A publication of the International Society for Horticultural Science

Chronica Horticulturae

Horticultural highlights

COVID-19 and horticulture: personal views • Brazilian coffee: from the seeds to the beverage

Symposia and workshops

Botanical Gardens and Landscapes • Sap Flow • Fig • Balkan Fruit Growing • UrbanFarm2020 – International Student Challenge

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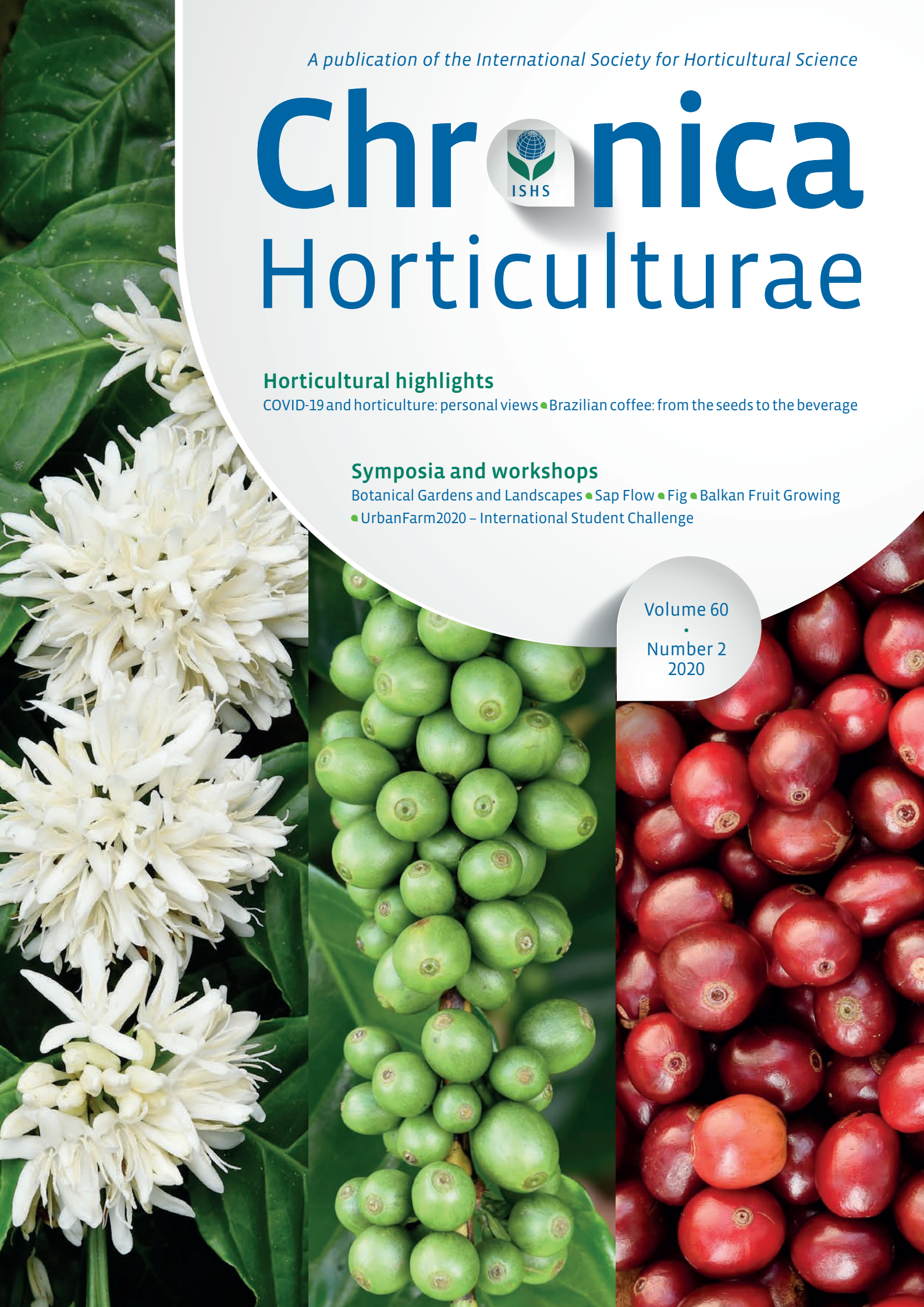

Chronica Horticulturae

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Cover photograph: Coffee flowers and berries from Brazil (Copyright: nimon/Shutterstock). See article p.15.

The status of the ISHS memberships

Silvana Nicola, Secretary of the ISHS Board

› Silvana Nicola

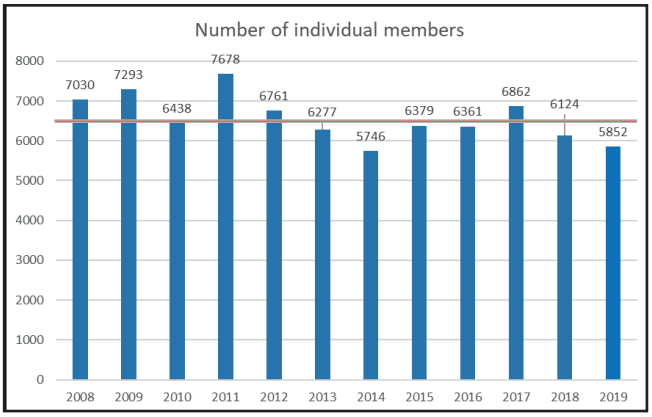

Figure 1. The number of individual ISHS members from 2008 to 2019 (mean=6566.75).

Figure 2. The number of individual ISHS members from low income countries from 2008 to 2019 (mean=10 for students, 504 for full members).

I write this editorial to report on the ISHS membership situation at the 2019 year's end. I will compare the present numbers with previous ones. At the end of 2019, ISHS had 5852 members. This is lower than our peak in 2011, when we had >7500. Previous values from the year 2008 to 2019 are presented (Figure 1). The cyclical 4-year nature of our membership, as influenced by increases in preparation for our International Horticultural Congresses, is evident. Unfortunately, there is a downward trend towards 2019.

Let's look at some specific breakdowns. Individual memberships from low income countries, both registered as students or full members, have not increased significantly over recent years, reaching ca. 500 in total in 2019 (Figure 2); students' representation is 2.6% of the total. A similar trend occurred for individual memberships not from low income countries (Figure 3); in this case, students' representation is 5.9% of the total, almost double that of four years ago and four times the figure from six years ago. In 2019, the total individual members from low income countries represented ca. 8.6% of the total ISHS members. Students represent ca. 5.6% of the total members, but 96% of them are not from low income countries (317 vs. 13).

If we look at the distribution of the members by regions (Figures 4 and 5), we may notice that Europe remains the largest area of membership represented in the Society. With 2239 members, it constitutes ca. 38% of the total members. The second region represented is Asia, with 1522 members and 26% of the share, followed by North and Central America with 1137 members, and a share of ca. 19%. Some significant changes in memberships compared with 2018 (Figures 6 and 7) may be due to some specific circumstances, e.g. Asia lost 132 members from Iran in one year; Oceania lost 57 members from Australia; South America lost ca. 70 members scattered across several countries.

Considering the most represented countries of our membership, our admirable goals to diversify our Society membership displayed so prominently at our last International Horticultural Congress, where the most diversified Board members were selected, are not yet coming to fruition. Figure 8 shows the number of members in the last four years per country, with at least 50 members in 2019. Nine countries (USA, Italy, Japan, P.R. China, Spain, Australia, Germany, Republic of

Figure 3. The number of individual ISHS members not from low income countries from 2008 to 2019 (mean=172 for students, 5880 for full members).

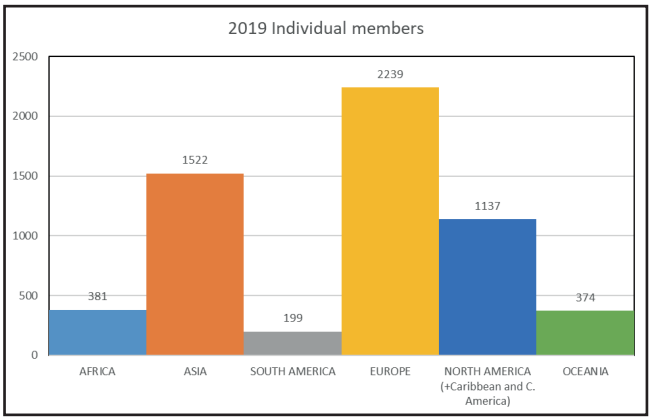

Figure 4. The number of individual ISHS members in 2019 by region.

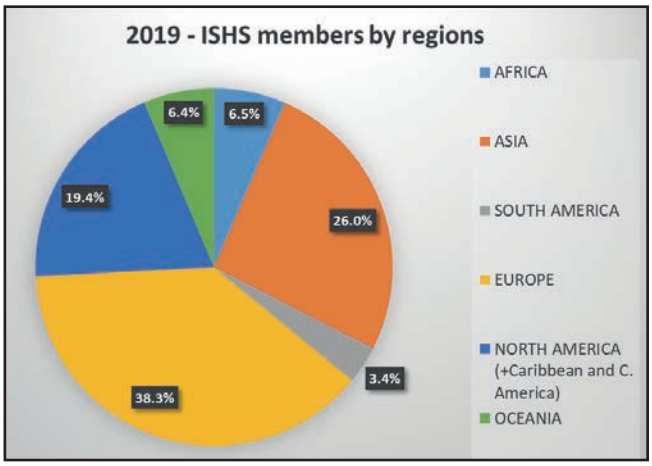

Figure 5. The proportion of individual ISHS members in 2019 by region.

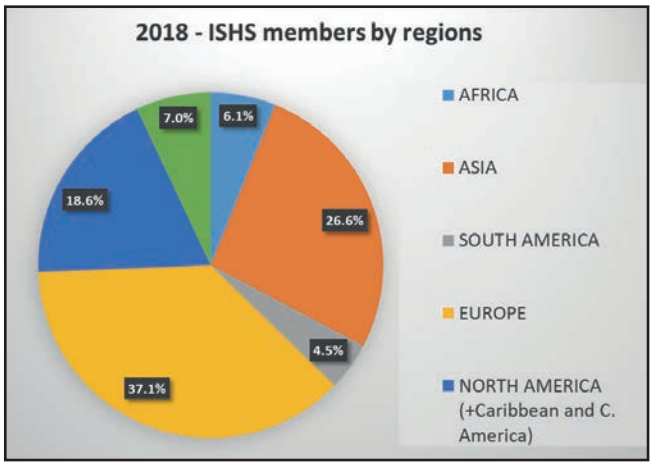

Figure 7. The proportion of individual ISHS members in 2018 by region.

Korea, The Netherlands) consistently represent more than 50% of the members. These are all high-income countries. Throughout the years shown, the trend of the number of ISHS members is for a steady decrease. Some historical ISHS countries are contributing to this slow decrease (e.g., Australia, UK, and Canada). Generally speaking, many countries in Latin America are losing members. In addition, there are countries that experienced a big jump in membership, due to particular successful meetings (e.g., Iran in 2017 (data not shown)) and then a giant drop during subsequent years. Some other countries experienced a significant drop (e.g., Turkey in 2019, in the year following the Congress held there in 2018). Many countries present slight fluctuations only.

We continue to work on ways to provide value for students and early career researchers, and to reach out to all those in developing countries, to find ways to support them in servicing the important horticultural industries in their countries.

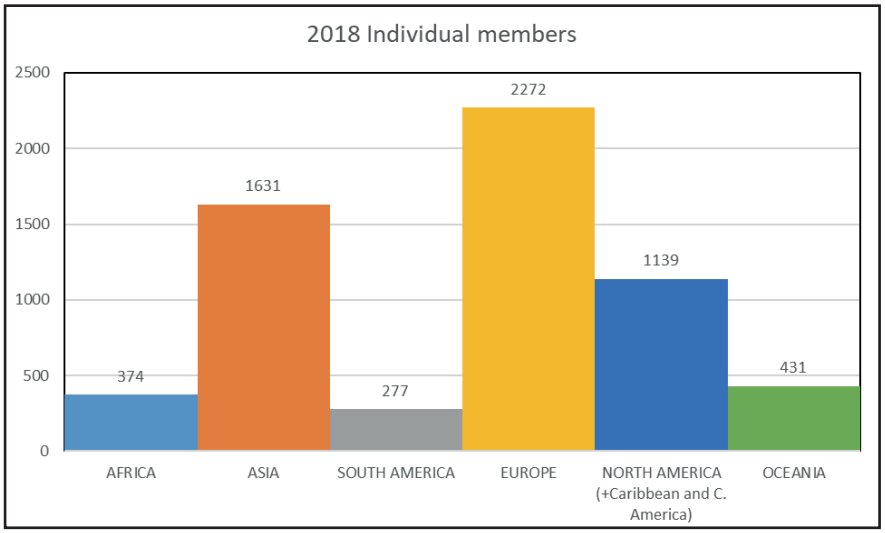

Figure 6. The number of individual ISHS members in 2018 by region.

The data presented thus far refer to 2019 and previous years. As of June 2019, we had >4800 members as an interim count. For comparison, in the same period for 2020, we have >4600 members. We will see what the rest of the year brings because of the shelter-at-home guidance to manage the COVID-19 virus. The present global situation is forcing each of us to consider radically different priorities, but we need to work together to rise again to lead the science of horticulture. The ISHS is a scientific society willing '*to nurture and deploy scientific growing knowledge for creating a better world*': we are experiencing how our world can become if we do not work *together* and use science *freely* and *openly* to create a better world. We must find a way to rise above politics and collaborate more at the global level, overcoming local differences and personal interests. For the moment, we need to think about ways we can interact and support each other while we stay apart. But we are looking forward to the day when we can meet each other once again in person, interact and network together for the improvement of global horticulture. These words at this moment look so unattainable... but we must keep our glimmer of hope as we shelter in place. Stay safe everyone!

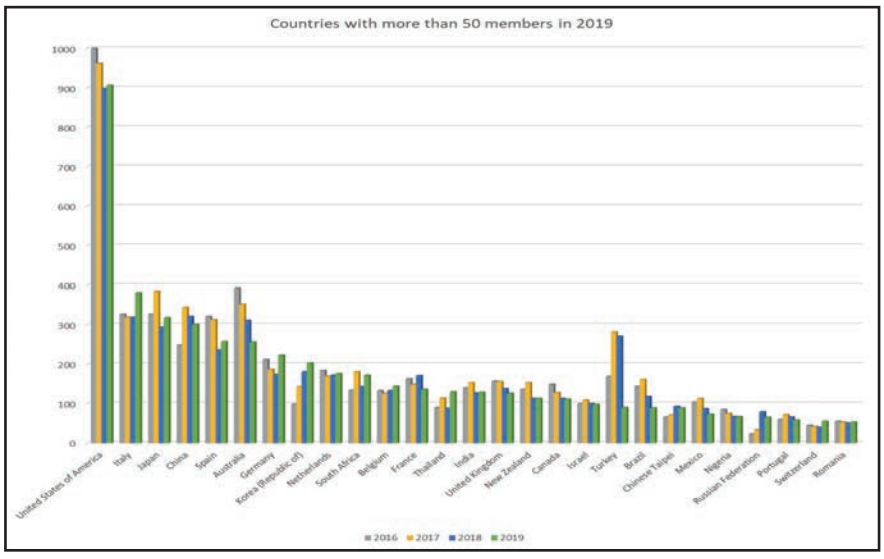

Figure 8. Number of ISHS members per country in the last four years ranked according to the 2019 number of members (only countries with at least 50 members are presented).

Spotlight on Honoured ISHS Members

› Sylvia Blankenship

Position or previous position

Senior Associate Dean for Administration and Professor of Horticultural Science, Emerita, North Carolina State University, USA

ISHS honour

ISHS Fellow since 2010

1. Tell us a bit about yourself (hometown, present location, family, hobbies, community involvement).

I grew up in two places due to my father's job. I spent the school year in Northern Virginia outside of Washington, D.C. and the summers in rural Texas. These two locations could not have been more different. Virginia was cosmopolitan with a variety of people and places to visit. Texas was a natural place with animals, plants, and whatever you could think up for entertainment. My mother was a gardener in an active garden club and we had a beautiful yard in the Virginia suburbs. My grandfather in Texas was a small farmer with several kinds of animals, a vegetable garden, and hay production. I would ride my horse around looking at the prairie. I currently live in Apex, North Carolina, which is a suburb of Raleigh. I have two sons and I'm a grandmother to a set of two-year-old twins. I spend a great deal of time with the twins taking them outside and showing them things. I like teaching children and judge an elementary school science fair every year. My hobbies include gardening, hiking, and quilting. I am also currently running our family farm in Texas. It is a beef cattle/forage operation. This gives me a different perspective on agriculture as a small business owner as compared to a professor.

› Dr. Sylvia Blankenship with a postharvest peach experiment (around 1999).

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

The agricultural background of my family, with both farming and gardening, had a big impact on me as a child and gave me my interest in nature and science. Like many young people, I didn't know what I wanted to do when I graduated from high school. I started off as a history major in a women's college, then went to Texas A&M for a year and took general courses. I then decided I wanted to be a dental hygienist and did that for a year, but didn't like it (yes, my parents were getting upset with me at this point) and went back to Texas A&M. I selected horticultural science because I liked the idea of being around nature and plants, even though at that point in time women were not particularly encouraged to go into science. I very quickly decided that I loved horticulture and it was definitely the place for me. After taking several plant physiology courses, understanding how plants function became a lifelong passion for me. ISHS puts me in touch with others who share that passion for plants.

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

I received my bachelor's and master's degrees from Texas A&M University in horticulture. It was there that I got a solid background in the basics of horticulture and plant physiology and it has served me well through the years. At Texas A&M, I mostly concentrated on ornamental plants. When I went to Oregon State University for my PhD, I started working on fruit crops (pears). I thought it wise to have expertise in a food crop. It was at Oregon State that I got interested in ethylene, fruit ripening, and plant senescence, and started my career as a postharvest physiologist. In 1983, I interviewed for a research/teaching position at North Carolina State University working with apples. I got the job and stayed there until my retirement in 2018.

My career is divided into two different jobs. The first was as a horticultural science professor. The second was as a college administrator: Senior Associate Dean for Administration in the College of Agriculture and Life Sciences.

› Dr. Sylvia Blankenship in a cold storage room injecting one of the early versions of 1-MCP into a sealed drum containing apples in the early 1990s.

As a horticultural science professor, I taught postharvest physiology and a graduate course in plant senescence. With research as my main responsibility, I felt a strong need to help and serve the apple growers in the state. During my career I have also worked on sweetpotatoes, peaches, bananas, flowers and several other commodites. I have always thought that as a profession, it is our job to help the horticultural producers worldwide, big and small, improve their businesses through education and research. I used postharvest physiology as the basis for working with others in horticultural science and related disciplines to reach their goals, resulting in a wide range of publications. I am very proud of the graduate students I have worked with. The majority were international students and have gone on to have excellent careers in horticultural science. I have seen some of my undergraduate students at grower meetings and they always mention postharvest physiology as a help in their careers.

I became an administrator because I wanted to help make life easier for the faculty. Bureaucracies can be difficult to navigate and having an experienced person to go to

makes life easier. I think we ask too much of faculty that is not science related. Many faculties spend a great deal of time doing paperwork and raising money, which detracts from what they were hired to do – science. The grant system is creating a huge amount of compliance paperwork which is not aiding the advancement of science. As an administrator I think I accomplished a great deal and contributed to the overall good of the college. I dealt with situations that were logistically, polictially and/or emotionally difficult. I would suggest to anyone who is moving into an administrative position in a university that they make friends with a good human resources person because there are so many situations that are based on people and their personalities. Poor communication is a common underlying cause of problems.

4. What do you consider to be your greatest achievements?

My work on ethylene has contributed to the field of postharvest physiology. The invention of 1-methylcyclopropene (1-MCP) as a way to control ethylene responses is at the top of the list. Edward Sisler (now deceased) and I patented this technology in 1996. Not only was this a commercial success with creation of the company AgroFresh and their products for horticultural crops, but 1-MCP gave scientists a tool to study ethylene during plant development. Thousands of papers have been published in the scientific community using 1-MCP. I have had growers tell me that their businesses were saved and made profitable by 1-MCP. I was recently inducted into the National Academy of Inventors and will soon be in the National Inventors Hall of Fame in the U.S. Horticultural science is not strongly represented in either of these groups and I am honored that they selected me and that I can serve as a voice for horticultural science.

One of my favorite studies was night temperature effects on maturation and quality of apples. This study was published in Scientia Horticulturae. The study was done in growth chambers using potted dwarf apple trees. Because of the amount of controlled factors in this study, it was possible to isolate what effects could actually be attributed to temperature. With climate change as such a current concern, understanding the effect of temperature on plants is the kind of information that we will need going forward.

I am also proud of some of the more practical work that I have done. One of the things that I did to help greenhouse growers was to work on ethylene in the atmosphere of greenhouses, most often the result of poor heating systems. I used to analyze air samples as a service for people and did some experiments on ethylene effects in plants. In a number of cases, it provided the explanation as to why the growers were experiencing growth problems on their plants. I published a paper on chronic ethylene effects in lilies. It showed that small amounts of ethylene can dramatically alter plant growth.

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

When you have an invention as successful as 1-MCP, there are challenges. As faculty, we are not trained business people, and it is important to get people on your team who know how to maneuver in the business and legal world. The success of 1-MCP is due to many, many people. As scientists we need to learn how to talk with people outside of the scientific community.

With a successful discovery, while most people are delighted and interested in your work, a few will appear that are greedy, jealous, or want it to be a failure. My advice to anyone in an adverse situation is to "take the high road". You know your work and just keep pushing it ahead so people will benefit from your discovery. It will be worth it in the end.

Understand that change is difficult. One of the first times I talked to a room full of growers about 1-MCP at the conclusion of my presentation, the room was rather silent with some mumbling going on. I wasn't sure how to interpret it and thought perhaps I did a poor job on my presentation. After the talk an irate grower came up to me and said he had a huge capital investment in his controlled atmosphere storages and he didn't want to lose it because of 1-MCP. I tried to answer his concerns and calm his fears about the possible change. Ultimately, time and experience with the new technology has solved most problems and I have received several awards and shows of support from grower groups.

As scientists, we often don't do a good job of telling our story and the press often wants a sensational story, not scientific fact. If you get in a position where you have much contact with the press or media, it pays to consult communication specialists on how to do this interaction. I was given the opportunity to take a media training course and it has served me well. Communication specialists can teach you how to get the message across that you want.

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

I was working on sweetpotatoes and I had gotten cuttings that I was going to put in the greenhouse. I needed to go out of town for a day so I left an undergraduate student with the cuttings and told him to plant them. When I came back, one of the greenhouse employees came to me and told me I needed to come look at my plants. The student had planted about half of the cuttings upside down. Sometimes you just have to start an experiment over!

Airports can be a challenge. I was on a U.S. domestic flight and I needed to bring back some soil samples for a colleague. I had several plastic bags of soil with me. I took them out at security so they could see them and immediately got pulled out of the line. I told the security official that it was soil and he

› Some of the people from the NC State University apple research and extension group that helped with 1-MCP and other apple projects (2018). From left to right: Dr. Sylvia Blankenship, Bernadette Clark, J.D. Obermiller, Ann Green, Dr. Dick Unrath (retired), Dr. Mike Parker.

› Dr. Sylvia Blankenship in 2018 speaking at her retirement reception. In the background: Dr. Richard Linton, Dean of the College and Dr. Roger Crickenberger.

told me that no one carried soil around. He tested them repeatedly with no sign of illegal substances, and with departure time for my flight getting closer and closer. Eventually he told me that he still didn't believe it was soil, but he let me go and I made the flight at the last minute. Next time, I think I will ship any soil.

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?

The postharvest community is a rather small one and interaction with people around the world is important. Shipping and handling of produce and plant products is a world wide business. I have learned a great deal in my career from talking with scientists from other places. ISHS gave me the opportunity to establish relationships with them so I felt comfortable going to them for advice and assistance. Even in this world of electronic communication, sometimes sitting at a table and having a coffee or beer with someone can open new doors. I have found that other scientists have perhaps dealt with problems and have answers to what are "new" issues to my location. ISHS holds so many good meetings; when I look at the opportunities, I wish I could go to them all. *Chronica Horticulturae* is like a "mini" trip around the world and it has interesting topics that help to broaden my horticultural knowledge. I always look forward to reading it.

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

Horticultural science has been a wonderful career for me and there are so many different avenues a person can pursue. Important traits a young person should cultivate are being observant, hard working, persistent and patient, whether looking for answers or educating others.

It is important for young people to find good mentors. These could be people who you don't necessarily work directly with, but who will give you frank advice about your situation. You may need multiple mentors from different parts of your life and career. One time I was in a very contentious meeting and getting more upset every minute at the person who was speaking. The older man sitting next to me, who I knew well, saw that I was getting ready to get into an argument with the speaker and he put his hand on my arm and quietly said "don't do it". In that situation he was correct and later I was very glad he was sitting next to me.

In our rushed world, try to find time to think and read what others have done. When you ask nature a question, nature won't lie, but you might not understand the answer. It is not to re- design the experiment to get the answer that you want, but you should look at the answer and try to figure out why it was the answer. Some of the most valuable information I found started from what I thought was some weird mistake, like this quote:

"Nature doesn't ask your permission; it doesn't care about your wishes, or whether you like its laws or not. You're obliged to accept it as it is, and consequently all its results as well." (Fyodor Dostoevsky, Notes from Underground, White Nights, The Dream of a Ridiculous Man, and Selections from The House of the Dead)

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

I think the food processing industries are going to change some food products. The meat industry is growing animal cells in culture to form food products. The same thing could happen in the plant industries. We have a growing population to feed and these types of technologies may become common. In addition, there are now the new "burgers" that are made from plants but taste like beef. There may be opportunities for growers to provide the plants for these types of products. All of this could mean new cultivars, new discoveries in plant growth, and new plant chemistry needs.

Climate change could offer new opportunities. Areas that couldn't previously grow a plant may be able to in the future. Existing plants may need more heat tolerance and fewer cold requirements. ISHS could play a big role in this by providing opportunities for scientists from different climates to learn from each other.

› Celebrating Dr. Blankenship's induction into the National Academy of Inventors in 2019. From left to right: Provost Warwick Arden, Dr. Sylvia Blankenship, Chancellor Randy Woodson.

Horticultural Science Focus

COVID-19 and horticulture: personal views

Kim Hummer, ISHS Board Member, Editor for *Chronica Horticulturae*

Greetings and salutations to all ISHS members! It's somewhat ironic that we all feel closer to each other now because we are apart: we have been individually "sheltering in place". Together, we are sharing the loneliness of the moment and the anxiety of the pandemic. We do what we can through teleconferencing, teleworking, and brief moments of outdoor fresh air. We send our humble thanks and recognition to our health care workers and essential employees for keeping ourselves and our social structure intact. It's 7 pm somewhere in the world right now, and our inner voices join those clapping and cheering crowds for the workers tireless efforts.

Of many occupations in the world, those in horticulture are being hard hit. Growers are plowing under beautiful crops, while some people go hungry. Truckers cannot move crops to distribution points. Logistics did not have a failsafe. Each country or region has a similar, though different, story to tell.

I have invited colleagues from Canada, Chile, Turkey, and Portugal to present their comments on how COVID-19 is affecting horticulture. I asked them:

- How is COVID-19 affecting the horticulture of your region?
- What are your hopes for how this difficult exercise that we are all going through now – could change the world of horticulture for the future?
- How could we make changes to horticultural operations for the better in the future?

As we continue through this global crisis, I will be asking additional international horticulturists to respond to these questions. I invite any of those who are reading this to contribute an article concerning COVID-19 stories and horticulture (policy, production, education, projects) – to share with ISHS colleagues. We will have a series of articles on this depending how this new challenge to horticulture continues. If a sufficient number of articles are received, we could prepare a newsletter to be published on the ISHS website with this information. Send your contributions to: hummerk@oregonstate.edu with the byline: COVID-19 article from (enter your country or region).

Here are the first four stories in the series, presented by Professor Dr. Yves Desjardins, from Canada, Professor Dr. Jorge Retamales, from Chile, Professor Dr. Uygun Aksoy, from Turkey, and Professor Dr. Antonio Monteiro, from Portugal.

Coping with COVID-19 in Québec, Canada

Yves Desjardins

› Yves Desjardins

Like half of the world population, we have been confined to our homes since 13 March 2020. Laval University has been closed for all activities. Only essential projects have been allowed to proceed. In my case, my lab has been authorized to continue an in vitro artificial digestion of cranberry polyphenols on a SHIME system. However, we have had to postpone a clinical trial on cranberry procyanidins, basically losing all recruited participants and delaying our project by at least one year from the time we will be unconfined. Other key projects and experiments have been cancelled in the greenhouses and the field and preparation for planting is delayed in our botanical garden. It will be a year for perennials.

Spring is rapidly settling in the province and transplants have been started in the greenhouses for most vegetables produced here. However, there are serious concerns about the availability of labour needed for planting and farm work since temporary foreign worker's permits have not been emitted yet for the 35,000 farm workers (from Guatemala and Mexico) needed yearly and essential to the Canadian horticultural industry. These concerns extend to the management of the compulsory 14-day quarantine the workers will have to submit themselves to, upon entry into the country and to the special conditions employers will have to provide for confinement issues. Social distancing will be difficult in this context. At this stage, the Québec government's program will encourage students and unemployed workers to lend a hand in the field. The government is already increasing the wage of certain workers to recognize their essential role in maintaining the supply chain and horticultural workers will most probably receive a compensation above the minimum wage for their work. We are also worried about the preservation of the supply chain for most of our imported fruit and vegetables from Mexico, Texas and California. The spread of the epidemic in these regions of the continent is bound to affect availability of certain commodities.

In times of crisis, one turns back to the basics and the essentials. I was surprised upon my first visit to the grocery store, a few days after the confinement order, to see empty shelves for flour, yeast, sugar, dry pulses and canned goods. This went along with the craze for toilet paper... At my local store, there were still ample supplies of fruit and vegetables and the shelves were well stocked. This tells somewhat of the diminished role of horticulture in times of need, and the lesser importance of fruit and vegetables to our diet in times of unsettlements. I always say to my students in the opening class of my horticulture course that horticulture is to agriculture what wine is to bread... quality of life versus sustainability. During emergencies, you go for the calories and the proteins first.

In response to the above concerns, our Canadian Provincial governments are making plans to be more self-sufficient and to be less dependent on foreign imports for our food supply. In the short term, we already foresee promotion of local buying and local production. In the long term, Québec is fortunate to have ample cheap hydroelectric power and we can forecast that our energy surpluses, which were to be exported to the U.S., might instead be used for our local greenhouse industry. This will cause major shifts in horticultural production and supply for the province and the country. I foresee more local, fewer food-mile buying in a near future. The pandemic will probably be the

"black swan" event that will cause the shift in production that many have sought; organic, local production might become the norm as we come back to "normality" in a few years. This will certainly spell for drastic changes to the globalization of horticulture that we have witnessed over the years. The competencies of horticulturists might be once again in demand to support the changes in production habits.

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The effect of COVID-19 on horticulture: Chile, April 2020

Jorge B. Retamales

› Jorge B. Retamales. Credit: Blueberry Consulting.

› How is COVID-19 affecting horticulture, specifically your research efforts as well as that of Chile?

I will speak mainly of fruit culture because this is the area in which I have expertise and information. In Chile, we have recently entered our autumn. Thus, most fruit crops have been picked. The exceptions are some late apples, grapes for wine, some citrus and kiwifruit. Also, most of the research for the season has been completed, except for some postharvest trials in apples, pears and kiwifruit. There are now restrictions on the movement of people and vehicles in several regions, but fortunately for us there is little activity at this time of the year both for production and research efforts.

In another scope, the great economic impact of the COVID-19 pandemic will likely reduce the availability of funding for research in at least the two coming years. Most of the funding for scientific research in our country is provided by the central government. Considering that the government is spending large amounts of money to maintain economic activity and reduce unemployment, a major reduction in funding for research and other expenses is expected. The few companies and institutions that provided funding for agricultural research will likely have a smaller budget for the coming years.

What are your hopes for how this difficult exercise that we are all going through now – could change the world of horticulture for the future?

We know when COVID-19 enters a given country but it is hard or impossible to predict when it will end. In most of South America, COVID-19 arrived in early March. If the disease is managed properly, a country could stop having new people being infected with this virus in 3-4 months (as has been reported to be happening in China). Given this timeframe, there might be some countries in the southern hemisphere of which the health system is weak or which somehow have not managed well the spread of COVID-19 and this might impair or restrict the amount of fruit they will be able to export to international markets in the coming season. For instance, in the case of Peru, they should start their picking season of avocados in late April. It seems highly improbable that they will be able to control COVID-19 in that country by that time. They might have problems with pickers having access to the fields so they probably will have a high proportion of fruit that will not be picked timely. Colombia, Guatemala and Mexico have also been planting large numbers of hectares of avocados in the last years and could also run into difficulties in the volume of fruit for export this next season. With the onset of spring in the southern hemisphere on September 21, many fruits will start to be ready to pick, but due to the risk of contagion, there might be restrictions to harvest them at their optimum maturity. On the other hand, people have had to stay in their homes in several countries to reduce the spread of contagion with COVID-19. For this, they have to rely on internet shopping and home delivery of groceries (including fruits and vegetables); this might change the structure of the marketing chains in several countries for the coming season and beyond.

How could we make changes to horticultural operations for the better in the future?

Even though the chances are low for COVID-19 contagion manipulating fruit, in the future people might be more worried about fruit handling and packing procedures and materials. This will demand an extra effort in cleanliness and in informing consumers about the different links of the marketing chain. People have also made an effort to maintain distance from others that they do not know. This attitude might be more common in the coming years and force changes in horticultural operations that demand a great number of people at short distances, such as harvest and packing. This could enhance the development of mechanical harvesting devices for various crops. It could also be possible that in the coming years researchers can develop some innovations to provide information to the consumer of the microbial load of fruit packages.

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COVID-19 affects Turkish horticulture

Uygun Aksoy

› Uygun Aksoy

The COVID-19 pandemic affected the whole world like a tsunami wave coming from the east and moving towards the west. The warning came during the last months of 2019 but many were not prepared. In Turkey, the first case was announced on 11 March 2020 followed by a lock-down for +65-year-old citizens on 15 March, which included farmers and farm workers as well. Travel between cities and all flights, coach, and train services were also stopped. The logistic companies on the other hand, are allowed to run within the country. There was a second ban for the younger (<20) population on 9 April. After various declarations of NGOs and journalists,

special permission was issued for seasonal workers and farmers including transfers between cities based on permission. There was a complete lock-down on the 11-12 and 18-19 April weekends in 30 metropolitan cities and Zonguldak, the center of coal mining known for high lung disease incidences.

As of 2019, horticultural crops occupy 4.32 million ha and have 18.72% share within total agricultural land. This figure excludes potatoes (141 thousand ha), onion (61 thousand ha), beans (89 thousand ha) and tea (85 thousand ha). Horticultural crops, namely vegetables, are consumed domestically. Only greenhouse vegetables and open field tomatoes, peppers, and cucumbers are exported as processed. Fruit are consumed in Turkey but also exported as fresh (citrus fruits and cherries), dried (grapes, figs, apricot, mulberry) or processed (strawberry and other berries as deep-frozen, pomegranate, Cornelian cherry, apple for juice extraction). Among nut species, hazelnut is the leading commodity for export. Similarly, cut flowers are also exported.

The demand of horticultural products has changed with the lock-down. Restaurants serve only for take away or home deliveries and completely closed for the lock-down weekends in April. Open fruit and vegetable markets are either closed, moved from the weekend to the weekdays, or the number of clients accessing is limited to keep the social distance. In Turkey, all horticultural crops, except for direct sales of small farms, are obliged to be sold at the wholesale markets of the municipalities. Nowadays, fruit and vegetable demand is at very low levels in the wholesale markets.

The short-term effect of COVID-19 restrictions is currently seen in limited labor availability for harvest, sowing or transplanting, especially in medium and large size farms that require external seasonal labor. On the other hand, small family farms mainly located in peri-urban areas face problems in accessing urban markets. The only solutions brought are as follows: some farmers groups and cooperatives started on-line sales, a few municipalities source their raw material directly from the farmers and some farmers donate if they do not have the chance to sell their products. The current season is somewhat like a transition period between winter fruit and vegetables to summer crops. The immediate adverse effect is observed in the ornamentals sector and will be followed by some crops left in the field, e.g., onion, strawberries, or early cherries. Most families' diets currently rely on dry produce such as pulses or pasta and fruit that are more durable. The most significant effect is expected to appear in summer, especially in the annuals, vegetable and ornamental plants, because distribution of inputs, propagation material and raw material for the processing industry as well as the financial capital are all significantly affected. The government has not given any support to agri-food production yet except 75% funding for seeds of few field crops in 21 provinces.

The exportation of horticultural crops, especially to Europe, continues in a 'no touch' system developed for 18-wheeler trucks at the buffer zones created at points of entry from Bulgaria and Greece. The Turkish drivers bring the truck to the customs area, take away the tractor unit leaving the semi-trailer filled with goods, drivers coming from the neighboring country come with their own tractor unit, fix to the semi-trailer and drive the goods to the targeted market. A similar system is ongoing with roro trucks between Italy and Turkey. The exportation figures announced for the January-March 2020 period show almost the same trends as the previous year with reductions in exports to China and some Gulf countries, only. However, each country may take additional preventive measures according to the prevalence of the pandemic. Russia, a major importer of Turkish fresh fruit and vegetables, issued a ban, which will be reflected in the statistics of the coming months. There is a restriction placed by the Turkish government to fresh lemon exportation until 31 August 2020. The companies must get special permission from the Ministry of Agriculture and Forestry. The further impact of the pandemic on Turkish horticulture will depend on the incidence rates and number of casualties, which will determine the conditions both in Turkey and in the importing markets. Everybody is worried but is in the state of "monitor, wait and see."

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Horticulture outcome of COVID-19 in Portugal is a patchwork

António Monteiro

COVID-19 infection in Portugal was delayed compared to other European countries. This has permitted the implementation of early control measures, which limited the progression of the disease. However, the confinement obligations and the restrictions to travelling and personal contact had a dramatic

› António Monteiro

effect on the economy, especially local commerce, restaurants and leisure activities as in many other countries.

Horticulture also suffered a strong negative impact that affected non-edible more than edible products. There were also differences between edible products, which is an interesting example of the impact of external factors in horticultural production and trade. Ornamental horticulture, particularly cut-flowers and pot plants, is having big difficulties. The situation is dramatic with flowering pot plants, e.g., lavandulas, dipladenias, pelargoniums to sell in March-May, the peak period of the year, which if unsold have to be destroyed. The same for cut-flowers but with the additional cost of keeping the crops in production.

The Portuguese government has included garden centers and flower shops on the list of priority shops that should continue to open to the public but this was not enough to keep sales going because costumers preferred to stay at home. At the end of April, the situation is starting to improve because garden centers are more active and exports to the Netherlands and neighboring countries are increasing. However, there is limited shipping capacity to export plants by truck because trucks carrying pot plants to central Europe do not have a return load since Portugal almost stopped importing many different goods.

Wine, fruit and vegetables continue to be sold and supermarkets announce they are giving a preference to national instead of imported produce. However, some growers are suffering more than others because the market pattern changed much.

The wine market suffered the most because restaurants are closed and buy no wine. Sales in supermarkets dropped around 15% because wine is not an indispensable product.

Hotels and restaurants are very important in Portugal due to the usually large tourist industry. Portuguese people prefer to eat at restaurants quite often. When restaurants

shut down and families have to buy food and eat at home, the consumption profile changes. When at home, people chose to eat fruit and vegetables that are particularly easy to prepare and do not require complex cooking. However, it is not only consumption that affects fruit and vegetable sales. Logistics, particularly transport, may limit sales because the produce cannot be delivered to the market. This is the case for 'Rocha' pear export to Brazil. It is restricted because there are fewer cargo ships sailing from Portugal to Brazil. These ships transport mangos from Brazil to Portugal and take 'Rocha' pear for the return. In Portugal the majority of mangos are consumed at restaurants. Closing restaurants induced a sharp drop in mango consumption and imports from Brazil.

Citrus growers are among the few with positive business opportunities owing to the sudden increase in orange consumption in search of vitamin C. Demand is very high, prices have doubled and growers could sell the whole orange production as far as they can get labour for fruit harvest and trucks to ship the produce.

The obligation to continue growing the crops before harvest comes is a great constraint in horticulture. It is impossible to turn-off the key and lay-off the workers.

Many fruit and vegetable growers continue to work as usual and to invest in their crops, expecting harvest to be successful. However, there is much uncertainty about the future particularly with berries, cherries, grapes and other fruit crops that require immigrant labor for harvest. The government says that they will allow immigrants to enter the country, but there are serious doubts about how to accomplish it.

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Horticultural Science News

› 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.

Biodegradable and non-degradable plastic mulches increase raspberry yield

› Lisa DeVetter

Growers and scientists alike within the field of horticulture are continually seeking ways to improve sustainable production of food crops. The application of plastic mulches is one way to enhance crop production through improved weed management and modification of soil temperature and moisture. However, the use of plastics in society is under scrutiny and end-of-life management of agricultural plastics is a growing concern that threatens sustainability. Biodegradable plastics are an alternative to non-degradable polyethylene and polypropylene plastic mulches. This research evaluated the application of biodegradable plastic mulches in floricane red raspberry in the Pacific Northwest (PNW). This two-year research project showed that biodegradable plastic mulches are comparable to non-degradable plastic mulches in a spring-planted 'Wake™Field' raspberry field. Furthermore, both biodegradable and non-degradable mulches increased yield by 34% and improved weed management compared to the non-mulched control, which represented growers' standard practice. While raspberry growers in the PNW adopting mulch application as a tool to aid establishment of spring-planted raspberry, time will tell whether biodegradable mulches truly degrade according to US (ASTM D5988-18) and European standards (EN 17033). Regardless, this research highlights the application and potential of plasticulture for raspberry and other perennial fruit crops. Further information is available by email request.

Lisa DeVetter won the ISHS Young Minds Award for the best oral presentation at the XII International *Rubus* and *Ribes* Symposium: Innovative *Rubus* and *Ribes* Production for High Quality Berries in Changing Environments in Switzerland in June 2019.

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Small RNA deep sequencing for plant virus discovery in cultivated *Rubus* and *Ribes* in Finland

› Fhilmar Raj Jayaraj-Mallika

Small RNA (sRNA) sequences are precisely 21, 22 and 24 nt (nucleotide) in length. Deep sequencing of sRNAs generates sRNA datasets. This procedure allows for the discovery of novel viruses and the identification of viral genomes for use in reference databases. RNA samples from *Rubus* and *Ribes* germplasm in Finland were combined for a large-scale virus diagnosis. The collection included ten red raspberry (*Rubus idaeus* L.) mother plants and one accession each from blackcurrant (*Ribes nigrum* L.) and redcurrant (*Ribes rubrum* L.) cultivars. VirusDetect, a user-friendly sRNA software, identified genomes of *Raspberry bushy dwarf virus* (RBDV), *Black raspberry necrosis virus* (BRNV), *Blackcurrant reversion virus* (BRV), *Rubus yellow net virus* (RYNV) and *Gooseberry vein banding virus* (GVBaV) based on homology-dependent contig assembly. Reverse-transcription PCR and direct sequencing of PCR products validated positive results in samples extracted from raspberry leaves. RBDV was detected in five samples (three raspberry cultivars); BRNV in six (three cultivars). Genome wide distribution of the sRNA read profile (21 and 22 nt) in RBDV and BRNV genomes provided novel "hotspot" information. In RBDV genomes, the lowest coverage by sRNAs was observed at 3'UTR (untranslated region). The upstream coat protein (CP) encoding sequence in RBDV was PCR amplified from one cultivar and aligned to geographical isolates previously characterized from red raspberries (96-99% identity). The analysis revealed that RBDV diversity is restricted in red raspberry plants worldwide. The genomic regions encoding RNA dependent RNA polymerase (RdRp) and small coat protein (CPs) in BRNV had the lowest coverage with sRNAs. The CPs nucleotides sequenced from three cultivars aligned poorly (~79%) or highly (99%) with BRNV isolates found in Finland and exhibited diversity (~25%) to BRNV Alyth (UK). In addition, the presence of *Pst*I endonuclease (CTGCA^G) site in CPs region distinguished isolates from Finland. The sRNA data assists unbiased virus detection. In this study, molecular diagnosis of CPs sequences rapidly detected BRNV, a virus at low titres in red raspberry.

Fhilmar Raj Jayaraj-Mallika won the ISHS Young Minds Award for the best poster at the XII International *Rubus* and *Ribes* Symposium: Innovative *Rubus* and *Ribes* Production for High Quality Berries in Changing Environments in Switzerland in June 2019.

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Improving the storage quality of mulberry fruit (*Morus nigra* L.) by different bio-materials

› İbrahim Kahramanoğlu

İbrahim Kahramanoğlu holds a PhD in Postharvest Biology and Technology and works as a lecturer at the European University of Lefke (Northern Cyprus). The objective of his studies is to test the effects of eco-friendly and edible bio-materials on the postharvest storability of fresh products. The human population on earth is increasing tremendously while available resources (i.e., water and soil) are continuously being regionally depleted. Therefore, postharvest storage of fresh products is as important as their production. The estimated postharvest loss throughout the world is around 10-15% in developed countries and 20-40% in developing countries, depending on the products. Agrochemicals play an important role in controlling some postharvest diseases, but misuse or excessive use of agrochemicals may cause significant damage to human and environment health. In line with this information, in a recent study, İbrahim Kahramanoğlu aimed to improve the postharvest storability of mulberry (*Morus nigra* L.) fruits, which are very soft and perishable, with different bio-materials. The treatments of the study were: two kinds of eggshell extracts [the supernatant (ESEx1) and the pellet (ESEx2)], 0.5% black seed (*Nigella sativa* L.) oil (Ns) and Mediterranean wild thyme (*Thymus capitatus* L.) oil (Tc). Freshly harvested fruits of the study were randomly divided into five groups (number of treatments, including control) of 100 fruits in each of the four replications. The treatments were applied by dipping the fruits, and then air drying them for 30 min. The mulberry fruits were then stored in a cold room at 4±1°C and 95% relative humidity. The study continued for 15 days and quality parameters were measured with 3-day intervals. Results showed that ESEx1, ESEx2 and Ns significantly reduced the weight loss and rotting rate; and the fruits treated with those treatments had acceptable quality even 12 days after storage (weight loss between 10.10 and 15.40%; and rotting rate between 0.081 and 0.163). Results were also found to be promising for the *Thymus capitatus* oil, and higher doses provided improved results. Findings of the present study suggest that the eggshell extracts provide preservation of the postharvest quality of mulberry fruits. If these results are confirmed for different fresh products, bio-preservatives such as these might be developed industrially and used for quality preservation during storage. İbrahim Kahramanoğlu won the ISHS Young Minds Award for the best oral presentation at the IV Balkan Symposium on Fruit Growing in Turkey in September 2019.

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Pomological, quality and organoleptic traits of some autochthonous apple cultivars in Prespa region, North Macedonia

› Nikola Saraginovski

Nikola Saraginovski is pursuing a PhD degree at Saints Cyril and Methodius University, while working as a Teaching Assistant at the Department of Fruit Growing at the Faculty of Agricultural Sciences and Food, in Skopje, North Macedonia. He participated in the IV Balkan Symposium on Fruit Growing in Istanbul, Turkey, with the research entitled: "Pomological, quality and organoleptic traits of some autochthonous apple cultivars in Prespa Region, North Macedonia". In the most important apple (*Malus × domestica*) growing region in the country, Prespa, apples have been grown for centuries. Throughout that long period of time, different cultivars have been dominantly grown. At the first half of the twentieth century, a large number of newly created, more productive, international cultivars were introduced, replacing the heritage types. With the biodiversity preservation at risk, preserving older cultivars from extinction is critical to maintain genetic diversity. Many heritage apple cultivars were abandoned by growers prior to the introduction of modern production technologies. The objective of this study was to assess the potential of reutilization of heritage cultivars and measuring their response to modern fruit production methods. The study aimed to evaluate the fruit characteristics and consumer acceptance of 13 heritage apple cultivars, grown in an orchard using typical cultural practices. In addition to conservation efforts, some cultivars deserve additional attention. 'Ciganka', 'Pašinka' and 'Karapaša' could be recommended for fresh consumption on a limited scale in typical rural areas with reduced chemical usage for protection of the surrounding environment. These cultivars could be good additions for the diversification of apple production in the region. These unique cultivars could satisfy the need of niche consumers who are willing to pay extra for locally grown cultivars with reduced use of agro-chemicals. 'Kolaćara' and 'Crveno Pote' had low sugar/acid ratios and are recommended for juice and cider production. 'Ciganka', 'Karapaša' and 'Pariska Palma' had high sugar/acid ratios and soluble solid content, and are recommended for wine and spirit production or drying. 'Zvečarka' and 'Tetovka' possess a specific and pleasing aroma and will be used as parents in specific breeding programs. The long-term conservation of each of these cultivars will enrich the future of this important fruit growing region.

Nikola Saraginovski won the ISHS Young Minds Award for the best poster at the IV Balkan Symposium on Fruit Growing in Turkey in September 2019.

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Combined effect of heat treatment and moringa leaf extract (MLE) on colour development, quality and postharvest life of tomatoes

› Bonga Ngcobo

Bonga Ngcobo is a PhD student in the Discipline of Horticultural Science at the University of KwaZulu-Natal, Pietermaritzburg, South Africa. He graduated with a BSc Agric and Masters (*cum laude*) from the same University and continued his studies under the supervision of Professor Isa Bertling, from the same Discipline, and Dr. Alistair Clulow, from the Discipline of Agrometeorology. His research focuses on improving the quality and yield of solanaceous (nightshade) crops using innovative, potential horticultural practices, such as application of moringa leaf extract and heat treatments. His current research on tomato (*Solanum lycopersicum*) quality, one of the solanaceous crops, is trying to increase phyto-nutrients, such as lycopene and vitamin C, in tomato and other solanaceous crops. To boost tomato markets in South Africa, which are currently under pressure, improving the nutritional quality while maintaining shelf life is a major challenge. Therefore, Bonga's research examined the effects of hot water treatment (HWT) and *Moringa oleifera* leaf extract (MLE), both safe and inexpensive treatments, individually and in combination, on colour, quality attributes, and postharvest life of the newly developed 'Snow White' cherry tomato. Tomatoes were harvested at mature green stage, brought into the laboratory and divided into various batches. These batches were treated with HWT at 48°C for 2 min, coated with either 5 or 10% MLE, or subjected to a combination of HWT at 48°C for 2 min and MLE at 5 or 10%. Bonga's study demonstrated that HWT combined with either 5 or 10% MLE significantly enhanced tomato fruit colour and carotenoid, particularly ß-carotene, concentrations, with no significant effect on total soluble sugars and firmness. The same treatment seems viable to extend postharvest life of tomatoes.

Bonga Ngcobo won the ISHS Young Minds Award for the best poster at the II International Symposium on Moringa in South Africa in November 2019.

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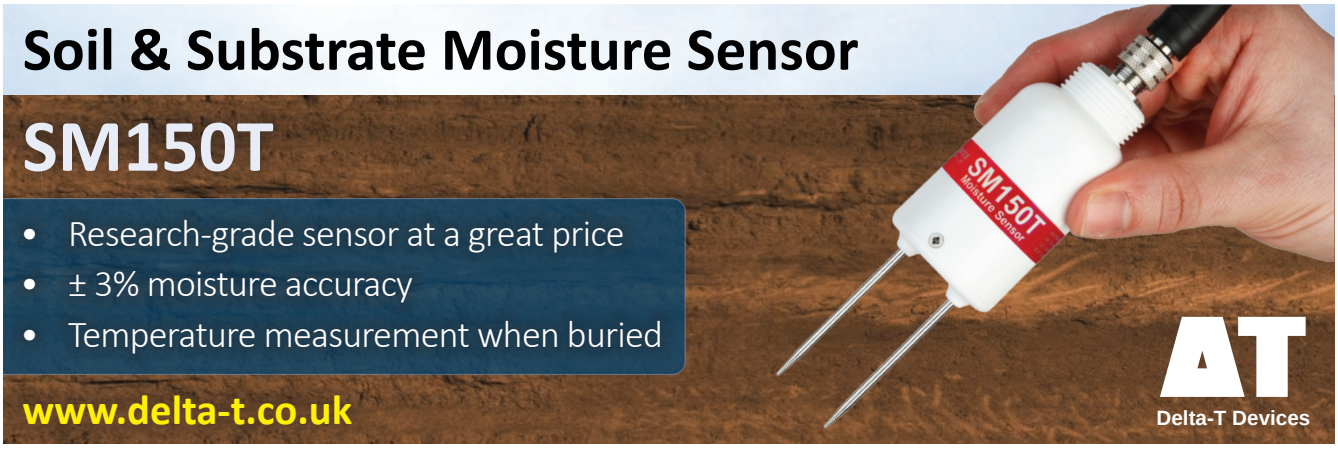

Brazilian coffee: from the seeds to the beverage

Elisa Reis Guimarães and Rubens José Guimarães

"In a cup of coffee, you can put the beauty of the world. In a cup of coffee, you can feel the bitter and sweet taste of life".
(Jorge Amado – Brazilian writer)

Coffee represents an important source of income and subsistence for approximately 125 million people worldwide, being the second most consumed beverage, only behind water. Brazil is a prominent country in the international coffee market: it is not only the world's largest producer and exporter of the beans, but also the world's second largest consumer of the beverage. Its continental dimensions and different coffee producing regions, with different soils and microclimates, in addition to varied production characteristics, provide a wide variety of the beverage's sensory profiles, which serve the most diverse and demanding consumers. The national industry and retail coffee sectors, particularly in the specialty coffee category, gained prominence in recent decades, driven by high quality work conducted by educational, research, and extension institutions committed to promoting the sustainable development of this market. The paths of coffee in the Brazilian market are addressed below with a call to the **II ISHS School on Beverage Crops, Brazil 2021**, which will be held at the Federal University of Lavras, in the state of Minas Gerais, Brazil. This event will provide participants with knowledge on plant propagation and cultivation, genetic improvement, harvesting and storage, processing and marketing of coffee, citrus and tropical fruits (banana, mango, pineapple, among others), sugar cane, grapes and cereals, with emphasis on beverage production.

› Coffee plantation in Brazil. Source: Rubens José Guimarães.

Brief worldwide history of coffee and its arrival in Brazil

Different tales are told about the discovery of coffee, but the plant likely originated in the *Kaffa* region, currently Ethiopia. The first records of coffee consumption, however, date from the middle of the 15th century, when Sufi monasteries from the Arabian Peninsula (present-day Yemen) prepared an infusion of boiling water using the leaves and berries. They learned how to prepare this beverage from the Ethiopians. The beverage produced was similar to tea because it kept them awake during long night vigils. Subsequently, new ways of preparing the drink were adopted, including roasting and grinding the beans before the infusion process (Pendergrast, 2010; Thurston et al., 2013). Although its initial consumption had an essentially utilitarian function, it soon gained a social characteristic, since the religious authorities concluded that the drink was not intoxicating and, thus, could be consumed by Muslims. Then, coffee started to be commercially cultivated and consumed in domestic environments, by affluent consumers, or in coffee shops (*kaveh kanes*) that spread throughout the region. Since then, coffee consumption has slowly expanded around the world, even gaining medicinal characteristics, being commercialized by Viennese apothecaries at the end of the 17th century (Morris, 2013; Pendergrast, 2010).

Since the discovery of the beans, the history of coffee has been marked by attempts to monopolize the product, by banning the export of its seeds, followed by its expansion throughout the world. It was also replete with attempts to repress consumption, due to its social characteristics and that it "stimulated rebellions" planned essentially in coffee shops, which were considered meeting points for intellectuals and citizens in search of news (Morris, 2013; Pendergrast, 2010). Its worldwide dissemination is therefore closely intertwined with the global history and development of several countries, since "the bean would help shape laws and governments, delay the abolition of slavery, exacerbate social inequities, affect the natural environment, and provide the engine for growth, especially in Brazil, which became the dominant force in the coffee world" (Pendergrast, 2010: 43).

The history of coffee in Brazil is closely linked to its social, political and economic development. It is believed that the first coffee seedlings arrived in the country in 1727, brought by the Portuguese officer Francisco de Melo Palheta, who cultivated them in his region of origin, in the state of Pará. Subsequently, the culture expanded to other states, such as Minas Gerais, São Paulo, Espírito Santo and Rio de Janeiro, and, already in 1830, it became

› Different coffee maturation stages. Source: Emanuelle Aparecida da Costa – Manager of CafEsal (UFLA's coffee shop school).

› Coffee flowers. Source: Emanuelle Aparecida da Costa – Manager of CafEsal (UFLA's coffee shop school).

the main Brazilian export product (Martins, 2012). As highlighted by Machado (2006: 1): "It was the profits from this crop, intensified from the 1830s and 1840s in the state of São Paulo, that allowed the emergence of railroads, the advance of urbanization, the entry of large waves of European immigrants (Italians, Germans, Spanish), the displacement of the center of political power from the Northeast to the Southeast, and even the refinement of Brazilian manners and customs."

However, the national coffee culture went through several crises in the first decades of the 20th century, mainly associated with the overproduction of the beans and the vulnerability of coffee growers to climatic events, pests and diseases that affected crops and fluctuations in international markets. Different attempts to intervene in this market were made in order to reduce the disparities between the production of the beans, the consumption of the beverage and the prices in international markets. Those attempts mainly included the acquisition of part of the national production by the Brazilian government, the construction of warehouses for regulatory stocks and the creation of taxes on bean exports. The crisis was so severe that, between 1931 and 1943/1944, the planting of new seedlings was prohibited and the Brazilian government resorted to the burning of 78 million coffee bags, equivalent to three times the annual global consumption at the time (Almeida et al., 2018; Martins, 2012).

In 1952, the Brazilian Coffee Institute (*Instituto Brasileiro do Café* - IBC) was created. IBC was an autarchy initially linked to the Ministry of Finance and, later, to the Ministry of Industry and Commerce. Its duties included the implementation of national coffee policy, through technical and economic assistance to the activity and the control of the commodity's commercialization (Brasil - Arquivo Nacional, 2013). Therefore, some practices adopted were the subsidized supply of green beans to national companies in periods of oversupply in the international market, the regulation of the entry of new firms in the segment and, in the macroeconomic plan, the control of retail coffee prices through the inflation control policy (Saes and Spers, 2006). However, the period of IBC's greatest intervention in the national coffee market occurred between 1959 and 1971, through the government's "Campaign for the Increase of Internal Coffee Consumption", aiming to minimize the pressure caused by the excessive supply of the commodity in the international market. With the tutelage of the State and the granting of subsidies, according to the company's processing capacity, the increase in the number of companies and the expansion of the capacity of those already established in the market were encouraged. Such protectionism in the sector resulted in the distortion of cost structures and in low technological investment, leading to the accumulation of inefficiency and managerial and technological unpreparedness of their companies (Saes and Spers, 2006).

The regulation of the industrial sector was essentially intended to favor the performance of the Brazilian trade balance through the appreciation of coffee in the international market. Therefore, the domestic market was left to absorb part of the surplus of non-exportable production, which, together with price fixing and the consequent disincentive to product differentiation, led to fierce competition for prices and low product quality, with a high degree of mixtures and impurities in its composition to reduce production costs. This led, in the 1980s, to a significant retraction in domestic demand for the product, which was also aggravated by the deregulation of this market, by the extinction of the IBC in 1990, and by the end of price fixing in 1992. There was, therefore, a disincentive to the production of superior quality coffees in the country, resulting in the adverse selection imposed by buyers, which "leveled down the quality of coffee offered by rural producers" (Saes and Spers, 2006: 356).

The drastic reduction in the quality of national coffee and the consequent drop in internal consumption of the beverage led to the promotion of actions such as the Self-Monitoring Program for the Coffee Industry, commonly known as the Seal of Purity of the Brazilian Coffee Industry Association (*Associação Brasileira da Indústria do Café* - ABIC). This program started in August 1989 and is still in force today. It aims at improving the coffee industry, increasing the product's credibility among Brazilian consumers and encouraging their increased consumption and knowledge about the beverage (ABIC, 2018a). Another initiative of ABIC, in this sense, was the establishment of the Coffee Quality Program (ABIC, 2018b), in 2004, aiming to demonstrate to the Brazilian consumer the different qualities available in national roasted and ground coffees. Thus, it established four quality categories, determined by global rating ranges of coffee quality (HQ) on a scale from zero to ten. They are: i) not recommended (HQ 0 to 4.5); ii) traditional/extra strong (HQ 4.6 to 5.9); iii) superior (HQ 6.0 to 7.2); and iv) gourmet (7.3 to 10) (ABIC, 2018c). Currently, ABIC also certifies the sustainability of coffees, capsule coffees and coffee shops, with its own seal and methodologies for evaluating these products/services (ABIC, 2018a).

Another important organization aimed at promoting the quality of national coffees is the Brazilian Specialty Coffee Association (*Associação Brasileira de Cafés Especiais* - BSCA), founded in 1991 by a group of 12 coffee growers who have identified significant potential in this market. In addition to its quality seal, which attests to the added value of the product and its traceability, BSCA provides technical and educational support to its members and promotes their participation in international events, generating business opportunities and bringing them closer to other actors in the productive chain (BSCA, 2020a). In partnership with the Brazilian Export and Investment Promotion Agency (*Agência Brasileira de Promoção de Exportações e Investimentos* - APEX) and the Alliance for Coffee Excellence (ACE), it promotes the national edition of the *Cup of Excellence*, one of the most renowned coffee quality contests in the world.

We do not intend to exhaust the actions designed to promote the quality and recognition of Brazilian coffee but cannot fail to mention the efforts of educational institutions, like federal universities and institutes, as well as research and technical assistance/rural extension companies. Through the production and dissemination of knowledge, they support other actors in this chain for the continuous improvement of their activities.

The end of the price fixing, together with such actions, contributed to the reversal of the reduction in the coffee consumption in Brazil and opened space for product differentiation and the consequent emergence and growth of the national category of specialty. Coffee differentiation appeared as a source of competitive advantage and for sustaining profit margins that are more satisfactory to the productive segment, allowing operations in specific markets and direct negotiation between producers and consumers. In this way, the actors start to develop a differentiated commercial relationship, marked by easier access to international markets and less dependence on traditional marketing channels (Zylbersztajn and Farina, 2001).

The coffee business in Brazil

The total area of coffee cultivation in Brazil is about 2,162,107 ha, of which 276,609 are in formation and 1,885,498 in production. The cultivation of *Coffea arabica* L. occupies 243,420 ha in formation and 1,514,349 ha in production, totaling an area of 1,757,769 ha (81.3% of the Brazilian coffee cultivated area), having as larger producers the states of Minas Gerais, São Paulo, Espírito Santo, Bahia and Paraná. The cultivation of *Coffea canephora* Pierre occupies 33,189 ha in formation and 371,149 ha in production, totaling an area of 404,338 ha, having the states of Espírito Santo, Rondônia and Bahia as major producers. The estimate of the Brazilian harvest of both coffee species for 2020 is between 57.15 and 62.02 million 60-kg bags of hulled coffee (CONAB, 2020).

According to the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE, 2006, 2017), the land distribution of coffee properties is composed of 188,392 properties with production of *Coffea arabica* L. and 75,969 with production of *Coffea canephora* Pierre, distributed in more than 1,794 Brazilian municipalities. Highly labor-intensive, coffee farming is responsible, directly and indirectly, for more than eight million jobs in the country (MAPA, 2017).

BSCA (2020b) considers the existence of 32 Brazilian coffee producing regions. Among them, five stand out for the production of specialty coffees and for obtaining Geographical Indications from the National Institute of Industrial Property (*Instituto Nacional de Propriedade Industrial* - INPI, 2018). Some of them are *Cerrado Mineiro, Mantiqueira de Minas, Norte Pioneiro do Paraná, Alta Mogiana* and *Região de Pinhal*.

According to BSCA estimates, the Brazilian specialty coffee production increased from 5.2 million 60-kg bags in 2015 to 8.5 million 60-kg bags in 2017, an increase of approximately 63% in the period (ABIC, 2018b). However, it is noteworthy that a large part of the production is still exported: in 2017, 7.6 million 60-kg bags were exported out of the 8.5 million 60-kg bags of specialty coffees produced in the country, equivalent to 89.4% of the total, the main destinations being the United States, Europe and Japan (Oliva, 2018).

The Brazilian commodity coffee industry has a large concentration of *players*: only 10 of the 355 companies that make up the national coffee industry (ABIC associates) hold 77.2% of the market share, whose monthly production volume (of roasted and ground coffee) was estimated at 1,147,736 bags between 2016 and 2017 (ABIC, 2017).

In the specialty coffee category, the difficulty in estimating the number of Brazilian roasters and micro roasters stands out. In 2017, ABIC had 283 associated companies that could be considered micro roasters (ABIC, 2017), but it is not possible to determine if they all work, whether or not exclusively, with specialty coffees. In the coffee shop sector something similar happens: according to Euromonitor, in a survey for BSCA, there are 13,095 coffee shops in the country, which include specialized and non-specialized establishments and other premium coffee shops, and it is not possible to determine exactly the quality of the coffee marketed by them for the indiscriminate use of the term 'special' (Proença, 2017).

The national coffee consumption reached a record of 22 million bags in 2017, with the national per capita consumption of roasted coffee estimated at 5.1 kg or 83 liters in the same period. Currently, traditional/commodity coffees represent between 90 and 95% of the national coffee consumption, being mostly purchased already roasted and ground. The profile of the Brazilian commodity coffee consumer, as presented by ABIC (2010), is composed mostly of women, aged between 36 and 50 and belonging to the middle class – about 48% of the Brazilian population.

Gourmet coffees, however, have the greatest potential for consumption growth among Brazilian consumers. Between the years 2017 and 2027, an increase of 26.2% in the national coffee consumption is projected, while these beans' production is expected to grow 33.6% and exports, 24.4% (MAPA, 2017).

In the specialty category, a consumption of 592,000 60-kg bags was estimated in 2017, an increase of 20.8% compared to the previous year, with a 19% increase in consumption between 2017 and 2018, totaling 703,000 60-kg bags and reaching a retail value of R$ 2.636 billion (US$ 680.43 million, in quotation on 12/31/2018), approximately 23% higher compared to the previous year. For 2021, a consumption of 1.063 million 60-kg bags of specialty coffees is projected in the country, which will represent 5.1% of the total national market (Proença, 2017; Rocha, 2018).

The profile of the Brazilian consumer of specialty coffees is predominantly composed of men between 21 and 35 years old, whose educational level consists of complete grad-

› Informal sensory evaluation of coffee (cupping) at CafEsal/UFLA. Source: Emanuelle Aparecida da Costa – Manager of CafEsal (UFLA's coffee shop school).

uate or postgraduate degrees and whose monthly family income normally exceeds five minimum wages. Such consumers are essentially motivated by the search for pleasure in coffee consumption, related to its quality attributes; by the curiosity about the producer origin, the beans production and postharvest methods; and by the support to environmental, social and economically sustainable initiatives related to coffee growing. Still willing to increase their consumption of specialty coffees and pay more for the product if more information about its characteristics is disclosed, many of these consumers purchase different equipment and methods for the beverage extraction in a domestic environment or consume it in specialized coffee shops. The researchers responsible for that study subdivide Brazilian consumers of specialty coffees into three categories – regular consumers, enthusiasts and specialists – who represent different levels of interest in the product and engagement in its consumption practice, verified through their motivations for consuming the beverage and product acquisition criteria (Guimarães et al., 2019a).

Brazilian coffee producing, roasting and brewing

The two most economically important coffee species, *Coffea arabica* L. (from East Africa) and *Coffea canephora* Pierre (from West Africa), are responsible for almost all coffee traded in the world. More specifically, the species *Coffea arabica* L. is originally from southwestern Ethiopia, southeastern Sudan and northern Kenya, at altitudes between 1,000 and 2,000 m and is currently grown in regions with higher altitudes of milder temperatures, between 18 and 21°C, on the African, American and Asian continents (Ferreira et al., 2019; Guerreiro Filho et al., 2008). The species *Coffea canephora* Pierre, on the other hand, originates from a hot (low annual average temperature of 22 to 26°C), humid and low altitude region, from Guinea to Congo, from the west coast to the central region of the African continent, with precipitation between 1,500 and 2,000 mm per year (Ferrão et al., 2007).

In Brazil between 1727 and 1933, coffee growers themselves selected the best plants and conducted an empirical genetic improvement. From 1933, when the Genetics Section of the Campinas Agronomic Institute (*Instituto Agronômico de Campinas* - IAC/Brazil) was created, genetic improvement started to be carried out with scientific methodology that increased the coffee productivity to 395% in relation to the 'Typica' cultivar that had been introduced in Brazil (Carvalho, 1985).

Currently, the techniques used in Brazil, e.g., genetic improvement, increase of seed quality, and harvest and postharvest processing, allow the reach of average yields of about 60 bags of *arabica* coffee, and about 120 bags of the *canephora* species per hectare with the use of irrigation. However, the average productivity in rural properties still needs to improve (Guimarães et al., 2019b).

› Different coffee brewing methods. Source: Emanuelle Aparecida da Costa – Manager of CafEsal (UFLA's coffee shop school).

The production of coffee tree only starts significantly after three years of sowing in a nursery. Therefore, it takes about six months for the formation of seedlings in a nursery and then another 30 months in the field for the first significant harvest, which only then will allow the return of part of the invested capital (Guimarães et al., 2019b).

In coffee trees, the branches responsible for fruit production need to grow for 12 months and only then bear fruit. Thus, throughout its productive life, coffee needs to divide the photo-assimilates produced between the growth of new branches and the production of fruits. As the fruits are "strong drains", during a year of high production the branches grow little and consequently the next productivity will be low. This oscillation between high and low yields is called the "coffee biennial" (Guimarães et al., 2019b).

At the beginning of the formation of coffee crops, or even after pruning, there is enough space between the planting lines for intercrops. In these cases, coffee growers (especially those with smaller properties) choose to plant annual crops between the lines of their coffee trees, making better use of the property's areas, rationalizing labor (usually family), and producing subsistence foods with the possibility of selling surplus to increase family income. Some crops used in intercropping are beans, corn, rice, soy, peanuts, cassava, sunflower, cotton, tobacco, vegetables and medicinal plants. In some regions, coffee plantations are also used in association with some other perennial crops such as rubber trees, papaya or other fruit trees, or coffee is also grown using agroforestry systems (Guimarães et al., 2019b; Reis and Da Cunha, 2010).

Around the month of April, when the fruits that ripen first start to fall, cleaning is done under the coffee plants to facilitate harvesting. At that time farmers prepare for harvest by renovating roads; acquiring the materials necessary for the harvest, such as "cloths", sieves, baskets, among others; cleaning granaries and repairing drying yards; and revising and renovating the machines and equipment that will be used. The harvest is done manually or mechanically. The mechanization can be done with large machines or even with portable harvesters that have facilitated the work of harvesting the coffee (Guimarães et al., 2019b; Reis and Da Cunha, 2010).

After harvesting, coffee is processed dry or wet, and then it is sun-dried or mechanically-dried and is subsequently hulled (Guimarães et al., 2019b).

Further on, the coffee industrialization starts. Green coffee goes through a roasting process, aimed at obtaining different beverage sensorial profiles. After a period, the beverage is extracted. Coffees also go through a cupping process in order to evaluate its sensorial quality (Borém, 2008).

In the specialty coffee category, the cupping process commonly follows the Specialty Coffee Association (SCA, 2018a, b) standards and protocols, which take into account coffee attributes such as fragrance/aroma, flavor, aftertaste, acidity, body, balance, sweetness, clean cup, uniformity, and overall aspect. Those coffees that reach over 80 points on the SCA 100-point scale are considered specialty, with those that exceed 90 points also being considered outstanding and reaching the highest selling prices.

All the steps in coffee production, since its planting, through its hulling, roasting and extraction, influence beverage quality. Different techniques are used in each of these steps to achieve different beverage profiles (Borém, 2008).

In Brazil, the most used coffee brewing method is the filter cloth or paper filter, with espresso coffee gaining prominence in recent years. Also, the significant growth of specialty coffees consumption in the country and the consumers' desire to develop their "sensory coffee library" stimulated the increasing adoption of other filter brewing methods, such as the Chemex, Hario V60, French Press, Aeropress, and Siphon, among others (Guimarães et al., 2016).

Brazilian coffee research

With the extinction of IBC in 1990, the coffee-related institutions felt the need to organize themselves and their research activities to optimize results. Thus, in 1996, by the initiative of national government, the Delibera-

tive Council for Coffee Policy (*Conselho Deliberativo da Política do Café* - CDPC), linked to the Ministry of Agriculture, Livestock and Supply (*Ministério da Agricultura, Pecuária e Abastecimento* - MAPA), was created. Also in 1996, the National Coffee Research and Development Program (*Programa Nacional de Pesquisa e Desenvolvimento do Café*) was created, under the management of CDPC and coordination of the Brazilian Agricultural Research Company (*Empresa Brasileira de Pesquisa Agropecuária* - Embrapa), in partnership with the institutions that make up the National Agricultural Research System, federal institutes and universities, and the private sector. In order to plan and carry out coffee research in Brazil, the Brazilian Coffee Research and Development Consortium (CBP&D/Café, 2020) was created in 1997, with the coordination of Embrapa and the participation of the following institutions:

- Agricultural Research Corporation of Minas Gerais (*Empresa de Pesquisa Agropecuária de Minas Gerais* - EPAMIG);
- Agronomic Institute of Campinas (*Instituto Agronômico de Campinas* - IAC);
- Paraná Agronomic Institute (*Instituto Agronômico do Paraná* - IAPAR);
- Espírito Santo's Institute of Research, Technical Assistance and Rural Extension (*Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural* - INCAPER);
- Ministry of Agriculture, Livestock and Supply (*Ministério da Agricultura, Pecuária e Abastecimento* - MAPA);
- Agricultural Research Corporation of the State of Rio de Janeiro (*Empresa de Pesquisa Agropecuária do Estado do Rio de Janeiro* - Pesagro-Rio);
- State University of Southwest Bahia (*Universidade Estadual do Sudoeste da Bahia* - UESB);
- Federal University of Lavras (*Universidade Federal de Lavras* - UFLA);
- Federal University of Viçosa (*Universidade Federal de Viçosa* - UFV).

Today, CBP&D embraces more than 40 Brazilian coffee-related institutions.

It is in this environment of research, teaching, extension and coffee production that the II ISHS School on Beverage Crops, Brazil 2021, will occur. The event will be held at the Federal University of Lavras, Minas Gerais, Brazil under the leadership of Patrícia Duarte de Oliveira Paiva, PhD, who is a professor at the Federal University of Lavras and ISHS Board Member. More information will be available soon at www.ishs.org.

II ISHS School on Beverage Crops, Brazil 2021

Brazil was chosen to host this event because it is the largest country in South America, and the greatest coffee, orange, and sugarcane producer in the world. The country is also third in the world for fruit production, with a continuously increasing wine industry. Therefore, this is the perfect place for a course on beverage crops, since the attendees, in a 3-week period, have a chance to learn and see the entire process, including plant propagation and cultivation, breeding, harvest and storage, processing and commercialization, and quality evaluation of important crops cultivated in Brazil for beverage purposes. Those crops include coffee, citrus and tropical fruit (banana, mango, pineapple and other), sugarcane, and vine and cereals. This is a unique experience, especially for those that are studying – Young Minds – and beginning their careers in Horticulture!

The event will be held at the Federal University of Lavras (UFLA, 2021), in the city of Lavras, Minas Gerais state, located on the southwest region of Brazil, the most important national area for these crops' production.

Founded in 1908 by Dr. Samuel Rhea Gammon, the then Agricultural School of Lavras, later the School of Agriculture of Lavras (ESAL) and, today, Federal University of Lavras (UFLA), is one of the most traditional and renowned institutions of higher education of Brazil (Guimarães et al., 2015).

UFLA is the eighth best Brazilian federal institution of higher education in the ranking of the Emerging Economies University Rankings 2020, of the British magazine Times Higher Education, and the second among universities in the state of Minas Gerais. UFLA

› Partial aerial view of UFLA's Campus in Lavras-MG. Source: UFLA's Communication Board (DCOM).

was also recognized in the Green Metric Ranking, occupying the 29th position in their worldwide general ranking and the second in Latin America and Brazil (UFLA, 2020). The Green Metric assessment takes into account: configuration and infrastructure, energy and climate change, waste, water, transport and mobility, and education and research. Thus, UFLA is not only concerned in achieving great higher education standards, but is also dedicated to protecting the environment and reducing the impact of its activities.

At UFLA, host organization for the **II ISHS School on Beverage Crops, Brazil 2021,** attendees will be able to see all of the steps of coffee production and industrialization, and taste high quality coffees from different Brazilian producing regions at our Coffee Shop School (*Cafeteria Escola* - CafEsal).

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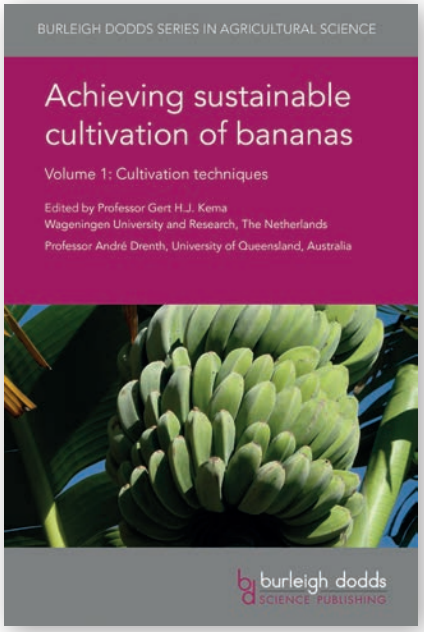
New Books
Websites

› New books, websites

Book reviews

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



Kema, G.H.J., and Drenth, A., eds. (2018). Achieving Sustainable Cultivation of Bananas, Volume 1: Cultivation Techniques (Cambridge, UK: Burleigh Dodds Science Publishing), pp.378. ISBN 9781786761569 (hardback). £180.00.

A 20% discount will be received by entering the code "CHRON20" when ordering through https://shop.bdspublishing.com/store/bds/detail/workgroup/3-190-55859

As for volumes previously published in the Burleigh Dodds Science stable, adaptation to climate-smart principles is a key thread running through this series. Bananas are cultivated in almost 140 tropical and subtropical countries, generating over US $50 billion per year. Four hundred million of the world's population rely on bananas as a staple food and/or source of income and it is the world's most exported fruit crop, according to the FAO.

Despite these figures, bananas are considered an orphan crop in terms of investment into sustainable and efficient production practices. This book, the first of three volumes, which draws upon expert knowledge from around the world, seeks to highlight efforts towards achieving sustainable cultivation. The volume is divided into three sections, namely a review of current challenges in banana production, a survey of improving cultivation practices right across the value chain and, finally, an assessment of how to measure and improve the environmental impact of banana cultivation.

The first part highlights the origin, domestication, dispersal and production of bananas as well as expanding on the opportunities and challenges for smallholder producers. There is an extensive review of the evolution of the banana industry and its future prospects. This section also highlights the importance of banana cultivation in Africa and its impact

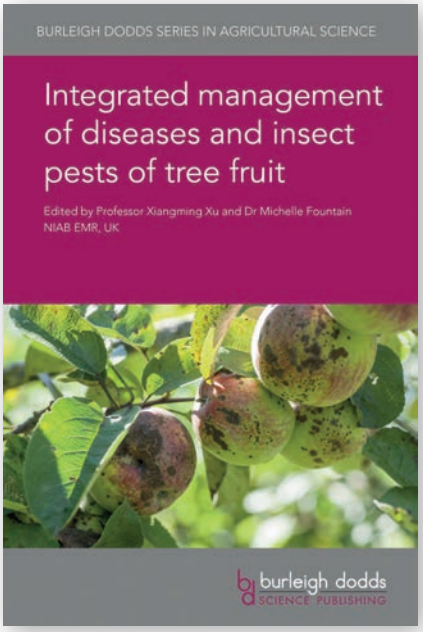
on the continent and its people. It also points out the role of bananas and plantains in global food security, particularly for developing countries where smallholder farmers are faced with challenges right across the value chain from production to marketing. The second part details how various practices can be improved across the value chain. These include on-farm sustainable management practices, most of which require an understanding of plant physiology and how it ultimately affects yield; the importance of using the correct propagules to ensure optimum plant performance; the importance of sourcing the correct planting material free of pests and diseases to not only ensure that healthy planting material is used for establishment, but also that risk of spread is reduced. A chapter outlining various certification schemes suggests that although appearing cumbersome, the schemes also encourage various holistic approaches towards achieving increased productivity and sustainability. Following chapters describe climate, climatic constraints and their impact on adoption of relevant cultural practices, including soil nutrition. Surprisingly, soil nutrition is a poorly-researched aspect of banana cultivation world-wide given that soil management is critical for optimum production of any horticultural crop. The final two chapters in this section highlight strategies, innovations and challenges that should be addressed throughout the supply chain to ensure that quality bananas are produced.

The third and final part focusses specifically on sustainability and its improvement, as well as the importance of all aspects of production and how they are managed in organic systems.

The book provides an excellent overview of banana cultivation across the world and how the adaptation and adoption of inter-disciplinary management strategies ensure sustainable production.

Each chapter of the book has an extensive reference list, which guides the reader towards further literature on each topic, making this volume a comprehensive foundation of knowledge on which future research strategies can be built.

Reviewed by Karin Hannweg, Chair ISHS Division Tropical and Subtropical Fruit and Nuts



Xu, X., and Fountain M., eds. (2019). Integrated Management of Diseases and Insect Pests of Tree Fruit (Cambridge, UK: Burleigh Dodds Science Publishing), pp.723. ISBN 9781786762566 (hardback). £210.00.

A 20% discount will be received by entering the code "CHRON20" when ordering through https://shop.bdspublishing.com/store/bds/detail/workgroup/?id=3-190-82511

This volume, in the Burleigh Dodds Series in Agricultural Science, provides extensive reviews of advances in research information on key diseases and insect pests, and mites, affecting tree fruit. Each of the 22 chapters is compiled by distinguished international experts in their field of research. The book discusses integrated tree fruit disease management techniques, such as surveillance and monitoring, breeding disease-resistant cultivars, and improved fungicide application. Also reviewed is the ecology of major insect and mite pests. Other chapters discuss a wide range of tree fruit pests, and ways of improving integrated pest management (IPM) from monitoring and forecasting to agronomic practices, and methods of biological control.

Part 1 of the book (Chapters 1-8) – 'Fruit diseases', focuses on fruit diseases and provides detailed research summaries on the causes of key tree fruit fungal diseases (apple scab, powdery mildew, apple replant diseases, apple canker in Europe and Asia, and brown rot), and viral diseases (apple mosaic virus and plum pox) considered to be of international importance.

For each fungal disease there are sections on symptoms, the life cycle and epidemiology, host resistance, orchard management, chemical and cultural control, and future trends. For the virus diseases discussed, there are also sections on detection, transmission, and the genetic and molecular basis of plant resistance.

Part 2 (Chapters 9-14) – 'Integrated fruit disease management', provides up-to-date information on the challenges for integrated fruit disease management techniques involving surveillance, breeding resistant cultivars, improved fungicide application, and the use of biological control agents.

There are chapters devoted to disease monitoring and decision-making, breeding fruit cultivars with durable disease resistance, improving plant propagation methods for fruit disease control, improving fungicide use in integrated disease management, the use of biological control agents in disease management strategies, and new technology for managing postharvest diseases including physical, chemical, and biological control agents.

Part 3 (Chapters 15-18) – 'Insect pests of fruit'. These chapters review the ecology of major insect pests (aphids, tortricid moths, and fruit flies), and mites, and provide details on their integrated management in tree fruit production. These involve insecticide programmes, physical crop protection, cultural and biological control, mating disruption, postharvest management, and molecular tools.

Part 4 (Chapters 19-22) – 'Integrated management of fruit insect pests' reviews methods to improve integrated pest management (IPM) techniques for tree fruit, and addresses the use of monitoring and forecasting, agronomic practices, and biological control. There are chapters on cultural control of arthropod pests in temperate tree fruit production, improving monitoring and forecasting in integrated management of fruit arthropod pests, and biological control in integrated management of deciduous fruit insect pests. The use of semiochemicals, and the optimizing of insecticide use in integrated management of fruit tree insect pests are also discussed.

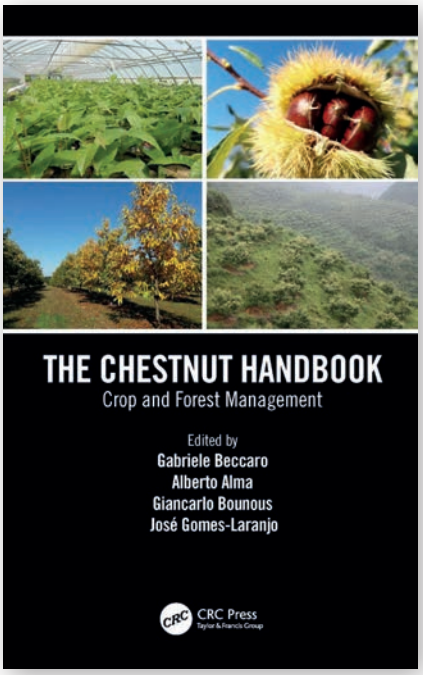
In each of the 22 chapters, an extensive up-to-date list of references is provided, together with a particularly useful section on 'Where to look for further information'. There are also some useful illustrations, tables, charts, and diagrams that present information in a very understandable format.

Present day and future fruit production is, and will be driven by supermarket and con-

sumer demands for product that is both free of pesticide residues and blemishes, and is grown in an environmentally-friendly way. The contents of the chapters in this volume go a long way in providing the scientific information required to develop truly integrated management strategies. The authors of the presented reviews provide a balanced view of chemical, cultural, and biological control practices for integrated diseases and pest management.

The distinguished authors provide extensive coverage of the different challenges faced by growers in the integrated management practices required to sustainably maintain control of diseases and pests of tree fruit.
In conclusion, this extremely comprehensive, accurate, and useful volume of reviews in the Burleigh Dodds series is recommended as an important reference for professionals and students alike involved in the management of diseases and insect pests of tree fruit. The reviews of the up-to-date scientific information available on the many different factors and interactions involved in integrated disease and pest management will be a great asset.

Reviewed by Chris Hale,
CNH Consulting, New Zealand



Beccaro, G., Alma, A., Bounous, G., and Gomes-Laranjo, J., eds. (2019). The Chestnut Handbook – Crop and Forest Management (Boca Raton, FL, USA: CRC Press, Taylor & Francis Group), pp.351. ISBN 9781138334021 (hardback) / 9780429445606 (ebook). $169.95 (hardback) / $52.16 (ebook). www.taylorfrancis.com.

The new '*The Chestnut Handbook – Crop and Forest Management*', by CRC, edited by Gabriele Beccaro, Alberto Alma, Giancarlo Bounous and José Gomes-Laranjo is really something you can't miss. It is the result of the common effort of 39 scientists coming from research institutions of 12 countries, in Europe, US, Australia, Japan, China, and South America. All cooperated in this extraordinary book, which is comprised of 13 chapters and 351 pages. The book is enriched by many specific figures, tables, and diagrams that make the reading of each chapter, and of the whole book, easy and rich with scientific and technical information. From history to nursery, crop, coppice (i.e., woodlands) and forest management, the book is a beautiful journey around the world of chestnut. It travels from its European and Chinese roots, with their different extraordinary traditions and genetic pools, to the relatively new techniques of chestnut cultivation in Australia, New Zealand, Chile, and Argentina. My mother recommended to her grandchildren to always carry a "magic chestnut" in their pockets. We collected nuts from our chestnut trees, because it would always be good luck for us. Still, I keep chestnuts for them. In the same way, I strongly suggest that you keep this book on your shelves, because you will always find the information you need on this extraordinary species.

Reviewed by Paolo Inglese,
University of Palermo, Italy

New titles

Palukaitis, P., and García-Arenal, F. (2019). Cucumber Mosaic Virus (St. Paul, MN, USA: APS Press), pp.380. ISBN 978-0-89054-609-3 (hardcover). $259.00. www.shopapspress.org

Palada, M.C., Ebert, A.W., and Joshi, R.C., eds. (2019). The Miracle Tree - Moringa oleifera, 2nd edn (Bloomington, IN, USA: Xlibris), pp.494. ISBN 9781796044546 (softcover) / 9781796044539 (e-book). $241.99 (softcover) / $5.95 (e-book). www.xlibris.com

First International Symposium on Botanical Gardens and Landscapes

Division Landscape and Urban Horticulture #ishs_durb
Division Ornamental Plants #ishs_dorn
Division Plant Genetic Resources and Biotechnology #ishs_dbio

› Participants of the symposium.

The First International Symposium on Botanical Gardens and Landscapes (BGL 2019) was successfully held on December 2-4, 2019, in Bangkok, Thailand. The symposium was organized by the Department of Plant Science, Faculty of Science, Mahidol University, under the auspices of the International Society for Horticultural Science (ISHS) and with the support of the Nikita Botanical Gardens, the Plant Genetic Conservation Project under the Royal Initiative of HRH Princess Maha Chakri Sirindhorn (RSPG), the Department of Agriculture (DOA), the Thailand Institute of Scientific and Technological Research (TISTR), and the Suan Luang Rama IX Garden.

The symposium attracted 148 participants, including presenters, accompanying persons, staff, researchers, and government agents from 14 countries around the world (Cambodia, China, Germany, Greece, India, Italy, Japan, Mauritius, Russia, Taiwan, Thailand, Uganda, United Kingdom, and USA), who shared their knowledge and experiences on a wide range of topics in botanical gardens and landscapes.

The symposium was opened by Associate Professor Dr. Kanchit Thammasiri, Symposium Convener, Associate Professor Dr. Puangpaka Umpunjun, Head of Department of Plant Science, and Associate Professor Dr. Palangpon Kongsaeree, Dean of Faculty of Science, followed by a welcome address and ISHS presentation by Professor Dr. Francesco Orsini, ISHS representative and Chair of ISHS Division Landscape and Urban Horticulture. Dr. Yuri Plugatar, Director of Nikita Botanical Gardens, gave a welcome address and introduced the Nikita Botanical Gardens. Then, Professor Dr. Francesco Orsini presented the ISHS certificate and medal to the Convener. The souvenirs to the symposium sponsors were presented by the Convener and the opening ceremony ended with group photographs.

There were two days of scientific program, starting with one keynote speaker, Professor Shengji Pei, Kunming Institute of Botany, China, and four invited speakers, namely Professor Dr. Hugh W. Pritchard, Royal Botanic Gardens, Kew, United Kingdom; Professor Dr. Chunlin Long, Minzu University of China, China; Professor Dr. Francesco Orsini, Bologna University, Italy; and Professor Dr. Irina Mitrofanova, Nikita Botanical Gardens, Russia. Then, 36 oral presentations were divided into five sessions: Research in botanical gardens, Research in landscapes, Research in plant conservation, Research in plant tissue culture, and Research in production, physiological, phytochemical, and molecular studies. In addition, 64 posters were presented over the two days. All oral and poster presentations were of interest to participants, who responded and shared knowledge and experiences with questions, suggestions, and discussion. Further discussions took place during the breaks, lunches, welcome dinner, and technical tour, which encouraged the participants to exchange research ideas, projects, and common interests.

The social program of the symposium included a welcome dinner, a cultural show relating to old Thai history, and a technical tour. Many pictures were taken and the participants enjoyed talking to old friends and meeting new friends.

At the end of the second day, a business meeting was arranged by Professor Dr. Francesco Orsini and Associate Professor Dr. Kanchit Thammasiri. It was agreed by all participants that an ISHS Working Group on Botanical Gardens would be beneficial to carry on the momentum established by this first symposium. Participants in the business meeting agreed to join the Working Group, once its creation is agreed by ISHS. Professor Dr. Francesco Orsini proposed that Associate Professor Dr. Kanchit Thammasiri serve as Chair for this Working Group. Professor Dr. Hugh W. Pritchard seconded, and the motion was approved unanimously. The ISHS Young Minds Awards were presented to Ms. Wipawee Nilapaka, Ph.D. candidate from Mahidol University, Thailand, for the best student oral presentation, “Floral visitors of Kluai Bua Si Som (*Musa rubra*: *Musaceae*): an ornamental plant in Thailand” and to Mr. Rodjanacorn Chuengpanya, Ph.D. candidate from Mahidol University, Thailand, for

the best student poster presentation, "In vitro propagation and callus induction of *Hedychium longicornutum* Griff. ex Baker using different explants". At the end of the symposium, Associate Professor Dr. Kanchit Thammasiri expressed his appreciation to all participants, to sponsors of the symposium and to all members of the Organizing Committee for their efforts and contributions.

The last day was entirely dedicated to a technical tour in the Suan Luang Rama IX Garden. The garden was established in 1989 to celebrate King Bhumibol's 60th birthday. The main objective of the garden is to promote botanical knowledge through research and collections of plants, as well as to provide a venue for relaxation and instill the stewardship of natural resources and environment in general populace. The garden is the largest green space in Bangkok with a beautiful botanical garden, a large lake, and gardens inspired by countries around the world. The garden covers an area of approximately 200 acres with all the standard park features, including extensive playgrounds, swan boats, well-groomed gardens and tree-lined paths. The participants were very interested in the garden.

The book of abstracts is available on the symposium website: plantscience.sc.mahidol.ac.th/bgl2019. The proceedings of the symposium will be published as a volume of *Acta Horticulturae* after editorial review.

Kanchit Thammasiri

› Contact

Associate Professor Dr. Kanchit Thammasiri, Symposium Convener, Department of Plant Science, Faculty of Science, Mahidol University, Rama VI Road, Phayathai, Bangkok 10400, Thailand, e-mail: kanchitthammasiri@gmail.com

› Professor Dr. Francesco Orsini (right), Chair of ISHS Division Landscape and Urban Horticulture, presenting the ISHS certificate and medal award to Symposium Convener, Associate Professor Dr. Kanchit Thammasiri (left).

› Visit to the Suan Luang Rama IX Garden.

A B

› Associate Professor Dr. Kanchit Thammasiri and Professor Dr. Francesco Orsini presenting the ISHS Young Minds Awards to A) Ms. Wipawee Nilapaka for the best student oral presentation, and B) Mr. Rodjanacorn Chuengpanya for the best student poster.

› XI International Workshop on Sap Flow

Division Precision Horticulture and Engineering #ishs_deng
Division Physiology and Plant-Environment Interactions of Horticultural Crops in Field Systems #ishs_dphy

The workshop discussed plant water relations and their measurement and strongly focused on plant water transport. Understanding plant water relations is critical in determining plant and tree productivity, agricultural plant and forest management and practices, and the global-biogeochemistry. One of the highlights of the workshop was how this field is moving towards integrated measurements automation as well as normalized analyses.

In particular, the keynote presentation of Dr. Rafael Poyatos from Universitat Autònoma de Barcelona, CREAF, Spain, introduced a large database of sap flow data conducted in hundreds of locations around the world. In addition, several presentations focused on the development of tools and packages to handle measurements of water and carbon fluxes in plants and their surroundings.

The workshop series has traditionally focused more on measurement methodologies of sap flow but this time broadened its scope to other aspects of plant water relations. Thus, another highlight was the development of new tools and methods available to probe deeper into plant function (keynote presentation of Professor Kathy Steppe from Ghent University, Belgium). Broader still, the emergence of remote sensing as a tool to monitor plant water status across a large area and detect stresses remotely was discussed (keynote presentation of Professor Jeannine Cavender-Bares from University of Minnesota, USA).

› Participants of the workshop on a field trip to nearby forest.

Finally, a technical highlight was the option proposed for the first time in our series of workshops for remote attendance and presentation. The successful remote presentation and discussion with the audience were appreciated by the attendees and offered promising options for future meetings. This technology allowed participation where conflicting duties otherwise prevented physical attendance. It also reduced our overall carbon footprint.

The workshop was hosted at the Hyytiälä Forestry Station in southern Finland. It was organized by Teemu Hölttä, Yann Salmon, Kaisa Rissanen and Timo Vesala from the University of Helsinki. There were 82 participants, and ICT international, Dynamax, UP GmbH, Ecomatik and EMS Brno participated as sponsors to the workshop. The ISHS Young Minds Awards were given to Jeanne Simon from INRA and the University of Montpellier, France, for the best oral presentation and to Magali Nehemy from the Global Institute for Water Security, School of Environment and Sustainability, University of Saskatchewan, Canada, for the best poster.

Teemu Hölttä and Yann Salmon

› Winners of the ISHS Young Minds Awards: A) Jeanne Simon (best oral presentation), B) Magali Nehemy (best poster).

› Contact

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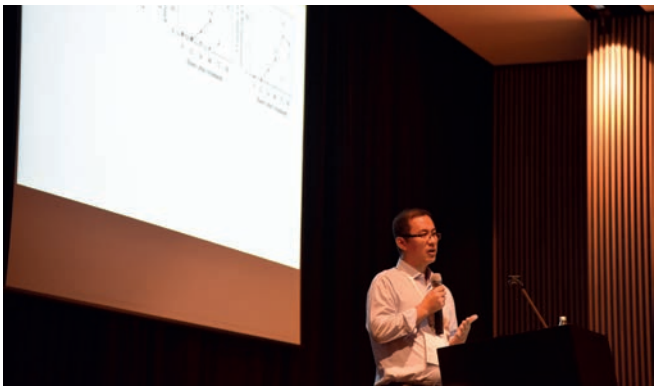
Yann Salmon, Institute for Atmospheric and Earth System Research (INAR)/Faculty of Sciences, University of Helsinki, Finland, e-mail: yann.salmon@helsinki.fi

› VI International Symposium on Fig

Division Temperate Tree Fruits #ishs_dfru



› Dr. Kumar Lama, winner of the ISHS Young Minds Award for the best oral presentation.

› General discussion on fruit quality and postharvest technology. From left to right: N. Major, K. Brkić Bubola, U. Aksoy, H. Ma, C. Crisosto

The VI International Symposium on Fig was held in Rovinj, Croatia, from 2-5 September 2019. The symposium was organized by the Institute of Agriculture and Tourism under the aegis of the International Society for Horticultural Science (ISHS). The conveners of the symposium were Dr. Smiljana Goreta Ban from the Institute of Agriculture and Tourism and Dr. Željko Prgomet from Polytechnic of Rijeka. More than 100 participants (including students) from 21 countries took part in the symposium, which included two invited opening lectures, 39 oral presentations and 35 posters. The symposium program consisted of six sessions: 1) Biodiversity, genetic resources, genomics, and transcriptomics; 2) Plant (eco)physiology and propagation; 3) Fruit quality and postharvest technology; 4) Fig production and orchard management; 5) Fig production under climate change; 6) Pest and disease management. During the symposium, a one-day technical visit was organized, where participants had a chance to visit fig orchards with local cultivars in northern Istria and got to taste some local fig products.

Figs are among the oldest fruits grown in areas with Mediterranean climate. After years of being unjustly neglected, now the demand is higher than the production. There is an increasing global interest in the marketing of fresh figs, while the new dried figs market also emerges due to the health benefits of this fruit species. However, in many countries, figs are still produced according to the traditional practices. They are harvested with small cracks in the skin and sold just at local markets due to low storage ability. Therefore, the main objective of this symposium was to update the scientists and R&D of the industry with the latest findings and research in the cultivation, processing and storage of figs.

In the first invited lecture, Dr. Moshe Flaishman presented up-to-date information on "Fresh fig industry: progress and challenges." During his talk, he highlighted the progress made in the past few years in our understanding of the molecular and biochemical mechanisms underlying fig fruit growth, maturation and functionality. In addition, he provided us with a better understanding of the inheritance of important traits and application of genome editing that will have a great impact on the development of new cultivars for the fresh fig industry. The second invited lecture was given by Dr. Uygun Aksoy and was devoted to "Dried fig industry: progress and challenges." She highlighted the pest damage and mycotoxins as the major challenges for the dry fig industry in the next period. Good agricultural and management practices and removal of low quality and contaminated fruit at processing level are for now the only methods used to prevent or reduce contamination. Also, the conversion to organic systems parallel to the demand of health-conscious consumers is a rising trend not only in Europe but also in the USA.

During the final discussion, several recent achievements in breeding of new fig cultivars, growing practices, and postharvest technology were highlighted as the main venue to major changes in the fig industry. These changes included: i) traditional fig orchards replaced by modern, dense and irrigated orchards; ii) development of new cultivars resistant to pests and diseases to improve the development of organic farming systems to produce a high-value product; iii) development of fig cultivars producing early breba and late-summer crops in order to have year-round production; iv) introducing new cultivars for drying and innovative healthy dried fig products; v) improved storage ability as a key point for the extension of fresh fig marketing.

Among the participants, eight young scientists competed for the ISHS Young Minds Awards. The award was given to Dr. Kumar Lama from the ARO Volcani Center, Israel, for the best oral presentation entitled "Ripening regulation and quality characterizations of fresh fig (*Ficus carica* L.)." A second award was given to Dr. Gabriele Usai from the University of Pisa, Italy, for his oral presentation entitled "High-quality, haplotype-phased de novo assembly of the highly heterozygous fig genome, a major genetic resource for fig breeding". No poster award was presented.

The next symposium, VII International Symposium on Fig, will be held in 2023, in China, as voted by the majority of the ISHS members, and Dr. Carlos Crisosto was elected as the new Chair of ISHS Working Group Figs.

› Dr. Željko Prgomet (right) presenting the ISHS Young Minds Award for the best oral presentation to Dr. Gabriele Usai (left).

After the symposium, a post-symposium tour lasting three days was organized in the southern part of coastal Croatia, Dalmatia, known for its tradition in fig growing and drying. The participants visited fig producers and agricultural cooperatives from that area. Within the post-symposium tour, the technical congress with a few presentations took place for the Croatian growers. Presentations were held by Dr. Moshe Flaishman ("World fresh fig industry: progress and challenges"), Dr. Željko Prgomet ("Current state and perspectives of the fig cultivation in Croatia") and Dr. Branka Levaj ("Fig processing").

Smiljana Goreta Ban and Iva Prgomet

› Participants of the symposium during technical visit.

› Exhibition of fig cultivars grown in Croatia and art work on figs.

› Contact

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Iva Prgomet, PhD, Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB), University of Trás-os-Montes and Alto Douro (UTAD), Quinta de Prados, 5000-801 Vila Real, Portugal, e-mail: iva.prgomet@gmail.com

› IV Balkan Symposium on Fruit Growing

Division Temperate Tree Fruits #ishs_dfru

› Participants at kiwifruit orchard at Gemlik district.

The IV Balkan Symposium on Fruit Growing was held in Istanbul, Turkey, from 14-18 September 2019. The symposium was organized by Atatürk University, under the aegis of the International Society for Horticultural Science (ISHS) Division Temperate Tree Fruits, in cooperation with the Atatürk Horticultural Central Research Institute belonging to the Ministry of Agriculture and Forestry of Turkey.

A total of 60 international scientists from 18 countries attended the symposium. Four days of the symposium were devoted to scientific oral and poster presentations and one day to a technical tour. The wide range of topics, mostly on temperate fruit species, was divided into five sessions: Genetics, biotechnology, breeding and genomics, Fruit

› Participants of the symposium.

quality, Germplasm evaluation, Rootstocks, and Pests and diseases. Altogether, 18 oral presentations and 39 posters were presented during the symposium.

During the one-day technical tour, participants visited Atatürk Horticultural Central Research Institute and joined the second national Aronia festival in the institute. In addition, participants visited fruit tree genetic resources parcels in the institute and some modern intensive kiwifruit and olive orchards in Gemlik District. Professor Dr. Sezai Ercisli, Symposium Convener, managed the field trip. Participants asked the kiwifruit and olive orchard owner many interesting questions related to production methods, orchard management, irrigation, etc.

In the opening ceremony, Professor Dr. Sezai Ercisli welcomed everyone and extended his thanks and gratitude to the participants and to the members of the Scientific and Organizing Committees. He also welcomed the participants on behalf of ISHS and gave a short presentation about ISHS.

In the Genetics, biotechnology, breeding and genomics session, international reports dealing with new insights on fruit tree genetics, biotechnology, breeding and genomics were presented. In particular, procedures to successfully cryopreserve pome fruits, new protocols for the in vitro propagation of *Prunus mahaleb*, and recent determination of the genetic diversity of lesser known temperate fruit species by using molecular marker systems were presented. In the Fruit quality session, external and internal fruit quality parameters were evaluated. This session focused on new postharvest reports of phytochemicals in different fruit species. In the Germplasm evaluation session, which covered a wide range of topics, the importance of genetic resources in a changing world was discussed. Several reports from different countries were presented on the diseases of indigenous fruit tree species and the impact of climate change on fruit tree genetic resources and developing adaptation strategies. New rootstocks for different fruit species and their propagation techniques were presented and management of pests and diseases on fruit species were discussed.

At the business meeting, a very active debate took place concerning the change of the symposium name from Balkan Symposium on Fruit Growing to South-Eastern Symposium on Fruit Growing; previously the Balkan Symposium on Vegetables and Potatoes changed its name to South-Eastern Symposium on Vegetables and Potatoes. However, participants voted and did not accept the new name. The new venue, Zagreb, Croatia, and convener, Dr. Boris Duralija, were selected for the next Balkan Symposium on Fruit Growing. The date has not yet been finalized.

ISHS Young Minds Awards were given to İbrahim Kahramanoğlu from the European University of Lefke (Northern Cyprus) for the best oral presentation entitled "Improving the storage quality of mulberry fruit (*Morus nigra* L.) by different bio-materials" and to Nikola Saraginovski from the Ss. Cyril and Methodius University, Department of Fruit Production Skopje (North Macedonia) for the best poster entitled "Pomological, quality and organoleptic traits of some autochthonous apple cultivars in Prespa region, North Macedonia".

Sezai Ercisli

› Contact

Prof. Dr. Sezai Ercisli, Ataturk University, Agricultural Faculty, Department of Horticulture, 25240 Erzurum, Turkey, e-mail: sercisli@atauni.edu.tr

› Winners of the ISHS Young Minds Awards: A) İbrahim Kahramanoğlu (best oral presentation), B) Nikola Saraginovski (best poster).

› Welcome speech of Convener, Prof. Dr. Sezai Ercisli.

› UrbanFarm2020 – International Student Challenge

Division Landscape and Urban Horticulture #ishs_durb

The second edition of the international student competition UrbanFarm, organized by the University of Bologna, Italy, was recently concluded. Since its inception, it has aimed at re-thinking the production of food in urban areas, promoting both environmental sustainability and welfare creation. Interdisciplinary teams of university students were invited to join the challenge, targeting the design of innovative urban farming systems that would integrate the best technological and design innovations for food production focusing on social, environmental and economic sustainability.

As with the first edition, the re-design work carried out by the different teams was focused on three abandoned spaces. The target locations of UrbanFarm2020 were in Galliera (Bologna, Italy), Lanuvio (Rome, Italy) and Longyearbyen (Svalbard Islands, Norway).

UrbanFarm2020 was launched on 15 October 2019, and the final phase of the competition was held on 19 and 20 February 2020 at the NovelFarm fair (Pordenone, Italy). The 20 teams that qualified for the final event were invited to set up a booth inside the fair to present and illustrate their projects to the visitors. During both days, fair attendees were able to express their preferences on the projects presented by the different teams. The points collected were added to the score achieved during the different stages of the competition. On the afternoon of 20 February, the teams presented their projects to an international jury, which included Runrid Fox-Kämper (ILS – Research Institute for Regional and Urban Development gGmbH), Stefania De Pascale (University of Naples Federico II), Silvio Caputo (University of Kent), Mohsen Aboulnaga (University of Cairo), and Xavier Gabarell Durani (Universitat Autònoma de Barcelona). The jury completed the evaluation of the projects based on the performances of the pitches and the overall score achieved during the previous stages of the competition. The three best teams were called again on stage for the final contest during which they engaged in a debate battle.

The jury awarded the first prize of €4000 to the Hop-E team composed by Brando Di Giovanni, Emanuele Durante, Laura Gabrielli, Luca Gialli and Michele Lapomarda (Alma Mater Studiorum University of Bologna, Italy), Mohamed Shahwan, Sherifa El-Haggan and Yasmina Ragab (Cairo University, Egypt), and Patricia Gonzalez Mariscal (Humboldt University of Berlin, Germany), who focused their project on the ex-SIAPA area in the municipality of Galliera.

The second prize, worth €2500, was awarded to the FENICE team composed by Andrea D'Aprile, Giuseppe Calore, Lorianne Ginot and Maia Correrella (Alma Mater Studiorum University of Bologna, Italy), Mariam Shehata, Mariam Elian, Nada Aly, Salma Abou Ghanema and Sohaila Ali (Cairo University, Egypt), and Olakunle Malik Sangodoyin (Ladoke Akintola University of Technology, Nigeria), who focused their project on the redevelopment of the area in the municipality of Lanuvio.

The third prize, worth €1000, was awarded to the Symbiont-Society team composed by Ana Krstic, Babette Brands, Federico Montefiori, Ferdinando Simoncelli, Francesca Anastasio, Martino Santoro and Matteo Landolfo (Alma Mater Studiorum University of Bologna, Italy), Andrea Frontani, Davide Libretti and Franco Abregu Guzman (Polytechnic of Milan, Italy), who focused their project on the city of Longyearbyen.

› Hop-E team, winner of the first prize. From left to right: Luca Gialli, Emanuele Durante, Yasmina Ragab, Sherifa El-Haggan, Michele Lapomarda, Mohamed Shahwan and Brando Di Giovanni.

› FENICE team, winner of the second prize. From left to right: Sohaila Ali, Nada Aly, Giuseppe Calore, Lorianne Ginot, Salma Abou Ghanema, Maia Correrella, Mariam Shehata, Andrea D'Aprile and Mariam Elian.

› Symbiont-Society team, winner of the third prize. From left to right: Federico Montefiori, Martino Santoro, Matteo Landolfo, Ana Krstic, Babette Brands, Ferdinando Simoncelli and Francesca Anastasio.

› Students awarded with the ISHS Young Minds Award.

Thanks to the dynamic learning approach of the competition, promising young students acquired the ability to work and collaborate in multidisciplinary and intercultural groups. The ISHS awarded the ISHS Young Minds Awards to all the members of the three winning teams. All the team members received an ISHS award certificate, a complementary subscription to the ISHS for the year 2020, an ISHS keyholder and an ISHS pin.

The organizing committee of UrbanFarm2020 would like to express heartfelt thanks to Alma Mater Foundation (FAM), Pordenone Fiere and Studio Comelli for generously supporting the organization of the competition; the company Flytech srl and the United Bank of Egypt for their contributions; the municipal administrations of Galliera, Lanuvio and Polar Permaculture; and, of course, all the other sponsors and partners listed on the UrbanFarm (https://site.unibo.it/urban-farm/en) website.

Giuseppina Pennisi, Francesco Orsini and Stefania De Pascale

› Contact

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Stefania De Pascale, Chair ISHS Division Protected Cultivation and Soilless Culture, Department of Agricultural Engineering & Agronomy, Via Universita 100, 80055 Portici (Naples), Italy, e-mail: depascal@unina.it

From the Secretariat

› New ISHS members

ISHS is pleased to welcome the following new members:

New Individual Members

Argentina: Prof. Dr. W. John Rogers; **Armenia**: Dr. Armen Gharibyan; **Australia**: Mr. Abdullah Al Hosni, Dr. Tintu Baby, Jurgen Clauss, Dr. Rosalie Daniel, Ms. Lisa Fyffe, Dr. Katie Stevens; **Austria**: Dr. Roland Ebel; **Belarus**: Iryna Puhachova; **Belgium**: Dr. Francoise Bafort, Dr. Luc Bruneel, Mr. Ben Colpaert, Mr. Geert Devriese, Maarten Hofkens, Ms. Leen Matthe, Ms. Nur Sholecha Ruseani, Bruno Telemans, Mr. Filip Vandenbussche; **Benin**: Dr. Sognigbe N'Danikou, Herbaud Zohoungbogbo; **Brazil**: Dr. Rodrigo Boaretto, Rosa Maria De Sousa, Ms. Monique Oliveira; **Bulgaria**: Mr. Vas Guo; **Canada**: Dr. Fadi Al-Daoud, Dr. Benjamin Cinget, Mr. Matteo Conti, Dr. Patrick Friesen, Arthur G, Jennifer Hoogenboom, Dr. Charitha Jayasinghege, Mr. Emilio Mastronardi, Mr. Suman Parajuli, Ms. Susan Rochefort, Ms. Chloe Veurink, Siyun Wang; **Chile**: Dr. Claudia Bonomelli, Assist. Prof. Maximiliano Bustamante, Prof. Rodrigo Infante, Mr. Erwin Ruiz, Dr. Pablo Ulloa; **China**: Dr. Ming Cai, Prof. Daidi Che, Prof. Dr. Yongsen Chen, Dr. Wenjun Huang, Riwang Li, Prof. Shixing Luo, Kaifeng Ma, Mr. Jianing Shao, Liyun Shi, Prof. Wen Xing, Li Xu, Prof. Dr. Liuqing Yang, Dr. Cunquan Yuan, Dr. Xi Yuan, Dr. Minhuan Zhang, Prof. Xiuxin Zhang; Chinese **Taipei**: Dr. Min-Chi Hsu; **Costa Rica**: Mr. Guillermo Jimenez; **Cote d'Ivoire**: Mr. Jean Mathias Koffi; **Cyprus**: Dr. Vassilis Litskas, Ms. Panayiota Xylia; **Czech Republic**: Dr. Jana Cmejlova; **France**: Mr. Alain Girardot, Dr. Laurence Hibrand-Saint Oyant, Dr. Eric Penot; **Germany**: Dr. Erica Fadón, Dr. Adrian Forster, Dr. Erich Lehmair, Ms. Birgit Lepp, Lukas Niedermann, Juergen Schmid, Ms. Sophie Stein; **Ghana**: Dr. Joseph Kudadam Korese; **Greece**: Dr. Chrysovalantou Antonopoulou, Georgios Salachas, Dr. Thiresia-Teresa Tzatzani; **Hungary**: Dr. Ferenc Nádosy, Mr. Peter Szabo, Dr. Tímea Tóth; **India**: Dr. Beela GK; **Indonesia**: Ms. Popi Aprilianti, Dr. Ni Made Armini Wiendi, Dr. Minangsari Dewanti, Dr. Erniawati Diningsih, Mr. Hanudin Hanudin, Dr. Media Fitri Isma Nugraha, Ms. Yupi Isnaini, Assoc. Prof. Ahmad Junaedi, Ms. Juang Gema Kartika, Dr. Suskandari Kartikaningrum, Dr. Ridho Kurniati, Dr. Kusumiyati Kusumiyati, Ms. Hartutiningsih M. Siregar, Suryawati Nurdin, Ms. Chitra Priatna, Ms. Ismi Puji Ruwaida, Dr. Fitri Rachmawati, Mr. Indijarto Budi Rahardjo, Dr. Sri Rahayu, Dr. Srinivsan Ramachandran, Mr. Arya Widura Ritonga, Dr.

Atra Romeida, Mr. I Putu Wahyu Sanjaya, Dr. Liauw Lia Sanjaya, Prof. Dr. Edi Santosa, Dr. Rudy Soehendi, Prof. Muhamad Syukur, Dr. Sasanti Widiarsih, Ms. Resta Patma Yanda, Dr. Rossa Yunita; **Israel**: Dr. Patricia Imas, Nativ Rotbart, Assoc. Prof. Moshe Shenker, Ms. Natalie Toren, Dr. Leo Winer, Mr. David Yalin; **Italy**: Dr. Francesco Caffa, Assoc. Prof. Antonia Cristaudo, Mr. Jacopo Durandi, Assist. Prof. Andrea Ertani, Roberta Giannotti, Dr. Antonio Giovino, Dr. Nicole Giuggioli, Mauro Mariotti, Wanda Occhialini, Assoc. Prof. Gaetano Siscaro, Anna Maria Vaira; **Japan**: Ms. Nanami Araki, Ms. Zheng Chen, Assist. Prof. Hiroki Ikeda, Mr. Hiroyuki Kikukawa, Ms. Kyoka Nagasaka, Mr. Atsushi Nakagawa, Dr. Takuya Wada; **Kenya**: Mr. Joseph Kiragu, Mr. Boniface Mutua; **Korea (Republic of)**: Dr. Ju Sung Cho, Lee Ho jin, Dr. Jae Min Jung, Ms. Da Yeon Kim, Mr. Jaesoon Kim, Mr. Jin-Ho Kim, YaeEun Kwon, Ka Youn Lee, Dr. Young Boon Lee, Eunui Oh, Hye Jin Oh, Jiwoo Park, Dr. Sang Kun Park, Je Yeon Yeon, Prof. Dr. Yong Kweon Yoo, Tae Woo Yoon; **Latvia**: Dr. Ilze Vircava; **Lithuania**: Dr. Laima Cesoniene; **Madagascar**: Ms. Kockelmann Virginie; **Malaysia**: Dr. Nur Qursyna Boll Kassim; **Mexico**: Ms. Aleyna De la Luz, Dr. Norma Helen Juárez, Dr. Jesús Humberto Nuñez Moreno, Dr. Fernando Sanchez; **Montenegro**: Ms. Tamara Popovic; **Morocco**: Prof. Mohammed Aziz Elhoumaizi; **Netherlands**: Ms. Salem Agboyinu, Levi Bin, Mr. Marcel Suiker, Dr. Adrianus Vermunt; **New Zealand**: Mr. David Billing, Dr. Stuart Dykes, Prof. Euan Mason, Ms. Alice Mcleod; **Nigeria**: Dr. Oluyemisi Adewale, Assoc. Prof. Apele Iyagba; **Norway**: Dr. Krzysztof Kusnierek; **Oman**: Mr. Basim Al-Kalbani, Assist. Prof. Pankaj Pathare; **Philippines**: Mr. Christpher Pascual; **Poland**: Dr. Roksana Rakoczy-Lelek; **Portugal**: Corina Carranca; **Romania**: Mihai Gidea, Ms. Lavinia Mihaela Iliescu, Andreea Stan; **Russian Federation**: Mr. Nikolai Glaz, Dr. Evgeniy Rybalko, Ms. Larisa Ufimtseva; **Saudi Arabia**: Prof. Hanady Ahmed; **Senegal**: Dr. Amadou Balde, Assoc. Prof. Joseph Bassama, Dr. Mamadou Diatte, Mr. Mor Dieye, Dr. Pape Diop, Dr. Babacar Labou, Dr. Issa Alé Ndiaye, Mr. Serigne Omar sene, Dr. Oumar Seydi, Dr. Elhadji Serigne Sylla, Dr. Etienne Tendeng; **Serbia**: Assoc. Prof. Danijela Djunisijevic-Bojovic, Dr. Milena Jordjevic; **Slovenia**: Tina Ternjak; **South Africa**: Mr. Christopher Berend, Ms. Anna Alexandra De Mooij, Mr. Arve Grindstad, Dr. Devid Guastella, Mr. Grant Magee, Ms. Chandika Ramlall, Mr. Neville van Buuren, Ms. Wilma van der Westhuizen; **Spain**: Mr. Rafael Anton-Herrero, Dr. Leandro Dias, Prof. Dr. Enrique Eymar, Mr. Raul Fernandez Sanchez, Mr. Jose Andrés García Muñoz, Brenda I. Guerrero, Ms. Elena Rosa-Martínez; **Sweden**: Julius Meidus, Dorsa Molai, Prof. Dr. Jean Wan Hong Yong; **Switzerland**: Ms. Florentina Gartmann, Hans Huber, Mr. Julian Hügly; **Thailand**: Mr. Patrick Trail; **Trinidad and Tobago**: Rayanna Radhaykissoon, Prof. Dr. Leslie Rogers; **Turkey**: Dr. Duygu Agagündüz, Ms. Hatice Gunes Altinkaya; **United Kingdom**: Mr. Simon Beasley, Ms. Anne Calderbank, Ms. Sandy Carney, Dr. Michelle Fountain, Simon Harlow, Ms. Katie Hopson, Mr. Pawel Kolodynski, Mr. Javier Martinez Perez, Mr. Hao Zhou; **United States of America**: Mr. Nestor Baeza, Ms. M. Elisabeth Black, Savannah Braden, Ms. Lisa Brutcher, Dr. Lily Calderwood, George Chabre, Rava Chapman, Yanyu Chen, Wesley Cusick, Assist. Prof. Francesco Di Gioia, Ms. Elizabeth Diehl, David Dorrance, Gregg Gentry, Mr. Lukas Hallman, Ms. Daisy Hernandez, Michael Holmes, Dr. J.S. Hu, Mr. Bob Johnson, Dr. Vijay Joshi, Navneet Kaur, Ms. Carmen Ketron, Ms. Mechthild Krus, Daniel LaValley, Mr. Brian Lawrence, Ms. Amelia Loeb, Austin Marty, Anne Meore, Prof. Deok-Gi Min, Dr. Jyostna Devi Mura, Jaime Patzer, Assist. Prof. Lorenzo Rossi, Taylor Schulden, Andrew Sherwood, Robert Smith, Ms. Jeanne Squires Lake, Molly Stanek, Derrick Stowell, Mr. Frank Torresy, Francisco Valenzuela-Acevedo, Dr. Andrew Watson, Julie Weisenhorn, Mr. Blake Young, Dr. Chengcheng Zeng

› In memoriam

L. Gene Albrigo (1940-2020)

Dr. L. Gene Albrigo, Professor Emeritus of the University of Florida/IFAS CREC, Lake Alfred, Florida, passed away on February 8, 2020, after a short illness. He is survived by his wife, Clydene, of 60 years (Daytona, FL), his son Tom Albrigo (Arizona), daughter Ruaun Malmberg (Georgia), 10 grandchildren, 7 great grandchildren and many friends and colleagues around the world. His work greatly benefited the worldwide citrus industry as demonstrated by his many highly successful students, and his strong ties with research colleagues and friends around the world.

Gene was born in Southern California and grew up on a peach farm. His father, Leo, was from Italy and managed the farm, while Gene's mother, Alma, managed the packing house. Gene harvested and trucked peaches to the Los Angeles wholesale market through high school. From 1960 to 1968, Gene worked on deciduous tree crops research and undergraduate instruction in fruit crops at the University of California, Davis. He earned his PhD in 1968, under Dr. Norman Childers at Rutgers, the State University of New Jersey. Over the past 51 years, Gene developed a widely recognized career in citrus horticulture at the UF/IFAS CREC in Lake Alfred, Florida. He was a pioneer in developing citrus teaching and research programs in citrus production and postharvest at CREC.

It is no exaggeration to say that Gene Albrigo's students form the backbone of the citrus production and processing industries in Florida. Gene led the development of an MS Degree program in Citriculture and developed courses on the Regulation of Vegetative and Reproductive Growth Citrus Fresh Fruit Technology – Postharvest. A highlight of his teaching accomplishments was that he developed the audio-video delivery of classes within the UF College of Agriculture. Many international and Florida citrus industry people have benefited from one or more of his courses and he has graduate students in influential positions in Florida and in many parts of the world.

Gene was widely traveled in South America,

Cuba, Europe, and Asia – wherever citrus is grown. He had cooperative projects in many of these countries. Gene was a living library of world citriculture. Gene organized nine international symposia mostly with the International Society of Citriculture (ISC). He was active in the ASHS, organized the 1989 ASHS Annual Meeting and was elected ASHS Fellow in 1998. He was President of the ISC from 1996-2000, organized the 2000 ISC Congress in Orlando, and became an ISC Fellow in 2008. He was also active in the ISHS and Citrus Section Chair from 2005-2010. Gene was the primary organizer of the InterAmerican Citrus Network under the aegis of FAO United Nations. He was also an active member of the Florida State Horticultural Society (FSHS) for over 50 years. In 2012, he was awarded Honorary Membership in the FSHS, recognizing his special meritorious service to the Society and the advancement of horticulture in Florida. This is the highest honor FSHS bestows upon its members.

Gene was initially hired at CREC in 1968 to work on preharvest conditions affecting postharvest fruit quality and handling. He published field studies on stress related problems and spray chemical induced necrosis of the peel and fruit injuries in the packing house. This led to work on fruit cuticle development and many landmark publications on fruit wax development, wind scar and peel phytotoxicity. Gene generated many research ideas about solutions to citrus problems leading to his collaboration with most of the entomologists, pathologists, postharvest physiologists and other horticulturists at CREC. He was an influential researcher in all aspects of Florida citrus.

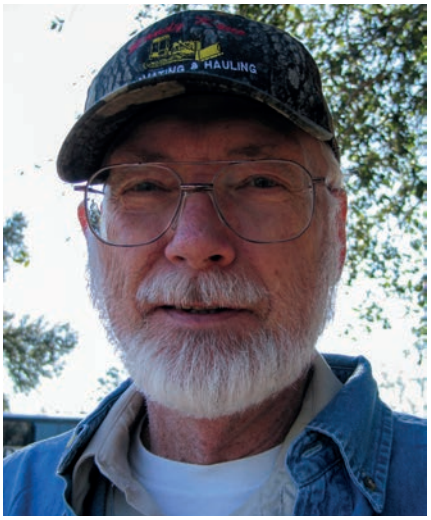
One of Gene's special research interests was the effect of climate on flowering and reproductive growth of citrus. His early studies on temperature and drought effects on flowering and fruit development led to later work emphasizing environmental control of flowering. He developed a computer program for Florida growers that predicts the level and date of flowering. Gene's flowering advisory bulletins based on his 'Citrus Flowering Monitor' were closely followed by many Florida production managers and were published weekly until a month before he passed away. Dr. Albrigo was inducted into the Florida Citrus Hall of Fame in 2018 (https://floridacitrushalloffame.com/inductees/dr-l-gene-albrigo/; View video).

Gene published over 130 articles and co-authored several book chapters. Along with Dr. Fred S. Davies, he published the book entitled "Citrus" (CAB International 1994, revised in 2019). This book is used as a citrus resource throughout the world. Although officially "retired" from UF in 2010, Gene continued his research program by working at CREC three days per week by commuting from his home in Daytona Beach and staying in central Florida until December 2019. He planned to retire next year at 80.

It's difficult to sum up a man who dedicated 51 years to research, but Dr. L. Gene Albrigo's meaningful contributions to the worldwide citrus industry will have an enormous impact on generations to come. No one else has had as great an influence on the citrus industry as Gene Albrigo.

Jim Syvertsen, Emeritus Professor of Plant Physiology, University of Florida, USA

Dr. John Maas



With great sadness, we announce the passing of Dr. John Maas on April 11, 2020. Dr. Maas was a long-time member of the International Society for Horticultural Science (ISHS). Dr. Maas worked as a US Department of Agriculture, Agricultural Research Service, berry crop plant pathologist at Beltsville, Maryland, for 34 years. Dr. Maas extended the bounds of traditional plant pathology, recognizing the necessity to develop skills in several areas of horticulture. He had close working associations with horticulturists across North America and abroad. As a pathologist, he worked closely with five strawberry breeders during his career. These successful working relationships led to an exemplary process for the development and release of strawberry cultivars having natural disease resistance.

Through the years, Dr. Maas collaborated with and supported numerous researchers, students, visiting scientists, and technicians. He will always be remembered as a collaborator who carried more than his share of the load. Dr. Maas was particularly interested in fostering the strawberry research of others and in forming rich research collaborations. This interest and devotedness for helping other researchers led to service as editor of North American Strawberry Growers Association's (NASGA's) Advances in Strawberry Research for 10 years. He was the editor of two editions of the Compendium of Strawberry Diseases published by the American Phytopathological Society (APS).

He was co-editor of the *Acta Horticulturae* proceedings of the first two ISHS International Strawberry symposia, organized by Professor Dr. Pasquale Rosati (1988, Italy) and co-organized by Dr. John Maas and Dr. Gene Galletta (1992, USA), respectively, and two International Horticultural Congress symposia. Dr. Maas was the Chair of ISHS Working Group Strawberry Culture and Management for six years. In addition, he was the Associate Editor for the Journal of the American Society of Horticultural Science (ASHS) for two years and of HortScience for eight years. He was co-organizer for pathology meetings, with Dr. Wayne Wilcox and Dr. Mike Ellis, and was Chair of the Small Fruit Diseases Working Group of the American Phytopathological Society.

Dr. Maas was the first recipient of NASGA's Service with Impact Award in 2018, for his dedicated service to the strawberry industry including his long service of presiding over the North American Strawberry Growers Research Foundation.

Dr. Maas published more than 130 research papers, book chapters, and books on diseases and pathogens of strawberry and other crops, and strawberry pollen morphology, secondary metabolites, phytonutrients, genetics, biotechnology, sources of resistant germplasm, and cultivar development and introduction. He researched many small fruit pathogens including fungi, bacteria, phytoplasmas, and viruses. John is greatly missed by his many scientific colleagues and friends. Cards and condolences may be sent to 270 True Philia Way, Berkeley Springs, WV, 25411, USA.

Dr. Kim Lewers, USDA Geneticist, Beltsville, Maryland, USA

Revision in the ISHS symposium schedule for 2020

Jill Stanley, Kim Hummer and Kelly Van Dijck

Dear ISHS Member, Dear Reader,

First, the Board and the staff of the ISHS Secretariat express our greatest condolences for any sorrow and losses caused by the COVID-19 pandemic. We hope that you, your family and colleagues continue to be healthy and well. We commiserate with each of you as many of us break the bonds of sheltering-at-home and are now beginning to emerge with masks and social distancing, to return to some new normalcy in the coming weeks. For those who are still experiencing ongoing challenges in your countries, we hope that your turn comes soon.

The hallmark of our Society is our ISHS symposia, where we meet together excited to learn the latest findings of our science from around the world and to network informally during the coffee breaks and evenings. We share in the local culture, see the horticulture in the countryside on tours that our hard-working conveners organize, and gain an unforgettable experience with our colleagues.

Sadly, due to these great extenuating circumstances, our way has been temporarily disrupted due to COVID-19. We must follow safety protocols for the health of all concerned.

Towards that end, conveners have had to reschedule, reconvene, or cancel ISHS symposia for 2020. Please review the following list. Note that 26 symposia have been rescheduled, and 9 have dates yet to be determined. One was cancelled. It is likely that there will be further changes in the timing of symposia, as the situation is changing constantly. We will keep you updated on our website.

Thank you all for your patience as we work through this difficult time. We look forward to the time when "we will all meet again..."

Rescheduled symposia	Country	Initial date	New date	
III Asian Horticultural Congress - AHC2020	Thailand	7-9 May 2020	15-17 December 2020	https://www.ishs.org/symposium/598
IV International Symposium on Woody Ornamentals of the Temperate Zone	Italy	20-22 May 2020	2-5 March 2021	https://www.ishs.org/symposium/691
IV International Symposium on Horticulture in Europe - SHE2020, VIII International Symposium on Human Health Effects of Fruits and Vegetables - FAVHEALTH2020, V International Humulus Symposium	Germany	2-6 June 2020	8-12 March 2021	https://www.ishs.org/symposium/507, https://www.ishs.org/symposium/725, https://www.ishs.org/symposium/694
XIV International Protea Research Symposium	Canary Islands, Spain	24-29 March 2020	14-19 March 2021	https://www.ishs.org/symposium/370
III International Symposium on Soilless Culture and Hydroponics: Innovation and Advanced Technology for Circular Horticulture	Cyprus	1-4 November 2020	21-24 March 2021	https://www.ishs.org/symposium/711
IV All Africa Horticultural Congress - AAHC2020	Senegal	22-25 November 2020	29 March-1 April 2021	https://www.ishs.org/symposium/512
VIII International Symposium on Production and Establishment of Micropropagated Plants	Portugal	21-26 June 2020	11-16 April 2021	https://www.ishs.org/symposium/281
IX International Strawberry Symposium	Italy	2-6 May 2020	1-5 May 2021	https://www.ishs.org/symposium/690
VI International Symposium on Papaya	Spain	3-6 November 2020	10-14 May 2021	https://www.ishs.org/symposium/357
IX International Symposium on Light in Horticulture	Sweden	8-12 June 2020	31 May-4 June 2021	https://www.ishs.org/symposium/676
IX International Symposium on Mineral Nutrition of Fruit Crops	Israel	7-11 June 2020	27 June-1 July 2021	https://www.ishs.org/symposium/396
II International Symposium on Tropical and Subtropical Ornamentals	Indonesia	22-24 July 2020	20-22 July 2021	https://www.ishs.org/symposium/642
XII International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems	USA	26-31 July 2020	1-6 August 2021	https://www.ishs.org/symposium/352
XII International Vaccinium Symposium	Canada	29 August-3 September 2020	28 August - 2 September 2021	https://www.ishs.org/symposium/646

International Symposium on Tropical and Subtropical Horticulture in Mediterranean Climate	Italy	7-10 September 2020	13-16 September 2021	https://www.ishs.org/symposium/376
II International Symposium on the Role of Plant Genetic Resources in Reclaiming Lands and Environment Deteriorated by Human and Natural Actions	Italy	21-24 September 2020	13-16 September 2021	https://www.ishs.org/symposium/648
XII International Symposium on Plum and Prune Genetics, Breeding and Pomology	Serbia	7-10 July 2020	14-17 September 2021	https://www.ishs.org/symposium/686
VII International Symposium on Persimmon	Japan	11-15 October 2020	22-26 September 2021	https://www.ishs.org/symposium/699
VIII South-Eastern Europe Symposium on Vegetables and Potatoes	North Macedonia	24-26 September 2020	24-26 September 2021	https://www.ishs.org/symposium/456
X International Symposium on Kiwifruit	Turkey	6-9 October 2020	27-30 September 2021	https://www.ishs.org/symposium/588
XIII International Mango Symposium	Spain	26-30 October 2020	27 September-1 October 2021	https://www.ishs.org/symposium/427
I International Symposium on Plant Propagation, Nursery Organization and Management for the Production of Certified Fruit Trees	Italy	28-30 September 2020	4-6 October 2021	https://www.ishs.org/symposium/607
XV International People Plant Symposium and II International Symposium on Horticultural Therapies	USA	15-17 October 2020	28-30 October 2021	https://www.ishs.org/symposium/706
I International Symposium on Reproductive Biology of Fruit Tree Species	France	2-6 November 2020	8-12 November 2021	https://www.ishs.org/symposium/388
III International Organic Fruit Symposium and I International Organic Vegetable Symposium	Italy	5-8 October 2020	14-17 December 2021	https://www.ishs.org/symposium/698
XVI International Symposium on Processing Tomato - XIV World Processing Tomato Congress	Argentina	15-19 March 2020	7-11 March 2022	https://www.ishs.org/symposium/545
Symposia – new date to be determined				
X International Pineapple Symposium	Dominican Republic	22-26 April 2020		https://www.ishs.org/symposium/685
XIII International Controlled and Modified Atmosphere Research Conference - CaMa2020	Belgium	17-20 May 2020		https://www.ishs.org/symposium/457
XV International Symposium on Virus Diseases of Ornamental Plants	Russia	7-11 June 2020		https://www.ishs.org/symposium/682
International Symposium on Tropical and Subtropical Viticulture	India	25-28 August 2020		https://www.ishs.org/symposium/314
XI International Symposium on Grapevine Physiology and Biotechnology	South Africa	11-15 October 2020		https://www.ishs.org/symposium/529
V International Symposium on Biotechnology and Molecular Breeding in Horticultural Species	China	14-17 October 2020		https://www.ishs.org/symposium/395
XIV International Citrus Congress - ICC2020	Turkey	8-13 November 2020		https://www.ishs.org/symposium/523
IX International Postharvest Symposium	New Zealand	9-13 November 2020		https://www.ishs.org/symposium/681
International Date Palm Conference - III International Symposium on Date Palm (ISHS) and VI Date Palm Symposium (King Faisal University)	Saudi Arabia	16-19 November 2020		https://www.ishs.org/symposium/714
Cancelled symposium				
XII International Symposium on Banana: ISHS-ProMusa Symposium on Healthy Banana Production Systems for Better Livelihoods	China	19-24 October 2020		

› Calendar of ISHS events

For updates and extra information go to 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 up-to-date before registering. If in doubt, sign in to your membership account and check/renew your membership status first: www.actahort.org or www.ishs.org

Year 2020

- October 25-28, 2020, Seoul (Korea (Republic of)): **III International Symposium on Germplasm of Ornamentals.** Info: Prof. Dr. Byoung Ryong Jeong, Department of Horticulture, 501 Jinju-daero, Gyeongsang National University, Jinju, Gyeongnam 52828, Korea (Republic of). Phone: (82)55-772-1913, Fax: (82)55-757-7542, E-mail: brjeong@gmail.com Web: http://www.isgo2020.org
- December 14-16, 2020, Bangkok (Thailand): **IX International Scientific and Practical Conference on Biotechnology as an Instrument for Plant Biodiversity Conservation (physiological, biochemical, embryological, genetic and legal aspects).** Info: Dr. Kanchit Thammasiri, Department of Plant Science, Faculty of Science, Mahidol University, Rama VI Road, Phyathai, Bangkok 10400, Thailand. Phone: (66)89-132-7015, Fax: (66)2-354-7172, E-mail: kanchitthammasiri@gmail.com E-mail symposium: biotech2020thailand@gmail.com Web: http://plantscience.sc.mahidol.ac.th/biotech2020

NEW
- December 15-17, 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 Web: http://ahc2020.org/

Year 2021

NEW
- March 2-5, 2021, Giarre, Catania (Italy): **IV International Symposium on Woody Ornamentals of the Temperate Zone.** Info: Prof. Dr. Valentina Scariot, Università degli Studi di Torino, Dept. Agric., Forestry & Food Sci., 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 Paolo Braccini 2, 10095 Grugliasco, Torino, Italy. Phone: (39)0116708802, Fax: (39)116708658, E-mail: gabriele.beccaro@unito.it E-mail symposium: woodyornamentals2020@unito.it Web: https://www.woodyornamentals2020.com/

NEW
- March 2-5, 2021, Giarre, Catania (Italy): **VIII International Conference on Landscape and Urban Horticulture.** Info: Prof. Daniela Romano, Universitá de Catania, Dip. DOFATA, Via Valdisavoia 5, 95123 Catania, Italy. Phone: (39)095234306, Fax: (39)095234329, E-mail: dromano@unict.it or Dr. Francesca Bretzel, CNR, IRET Istituto di Ricerca sugli Ecosist, Via G. Moruzzi 1, Pisa 56124, Italy. Phone: (39)0506212485, Fax: (39)0506212473, E-mail: francesca.bretzel@cnr.it or Dr. Stefania Toscano, Via Valdisavoia 5, 95123 Catania(CT), Italy. Phone: (39)0954783303, E-mail: stefania.toscano@unict.it E-mail symposium: info@luh2021.it Web: https://www.luh2021.it/

NEW
- March 8-12, 2021, Stuttgart (Germany): **IV International Symposium on Horticulture in Europe - SHE2020.** Info: Prof. Dr. Jens N. Wünsche, University of Hohenheim, Department of Crop Science, Section Crop Physiology of Specialty Crops, Emil-Wolff-Str. 25, 70593 Stuttgart, Germany. Phone: (49)711-459-22368, Fax: (49)711-459-22351, E-mail: jnwuensche@uni-hohenheim.de or Dr. Michael Helmut Hagemann, University of Hohenheim, Department of Crop Science, Section Crop Physiology of Specialty Crops, Emil-Wolff-Str. 25, 70599 Stuttgart, Germany. Web: https://she-ihs-fav2020.de/

NEW
- March 8-12, 2021, Stuttgart (Germany): **VIII International Symposium on Human Health Effects of Fruits and Vegetables - FAVHEALTH2020.** Info: Prof. Dr. Jens N. Wünsche, University of Hohenheim, Department of Crop Science, Section Crop Physiology of Specialty Crops, Emil-Wolff-Str. 25, 70593 Stuttgart, Germany. Phone: (49)711-459-22368, Fax: (49)711-459-22351, E-mail: jnwuensche@uni-hohenheim.de or Prof. Dr. Bhimanagouda Patil, VFIC, Texas A&M University, Department of Horticulture, 1500 Research Parkway Ste A120, College Station, TX 77845, United States of America. Phone: (1)9794588090, Fax: (1)9798624522, E-mail: b-patil@tamu.edu Web: https://she-ihs-fav2020.de/

NEW
- March 8-12, 2021, Stuttgart (Germany): **V International Humulus Symposium.** Info: Prof. Dr. Jens N. Wünsche, University of Hohenheim, Department of Crop Science, Section Crop Physiology of Specialty Crops, Emil-Wolff-Str. 25, 70593 Stuttgart, Germany. Phone: (49)711-459-22368, Fax: (49)711-459-22351, E-mail: jnwuensche@uni-hohenheim.de or Dr. Michael Helmut Hagemann, University of Hohenheim, Department of Crop Science, Section Crop Physiology of Specialty Crops, Emil-Wolff-Str. 25, 70599 Stuttgart, Germany. Web: https://she-ihs-fav2020.de/

NEW
- March 14-19, 2021, Brena Baja (La Palma) & La Laguna (Tenerife) (Spain): **XIV International Protea Research Symposium.** Info: Prof. Dr. Juan Alberto Rodríguez Pérez, Àrea 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

NEW
- March 21-24, 2021, Lemesos (Cyprus): **III International Symposium on Soilless Culture and Hydroponics: Innovation and Advanced Technology for Circular Horticulture.** Info: Assist. Prof. Nikolaos Tzortzakis, Dept. Agricultural Sciences, Biotechnology, Food Science, Cyprus University of Technology, 3036, Lemesos, Cyprus. Phone: (35)7 25002280, Fax: (35)7 25002838, E-mail: nikolaos.tzortzakis@cut.ac.cy or Prof. Dr. Silvana Nicola, University of Turin, Dept. of Agric., Forest and Food Sciences, Leonardo Da Vinci 44 (L.Paolo Braccini, 2), 10095 Grugliasco (TO), Italy. Phone: (39)0116708773, Fax: (39)0112368773, E-mail: silvana.nicola@unito.it Web: https://www.hydro2020.com/

NEW
- March 29 - April 1, 2021, Dakar (Senegal): **IV All Africa Horticultural Congress - AAHC2020.** Info: Dr. Moctar Fall, Cluster Horticulture, 2,5 km Route de lAéroport, Immeuble MSA - BP 25 852, Dakar, Senegal. Phone: (221)776389171, E-mail: directeur@agroseed.sn Web: http://www.aahc2020.org

NEW ■ April 11-16, 2021, 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, Calcada Martim de Freitas, 3000-456 Coimbra, Portugal. Phone: (351)239240700, Fax: (351)239240701, E-mail: sandraimc@ci.uc.pt E-mail symposium: pempishs.coimbra2020@uc.pt

NEW ■ April 18-22, 2021, Davis, CA (United States of America): **VIII International Symposium on Rose Research and Cultivation**. Info: Dr. Deborah Golino, 2828 Loyola Dr, Davis Ca 956181633, United States of America. Phone: 5307548102, E-mail: dagolino@ucdavis.edu or Brent Pemberton, Texas A&M, Agric. Research & Ext. Ctr., PO Box 200, Overton, TX 75684, United States of America. Phone: (1)9038346191, Fax: (1)9038347140, E-mail: b-pemberton@tamu.edu Web: https://ucanr.edu/sites/ISHS/

NEW ■ April 19-22, 2021, Murcia (Spain): **III International Symposium on Beverage Crops**. Info: Rocio Gil Muñoz, Avda Ntra Sra de la Asunción N24, 30520 Jumilla, Spain. E-mail: mariar.gil2@carm.es or Prof. Dr. Encarna Gómez-Plaza, Universidad de Murcia, Fac. Veterinaria, Dep. Tecnología Alimentos, Campus Espinardo, 30071 Murcia Murcia, Spain. Phone: (34) 868887323, E-mail: encarna.gomez@um.es or Prof. Dr. Cristina Garcia-Viguera, Phytochemistry and Healthy Foods Lab, Dept Food Science Technoloy CEBAS-CSIC, Campus Espinardo 25, Espinardo, 30100 Murcia, Spain. Phone: (34) 968396200, Fax: (32)9686213, E-mail: cgviguera@cebas.csic.es Web: https://www.bevcrops21.es/

■ April 28 - May 1, 2021, Toluca (Mexico): **V International Conference on Postharvest and Quality Management of Horticultural Products of Interest for Tropical Regions**. Info: Prof. Dr. Omar Franco Mora, Laboratory of Horticulture, Faculty of Agriculture, Universidad Autónoma del Estado de México, Toluca, México, 50140, Mexico. E-mail: franco_omar@hotmail.com E-mail symposium: convener@pqmhp2021.com Web: https://pqmhp2021.com/

NEW ■ May 1-5, 2021, 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, Council for Agric. Research & Economics, 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://www.iss2021.com/

NEW ■ May 10-14, 2021, Almeria (Spain): **VI International Symposium on Papaya**. Info: Prof. Dr. Julian Cuevas González, University of Almería, La Cañada de S. Urbano s/n, 04120 Almería, Spain. Phone: (34)950015559, Fax: (34)950015939, E-mail: jcuevas@ual.es E-mail symposium: papaya2020@ual.es Web: http://www2.ual.es/VI-simposium-on-papaya/

NEW ■ May 20-25, 2021, Beijing (China): **IX International Cherry Symposium**. Info: Prof. Dr. Kaichun Zhang, Beijing Academy of Forestry & Pomology Sci., Jia 12, Ruiwangfen, Xiangshan Str, Haidian, Beijing, 100093, China. Phone: (86)1082596007, E-mail: kaichunzhang@126.com E-mail symposium: cherrysymposium9@126.com Web: http://2021.cherries.cn

■ May 24-28, 2021, Almería (Spain): **International Symposium on Models for Plant Growth, Environments, Farm Management in Orchards and Protected Cultivation**. Info: Prof. Dr. Francisco Domingo Molina Aiz, Universidad de Almería, CITE II-A, Despacho 1.07, Carretera Sacramento s/n, 04120 Almería, Spain. Phone: (34)950015449, Fax: (34)950015491, E-mail: fmolina@ual.es or Dr. Lorenzo Leon, IFAPA Centro "Alameda del Obispo", Avda. Menendez Pidal s/n, E-14004, Córdoba, Spain. Phone: (34)671532697, Fax: (34)957016043, E-mail: lorenzo.leon@juntadeandalucia.es E-mail symposium: horchimodel2021@ual.es Web: http://www2.ual.es/horchimodel2021/

■ May 30 - June 3, 2021, Limassol/Lemesos (Cyprus): **VI International Symposium on Postharvest Pathology: Innovation and Advanced Technologies for Managing Postharvest Pathogens**. Info: Assist. Prof. Nikolaos Tzortzakis, Dept. Agricultural Sciences, Biotechnology, Food Science, Cyprus University of Technology, 3036, Lemesos, Cyprus. Phone: (35)7 25002280, Fax: (35)7 25002838, E-mail: nikolaos.tzortzakis@cut.ac.cy Web: http://web.cut.ac.cy/postharvestpathology2021/

NEW ■ May 31 - June 4, 2021, 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 BstadAlnarp, 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: ISHSLight2020@slu.se Web: https://www.ishslight2020.se/

■ May 31 - June 4, 2021, Naoussa (Greece): **X International Peach Symposium**. Info: Prof. George Manganaris, Anexartisias 57, PAREAS Building, P.O. Box 50329, 3603 Lemesos, Cyprus. Phone: (357)25002307, Fax: (357)25002804, E-mail: george.manganaris@cut.ac.cy or Dr. Athanassios Molassiotis, Pomology lab, Faculty of Agriculture, AUTH, 54 124 Thessaloniki, Greece. Phone: (30)2310 998882, Fax: (30)2310 998882, E-mail: amolasio@agro.auth.gr Web: https://www.fruitsciences.eu/peach2021

■ June 6-9, 2021, Cordoba (Spain): **XV International Asparagus Symposium**. Info: Juan Gil, Plaza de la oca, 1, 2-1, Córdoba, Spain. E-mail: juan.gil@uco.es Web: https://www.ias2021.com/

NEW ■ June 7-10, 2021, Drammen (Norway): **IV International Symposium on Plant Cryopreservation**. Info: Dr. Dag-Ragnar Blystad, NIBIO - Norwegian Institute of Bioeconomy R, Division of Biotechnology and Plant Health, Høgskoleveien 7, No-1431 Ås, Norway. Phone: (47)90872588, E-mail: dag-ragnar.blystad@nibio.no Web: https://nibio.pameldingssystem.no/cryo-2021

NEW ■ June 7-10, 2021, Lugo (Spain): **VII International Chestnut Symposium**. Info: Prof. Santiago Pereira-Lorenzo, Universidad de Santiago de Compostela, Escola Politécnica Superior de Ingeniería, Avda. Benigno Ledo sn, 27002 Lugo (Galicia), Spain. Phone: (34)982823128, E-mail: santiago.pereira.lorenzo@usc.es E-mail symposium: ChestnutLugo21@gmail.com Web: http://chestnutsymposium.com/

NEW ■ June 21-25, 2021, Davis, CA (United States of America): **VIII International Symposium on Almonds and Pistachios.** Info: Dr. Louise Ferguson, 2037 Wickson Hall, Plant Sciences Department Mail Stop II, UC Davis 1 Shields Ave. Davis CA 95616, United States of America. Phone: (1) 559 737 3061, Fax: (1) 530 752 8502, E-mail: lferguson@ucdavis.edu or Dr. Thomas M. Gradziel, Department of Pomology, University of California, 1 Shields Avenue, Davis, CA 95616-8683, United States of America. E-mail: tmgradziel@ucdavis.edu or Bruce Lampinen, Dept of Plant Sciences, University of California, 1 Shields Avenue, Davis, CA

95616, United States of America. E-mail: bdlampinen@ucdavis.edu Web: https://ucanr.edu/sites/Almond_Pistachio_2021/

NEW ■ June 27 - July 1, 2021, Ma'ale HaHamish (Israel): **IX International Symposium on Mineral Nutrition of Fruit Crops.** Info: Dr. Uri Yermiyahu, Gilat Research Center, Soil and Water, Mobile Post Negev 85280, Israel. Phone: (972)89928649, Fax: (972)79926485, E-mail: uri4@agri.gov.il or Dr. Arnon Dag, Plant Sciences, Gilat Research Center, Agricultural Research Organization, (The Volcani Center), Mobile Post Negev, 85280, Israel. Phone: (972)506220155, Fax: (972)89926485, E-mail: arnondag@agri.gov.il Web: https://www.ortra.com/events/mnutrition2020

■ July 12-16, 2021, Hangzhou City, Zhejiang Province (China): **III International Symposium on Fruit Culture along Silk Road Countries.** Info: Prof. Dr. Yuanwen Teng, Dept. Of Hort., College of Agric.& Biotech., Zhejiang University, Zijingang Campus, Hangzhou 310058, China. Phone: (86)571-88982803, Fax: (86)571-88982803, E-mail: ywteng@zju.edu.cn or Prof. Dr. Zhen-Hai Han, Institute for Horticultural Plants, China Agricultural University, No. 2 Yuanmingyuanxilu, 100193 Beijing, China. Phone: (86)1062732467, Fax: (86)1062734391, E-mail: rschan@cau.edu.cn

NEW ■ July 20-22, 2021, 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

NEW ■ August 1-6, 2021, 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 Web: https://2021orchardsystems.com/

NEW ■ August 22-27, 2021, Ghent (Belgium): **II International Symposium on Growing Media, Soilless Cultivation, and Compost Utilization in Horticulture.** Info: Dr. Bart Vandecasteele, ILVO, Plant Sciences Unit, B. Van Gansberghelaan 109, 9820 Merelbeke, Belgium. Phone: (32)92722699, E-mail: bart.vandecasteele@ilvo.vlaanderen.be E-mail symposium: info@growingmedia2021.com Web: https://www.growingmedia2021.com/

■ August 22-26, 2021, Corvallis, OR (United States of America): **X International Congress on Hazelnut.** Info: Prof. S.A. Mehlenbacher, Department of Horticulture, 4017 ALS Bldg., Oregon State University, Corvallis, OR 97331-7304, United States of America. Phone: (1)5417375467, Fax: (1)5417373479, E-mail: mehlenbs@hort.oregonstate.edu Web: https://hazelnut2021.org/

NEW ■ August 28 - September 2, 2021, Halifax, Nova Scotia and Charlottetown, Prince Edward Island (Canada): **XII International Vaccinium Symposium.** Info: Prof. Dr. David Percival, Dalhousie University, Department of Plant, Food, and, Environmental Sciences, PO Box 550, Truro, NS B2N 5E3, Canada. Phone: (1)9028937852, Fax: (1)9028931404, E-mail: david.percival@dal.ca Web: http://www.Dal.ca/ivs

NEW ■ September 13-16, 2021, Palermo (Italy): **International Symposium on Tropical and Subtropical Horticulture in Mediterranean Climate.** Info: Prof. Vittorio Farina, Università degli Studi di Palermo, Dipartimento Scienze Agrarie, Alimentari e Forestali, viale delle Scienze edif 4 - 90128 Palermo, Italy. Phone: (+39)09123896090, E-mail: vittorio.farina@unipa.it or Dr. Giuseppe Sortino, Department of Agricultural & Forest Science, University of Palermo, Viale delle Scienze, Edificio 4 ingresso H, 90128 Palermo, Italy. Phone: (39)09123861234, E-mail: giuseppe.sortino@unipa.it E-mail symposium: info@tropmed2020.it Web: http://www.tropmed2020.it

NEW ■ September 13-16, 2021, Palermo (Italy): **II International Symposium on the Role of Plant Genetic Resources in Reclaiming Lands and Environment Deteriorated by Human and Natural Actions.** Info: Prof. Francesco Marra, Department of Agricultural & Forest Science, Viale delle Scienze, Edificio 4 ingresso H, 90128 Palermo, Italy. Phone: (39)09123861236, Fax: (39)09123861211, E-mail: francescopaolo.marra@unipa.it or Dr. Emilio Badalamenti, Viale delle Scienze, Palermo, Italy. E-mail: emilio.badalamenti@unipa.it E-mail symposium: info@ispgr-it2020.it Web: http://www.ispgr-it2020.it

NEW ■ September 14-17, 2021, 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 Web: http://www.plum2020.com

■ September 20-24, 2021, Riva del Garda, Trento (Italy): **XIV International Symposium on Plant Bioregulators in Fruit Production.** Info: Dr. Fabrizio Costa, Via Mach 1, 38010 San Michele all'Adige, Trento, Italy. Phone: (39)0461615563, E-mail: fabrizio.costa@fmach.it Web: https://eventi.fmach.it/ISHS-2021

NEW ■ September 22-26, 2021, Nara (Japan): **VII International Symposium on Persimmon.** Info: Prof. Dr. Keizo Yonemori, Faculty of Agriculture, Ryukoku University, 1-5 Yokotani, Seta Oe-cho, Otsu 520-2194, Siga, Japan. Phone: (81)775995695, Fax: (81)775995608, E-mail: keizo@agr.ryukoku.ac.jp E-mail symposium: 2020persimmon@gmail.com Web: http://kaki2020.jshs.jp

NEW ■ September 24-26, 2021, Ohrid (North Macedonia): **VIII South-Eastern Europe Symposium on Vegetables and Potatoes.** Info: Prof. Dr. Gordana Popsimonova, Debarca 16, 1000 Skopje, North Macedonia. Phone: (389)70255878, E-mail: gpopsimonova@yahoo.com or Skender Kaciu, Univ. of Prishtina-Faculty of Agri., and Veterinary, Boulevar B.Clinton bb, 10000 Prishtina, Kosovo. E-mail: skenderkaciu@yahoo.com E-mail symposium: contact@ishs8.org Web: https://ishs8.org/

NEW ■ September 27-30, 2021, Yalova (Turkey): **X International Symposium on Kiwifruit.** Info: Dr. Arif Atak, Horticultural Central Research Institute, Department of Viticulture, 77102 / YALOVA, Turkey. Phone: (90)2268142520, Fax: (90)2268141146, E-mail: atakarif@gmail.com E-mail symposium: secretariat@kiwi2020.org Web: http://www.kiwifruit2020.org/

NEW ■ September 27 - October 1, 2021, Malaga (Spain): **XIII International Mango Symposium.** Info: Dr. J. Ignacio Hormaza, EE. La Mayora - CSIC, 29750 Algarrobo-Costa, Malaga, Spain. Phone: (34)952552656, Fax: (34)952552677, E-mail: ihormaza@eelm.csic.es or Dr. Víctor Galán Sauco, Isaac Albéniz 17, 38208 La Laguna, Tenerife, Canary islands, Spain. Phone: (34)922261647, E-mail: vgalan46@gmail.com E-mail symposium: mango2020@ihsm.uma-csic.es Web: https://en.mango2020.es

■ October 4-7, 2021, York (United Kingdom): **III International Symposium on Carrot and Other Apiaceae.** Info: Ms. Coral Russell, BGA House, Nottingham Road, LN110WB Louth, United Kingdom. Phone: 07792893336, E-mail: coral.russell@britishgrowers.org

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