul’s gardens and flower culture, which attained such exceptional heights several centuries ago and exerted impact on western gardening.

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➤ Tulip from Ekrem Hakki Ayverdi; 18. Asırda Lale (Tulip in the 18<sup>th</sup> century).

## ➤ ISHS Young Minds Award winner summaries

Below is a selection of research summaries from winners of ISHS Young Minds Awards for best oral and poster presentations at ISHS symposia. To view other exciting research summaries by other winners, please visit [www.ishs.org/young-minds-award](http://www.ishs.org/young-minds-award).

### Estimation of fruit tree production by quantitative indicators: the case of lychee in Madagascar

Aina Fehizoro Rabodomanantsoa received her Master’s degree in agricultural sciences on the subject of “Economic valorization of Bourbon geranium essential oil in Madagascar” in 2015. She is currently studying for her PhD on “Forecasting and assessing the lychee yearly production in terms of volume and fruit quality considering a complex system in the east coast region of Madagascar using models to predict more accurately the onset of the harvesting season”.

Madagascar is the top exporter of lychee in the world. The country’s yearly exports are

approximately 25,000 t, exported mainly to Europe to meet the seasonal consumption of lychee over the end-of-the-year festivities. Lychee production is concentrated in the eastern part of Madagascar and mainly relies on smallholder farmers. Export management is challenging because of climatic variations from season to season, and differences in agricultural practices. Thus, methods and techniques that allow an improved estimation of the lychee production are needed in order to better organize lychee export planning. Thus, the objective of this study



➤ Aina Fehizoro Rabodomanantsoa



was to estimate lychee tree yields prior to harvest. Several tree traits (i.e. basal trunk diameter, diameter at breast height (DBH), canopy diameter, canopy height, number of bunches, load rate) have been considered to estimate the number of fruit per tree and mean fruit weight. A methodology of image analysis based on hue angle criteria was also developed simultaneously to predict individual tree yield. The study was performed on 35 trees of various sizes over two-year harvesting periods. Results indicated that the large variation in yield observed between trees, i.e. from 1 to 860 kg of fruit, was signifi-

cantly related ( $R^2 > 0.8$ ) to the DBH, the basal trunk diameter and the number of bunches. However, an effective yield prediction was also obtained by using the volume of the canopy and the fruit load rate as indicators ( $R^2 > 0.8$ ). Promising results were also obtained using the image analysis methodology that was developed ( $R^2 = 0.75$ ). These results led to a method that can easily be used to estimate the fruit production of a lychee tree just before harvest, from both the tree structural measurements and/or by using simple images of the lychee tree at harvest taken from two different sides.

Aina Fehizoro Rabodomanantsoa won an ISHS Young Minds Award for the best poster at the VII International Symposium on Tropical and Subtropical Fruits at IHC2018 in Turkey in August 2018.

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## Using a lysimetric station to determine the irrigation water requirements for chufa crop (*Cyperus esculentus* var. *sativus*)



➤ Núria Pascual-Seva

Chufa, also known as tigernut, is a typical irrigated crop in Valencia (Spain). It is cultivated for its tubers, which are mainly used for producing a traditional refreshing drink called "horchata". It is mainly furrow irrigated, using large amounts of water. Several studies have been carried out in the last years by the research team in which this contribution

has been undertaken, in order to improve the irrigation efficiencies in chufa crop. Although the previously obtained improvements are considerable, they are not definitive, as the crop water requirements are still unknown. To enable growers to determine these water needs, it is necessary to determine the crop evapotranspiration. This experiment was carried out on an experimental plot of the Universitat Politècnica de València, within the traditional chufa cultivation area. This plot includes a lysimetric station, which enables the determination of the daily crop evapotranspiration. Furthermore, the plot is equipped with an agro-meteorological station, which provides the necessary parameters for determining the daily reference evapotranspiration through the FAO-56 Penman-Monteith method. The crop coefficient has been estimated relating the crop and reference evapotranspiration values, for the different growth stages. According to FAO-56, four growth stages were identified and their length determined as initial stage (21 days), development stage (76 days), mid-season stage (43 days), and late stage (29 days). The single crop coefficient values for the initial, mid-season and the end of the late

growth stages were established as 0.25, 1.43 and 0.75, respectively. This contribution presents a first approximation to determine the single crop coefficient for chufa crop, and it is currently being continued under the economic support of Generalitat Valenciana [GV/2017/037], with the aim of determining the dual crop coefficient for chufa crop. The use of the crop coefficient will enable irrigation water doses to be adjusted to water requirements, thus reducing the volume of water applied and improve the irrigation efficiencies for the chufa crop.

Núria Pascual-Seva won an ISHS Young Minds Award for the best oral presentation at the II International Symposium on Root and Tuber Crops: Value Added Crops for the Next Generation at IHC2018 in Turkey in August 2018.

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## The effects of storage temperature and packing method on quality of roots and seed yield in purple carrot (*Daucus carota* L.)

Nurten Lokoglu graduated from Ankara University, Agriculture Faculty, Department of Horticulture in 2007 and completed her Master's degree in 2010. She has been studying for her PhD since 2012, while also working at the Vegetable Department of Transitional Zone Agricultural Research Institute (GKTAEM) in Eskisehir since 2011.

Her PhD research was carried out to determine the effects of storage conditions of

roots on seed yield and quality in purple carrots. For this purpose, purple carrot roots for seed were stored in refrigerated (4°C) and non-refrigerated stores in soil + sawdust, soilless + sawdust and perforated PE bags for 16 weeks between 2015-2016. During the storage period, sprouting, rooting, shriveling and decay rate were determined. After storage, seed yield characteristics were determined from roots planted into the field.

Increasing the length of the storage period caused an increase in the rate of rooting, sprouting and decay. The rate of sprouting and rooting was increased in the treatments: in refrigerated storage using PE bags (56.67%), and in non-refrigerated storage using soilless + sawdust (72.50%) and soil + sawdust (90.84%). Seed yields of roots taken from refrigerated and non-refrigerated storage were 36.74 and 21.02 g plant<sup>-1</sup>, respective-





> Nurten Lokoglu

ly. In terms of packaging types, better results were obtained in soilless + sawdust (22.20-60.12 g plant<sup>-1</sup>) for both storage conditions. Nurten Lokoglu won an ISHS Young Minds Award for the best poster at the II International Symposium on Root and Tuber Crops: Value Added Crops for the Next Generation at IHC2018 in Turkey in August 2018.

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## Cultivation and breeding of ornamental plants adapted for use on green roofs



> Stella Aurea Cristiane Gomes da Silva

Stella Aurea Cristiane Gomes da Silva is a PhD student at the Federal Rural University of Pernambuco (UFRPE), Brazil, focusing on genetic breeding of plants in the Department of Agronomy. For her doctorate (2015-2019), she is focusing on cultivation and breeding of ornamental plants adapted for use on green roofs. She is also doing a mixed doctor-

ate, which includes studying for 11 months at the University of Bologna, Italy. Her goal is to improve knowledge in the area of genetic breeding, in order to cooperate significantly in the agricultural sector (farm, floriculture and research).

The paper "Establishment phase characteristics of Brazilian native grasses for use in turfgrass" of S.A.C. Gomes da Silva et al. (2018) aimed to evaluate the establishment phase of Brazilian native accessions of *Axonopus parodii*, *Paspalum leptum* and *P. notatum* for use as ornamental turfgrass. The genus *Paspalum* has great potential for use in turfgrass and vegetation coverage. Preliminary results demonstrated that accessions of *Axonopus parodii*, *Paspalum leptum* and *P. notatum*, which are species native from Brazil, demonstrated attributes desirable for further turfgrass selection and breeding.

The paper "Selection of *Axonopus* and *Paspalum* accessions based on vegetative propagules tolerance to low temperature storage" of A.G. dos Santos et al. (2018) aimed to evaluate the tolerance to low temperature storage of vegetative propagules of *Axonopus parodii*, *Paspalum leptum* and *P. notatum* for turf-

grass establishment. The propagules were stored in a cold chamber at 6.5°C and 85% RH, according to the treatments: zero storage days (0 SD), which served as the control; and consecutively 2, 4, 6, 8 and 10 SD. The results showed that vegetative propagules of *Axonopus parodii* and *Paspalum* accessions were tolerant to storage of up to 10 days at 6.5°C and maintained high survival rate, soil coverage rate and number of tillers produced.

Stella Aurea Cristiane Gomes da Silva won an ISHS Young Minds Award for the best poster at the IV International Conference on Turfgrass Management and Science for Sports Fields: Bridging the Needs and Research on Turfgrass at the Age of Climate Change at IHC2018 in Turkey in August 2018.

### > Contact

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## > Courses and meetings

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

IV International On-line Course on Postharvest & Fresh-Cut Technologies, 15 January-15 September 2019. Info: Dr. Francisco Artés-Hernández, Postharvest & Refrigeration Group, Universidad Politécnica de Cartagena, Paseo Alfonso XIII, 48, 30203 Cartagena, Murcia, Spain, e-mail: postharvest@upct.es, web: [www.upct.es/gpostref/](http://www.upct.es/gpostref/)

Advanced course on Food loss and waste reduction and management, 21-25 January 2019, Zaragoza, Spain. Info: Mediterranean Agroeconomic Institute of Zaragoza (IAMZ) - CIHEAM, Avenida de Montañana 1005, 50059 Zaragoza, Spain, phone: +34 976 716000, fax: +34 976 716001, e-mail: [iamz@iamz.ciheam.org](mailto:iamz@iamz.ciheam.org), web: [www.iamz.ciheam.org](http://www.iamz.ciheam.org)

North American Strawberry Growers Association (NASGA) Annual Meeting and 9<sup>th</sup> North American Strawberry Symposium, 3-6 Feb-

ruary 2019, Orlando, FL, USA. Info: <https://www.nasga.org/n-american-strawberry-growers-conference.htm>

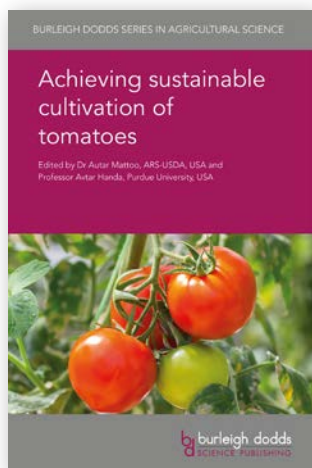
Southeast Asia Vegetable Symposium (SEAVEG2019): Advancing Vegetable Technology for Higher Productivity and Better Human Health, 9-11 July 2019, Melaka, Malaysia. Info: e-mail: [seaveg2019@mardi.gov.my](mailto:seaveg2019@mardi.gov.my), web: [seaveg.mardi.gov.my](http://seaveg.mardi.gov.my)

Postdoc Academy for Transformational Leadership - Scaling Sustainability, September 2019-July 2021, Application deadline: 15 March 2019, HU Berlin & Leuphana Lüneburg (Germany), SRC (Sweden) and DRIFT (The Netherlands). Info: Kathrin Klementz, phone: +4930209366346, e-mail: [kathrin.klementz@hu-berlin.de](mailto:kathrin.klementz@hu-berlin.de), web: [www.bosch-stiftung.de/en/project/postdoc-academy-transformational-leadership](http://www.bosch-stiftung.de/en/project/postdoc-academy-transformational-leadership)

## > 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](http://www.ishs.org) or the *Acta Horticulturae* website [www.actahort.org](http://www.actahort.org)



Mattoo, A., ed. (2017). *Achieving Sustainable Cultivation of Tomatoes* (Cambridge, UK: Burleigh Dodds Science Publishing), pp.400. ISBN 978-1-78676-040-1 (hardback). £190.00.

A 20% discount will be received by entering the code "ISHS20" when ordering through <https://shop.bdspublishing.com/checkout/Store/bds/Detail/WorkGroup/3-190-52948>

This book contains 18 chapters grouped in three main areas: a) cultivation techniques, b) plant physiology and breeding, and c) diseases, pests and weeds. Authors made remarkable efforts to balance essential background with basic-applied research findings enhancing the understanding of the various issues and techniques involved in tomato production, physiology, breeding and genetics. In addition, each chapter ends with future trends and where to look for further information, providing readers the latest references and specific web links. It is a valuable resource of modern knowledge for

research academics and graduate students, and also applicable to consultants and managers involved in tomato R&D, such as those in seed and chemical companies. The book is certainly not concise (542 pages), so it takes some effort to go through the content.

The first section focuses on applications of the CROPGRO-tomato growth model into current production practices and environments. It nicely describes how plant development changes dynamically under water and N-nutrient limitations and thresholds, with examples of tomatoes grown under sandy soils in Florida conditions. This is followed by two chapters describing how environmental and cultural factors maximize resource use efficiency for optimal sustainable production. Very detailed information is provided in a chapter on irrigation and fertilization management, particularly N, in response to current environmental regulations in the state of Florida. This is followed by a chapter on organic greenhouse tomato production, presenting useful figures on production costs, soil and soilless cultivation comparison and a complete list of organic nutrient sources.

The physiology section begins with a description of the role of natural gene mutations in vegetative and reproductive development, and water relations and drought resistance of wild tomato relatives. There are descriptions of novel defense gene systems, which are derived from wild relatives that confer resistances to abiotic and biotic stresses. It also includes information about advances made in identifying and mapping molecular markers linked with disease and insect resistance genes and quantitative trait loci (QTL). A perspective on the global conservation and exchanges of genetic diversity, and the complex regulatory international barriers or restrictions (phytosanitary certificates), are critically presented within the context

of future progress in crop improvement in response to climate change adaptation. I was particularly interested in the chapters depicting new prospects for improving fruit quality traits related to flavor, texture and abiotic stress tolerance. Those included discussions on the genetic factors and modern approaches in molecular breeding and genetic engineering researchers are now employing to more precisely explain and increase the complex traits that determine fruit quality, and strategies utilized to extend the tomato shelf life.

The final section begins with a comprehensive overview of major tomato viruses and their insect-vectors, highlighting the application of modern genetic tools and genetic engineering as well as the importance of combining different sources and types of resistances in a single genotype. This is followed by chapters depicting the biology of major insect and mite pests and current and new IPM strategies, with valuable examples of diagnostics, monitoring and applications in various regions and covering a wide range of climatic conditions around the world. A final section on the history of tomato cultivar development nicely summarizes the successes and challenges tomato breeders encounter when dealing with complex quantitative resistance. Methodologies used to speed up the progress of resistant cultivars are extensively and critically discussed for specific cases of bacteria, fungi, viruses and nematodes. The final chapter also describes successes and limitations of integrated weed management, with examples of chemical and non-chemical control methods, and the differential strategies used in single or mixed weed scenarios.

*Reviewed by Daniel Leskovar, Chair ISHS Division Vegetables, Roots and Tubers*



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# ➤ First ISHS Summer School on Pre- and Postharvest Physiology of Temperate Fruit Crops



➤ Students and lecturers of the summer school outside the KOB near Lake Constance, Germany. Photo by Arju Ali Kahn.

This Summer School was open for young minds and early career scientists interested in pre- and postharvest physiological aspects of perennial fruit tree species, such as the principles of crop management, fruit growth and development, stress physiology, product quality, postharvest physiology, market and supply chain management and modelling and scientific working.

Out of a cohort of over 100 applications, twenty successful applicants from 17 countries and six continents were notified and invited to participate in the Summer School from 22 July - 4 August 2018 in Germany. A key selection criteria was a letter of motivation, outlining the interest in horticultural research and why their participation in the Summer School would be of benefit. Unfortunately, one student from Kenya was ultimately not able to attend due to visa issue difficulties.

The Summer School was sponsored by the German Academic Exchange Service and the ISHS, organised and hosted by the University of Hohenheim, Stuttgart, and the Centre of Competence for Fruit Cultivation, Meersburg, and led by Prof. Jens Wünsche, Ger-

many, Prof. Ted DeJong, USA, and Prof. Chris Watkins, USA.

## Week 1

The Summer School commenced with a series of short presentations to introduce all participants, the course content and the University of Hohenheim. This provided the attendees with a better understanding of the mission, activities and scientific structure of the ISHS. The group was made to feel welcome in Germany and the university environment, and special attention was dedicated to the diverse, multicultural composition of the group. This diversity led to exchanges of differing points of views that would enrich discussions about topics during the course. It was the first of many other opportunities that would lead the group to form wonderful friendships, and share in this amazing experience. The group had the opportunity to visit laboratories and orchards of the Institute of Crop Physiology of Specialty Crops, and hear about research programmes on plant physiology and crop management.

The first formal lecture was by Prof. Ted DeJong, USA, who provided many new

insights on plant physiology and inspired everybody to develop a critical approach towards conducting research and to always formulate new questions about research aims. Day one concluded with 15-minute presentations by each of the students to become more familiar with each other.

Day two of the summer school started as a beautiful sunny morning. The day was scheduled for topics on fruit breeding, propagation, training & pruning and growth & development for fruit crops. But firstly, Prof. Jens Wünsche discussed the German exchange program and DAAD fellowships, followed by Mr. Benjamin Gehring from the Office of International Affairs speaking about the Student Mobility Program at the University of Hohenheim. He also explained the student organizational structure, student body and admission procedures for different courses available at the university. Following this, Dr. Andreas Peil from the Institute for Breeding Research on Fruit Crops, Julius Kühn Institute, gave a lecture on fruit breeding. He elucidated milestones, development, activities, aims, and recent biotechnological approaches for a modern fruit breeding

program. The group was fascinated by his presentation on precision breeding. Later in the day, Prof. Wünsche gave an enlightening lecture on vegetative propagation, and training and pruning methods for temperate fruit trees, and the group learned about different physiological aspects and techniques of tree manipulation. Prof. DeJong explained different aspects of shoot and fruit growth development. His talk included apical dominance, gravitropism, carbohydrate/resource balance and the concept of 'reiteration'. He also explained the concepts of fruit growth and the effect of fruit thinning on physiology, with special emphasis on major temperate nut crops.

The final lecture of the day was given by Dr. Patrick Winterhagen, on the growth and development of pomefruit. In this interactive session, the plant growth cycle, flowering, bud development, and fruit set, as well as the influence of crop load on fruit development and quality, was discussed. The day ended with a mesmerizing view of the sunset and a barbeque dinner held in the university vineyard.

Wednesday started with a guided tour through the Deutsche Landwirtschaftsmuseum (German Agricultural Museum). The tour was led by Frank Emmerich. He gave interesting and unexpected insights into former agricultural systems. The tour started with the first settlement of humans, gave an overview of the development of tillage, different steps of dairy production and the industrial sugar production. Following this, the group went back in time again to explore the history of Hohenheim castle. The ruler and owner was Carl Eugen Herzog von Württemberg,

who was a profligate from a young age. It is stated he had 77 sons, but eventually became an important figure in his older years in the development of major improvements in agriculture.

Back in the lecture room, a much anticipated highlight of the day was the presentation by Prof. Chris Watkins, USA, about fruit ripening, maturation and control strategies. Prof. Watkins gave insights into methods and techniques to determine quality, showed efficient and effective postharvest strategies, and pointed out problems that the New York state apple industry is facing.

The day concluded with a visit to the 35-ha Hohenheim Gardens. Dr. Robert Gliniars, curator of the Hohenheim Gardens, made up a fantastic garden tour, through gardens of the castle, and the botanical and exotic gardens. He still had the full attention of the group, even when the temperature reached 40°C (104°F). The group heard about old German apple and plum varieties and rather unknown tree fruits like medlar (*Mespilus germanica* L.).

The evening was open for individual activities, in which most of the students explored the lively city centre of Stuttgart and enjoyed a cold German beer after another exciting day.

The fourth day covered fruit protection and stress physiology. Four lectures by expert professors about biotic and abiotic stress were held after the opening lecture by Prof. Wünsche about the economy and political system of Germany. First, Prof. Claus Zebitz from the University of Hohenheim talked about pests in fruit production systems. As some of these pests were not present in

some participants' home countries, it provided an interesting background. The second lecture by Prof. Ralph Vögele from the University of Hohenheim was on pathogens in fruit production systems, and thirdly, Prof. Georg Noga from the University of Bonn talked about stress physiology with regard to sunburn damage and the plant response. It was inspiring to understand plant responses to stress from the aspect of biochemistry and metabolism. The day ended with a lecture from Prof. DeJong on climate change and the long term influences on fruit crops in Mediterranean climates.

The final day of the first week started with an enthusiastic overview of German culture by Prof. Wünsche, followed by a lecture by Prof. DeJong on modelling peach tree growth, which was the result of a collaboration with modelling and mathematical professionals to construct a model to predict tree growth patterns. The model was able to account for specific source/sink interactions, accurately predicting fruit size distribution throughout the tree.

The lectures of the day concluded with an overview of scientific working methods by Prof. George Cadisch, followed by an immensely valuable discussion on the principles behind publication. Through this discussion, important information about what to watch out for when writing, editing and submitting papers to a journal were presented by editors of renowned scientific journals. The afternoon was spent at the Mercedes Benz museum, a fascinating place to visit. A guided audio tour begins on the eighth floor, with the earliest Mercedes Benz motors, and concludes on the first floor with their newest



► Students and lecturers enjoying looking out from Heidelberg Castle on the weekend excursion. Photo by Arju Ali Kahn.



models. Moving down floor by floor, you are whisked through time as they display the evolution of the modern automobile. When the museum visit had come to a close, the group went out to the city to enjoy music and German refreshments. The night was concluded by a spectacular lunar eclipse, before moving back to the accommodation for evening.

On Saturday, the group left Hohenheim with heavy hearts, but fortunately, a new adventure awaited; a road trip en-route to Meersburg, where the second part of the Summer School would continue. There was the chance to visit Heidelberg Castle, the Black Forest, and the Rhein Falls in Switzerland.

At the Heidelberg Castle it seemed the stairs would never end on the walk up, but it was well worth the sweat. At the top everyone was greeted by the ancient Heidelberg Castle and a picturesque view of Heidelberg. This served as an ideal moment for group photos. In the afternoon there was a quick visit to the University of Heidelberg, the oldest university in Germany. Later that afternoon, the group continued on to the Black Forest. The drive gave many scenic landscapes, and a view of the more rural parts of Germany. After a long day of sightseeing and travelling, the day was concluded with pizza and wine whilst enjoying the serene view. Communication was very humorous when trying to give food orders to the service staff. It

seemed that the further we went from the city, the fewer people spoke English. After a good night's rest, and a good breakfast, the group embarked on a hike to a small waterfall before continuing the journey to Bodensee. After a sweltering couple of hours in the cars, which would have been longer if not for the autobahn, there was the reward of the picturesque Rhein Falls in Switzerland. The clear masses of water and the beautiful view will be forever etched in our memories. Later that afternoon, the vans arrived at Meersburg where a buffet dinner was enjoyed, and everyone settled in for another full week.

## Week 2

After a pleasurable weekend of sightseeing, the group was welcomed at the Centre of Competence for Fruit Growing (KOB) by its Executive Director, Dr. Manfred Büchele. Founded in 2001 by Hohenheim University, the center is performing applied research on pre- and postharvest physiology of fruit trees, cultivars, organic production and plant protection. Located in the Lake Constance area, the second most important apple production area in Germany (25-30% of production), this region is blessed with an exceptional climate. While the large water body of Lake Constance contributes to moderate the climate, the proximity of the Alps creates a large day/night temperature differential,

which creates a favorable microclimate suitable for apple production.

Precision horticulture was the focus for the first day, with the SmaArt project presented by Andreas Riehle. This camera system innovation for automated blossom thinning with the Darwin machine was awarded the silver medal at Agritechnica 2017, the biggest trade fair for agricultural innovation in Europe. The camera detects the white clusters on the trees and adjusts the rotation of the spindle to the abundance of flowers in every single tree. Mr. Riehle also discussed some fundamental notions of flower bud initiation and the importance of crop load management, and presented some examples of thinning strategies.

In the afternoon, there was an orchard walk and visit of experimental plots. Thomas Kinninger explained his technique to prune the trees and improve fruit bud formation, and several trials of hail nets (different colors, mesh size, fully or partially covering trees) were displayed. This was followed by Michael Haltmaier, a plant protection specialist, who explained some trials of his team, working on scab, codling moth, fire blight and weeds.

The day ended with a Brazilian barbecue prepared and served by Dr. Daniel Neuwald, the leader of the postharvest physiology research team, in a relaxed atmosphere in the backyard of the research center.

The program continued on day two with a lecture by Prof. Watkins, concentrating on postharvest physiology and technology. Prof. Watkins first talked about how the morphology of the fruit affects the gas exchange of the fruit. There are several non-chemical and chemical control methods for ethylene concentrations in storage, and one of the chemical control methods includes 1-MCP, which was introduced by Mr. Andreas Riehle, technical manager at AgroFresh. Mr. Riehle also introduced some possible future storage technologies, such as sensor technology, which potentially could be used throughout the supply chain to optimize efficiency. Current storage technology was introduced by Mrs. Nadine Klein, researcher at KOB. Mrs. Klein talked about controlled atmosphere (CA) storage and the importance of controlling gas concentrations and preventing O<sub>2</sub> stress. After her lecture, the group was guided through the KOB storage facilities. It was very interesting to see how different cultivars of apples have different responses to the storage conditions. As a last official activity of the day, we visited a state-of-the-art packing house at the Württembergische Fruit Cooperative (WOG). There, the group was introduced to the extremely modern and automated processes, which allow efficient handling of the fruit. The day was wrapped

The feedback from the 19 participants about the summer school has been overwhelmingly positive. It was an unforgettable experience, and an opportunity of a lifetime for many of the students, and this can be summed up by the quotes from some of the participants:

- "This summer school was a perfect blend of: valuable up-to-date lectures by renowned experts, laboratory and field visits, and unforgettable social interactions between all of the participants." – Nikola Saraginovski, Macedonia.
- "The Summer School equipped me with valuable horticultural knowledge and gave us the opportunity to meet renowned horticulturists and wonderful individuals from around the globe" – Werner Truter, South Africa.
- "The participants I interacted with during the trip had the amazing ability to remain jovial while being perfectly candid. It was an honour to share this experience with them" – Andrew van Lingen, South Africa.
- "The Summer School gave participants the opportunity to build lifelong friendships with possible collaboration in the future. Besides that, the Summer School highlighted the contribution of horticulture research, and gave us an extensive overview of the German history and culture" – Burak Erdem Algül, Turkey.
- "I feel so lucky to have had this amazing opportunity to learn from some of the leaders in horticultural science, and to build relationships with upcoming researchers from around the world" – Claire Scofield, New Zealand.
- "I am really happy to have made good contacts from more than 16 countries and be able to follow the career of some of the next actors of research in fruit tree physiology around the world!" – Évelyne Barriault, Canada.
- "The summer school has been the most amazing experience of my life. Based on where I was born, attending an international event in Europe was like a dream. It also gave me the brilliant opportunity to interact with experts from multicultural and different backgrounds that motivated me and encouraged me to believe in my ability." – Gaudence Nishimwe, Kenya.

up with a dinner at a brewery restaurant in Kressbronn, with a beautiful view over the vineyards and Lake Constance.

An extensive insight into organic fruit production in Germany was given by Birgit Gutberlet the next day, particularly focusing on the Bodensee area. The market and demand for organic-produced apples is growing in Germany as well as in Europe, with producers receiving premium prices for their products. The group visited different organic apple orchards and farmers, who commented on the strict regulations, positive aspects and challenges of organic fruit production. They also gave solutions for the challenges that they face and gave their insight into the future of organic farming. One crucial lesson learned was: organic farming is much more than a farming practice; it is a philosophy and commitment of working together with nature. This day was concluded with a wonderful meal with a view of the Bodensee area. On the final official day of the summer school, a brief introduction to the orchard

machinery at KOB was given by Thomas Kininger. Afterward, a very useful lecture was delivered by Dr. Michael H. Hagemann and Prof. Wünsche on hop breeding and physiology. This informative session consisted of hop history, increasing production, the main growing regions, annual production cycle, and uses in beer and processing. To further understand the theoretical knowledge of hop production, the group visited the Hop Research Centre, Strass, under the guidance of Franz Wollhaf. Here, the production technology and processing unit were explained. Following this was a visit to a leading hop grower, Lukas Locher, in the region of Tettmang, where the group was able to try various kinds of beer using hops in different ways.

To wrap up the summer school, a day's outing to the flowering Island of Mainau had been arranged for the group. The 44-ha botanical garden was a very impressive site, with its thousands of plant species, and stunning historic buildings. The day finished with a

delicious dinner overlooking Lake Constance, where the group was able to enjoy each other's company before parting ways the next morning.

*The participants of the ISHS Summer School, and collated by Claire Scofield and Jens Wünsche*

## ➤ Contact

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# ➤ International Forum on Horticultural Product Quality

The one-day inaugural International Forum on Horticultural Product Quality took place in Bangkok, Thailand, on 22 August 2018, and was hosted by ISHS and the VNU Exhibitions Asia Pacific Co., Ltd. (VNU). This joint venture was held in association with Horti-Asia2018 and AgroTechnica Asia at a major Southeast Asia Trade Show. A key objective of this Forum was to develop links between science and technology at one venue. Prof. Dr. Sisir Kumar Mitra, India, the ISHS Board member responsible for Publications and representing Asia, described the structure and formation of ISHS.

The Forum attracted more than 70 participants from 10 countries, with 14 oral and 20 poster presentations. A wide and diverse range of topics on fruit, vegetables and flowers was covered, and included presentations on factors that affected quality from the field through the value chain to the market place. Results of production and postharvest research on papaya, litchi, mulberry, tomatoes, fresh herbs, banana, turmeric, pineapple, onion, longan, melon, peppers, orchids, oranges, lettuce and curry were all covered during the Forum.

Mr. Yves Gidoin, President of VEGEPOLYS,

Angers, France, and chairman of the Organising Committee of the XXXI International Horticultural Congress (IHC2022) to be held in France in 2022, was a keynote speaker. His topic was "The innovation process in the plant sector: an example of the French Pôle de Compétitivité Vegepolys". He outlined his 35 years of experience in French fruit and vegetable cooperative management, highlighting the key points needed for producers/exporters to control the quality to consumers. Along the Loire Valley, there are many plant actors (companies, research and training centers). They are gathered within the

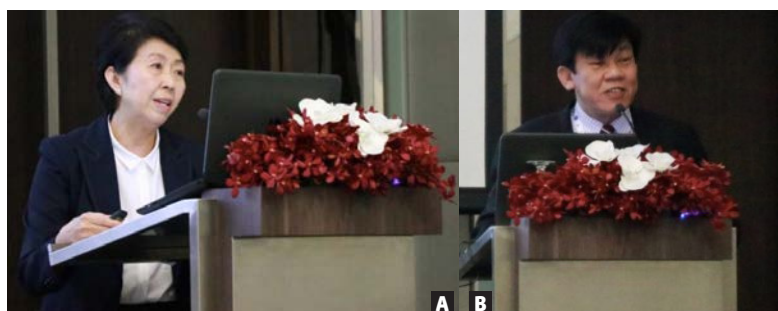


## ➤ Opening ceremony of the Forum.

From left: Prof. Dr. Sisir Kumar Mitra, India (ISHS Board member), Dr. Surawit Wannakraioj, Thailand (Co-Chair), Mr. Bert van der Feltz, Thailand (President and CEO East West Seeds Ltd.), Prof. Dr. Errol Hewett, New Zealand (Co-Chair and keynote speaker), Ir. Jozef Van Assche, Belgium (ISHS Executive Director), Mr. Yves Gidoin, France (keynote speaker and President Vegepolys) and Mr. Manual Madani, Thailand (International Sales Manager, VNU).







► Keynote speakers: A) Ms. Paphavee Suthavivat, CEO of Swift Co. Ltd., Thailand; B) Prof. Dr. Antonio Acedo, Mekong Institute, Thailand.

VEGEPOLYS competitiveness cluster to facilitate partnerships between companies and researchers. Companies' competitiveness is boosted through innovation and international development. Mr. Gidoïn described the activities of Fleuron d'Anjou of which he is the Chairman. It is a VEGEPOLYS member and is a cooperative group with over 100 producers and 140 employees producing fruit, vegetables, flowers and plants. Export oriented, Fleuron d'Anjou controls the whole cold chain to guarantee high quality products for consumers.

Prof. Dr. Antonio (Jun) Acedo from the Mekong Institute, Thailand, and formerly from The World Vegetable Centre, delivered a stimulating keynote address "Postharvest handling and technologies for fresh horticultural produce". Food losses in developing Asian countries reflect the lack of postharvest knowledge, techniques and facilities combined with the perishable nature of fruit and vegetables, complex and inefficient supply chains, and hot and humid climates. Improved postharvest management of fruit and vegetables, comprising value chain analysis, technology generation and building capacities, were introduced to reduce postharvest losses, par-

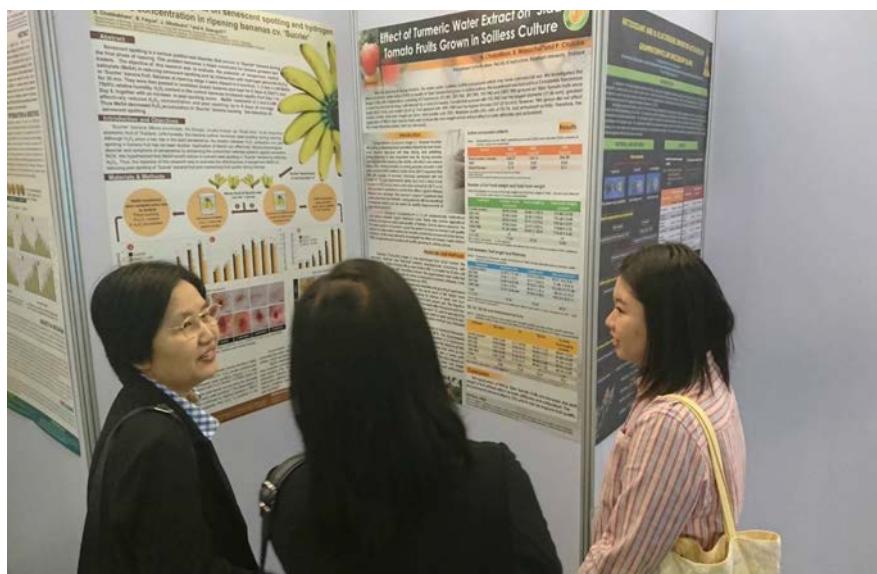
ticularly for smallholders. Economic analysis of new technologies introduced indicated that most were profitable after being documented in local languages and disseminated to stakeholders through training and other capacity building programs. Fundamental to effective mainstreaming of postharvest technologies was smallholders organizing and collectively dealing with markets that should direct production and postharvest efforts.

Key elements of the success story of a sustainable, vertically integrated, production, processing and marketing company were outlined by Ms. Paphavee Suthavivat, CEO of Swift Co. Ltd., Thailand, in her presentation "Sustainable fresh produce business practice: a case of Swift Co. Ltd." The company's Mission Statement is to supply premium quality produce with the highest standard of food safety so that every stakeholder in the value chain benefits fairly from the company's operation. Swift Co. Ltd. creates long-term contracts with groups of smallholder farmers, guaranteeing a minimum buying price. If the market price goes up, the company will buy at market price. If the market price goes down, the company will buy at an agreed guaranteed price. This system has

been sustainable and profitable for more than 20 years. Product safety and quality is assured since all contracted farms are strictly controlled under the highest standards of food safety including GLOBAL GAP, AGRO-CHEMICAL FREE, and ORGANIC FARMING, and processing is according to BRC standards, HACCP, TRACEABILITY and SEDEX SMETA. Swift products have been well accepted in Europe, Japan, USA, New Zealand and Australia for more than three decades. This system is a valuable model for other Asian and African countries.

Prof. Dr. Errol Hewett, New Zealand, gave the opening keynote address "Preharvest factors affecting postharvest quality of horticultural products". Overall product quality is influenced by key factors affecting plants during preharvest growth and development. A balanced nutrient programme is essential to optimise growth and postharvest quality. Calcium deficiency creates a range of physiological disorders in some fruit, which only appear during storage. Little information is available about calcium requirements of subtropical and tropical fruit. Pests and diseases present major challenges in many tropical and subtropical production systems. Integrated systems, with accurate identification of pests and pathogens and monitoring of populations, are a developing technology. Successful organic systems exist and several successful cooperative examples exist locally as models. Plant breeding holds enormous promise for increasing productivity, nutritive value and overall quality. The new gene editing technique (CRISPR) builds on existing genomic information to create new, desirable, safe and economically successful cultivars adapted to a range of environmental, edaphic and social production systems faster than traditional breeding programmes. Robotic equipment and sophisticated drones driven by artificial intelligence will become an important part of future horticultural production systems.

*Errol W. Hewett and Surawit Wannakraioj*



► Poster viewing: Dr. Praewphan Jomngam (left), Maejo University, Chiang Mai, Thailand, and Dr. Jenjira Chumpookam (right), Kasetsart University, Bangkok, Thailand.

## ► Contact

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Dr. Surawit Wannakraioj, Department of Horticulture, Kasetsart University, Bangkok, Thailand, e-mail: agrsuw@ku.ac.th

# > III International Symposium on Horticultural Crop Wild Relatives

Division Plant Genetic Resources and Biotechnology  
Division Temperate Tree Nuts

#ishs\_dbio  
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> Participants and visitors of the scientific part of the symposium.

The III International Symposium on Horticultural Crop Wild Relatives was successfully held in Plovdiv, Bulgaria, from 15<sup>th</sup> to 17<sup>th</sup> of October, 2018. The symposium was organized by the Fruit Growing Institute – Plovdiv, under the aegis of the International Society for Horticultural Science (ISHS). The symposium brought together 28 scientists from 10 countries (Serbia, Romania, Turkey, Iran, Korea, Ukraine, Thailand, Russia, Norway and Bulgaria). The symposium topics were enriched by adding the autochthonous species, local and old cultivars and the event attracted a great interest and attendance. Interesting scientific studies related to many horticultural crops were presented – from the well-known worldwide apple, pear and sweet cherry to medlar, jujube and other species, less familiar to the audience. The opening ceremony of the III International Symposium on Horticultural Crop Wild Relatives started with a short greeting by the Convener, Prof. Dr. Stefan Gandev, followed by a welcome address by ISHS Honorary Member and representative, Dr. Damiano Avanzato. Dr. Avanzato highlighted the importance of the symposium and presented the ISHS certificate and medal award to the Convener. One of the formal guests of the event was

the head of the Agricultural Academy of Bulgaria, Prof. Dr. Vasil Nikolov. He expressed his interest in the topics of the symposium and admiration of the organizing team. During the two days of scientific sessions, 12 oral presentations were given to the audience. The first plenary lecture entitled “Role of man and climate change on the erosion of PGRs and actions to protect them, with special focus to nuts” was presented by invited speaker Dr. Damiano Avanzato. It refers to climate change affecting the environment and the natural habitats of nut species. Global warming increases the area of dry lands and decreases winter chill in most warm growing regions of temperate fruits and nuts. This leads to various disorders of plant development, such as flower bud

drop, floral and leaf bud burst delay, poor fruit set and low quality. Crop wild relatives are an important valuable gene source for plant breeding due to their high plasticity to different environmental factors. Dr. Avanzato emphasized the importance of preserving all genetic resources and presented possible strategies for their conservation. The second speaker, Prof. Dr. Valentina Bozhkova, described some wild forest fruit species and local cultivars, native to a region in northern Bulgaria, and highlighted their importance, not only for plant breeding and biodiversity but also for saving the national traditions. All scientific presentations aroused great interest and discussion. Topics included: sorboid plants (such as rowan, white beam, chokeberry and service tree) and their use in breeding in Ukraine, old local Bulgarian pear cultivars, some chemical compounds in hawthorn fruit, late leafing walnut cultivars in Iran, cornelian and sweet cherry genotypes and others. During the poster session, participants had the opportunity to see 24 scientific studies, introduced by attractive posters and pictures. The audience was able to sample some jujube fruit (*Ziziphus jujuba* Mill.). At the closing ceremony of the symposium Dr. Damiano Avanzato announced the winners of the ISHS Young Minds Awards: Dr. Svetoslav Malchev and PhD student Marieta Nesheva, both from the Fruit Growing Institute – Plovdiv, Bulgaria, who were congratulated on the best oral



> ISHS representative Dr. Damiano Avanzato (left) presenting the ISHS certificate and medal award to Symposium Convener Prof. Dr. Stefan Gandev (right).



presentation entitled “Pomological studies of Bulgarian cultivars and forms of cornelian cherry (*Cornus mas* L.)” and the best poster presentation entitled “‘Silistrenska ranna’ – Bulgarian local cultivar in apricot breeding”, respectively. On the third day of the event, a technical tour was organized and the participants visited the Fruit Growing Institute – Plovdiv, saw the trial orchards, and the oldest pecan tree (*Carya illinoensis*). The symposium was effective and valuable because scientists from around the world, working in a similar field, assembled and exchanged ideas on preserving and studying horticultural crop wild relatives and local cultivars. The IV International Symposium on Horticultural Crop Wild Relatives in 2022 will be held in Sanliurfa, Turkey and the convener of the event will be Prof. Dr. Bekir Erol Ak, head of the Department of Horticulture at Harran University.

**Marieta Nesheva**

### ➤ Contact

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➤ Participants by the oldest pecan tree in the Fruit Growing Institute – Plovdiv.



➤ Dr. Damiano Avanzato presenting the ISHS Young Minds Awards to A) Svetoslav Malchev for the best oral presentation, B) Marieta Nesheva for the best poster.

## ➤ IX International Symposium on Soil and Substrate Disinfestation

Division Protected Cultivation and Soilless Culture

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Over 140 scientists and accompanying persons from 22 countries around the globe came to Heraklion, Crete, Greece to attend the IX International Symposium on Soil and Substrate Disinfestation (SD2018) from 9-13

September 2018. The symposium was organized by the Hellenic Society of Phytiastry and the Agricultural University of Athens, under the aegis of the International Society for Horticultural Science.



➤ Symposium participants at Agris Plantlets company.

We are a scientific group with a long standing history of actions and important contributions towards solving soil disinfestation problems, from many years ago in the days of the late Prof. Van Assche, until today. We believe that this contribution will continue as a result of the participation of a diversified group of scientists, from Australia, Belgium, Canada, China, France, Germany, Greece, Indonesia, Israel, Italy, Japan, Martinique, Morocco, the Netherlands, Poland, Romania, Singapore, South Africa, Spain, Switzerland, Turkey, and USA. China, USA and Greece had the greatest representation.

The primary aim of this international symposium was to promote and highlight current world research developments and application activities related to soil and substrate disinfestation by providing the podium



to several invited lectures along with oral presentations, a poster session and a very important round table discussion.

The symposium was opened by Prof. Jaacov Katan from Rehovot, Israel, who gave the opening lecture on “Milestones and future expectations of soil disinfestation after 45 years of soil disinfestation symposia (1973-2018)”, followed by a lecture by Giovanna Gilardi from Torino, Italy on “Emerging soilborne pathogens and trends in their management”.

The symposium included nine sessions:

- Session 1: Anaerobic soil disinfestation, with invited lectures given by Erin Rosskorf from Fort Pierce, Florida, USA, and Joji Muramoto from Santa Cruz, California, USA, followed by several oral presentations;
- Session 2: Soil disinfestation and beneficial microorganisms, with an invited lecture by Krishna Subbarao, Salinas, California, USA on “Are substrate-mediated microbial community shifts the future of soilborne disease management?”;
- Session 3: Soil disinfestation against nematodes, with several oral presentations;
- Session 4: Soil solarization, biosolarization, biofumigation and nonfumigant soil disinfestation technologies, with an invited lecture by Eris Tjamos, Athens, Greece on “Recent achievements of soil solarization application against soilborne pathogens in outdoor and covered organic or IPM crops in Greece”, followed by several oral presentations;
- Session 5: Soil disinfection technologies, with an invited lecture by Abraham Gamliel, Bet Dagan, Israel on “Soil disinfestation technology: applied tools for improving efficacy of pathogen management”, followed by several oral presentations;
- Session 6: Dimethyl disulphide (DMS), with an invited lecture on “Sustainability



› Symposium participants at Agris Plantlets greenhouses.

of European vegetable and strawberry production in relation to fumigation practices in EU” given by Nicola Greco, CNR, Bari, Italy, followed by several oral presentations;

- Session 7: The phase out of methyl bromide under the Montreal Protocol, with an invited lecture by Ian Porter, Bundoora, Australia, on “Progress and remaining challenges with the phase out of methyl bromide under the Montreal Protocol”;
- Session 8: Cultural practices and combined control measures, with several presentations;
- Session 9: Resistant cultivars and grafting for soil-borne disease management, with several oral presentations.

A high-quality one-day technical visit was also organised in the famous vegetable and ornamental growing region of Ierapetra on Wednesday 12 September. The excursion included a short visit of Plastika Kritis industry in Heraklion, followed by a visit to the

leading Vegetable Rootstock and Plantlets Nursery of Agris company and the Seed Company Rijk Zwaan. Participants visited typical agricultural production glasshouses for high quality vegetables, and Ierapetra plastic houses at the stage of soil solarization.

In a round table discussion on “Future of soil disinfestation in the European regulatory climate”, moderated by Prof. Jaacov Katan from Rehovot, Israel and Francesca Ydraiou from ESYF, Athens, Greece, the following was stressed: The clear message from the scientific community meetings was that the use of chemical soil disinfestation is still a very important tool needed to maintain a financially sustainable production of intensive crops in Europe and in the rest of the world. It was also underlined that the EU registration system, according to the Regulation EC 1107/2009, is overly complex and conservative; the system should become more pragmatic and risk based; the regulators should be in touch with the real agricultural world; the scientific community should express their evaluation independently from political pressure.

Special thanks are due to our sponsors: Plastika Kritis, Certis-Efthymiadis, Corteva, Rijk Zwaan, Agris, Alfa, P.K. Petropoulos and Agrotipos, who helped the organizers to cover many expenses that were unable to be covered only through registration.

*Eleftherios (Eris) Tjamos*



› Strip soil solarization in Ierapetra.

## › Contact

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# > XV International Symposium on Processing Tomato

Division Vegetables, Roots and Tubers

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> Co-Conveners of the symposium. From left to right, Luca Sandei (Italy), Montaña Cámara (Spain) and Panagiotis Kalaitzis (Greece).

The XV International Symposium on Processing Tomato was held alongside the XIII World Processing Tomato Congress on 12-14 June 2018 in Athens, Greece. As in previous editions, the symposium was jointly organized by ISHS in collaboration with the World Processing Tomato Council (WPTC) and Global Events, in this particular case, as the local organizer. Since the creation of WPTC in 1998 at Pamplona (Spain), congresses have taken place regularly every two years in a different WPTC member country. The “multi-disciplinary and participative” spirit of the first meetings is still alive and is fully in the spirit of the ISHS mission statement: *To nurture and deploy scientific growing knowledge for creating a better world.*

In this edition, three scientists worked together as Co-Conveners, Panagiotis Kalaitzis (Mediterranean Agronomic Institute of Chania, Greece), Luca Sandei (SICCA, Italy) and Montaña Cámara (University Complutense of Madrid, Spain), to celebrate 29 years (1989-2016) of fruitful collaboration between science and the tomato industry with the special theme of this 2018 edition being “Looking at the future”. This has been possible thanks to the collaboration and support of Sophie Colvine, acting as Symposium Secretary in representation of WPTC.

Our call for papers attracted 68 abstract submissions from 18 different countries, indicating the great representation of the international scientific community involved in tomato research. The symposium was focused on three main topics:

- Adaptability and resilience in crop production;
- The smart tomato factory;
- Healthy products for the next generations.

The symposium program was arranged into six oral sessions on the following major topics: Agricultural challenges, Irrigation and breeding, New tools for quality, Tomato and health, Agronomic innovations, and Healthy products for the next generation, as well as a roundtable on “Research and industry working together” and two poster sessions for one-to-one discussions with the research authors. A total of 25 oral presentations and 43 posters were discussed. We are sure that all scientific papers published in *Acta Horticulturae* will be of great value for everybody involved in tomato research.

The symposium started with Session 1: Agricultural challenges, in which the invited lecture about “Parasitism and control of broomrape in tomato” was given by Dr. Yakov Goldwasser. Other problems related to tomato crops were also addressed, such as the management of *Fusarium oxysporum*,

the pathogenicity of *Pythium* species and the effect of rootstock on yield and quality in processing tomatoes. Professor Panagiotis (Co-Convenor of the symposium) explained the role of prollyl 4 hydroxylase in the regulation of tomato fruit growth process, quality and productivity. Session 2 focused on irrigation and breeding, in which invited speaker Dr. Dani Zamir (Ohio State University, USA) opened the discussion with a presentation on “A quest for the perfect tomato”. In this session, the importance of water, soil microbial and physicochemical properties were demonstrated. As a new and interesting format, Session 3 was a roundtable focus on the different experiences in different countries (USA, Spain, Australia, etc.) about “Research and industry working together”. This successful session was designed and organized by Dr. Diane Barret and Dr. Cosme Argerich, who, although not physically present, gave clear enough guidelines to have a very interesting discussion. The main topic of Session 4 was related to tomatoes and health, such as cardiovascular disease prevention. Invited speaker, Prof. Dr. Antonia Trichopoulou, in a joint session with the Congress, gave a lecture entitled “Greek traditional Mediterranean diet: the role of tomato paste”. Session 5 was devoted to discussing different agronomic innovations, in four oral presentations. Session 6: New tools for quality, included the presentation by Dr. Luca Sandei (Co-Convenor of the symposium) about “Assessment of total quality factors (nutritional, functional and taste) and simultaneous evaluation of molecular markers profile for the origin characterization of typical Italian tomato derivatives (puree and diced tomatoes – 100% Italian)”. The last session, number 7, was dedicated to evaluating the importance of healthy products for the next generations. In this session the importance of local and green solutions were addressed, as well as the key factors for new products acceptance.

For all of us, the symposium has been an excellent opportunity to network with leading scientists as well as tomato industry representatives from around the world.

During the symposium, the Scientific Committee selected two ISHS Young Minds Awards for junior scientists. The award for the best oral presentation was given to Laura Domínguez Díaz, PhD student at the Univer-



► Co-Conveners and Sophie Colvine (AMITOM) presenting the ISHS Young Minds Awards to Laura Domínguez Díaz (third from right) for the best oral presentation and Michael P. Dzakovich (third from left) for the best poster.

sity Complutense of Madrid (Spain), for her oral presentation on “Food Neophobia: Spanish case study related to new formulations based on traditional gazpacho”; and the best poster to Michael P. Dzakovich, PhD student at the University of Ohio (USA) for the work entitled “From bitter to better: tomato glycoalkaloids”.

The fourth “Bernard Bièche Memorial Award” was given to Montaña Cámara (Spain) for her involvement in tomato research, starting in 1996 in UCDavis, and the excellence of her contributions during previous ISHS tomato

symposia, acting as Co-Convener in China (2014), Chile (2016) and this last one in Greece. Finally, the active ISHS members present in the business meeting selected Luca Sandei from SICCA (Italy) as the new Chair of ISHS Working Group Production of Vegetables for Processing. He will be responsible for the next symposium, which will be organised in San Juan, Argentina in 2020.

*Montaña Cámara Hurtado,  
Luca Sandei and Panagiotis Kalaitzis*



► Bernard Bièche Memorial Award” to Dr. Montaña Cámara (Spain).

### ► Contact

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## ► II International Symposium on Carrot and other *Apiaceae*

Division Vegetables, Roots and Tubers

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The II International Symposium on Carrot and other *Apiaceae* was held in Krakow, Poland, on September 19-22, 2018. Following the first successful edition of the symposium organized in Angers, France, in 2014, we have been continuing the mission of bringing the most recent scientific findings and technical advances to the community of carrot and *Apiaceae* researchers, breeders, growers, and industry. The venue of the symposium was the Holiday Inn Krakow City Centre, situated very close to the Old Town. The symposium was organized by the Polish Society for Horticultural Sciences (PTNO) in collaboration

with the Faculty of Biotechnology and Horticulture, University of Agriculture in Krakow (URK) and under the aegis of the International Society for Horticultural Science. During the four days of the symposium, around 350 participants, including researchers, breeders, growers, policy makers, industry and media representatives from 44 countries, enjoyed more than 60 oral and poster presentations on the most recent research results and technical advancements in carrot and *Apiaceae*. They were presented during the welcome session, two plenary sessions and three parallel technical and scientific ses-



► ISHS representative Dr. Emmanuel Geoffriau (left) presenting the ISHS medal award to Symposium Convener Prof. Dariusz Grzebelus (right).





► Participants of the symposium.

sions, followed by one poster session. The symposium was greatly supported by the platinum sponsor, Vilmorin-Mikado, the gold sponsor, Bayer Crop Science, and the bronze sponsor, Simon Group. The organizers were locally supported by Hazera Poland, Sielec Kolonia Cooperative, Amplus, and URK. Targi w Krakowie, in collaboration with the City of Krakow, provided organizational support for the symposium.

The symposium was opened by the Vice-Rector for Research and International Cooperation of URK, Prof. Florian Gambuś, and the ISHS representative, Dr. Emmanuel Geoffriau, France. The invited lecture in the opening session was presented by Prof. Philipp Simon (USDA-ARS, Vegetable Crops Research Unit, and Department of Horticulture, University of Wisconsin-Madison, USA). It was entitled “Carrot genome and beyond” and outlined all current major issues, providing a strong

foundation for the rest of the symposium. Eight plenary lectures delivered by outstanding scientists and experts reviewed the state of the art in carrot genetic resources, biotechnology, breeding, crop management and protection. Matthew Nelson (Royal Botanic Gardens, Kew, UK) spoke about new genetic and adaptive diversity for carrot improvement. Irwin Goldman (Department of Horticulture, University of Wisconsin-Madison, USA) presented carrot breeding efforts at his home university over the last few decades, aiming at improved quality, productivity and accessibility in processing. Emmanuel Geoffriau (Agrocampus-Ouest, IRHS, Angers, France) gave a talk on progress and challenges for carrot breeding and production, Taro Takagi (Vilmorin-Mikado, Japan) spoke on carrot breeding for health benefits and Michaela Hundertmark-Bertaud (Vilmorin-Mikado, France) presented on vigor tests vs. carrot

stand establishment in field trials. Laure Barrot (Vilmorin-Mikado, France) provided a lecture on the control of carrot nematode *Heterodera carotae* by a resistant genotype. Finally, Ewa Grzebelus (URK, Poland) spoke on applications of protoplast cultures in *Apiaceae* and Rafał Barański (URK, Poland) presented an overview of the advances in carrot genome editing using CRISPR-based systems. Oral presentations in the three technical sessions focused on cultivation and postharvest techniques, crop protection and food chain and logistics. The three scientific sessions were focused on genetics, genomics, phylogeny, diversity, domestication and stress resistance in carrot and other *Apiaceae*. Twenty-four posters ranged from genetics and genomics to stress resistance and ethnobotany. On the last day of the symposium, professional tours were offered to the attendees, including visits to the Amplus company,



► Inaugural lecture by Prof. Philipp Simon.



► Field day and Carrot Expo at the University of Agriculture in Krakow.



> **Winners of the ISHS Young Minds Awards:** A) Silvia Bruznican for the best oral presentation, B) Katarzyna Stelmach for the best poster.

one of the leaders on the Polish fruit and vegetable market, to the Sielec Kolonia cooperative, where carrot demonstration plots were located, and to the laboratories of the Institute of Plant Biology and Biotechnology, URK. Finally, all symposium participants enjoyed a Carrot Expo at the Krakow-Mydlniki URK campus, organized with great support from the platinum and gold sponsors of the event. A collection of carrot cultivars was presented, and the attendees were able to get in touch with Vilmorin and Bayer experts.

At the ISHS business meeting, Dr. Emmanuel Geoffriau, ISHS representative and Chair of ISHS Working Group Carrot and other *Apiaceae*, presented information about the Society to all participants, and invited them to become members. ISHS Young Minds Awards were presented to Silvia Bruznican, PhD student from EV-ILVO, Belgium, for the best oral presentation entitled “Asymmetric protoplast fusion of celeriac and related *Apiaceae* species”, and to Katarzyna Stelmach, PhD student from URK, Poland, for the best poster

entitled “The structure of genetic diversity of the population of western-type carrot (*Daucus carota* subsp. *sativus* var. *sativus*)”. The assembly decided that Dr. Emmanuel Geoffriau should continue for another term as Chair of the ISHS Working Group Carrot and other *Apiaceae*. Dr. Charlotte Allender presented the candidacy of a consortium of UK based entities to organize the III International Symposium on Carrot and other *Apiaceae* in Great Britain in 2021. The assembly unanimously accepted their kind offer.

**Dariusz Grzebelus**

## > Contact

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# > New ISHS members

ISHS is pleased to welcome the following new members:

## New Individual Members

**Australia:** Dr. Ines Carrin, Mr. Kerry Eupene, Ms. Maninder Kaur, Dr. Joel Killey, Mr. Paul Looby, Mr. Nathaniel Sopelario, Mr. Mark Spagnolo, Ms. Sashika Yalage don; **Austria:** Dr. Peter Kusstatscher; **Belgium:** Mr. Matthias Naets, Mr. Piet Putzeys, Ms. Liesbeth Schenkels, Mr. Nico Vergote, Mr. Selwyn Vilers; **Brazil:** Daniela da Hora Farias, Prof. Dr. Ben-Hur Mattiuz; **Cambodia:** Mr. Sen Sam Chhun; **Canada:** Ms. Katherine Keary, Yun Kong, Jason Lanoue, Mr. Serge Levesque, Dr. Caroline Provost, Ms. Amilah Rasool, Dr. Jian Wu; **Chile:** Dr. Francisco Alborno; **China:** Yang Bi, Prof. Dr. Bing Cao, Dr. Chen Chen, Pei-Jen Chen, Wenzhong Hu, Gui-Xia Jia, Prof. Dr. Aili Jiang, Prof. Boqiang Li, Dr. Danqing Li, Assist. Prof. Qingzhu Li, Prof. Dr. Yongcai Li, Dr. Chenghui Liu, Prof. Dr. Qinglin Liu, Mr. Hai-tao Long, Ji Nana, Ms. Ziming Ren, Dr.

Changhua Tan, Dr. Junjie Wang, Li Wang, Yi Wang, Prof. Yulan Xiao, Assoc. Prof. Huali Xue, Dr. Qiya Yang, Wan Yingling, Prof. Hongyin Zhang, Qian Zhang, Mr. Wenwei Zhang, Prof. Shujun Zhou; **Chinese Taipei:** Prof. Dr. Chen Chang, Assoc. Prof. Po-Lin Chen, Assist. Prof. Chen Chien-An, Mr. Chie-Chin Hsu, Ms. Pei-Hsuan Lai, Hong-Hsuan Lee, Mr. Sung-yueh Liu, Ms. Pei Chun Tu, Ms. Chia-Ching Wu, Dr. Hung-Ying Yang; **Denmark:** Chane Thanthong; **Ecuador:** Mr. William Viera; **Estonia:** Mailis Vinogradov; **Fiji:** Reema Prakash; **Finland:** Mr. Fhilmar Raj Jayaraj Mallika, Tero Tommila; **France:** Prof. Dr. Gerhard Buck-Sorlin, Marion Carrier, Dr. Jinliang Chen, Ms. Evelyn de Pontbriand, Nafissa Dehimeche, Mr. Antonin Della Noce, Dr. Arnaud Huignard, Dr. Nemo Peeters, Anne Schneider, Ms. Jeanne Simon; **Germany:** Mr. Ludger Linnemann-

stoens, Dimas Wiese, Prof. Dr. Frank Will; **Guadeloupe:** Mr. Olivier Hubert; **India:** Dr. Pandurang Adsule, Mr. Bhavinkumar Patel, Supreet Setia; **Indonesia:** Dr. Catur Hermanto, Ms. Yayu Romdhonah; **Israel:** Dr. Dana Charuvi, Dr. Silit Lazare, Dr. Hagai Yasuor, Dr. Carmit Ziv; **Italy:** Ms. Greice Amaral Carneiro, Assoc. Prof. Elena Baraldi, Prof. Dr. Riccardo N. Barbagallo, Ms. Imen Belgacem, Dr. Gianni Ceredi, Prof. Angelo Chichelli, Prof. Cinzia Comino, Paola Crino, Dr. Paola Deligios, Dr. Arianna Marengo, Prof. Giovanni Mauromicale, Alberto Mazzucato, Dr. Gaetano Pandino, Assoc. Prof. Pietro Santamaria, Mr. Lucio Spadotto, Dr. Valeria Toscano, Dr. Silvia Valente; **Japan:** Mr. Md Meskatul Alam, Dr. Masatake Eguchi, Dr. Yasunaga Iwasaki, Dr. Keiichi Kanno, Etsuko Miyazawa, Mr. Shogo Nagano, Dr. Naonobu Noda, Kenichi-



ro Sakamoto, Assist. Prof. Hiroki Umeda, Ms. Aiko Yazawa, Dr. Keita Yoshinaga, Dr. Tiejun Zhao; **Korea (Republic of):** Prof. Dr. Byungjoon Ahn, Myung Suk Ahn, Young Mo Ahn, Ms. Ah Ram Cho, Eunyoung Choi, Ms. Yu-Hyeon Choi, Dr. Balkrishna Ghimire, Assist. Prof. Byung-Chun In, Mr. Md. Mazharul Islam, Yongsam Jeon, Ms. Min-Jung Jung, Mr. Sol-moe Kang, Ms. Suji Kang, Prof. Hyeon Tae Kim, Jiseon Kim, Dr. Sang Yong Kim, Dr. A-Young Lee, Dr. Seung Youn Lee, Nam Hyun Lim, Dr. Manjulatha Mekapogu, Mr. Daniel Uyeh, Mr. UK-hyeon Yeo, Prof. Dr. Yong Kweon Yoo, Ms. Bumhee Yoon; **Lithuania:** Dr. Neringa Rasiukeviciute; **Malaysia:** Mr. Arizal Arshad; **Mexico:** Francisca Hernández Epigmenio, Eddi Feliciano Jiménez Ruiz, Prof. Jose Merced Mejia-Muñoz; **Netherlands:** Dr. Emilie Fradin, Dorthe Larsen, Priscila Malcolm Matamoros, Dr. Ard Nieuwenhuizen,

Dr. Bas Rutjens, Mr. Malleshaiah Sharath, Jaap van Tuyl, Dr. Nastassia Vilfan; **New Zealand:** Mr. Arvind Patel; **Norway:** Dr. Belachew Asalf Tadesse; **Peru:** Jesus Pereda; **Poland:** Assoc. Prof. Stanislaw Pluta, Assist. Prof. Andrzej Salata; **Portugal:** Prof. Dr. Fernanda Delgado; **Reunion:** Mr. Ahmed Taibi; **Russian Federation:** Prof. Dr. Vladimir Gudkovski; **Serbia:** Natasa Duduk, Dr. Jovana Hrustic, Prof. Dr. Ivana Vico; **Spain:** Paolo Bonini, Prof. Dr. Xavier Gabarrell Durany, Ramón Gisbert Mullor, Mr. Joan Muñoz Liesa, Mr. Javier Pery, Dr. Carmen Villalobos Rivera; **Sri Lanka:** Prof. Palitha Weerakkody; **Switzerland:** Dr. José Vouillamoz; **Thailand:** Dr. Hatthaya Arunothayanan, Assoc. Prof. Wanphen Jitjaroen, Dr. Sirilak Kamonwannasit, Dr. Panumas Kotepong, Mr. Warayu Phasri, Dr. Bung-on Prajanban, Dr. Ratchanee Puttha, Somruedee Seehavet, Dr. Rattikarn

Sennoi; **Turkey:** Assist. Prof. Seçkin Kaya, Dr. Serpil Orhan Fedakar; **United Kingdom:** Mr. Jonathan Green, Ms. Maria Gutiérrez Pozo, Mr. Thomas Heaven, Dr. Dorota Jarret, Mr. Tony Lord, Dr. Richard Smart; **United States of America:** Dr. Christie Almeyda, Dr. Elizabeth Bihn, Mr. Sean Campbell, Mr. Eduardo Ceron Riveros, Ms. Yen-Hua Chen, Mr. Etienne Cowper, Matt Daniels, Dr. Haijie Dou, Prof. William Fry, Jonah Gardner, Andrea Garfinkel, Brandon Huber, Mr. David Kohanbash, Assist. Prof. Thomas Kon, Mr. Brad Kroeker, Dr. Alexa Lamm, Assoc. Prof. Guodong Liu, Assist. Prof. Robson Machado, Dimitri Mandelis, Tom Manning, Ms. Melissa Munoz, Jeff Penner, Jennifer Perry, Kari Peter, Ms. Rita Robinson, Mr. Martin Ruskin, Jeffrey Stines, Mary Tipping, Sahara Vilchis, Kellie Walters, Matthew Willman, Assist. Prof. Lu Zhang; **Vietnam:** Dr. Thi Thu Huong Bui

## > In memoriam

### Dietrich Fritz (1923-2018)



Horticulture has lost an exceptional spokesman of our profession. Prof. Dr. rer. hort., Dr. h.c. Dietrich Fritz passed away on September 5, 2018 at the age of 95 in his hometown Freising in Germany.

After serving other institutions, he was invited by the Technische Universität München to establish a new Institute for Vegetable Science in 1961, located in Freising-Weihenstephan, which he chaired for 29 years until 1990.

Prof. Fritz, with his professional knowledge, his energy and his innovative ideas, helped shape the German and the European vegetable scene for decades. He was a man of vision, who recognized way ahead of his time, that vegetables were not simply food for people, good enough just as a side dish on a plate, but important for a healthy diet within a modern lifestyle. He investigated ecological and economical production methods from field to fork, to improve quality of vegetables, and to be beneficial for producers, the trade and the consumer.

He was well accepted by everybody because of his unique ability to embrace science with practice. Early on in his research career he understood the importance of producing vegetables in an environmentally friendly way, in accordance with locations for best possible quality. His professional motto was: "Healthy soil for healthy plants for healthy people!" But his passion was not only directed at vegetables, he put much effort into selecting wild herbal populations for domestication of medicinal plants and also in researching edible fungi under controlled conditions.

He gave lectures to students in horticulture, agriculture, home economics, food technology and horticultural land management. He guided 31 PhD students and four habilitations; whilst 11 of his students became professors. His scientific work yielded over 500 publications and in his well-accepted book, he emphasized the influence

of environment and production management on field and storage quality of vegetables.

In his eloquent way, he was well recognised by his students and his message was heard in politics, in organisations and by the vegetable producers. Prof. Fritz was a vice president of the German Society for Horticultural Science and chairman of the section plant quality of German Agricultural Research Institutions. He was awarded with the Federal Cross of Merit on Ribbon (Bundesverdienstkreuz) from the Fed. Rep. of Germany. In 1998 the Humboldt Universität at Berlin honored him with Dr. rer. hort. h.c., recognizing his long and outstanding achievements.

In 1969, Prof. Fritz attended the ISHS International Horticultural Congress in Brussels. This was the start of a lifelong affiliation with this most important international horticultural organization. In Maryland he was elected Chair of the Section for Vegetables, holding this position from 1966 to 1974. After this he became Vice President (1974-1978) and President (1978-1982) of ISHS. A highlight was the 21<sup>st</sup> International Horticultural Congress held in Hamburg, Germany in 1982, which Prof. Fritz chaired as ISHS President. The congress was a great success with over 2200 participants from 77 countries, presenting 1250 papers and posters. The meeting offered splendid scientific and social contacts in a pleasant atmosphere. 'Horticulture in the Industrial Society' was the heading of this congress on which Prof. Fritz elaborated in his opening speech: "We are concerned by the conflict between horticulture industry and society at large. In densely populated industrial countries with high wage levels, consumers expect excellent standards of horticultural produce. The problem of growing and marketing under those conditions makes environmental protection especially obvious. Though, these problems exist all over the world and is a scientific challenge to all of us. Among the important topics are growing and marketing quality horticultural produce to improve our lives and at the same time, to protect our environment."

We shall remember Prof. Fritz as a teacher, scientist, friend, colleague and an outspoken horticulturist.

*W.H. Schnitzler,  
Life Science Center Weihenstephan, Freising, Germany*

# > Calendar of ISHS events

For updates and extra information go to [www.ishs.org](http://www.ishs.org) and check out the calendar of events. Alternatively use the “science” option from the website navigation menu for a comprehensive list of meetings for each Division or Working Group.

To claim reduced registration for ISHS members your personal membership number is required when registering - ensure your ISHS membership is current **before** registering. When in doubt sign in to your membership account and check/renew your membership status first: [www.actahort.org](http://www.actahort.org) or [www.ishs.org](http://www.ishs.org)

## Year 2019

- January 27-31, 2019, Tenerife (Spain - Canary Islands): **XI International Symposium on Protected Cultivation in Mild Winter Climates & I International Symposium on Nettings and Screens in Horticulture**. Info: Prof. Dr. Juan A. Fernandez, Dpto. Producción Vegetal, Univ. Politécnica de Cartagena, Paseo Alfonso XIII, 48, 30203 Cartagena (Murcia), Spain. Phone: (34)968325446, Fax: (34)968325435, E-mail: [juan.fernandez@upct.es](mailto:juan.fernandez@upct.es) or Dr. Francisco Moisés Del Amor Saavedra, Instituto Murciano de Investigación y, Desarrollo Agrario (IMIDA), C./Mayor s/n. La Alberca, 30150 Murcia, Spain. E-mail: [francisco.delamor@carm.es](mailto:francisco.delamor@carm.es) or Dr. Avi Sadka, ARO, The Volcani Center, Department of Fruit Trees Sciences, 68 HaMaccabim Rd., P.O. Box 15159, Rishon LeZion 7528809, Israel. Phone: (972)3-9683343, Fax: (972)3-9669583, E-mail: [vhassadka@volcani.agri.gov.il](mailto:vhassadka@volcani.agri.gov.il) Web: <http://www.mildwinter2019.org>
- NEW** ■ February 25 - March 1, 2019, Singapore (Singapore): **VII International Symposium on the Taxonomy of Cultivated Plants**. Info: Dr. Nigel Taylor, National Parks Board, 1 Cluny Road, Singapore Botanic Gardens, 259569 Singapore Singapore, Singapore. Phone: (65) 64719901, Fax: (65) 64674832, E-mail: [nigel\\_taylor@nparks.gov.sg](mailto:nigel_taylor@nparks.gov.sg)
- March 12-15, 2019, Orihuela (Spain): **X International Symposium on Artichoke, Cardoon and their Wild Relatives**. Info: Prof. Dr. Daniel Valero, University Miguel Hernandez, Ctra. Beniel Km. 3,2, 3312 Orihuela (Alicante), Spain. Phone: (34)966749743, Fax: (34)966749677, E-mail: [daniel.valero@umh.es](mailto:daniel.valero@umh.es) Web: <http://www.artichoke2019-oriuela.com/>
- May 1-3, 2019, Seoul (Korea (Republic of)): **XIII International Symposium on Flower Bulbs and Herbaceous Perennials**. Info: Prof. Dr. Ki-Byung Lim, Department of Horticulture, College of Agriculture and Life Sciences, Kyungpook National University, 41566 Daegu, Korea (Republic of). Phone: (82)53-9505726, Fax: (82)53-9505722, E-mail: [kblim@knu.ac.kr](mailto:kblim@knu.ac.kr) E-mail symposium: [info@flowerbulb2019.org](mailto:info@flowerbulb2019.org) Web: <http://flowerbulb2019.org/>
- May 6-9, 2019, Taichung (Chinese Taipei): **VI International Symposium on Tomato Diseases**. Info: Dr. Lawrence Kenyon, World Vegetable Center, PO Box 42, Shanhu, 74199 Tainan, Chinese Taipei. Phone: +886 6 5837801, Fax: +886 6 5830009, E-mail: [lawrence.kenyon@worldveg.org](mailto:lawrence.kenyon@worldveg.org) or Dr. Ruey-Jang Chang, 189, Chung-Cheng Road, 41362 Taiwan Wufeng, Taichung City, Chinese Taipei. Phone: (886)4-23317500, Fax: (886)4-23302803, E-mail: [raychang@tari.gov.tw](mailto:raychang@tari.gov.tw) or Prof. Dr. Fuh-Jyh Jan, Department of Plant Pathology, National Chung Hsing University, 250 Kuo Kuang Road, 40227 Taiwan Taichung, Chinese Taipei. Phone: (886)4-22854145, Fax: (886)4-22854145, E-mail: [fjjan@nchu.edu.tw](mailto:fjjan@nchu.edu.tw) E-mail symposium: [info@2019tomato.org](mailto:info@2019tomato.org) Web: <https://2019tomato.org/Web>: <https://www.nparks.gov.sg/sbg/whats-happening/7th-international-symposium-on-the-taxonomy-of-cultivated-plants>
- May 15-18, 2019, Tirana (Albania): **II International Symposium on Medicinal, Aromatic and Nutraceutical Plants from Mountainous Areas**. Info: Alban Ibrahliu, Koder Kamez 1029, Tirana, Albania, 1029 Tirana, Albania. Phone: (355)682042424, E-mail: [albanibrahiu@ubt.edu.al](mailto:albanibrahiu@ubt.edu.al) Web: <http://mapmountain2019.com>
- May 19-24, 2019, Liège (Belgium): **V International Symposium on Postharvest Pathology: From Consumer to Laboratory - Sustainable Approaches to Managing Postharvest Pathogens**. Info: Prof. Dr. Haissam Jijakli, Integrated and Urban Plant Pathology Lab, Gembloux Agro bio tech, Passage des Déportés, 2, 5030 Gembloux, Belgium. Phone: (32)81-622431, Fax: (32)81-622432, E-mail: [mh.jijakli@uliege.be](mailto:mh.jijakli@uliege.be) Web: <https://events.uliege.be/postharvest2019/>
- June 3-7, 2019, Prague (Czech Republic): **XV Eucarpia Symposium on Fruit Breeding and Genetics**. Info: Dr. Jiri Sedláček Res. & Breeding Inst. of Pomology Holovousy, Holovousy, 50801 Horice, Czech Republic. Phone: (420) 435 692 821, Fax: (420) 435 69 33, E-mail: [sedlak@vsuo.cz](mailto:sedlak@vsuo.cz)
- June 7-11, 2019, Hanoi (Vietnam): **VI International Symposium on Lychee, Longan and Other Sapindaceae Fruits**. Info: Ms. Thi Ha Le, Fruit and Vegetable Research Institute, Trau Quy town, Gia Lam district, Hanoi, 84 Hanoi, Vietnam. Phone: (84)934347046, Fax: (84)2438276148, E-mail: [leharifav2001@yahoo.com](mailto:leharifav2001@yahoo.com) E-mail symposium: [secretariat@lycheelongan2019.com](mailto:secretariat@lycheelongan2019.com) Web: <http://lycheelongan2019.com>
- June 9-12, 2019, Molfetta (Italy): **VI International Symposium on Applications of Modelling as an Innovative Technology in the Horticultural Supply Chain - Model-IT 2019**. Info: Dr. Maria Luisa Amodio, Via Napoli 25, 71100 Foggia, Italy. Phone: (39)0881-589105, Fax: (39)0881-589244, E-mail: [m.amodio@unifg.it](mailto:m.amodio@unifg.it) or Prof. Giancarlo Colelli, Dip.SAFE Università di Foggia, Via Napoli 25, 71100 Foggia, Italy. Phone: (39) 320 4394535, E-mail: [giancarlo.colelli@unifg.it](mailto:giancarlo.colelli@unifg.it) Web: <http://www.unifg.it/modelit2019>
- June 16-20, 2019, Angers (France): **Greensys 2019 - International Symposium on Advanced Technologies and Management for Innovative Greenhouses**. Info: Prof. Dr. Pierre-Emmanuel Bournet, Agrocampus Ouest, 2, rue Le Nôtre, 49045 Angers, France. Phone: (33) 2 41 22 55 04, Fax: (33) 2 41 22 55 53, E-mail: [pierre-emmanuel.bournet@agrocampus-ouest.fr](mailto:pierre-emmanuel.bournet@agrocampus-ouest.fr) or Dr. Hicham Fatnassi, INRA 400 Route des Chappes, 06903, Sophia Antipolis, France. Phone: (33)492386400, E-mail: [hicham.fatnassi@inra.fr](mailto:hicham.fatnassi@inra.fr) or Eric Brajeul, Centre CTIFL de Carquefou, ZI Belle Etoile Antarès, 35 Allée des Sapins, 44483 Carquefou Cedex, France. Phone: (33)240508165, Fax: (33)240509809, E-mail: [brajeul@ctifl.fr](mailto:brajeul@ctifl.fr) E-mail symposium: [greensys2019@agrocampus-ouest.fr](mailto:greensys2019@agrocampus-ouest.fr) Web: <https://www.greensys2019.org/>
- June 17-20, 2019, Matera (Italy): **IX International Symposium on Irrigation of Horticultural Crops**. Info: Prof. Dr. Bartolomeo Dichio, Università degli Studi della Basilicata, DICEM, Via S.Rocco, 75100 Matera, Italy. Phone: (39)08351971422, E-mail: [bartolomeo.dichio@unibas.it](mailto:bartolomeo.dichio@unibas.it) or Prof. Cristos Xiloyannis, Università degli Studi della Basilicata, DICEM, Via S.Rocco, 75100 Matera, Italy. Phone: (39)08351971416, Fax: (39)0971205378, E-mail: [cristos.xiloyannis@unibas.it](mailto:cristos.xiloyannis@unibas.it) E-mail symposium: [info@irrigationmatera2019.com](mailto:info@irrigationmatera2019.com) Web: <http://www.irrigationmatera2019.com>
- June 18-21, 2019, Hoce (Slovenia): **IV International Symposium on Underutilized Plant Species**. Info: Prof. Dr. Franc Bavec, University



of Maribor, Faculty of Agriculture and Life Sciences, Pivola 10, 2311 Hoce, Slovenia. Phone: (386)2-3209030, Fax: (386)2-6161158, E-mail: franci.bavec@um.si E-mail symposium: ishs2019@galileo3000.si Web: <http://www.ups2019.si/>

**June 24-28, 2019, Milan (Italy): III International Symposium on Growing Media, Composting and Substrate Analysis.**

Info: Dr. Patrizia Zaccheo, DISAA, University of Milan, Via Celoria 2, 20133 Milano, Italy. Phone: (39)0250316536, E-mail: patrizia.zaccheo@unimi.it or Dr. Costantino Cattivello, ERSa-FVG, Via Sabbatini 5, 33050 Pozzuolo del Friuli (UD), Italy. Phone: (39)0432529241, Fax: (39)0432529273, E-mail: costantino.cattivello@ersa.fvg.it or Prof. Dr. Francesco Giuffrida, Di3A - Catania University, Via Valdisavoia 5, 95123 Catania, Italy. Phone: (39)095234323, Fax: (39)095234329, E-mail: francesco.giuffrida@unict.it E-mail symposium: susgro2019sci@promoest.com Web: [www.susgro2019.com](http://www.susgro2019.com)

**June 25-28, 2019, Zürich (Switzerland): XII International Rubus and Ribes Symposium: Innovative Rubus and Ribes Production for High Quality Berries in Changing Environments.**

Info: Dr. Christoph Carlen, Agroscope, Route des Vergers 18, 1964 Conthey, Switzerland. Phone: (41) 27 345 35 11, Fax: (41) 27 346 30 17, E-mail: christoph.carlen@agroscope.admin.ch or Dr. Erika Krüger, Hochschule Geisenheim University, Dept. of Pomology, Von-Lade-Strasse 1, 65366 Geisenheim, Germany. Phone: (49)6722502561, Fax: (49)6722502560, E-mail: erika.krueger@hs-gm.de or Gunhild Muster, Staatliche Lehr- und Versuchsanstalt, Wein- und Obstbau Weinsberg, Traubenplatz 5, D-74189 Weinsberg, Germany. E-mail: gunhild.muster@lvwo.bwl.de Web: <http://www.rubusribes.agroscope.ch>

**June 30 - July 4, 2019, Ghent (Belgium): VI International Symposium on Cucurbits.**

Info: Dr. Peter Bleyaert, Landmansstraat 51, Rumbeke 8800, Belgium. Phone: (32)51-273270, Fax: (32)51-240020, E-mail: peter.bleyaert@inagro.be or Prof. Dr. Marie-Christine Van Labeke, Department of Plant Production, University of Gent, Coupure links, 653, 9000 Gent, Belgium. Phone: (32) 9-2646071, Fax: (32) 9-2646225, E-mail: mariechristine.vanlabeke@ugent.be or Mr. Raf De Vis, Stuivenbergvaart 85, 2800 Mechelen, Belgium. E-mail: raf.de.vis@proefstation.be E-mail symposium: info@cucurbits2019.org Web: <http://cucurbits2019.org/>

**July 6-10, 2019, Malatya (Turkey): XVII International Symposium on Apricot Breeding and Culture.**

Info: Prof. Dr. Sezai Ercisli, Ataturk University Agricultural Faculty, Department of Horticulture, 25240 Erzurum, Turkey. Phone: (90) 442-2312599, Fax: (90) 442 2360958, E-mail: sercisli@atauni.edu.tr Web: <http://www.apricot2019.org>

**July 14-18, 2019, Charlotte, NC (United States of America): II International Symposium on Vegetable Grafting.**

Info: Prof. Frank J. Louws, Department Head, Horticultural Science, North Carolina State University, Campus Box 7609, NC State University, Raleigh, NC 27695-7609, United States of America. Phone: (1)9195156689, Fax: (1)919515152505, E-mail: fjloows@ncsu.edu Web: [projects.ncsu.edu/mckimmon/cpe/opd/VGRAFTING/](http://projects.ncsu.edu/mckimmon/cpe/opd/VGRAFTING/)

**August 12-17, 2019, Taian, Shandong (China): IV International Conference on Fresh-Cut Produce.**

Info: Prof. Qingguo Wang, Room 304, No.61 Daizong Street, Taian, 271018, China. Phone: (86)538-8249204, E-mail: wqgyyy@126.com E-mail symposium: freshcut2019@126.com Web: <http://www.fresh-cut2019.com>

**September 1-5, 2019, Erfurt (Germany): XXVI International Eucarpia Symposium Section Ornamentals: Editing Novelty.**

Info: Philipp Franken, Institute for Veget. & Ornamental Crops, 14979 Grossbeeren, Germany. E-mail: franken@igzev.de E-mail symposium: eucarpia-ornamentals2018@igzev.de Web: <https://www.eucarpia-ornamentals2018.org/>

**September 2-5, 2019, Rovinj (Croatia): VI International Symposium on Fig.**

Info: Smiljana Goreta Ban, Karla Huguesa 8, Porec, Croatia. E-mail: smilja@iptpo.hr or Zeljko Prgomet, Collegium Fluminense Polytechnic of Rijeka, Trpimirova 2/V, HR-52210 Rijeka, Croatia. Phone: (385)98255791, E-mail: skink@pu.t-com.hr E-mail symposium: fig2019@iptpo.hr Web: <http://fig2019.iptpo.hr>

**September 14-18, 2019, Istanbul (Turkey): IV Balkan Symposium on Fruit Growing.**

Info: Prof. Dr. Sezai Ercisli, Ataturk University Agricultural Faculty, Department of Horticulture, 25240 Erzurum, Turkey. Phone: (90) 442-2312599, Fax: (90) 442 2360958, E-mail: sercisli@atauni.edu.tr

**September 30 - October 3, 2019, Guadalajara (Mexico): IX International Symposium on New Ornamental Crops.**

Info: Dr. Rodrigo Barba Gonzalez, CIATEJ a.c., Av. Normalistas # 800, Colinas de la Normal, Guadalajara Jalisco CP 44270, Mexico. Phone: (52)3333455200, Fax: (52)3333455245, E-mail: rbarba@ciatej.mx Web: <https://sites.google.com/site/newornamentalcrops/>

**October 7-11, 2019, Palermo (Italy): International Symposium on Precision Management of Orchards and Vineyards.**

Info: Dr. Riccardo Lo Bianco, Università degli Studi di Palermo, Dipartimento SAAF, Viale delle Scienze, Ed 4, 90128 Palermo, Italy. Phone: (39) 09123896097, Fax: (39) 09123860813, E-mail: riccardo.lobianco@unipa.it or Dr. Antonino Pisciotta, viale delle Scienze, 11, 90128 Palermo, Italy. E-mail: antonino.pisciotta@unipa.it or Assist. Prof. Luigi Manfrini, Università di Bologna, 40127 Bologna, Italy. E-mail: luigi.manfrini@unibo.it E-mail symposium: info@pmov2019.it Web: <http://www.pmov2019.it>

**November 10-13, 2019, Pretoria (South Africa): II International Symposium on Moringa.**

Info: Ms. Sunette Laurie, ARC - Roodeplaat, Private Bag x293, 0001 Pretoria, South Africa. Phone: (27)128419639, Fax: (27)128080844, E-mail: slaurie@arc.agric.za Web: <http://www.ism2019.co.za/>

**December 2-4, 2019, Bangkok (Thailand): I International Symposium on Botanical Gardens and Landscapes.**

Info: Dr. Kanchit Thammasiri, Department of Plant Science, Faculty of Science, Mahidol University, Rama VI Road, Phayathai, Bangkok 10400, Thailand. Phone: (66)89-132-7015, Fax: (66)2-354-7172, E-mail: kanchitthammasiri@gmail.com E-mail symposium: bgl2019thailand@gmail.com Web: <http://www.sc.mahidol.ac.th/scpl/bgl2019>

## Year 2020

**January 21-24, 2020, Bengaluru (India): International Symposium on Tropical and Subtropical Viticulture.**

Info: Prof. Dr. Dilipraj Patil, Associate director of Research, MHREC, University of Horticultural Sciences, Udyanagiri, Bagalkot, 587104, India. E-mail: adre.uhsbagalkot@gmail.com or Dr. Girigowda Manjunatha, Officer In-charge, Bio-control laboratories, Directorate of Horticulture, University of Horticultural sciences, Bagal, Karnataka, 570020, India. Phone: (91)9916219697, E-mail: gmanjunath2007@gmail.com

**March 24-29, 2020, Brena Baja (La Palma) & La Laguna (Tenerife) (Spain): XIV International Protea Research Symposium.**

Info: Dr. Juan Alberto Rodríguez Pérez, Área de Producción Vegetal, Universidad de La Laguna, Calle Dinamarca 29, 38300 La Orotava, Tenerife, Spain. Phone: (34)666695267, E-mail: jarodrip@ull.es Web: <https://proteas2020.asocan.net>

**May 3-6, 2020, Rimini (Italy): IX International Strawberry Symposium.**

Info: Prof. Dr. Bruno Mezzetti, Dip.Sci. Agrarie, Alimentari ed Ambientali, Università Politecnica delle Marche, Via Brecce Bianche, Ancona 60100, Italy. Phone: (39)0712204933, Fax: (39)0712204856, E-mail: b.mezzetti@univpm.it or Prof. Dr. Maurizio Battino, Dept of Clinical Sciences, Sect Biochemistry, Università Politecnica delle Marche, Via Ranieri, 65 - 60100 Ancona, Italy. E-mail: m.a.battino@univpm.it or Dr. Gianluca Baruzzi, via

La Canapona, 1 bis, Magliano, 47100 Forlì, Italy. Phone: (39) 543 89566, Fax: (39) 543 89077, E-mail: gianluca.baruzzi@crea.gov.it  
Web: <https://tinyurl.com/ISS2020rimini>

■ May 7-9, 2020, Bangkok (Thailand): **III Asian Horticultural Congress AHC2020**. Info: Mr. Ananta Dalodom, Horticultural Science Society Thailand, Department of Agriculture, 50 Paholyothin Rd., Chatuchak, Bangkok 10900, Thailand. Phone: (66)29406578, Fax: (66)29406579, E-mail: ananta.dalodom@gmail.com E-mail symposium: ahc2020bangkok@gmail.com

■ May 20-22, 2020, Torino (Italy): **IV International Symposium on Woody Ornamentals of the Temperate Zone**. Info: Dr. Valentina Scariot, Università degli Studi di Torino, Largo Paolo Braccini 2, 10095 Grugliasco, Torino, Italy. Phone: (39)0116708932, Fax: (39)0116708798, E-mail: valentina.scariot@unito.it or Prof. Dr. Gabriele Loris Beccaro, Università degli Studi di Torino, Dept. Agric., Forestry & Food Sci., Largo Braccini, 2, 10095 Grugliasco Torino, Italy. Phone: (39)0116708802, Fax: (39)116708658, E-mail: gabriele.beccaro@unito.it

■ June 8-12, 2020, Malmö (Sweden): **IX International Symposium on Light in Horticulture**. Info: Assist. Prof. Most Tahera Naznin, Department of Biosystems and Technology, Swedish University of Agricultural Sciences, Box 103, 23053 Alnarp, Sweden. Phone: (46)40415019, E-mail: naznin.most.tahera@slu.se or Dr. Maria Karlsson, Växtskyddsvägen 3, skne, Hunnestorpsvägen 29, skne, 23053 Bstad Alnarp, Sweden. Phone: (46)40-415370, E-mail: maria.e.karlsson@slu.se or Prof. Dr. Beatrix Waechter Alsanius, Dept. of Biosystems and Technology, SLU, Box 103, 230 53 Alnarp, Sweden. Phone: (46)40415336, E-mail: beatrix.alsanius@slu.se E-mail symposium: ishs2020@slu.se

**NEW** ■ June 21-26, 2020, Coimbra (Portugal): **VIII International Symposium on Production and Establishment of Micropropagated Plants**.

Info: Prof. Dr. Jorge Canhoto, Department of Life Sciences, University of Coimbra, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal. Phone: (351)239855210, Fax: (351)239855211, E-mail: jorgecan@ci.uc.pt or Dr. Sandra Correia, Department of Life Sciences, University of Coimbra, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal. Phone: (351)239240700, Fax: (351)239240701, E-mail: sandraimc@ci.uc.pt

■ July 7-10, 2020, Zlatibor (Serbia): **XII International Symposium on Plum and Prune Genetics, Breeding and Pomology**. Info: Dr. Darko Jevremovic, Kralja Petra I 9, 32000 Cacak, Serbia. Phone: (381)32321375, Fax: (381)32321391, E-mail: darkoj@ftn.kg.ac.rs E-mail symposium: plum2020@institut-cacak.org

■ July 22-24, 2020, Bogor, West Java (Indonesia): **II International Symposium on Tropical and Subtropical Ornamentals**. Info: Dr. Syarifah Iis Aisyah, Dept. of Agronomy and Horticulture, IPB, Jl. Meranti, Kampus IPB Darmaga, 16680 West Java Bogor, Indonesia. Phone: (62)2518629353, E-mail: syarifahiis@yahoo.com or Dr. Dewi Sukma, Department of Agronomy and Horticulture, Bogor Agricultural University, Jl. Meranti Kampus IPB Dramaga, 16680 Bogor, Indonesia. Phone: (62)-251-8629353, Fax: (62)-251-8629353, E-mail: dsukma70@yahoo.com E-mail symposium: tso2020indonesia@gmail.com Web: <http://tso2020.ipb.ac.id>

■ July 26-31, 2020, Wenatchee, WA (United States of America): **XII International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems**. Info: Prof. Stefano Musacchi, Washington State University, TFREC, 1100 N. Western Ave., Wenatchee, WA 98801-1230, United States of America. Phone: (1)509-663-8181, Fax: (1)509-662-8714, E-mail: stefano.musacchi@wsu.edu E-mail symposium: info@2020orchardsystems.com

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

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