A publication of the International Society for Horticultural Science

Chronica Horticulturae

Horticultural highlights

V European Horticultural Congress • Integrated management of the passion fruit woodiness disease in Santa Catarina State, Brazil

Symposia and workshops

Jujube • Plant Cryopreservation • GreenSys2023: New Technologies for Sustainable Greenhouse Systems • Organic Greenhouse Horticulture • Olive • EUCARPIA Fruit Breeding and Genetics • Plant Propagation, Nursery Organization and Management for the Production of Certified Fruit Trees • Precision Management of Orchards and Vineyards • Mango • Carrot and Other *Apiaceae*

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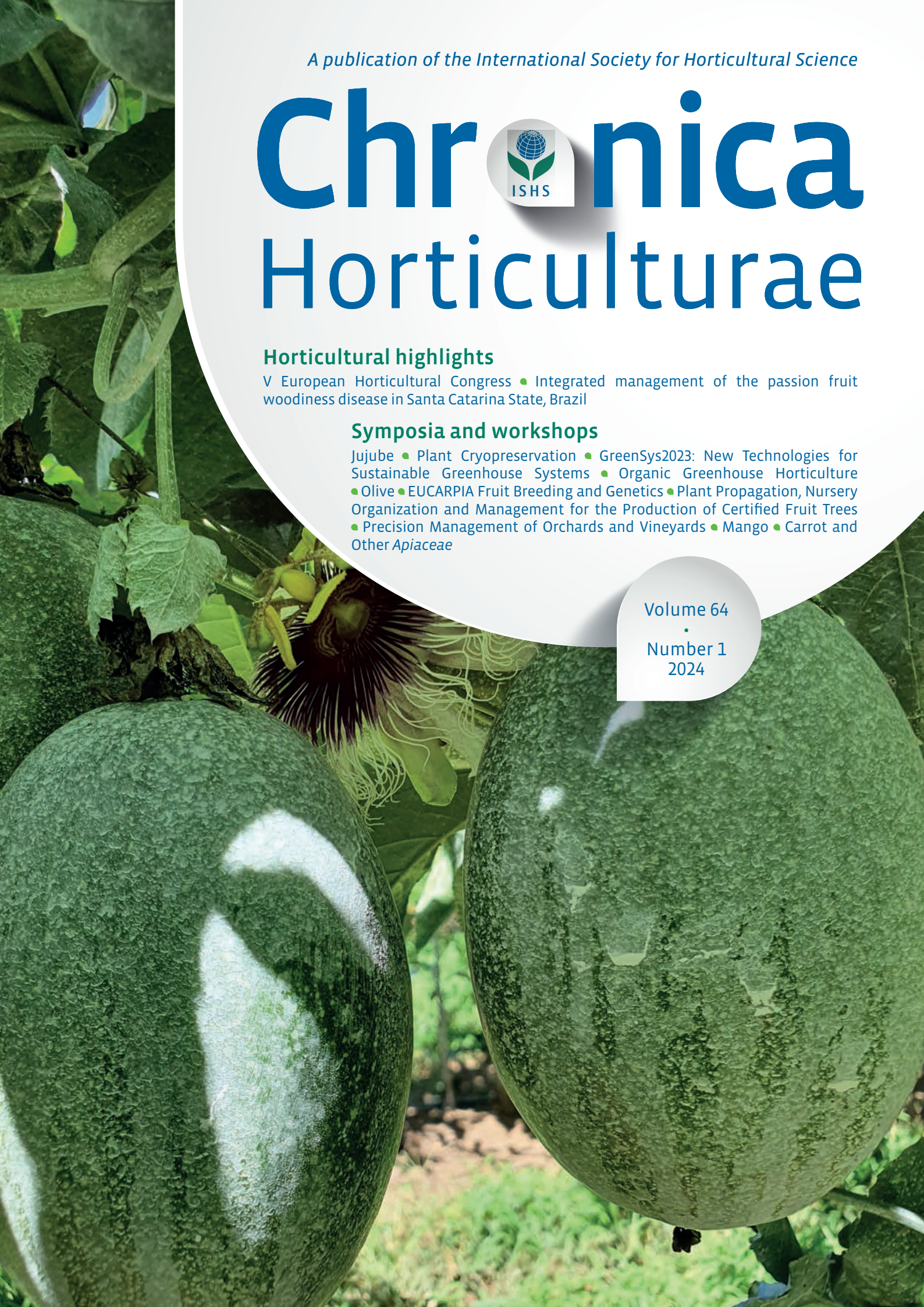

Chronica Horticulturae

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

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

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

› Contents

Cover photograph: Typical passion fruit plant (*Passiflora edulis* Sims.) cultivated in Santa Catarina State, Brazil, with kaolin spray to avoid sun damages. Courtesy of Henrique Belmonte Petry. See article p.13.

› From the cockpit

Peter J. Batt, Editor, *Chronica Horticulturae*

› Peter J. Batt

Welcome to this spring/autumn edition of *Chronica Horticulturae*, the first for 2024. 'Down under' the summer holidays have been and gone, the kids have gone back to school and TAFE and university courses have resumed. However, depending on where you live in this great island continent we call Australia, it's been a summer many horticulturists would rather forget. On the east coast, two cyclones, Jasper and Kirrily, have delivered unprecedented rainfall to Queensland, NSW and Victoria, severely damaging and even destroying entire crops, while in the south-west of Western Australia, while we have yet to see a drop of rain, daily temperatures have frequently exceeded 35°C.

We're not alone. The European Union's Copernicus Climate Change Service has reported that 2023 was the hottest year on record. While deadly heat waves impacted China, North America and Europe, we also saw torrential rainfall in the Middle East, Korea, China and South Africa. Wildfires raged in Canada, Greece and Hawaii, while East Africa, Indonesia and much of South-East Asia received below average rainfall. Climate change is real and as global temperatures increase, so also does the frequency and intensity of destructive weather events, which not only threaten food production and security on a global scale, but also the very livelihood of horticulturists worldwide.

In addressing climate change and sustainability, whether directly or indirectly, in this issue we recognise some of the great work that a new cohort of horticultural researchers are undertaking to address some of the major issues facing our world. Utpal Das explores the potential for jujube to mitigate the impacts of climate change and to provide an alternative source of livelihood for smallholder farmers. Across the globe, freshwater resources are coming under increasing pressure from urbanisation, industrialisation and the need to conserve biodiversity. Muthianzhele Ravuluma investigates improved water management systems in pomegranate orchards, while Francesca Zuffa looks at the genes that impact stomatal density in apples. To reduce the amount of agricultural chemicals and fertilisers utilized in fruit production, Valentina Ricciardi explores the gene sequences for resistance to downy mildew in grape vines, while Eve-Marie Boudreau-Forgues looks at the role biostimulants have on the production and fruit quality of blueberry. To reduce food wastage, Aleksandra Koričanac explores how the parameters affecting fruit quality change as European plums ripen, while Mirko Piani looks at the non-destructive grading of red fleshed kiwifruit. To reduce seed loss and waste in umbelliferous crops, Heather Wickson looks at the genetic mechanisms that influence seed shattering in parsnip. As interest grows in alternative crops such as cannabis, Sebastian Dam looks at how light intensity impacts the bud density and tetrahydrocannabinol content. Looking more broadly towards the environment and the preservation and protection of biodiversity, Jingyin Bao investigates cryopreservation techniques for an endangered species, and as competition for land intensifies, Lorenzo Bonzi explores the impact of light transmission on fruit crops under photovoltaic arrays.

The lack of arable land, especially within our cities, and the need to conserve resources are leading to the rapid establishment of plant factories (vertical farming), many of which are based entirely on the use of artificial light. Genhua Niu, from Texas A&M, provides an insightful review of the new textbook edited by esteemed experts and plant factories with artificial lighting (PFAL) pioneers, Emeritus Professor Toyoki Kozai and Dr. Eri Hayashi. Comprised of seven parts and a total of 21 chapters, this book offers a comprehensive overview of recent advancements in PFAL technologies and their applications in modern plant production.

Henrique Belmonte Petry, Edson Bertolini, Daniel Remor Moritz, Diego Adílio da Silva, Darlan Rodrigo Marchesi and Márcio Sônego provide our lead article in the World of Horticulture, exploring alternative mechanisms for the control of Passion fruit woodiness disease (PWD) in passion fruit. While there is no specific control measure for PWD, when several integrated disease management strategies are combined, including the use of a sanitary break period of at least 30 days, the use of healthy seedlings, early detection of infection, and the systematic eradication of infected plants, it is possible to achieve a significant reduction of the initial inoculum of the disease and to delay the transmission of the disease to the following crop. The planting of grasses as green manure – mainly black oats – a non-virus-host species during the sanitary break period, the use of windbreaks and the application of mineral or vegetable oils also help to reduce the transmission of the virus.

Within this edition, while we praise the efforts of our young researchers, we also acknowledge and pay our respects to several of our colleagues who have recently passed away. In their own individual way, each has made a significant contribution to the field of horticulture, but through those their lives have impacted, their legacy will endure for generations.

We also thank and acknowledge the many conveners, institutions, partners and sponsors that continue to provide, organise and deliver the many symposia upon which this Society depends.

› Opportunities, changes and challenges

François Laurens, Peter J. Batt, Lukas Bertschinger, Yao-Chien Alex Chang, Ted DeJong, Moctar Fall, Patricia Paiva, Ryutaro Tao and Peter Vanderborght

› François Laurens

According to Chinese mythology, 2024 is the Year of The Dragon, a year of great potential and opportunity, and a year of creativity and innovation. Over the past 18 months, your Board has been exploring multiple opportunities to improve our bottom line by both increasing our revenue and reducing our costs.

To enhance the overall quality and to future-proof our peer reviewed journals, we are currently in negotiation with an external publisher to out-source the publication of our journals. Supported by a new Editor in Chief, this will significantly reduce the time for the receipt of a manuscript and its ultimate publication, thereby making our journals more attractive to potential authors and, in time, significantly improving the impact factor.

To reduce the costs of travel, most Board meetings have been conducted online. In February, at the invitation of the organisers of the 23rd World Orchid Conference, the Board met in Taiwan, with all expenses including travel and accommodation paid for by our hosts. For that we are most grateful.

In 2024, to increase our revenue, we will roll out a number of new membership categories for corporate, industry and affiliated organisations. To facilitate the process of attracting new corporate members, we plan to participate in a number of major industry events. ISHS will participate in Macfrut, the largest fresh fruit and vegetable exhibition in Europe in Rimini, Italy, in May 2024, and we will partner with the Australian Society of Horticultural Science at Horticulture Connections in Melbourne for the biggest horticultural trade fair in Oceania in June 2024. We have also renewed and revised our memorandum of understanding with the Food and Agriculture Organization of the United Nations.

After two very successful online events late last year, we have established a Young Minds Committee. Comprised of six students and six early career researchers from each of the six geographic regions (Africa, Asia, Europe, North America, South America and Oceania), the Young Minds Committee will provide the Board with greater insights into the type of events our younger members want, need and expect from ISHS.

While our existing business model has served us well since the Society was first incorporated in 1959, we live in a very different world today. To assist the Board in better understanding the challenges that lie ahead of us and to facilitate the development of a new business plan, we have recruited a competent and capable management consultant to guide us.

With the assistance of a communication company, the ISHS brand and image have been revitalized. The core values and purpose of ISHS will be communicated through our new headline statement: Advancing horticulture for a better tomorrow together. To communicate this to the general public and to accommodate the new membership categories, we will soon begin to upgrade our website with the addition of a 'members only' portal and we will seek to improve our presence on social media.

Through the 30+ symposia that we conduct every year, the IHC, and the three regional congresses in Africa, Asia and Europe, and the subsequent publication of those proceedings through *Acta Horticulturae*, ISHS is providing a means for horticultural researchers and practitioners from every corner of the world to connect and to share their experiences. As repeatedly highlighted by the Spotlight articles we regularly publish in *Chronica Horticulturae*, it is from these initial contacts and interactions that lifelong friendships evolve that both define us and drive us.

We look forward to working with you all in 2024 and to collectively and collaboratively addressing some of the major issues that impact our world today.

EHC 12-16 May 2024 Bucharest, Romania | EUROPEAN HORTICULTURE CONGRESS

V European Horticultural Congress, a key event for international horticulture, 12-16 May 2024, Bucharest, Romania

Florin Stănică, President of EHC2024, and the Organizing Committee

The V European Horticultural Congress (EHC2024) is the major horticultural event of the year: with 10 symposia and 30 keynote speakers, we expect to host over 1,000 participants. In addition, with 11 technical tours and 5 post-congress professional tours, our guests will have a unique opportunity to visit some of the most important horticultural areas of Romania.

Young researchers in the spotlight!

EHC2024 encourages the active participation of young scientists, integrating both students and early career professionals into our scientific community through training and mentoring. With this, we want to ensure the continuity and future of horticultural research and of the ISHS community.

Horticulture at crossroads – 10 symposia on innovation and technology

The congress is structured around 10 symposia, where science and innovation meet industry and where bridges are built to facilitate the sustainable development of horticulture in Europe and indeed the world.
The 10 symposia are focused on current challenges in the horticultural field and include:

- S01 History of horticulture in Europe;
- S02 Sustainable vegetable production from seed to health booster sources;
- S03 Fruit production systems for sustainable and resilient development;
- S04 Viticulture and winemaking between tradition and innovation;
- S05 Berries between opportunities and challenges;
- S06 Ornamental horticulture for the service of society;
- S07 Urban horticulture: from vertical farming to planting design;

› Congress location – Palace of the Parliament.

› Exhibition area in the Palace of the Parliament.

› Peleș Castle.

› Pietroasa wine cellars.

- S08 Genetic resources in horticulture: screening, propagation, use, and conservation;
- S09 Robotics, mechanization and smart horticulture;
- S10 Postharvest and horticultural products quality.

The congress brings together 30 keynote speakers, all of whom are internationally recognized for their notable expertise in the field of horticulture. They cover a wide range of disciplines and bring to the fore the latest discoveries and research in their respective fields.

Post-congress – discover Romania through the EHC2024 tours

The 11 technical and 5 post-congress tours have been carefully designed to expose participants to horticulture education and research institutions, production sites, processing companies, vineyards and wine cellars.

For an authentic experience, every participant will be introduced to the history, traditions, local food and wines and the natural beauty of Romania. By exploring the historical regions of Transylvania, Moldova, Muntenia – Oltenia and Dobrogea, the medieval castles, monasteries, the picturesque landscapes of the Carpathian Mountains and Danube, participants will enjoy a complete and authentic image of Romania.

If you want to learn about the latest scientific achievements in horticulture, join EHC2024, between May 12-16, 2024, in Bucharest, in one of the most iconic buildings in the world – the Parliament Palace. We look forward to meeting you in Romania in May 2024 at the V European Horticultural Congress!

› Gala dinner location – Mogosoaia Palace.

› About the author

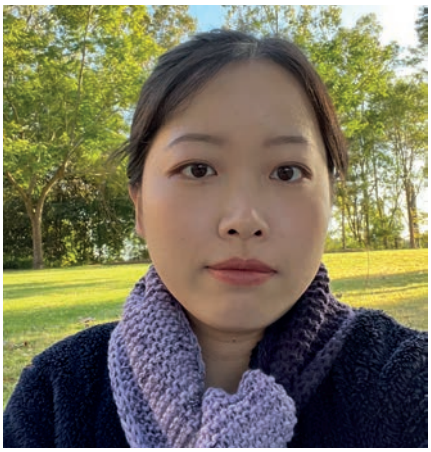
› Florin Stănică

Prof. Florin Stănică is Vice-Rector of the University of Agronomic Sciences and Veterinary Medicine of Bucharest, and corresponding member of the Romanian Academy, Section Agricultural and Forestry Sciences. He is member of the Academy of Agricultural and Forestry Sciences, and Vice-President of the Section Horticulture. Prof. Stănică is Professor of Pomology at the Bucharest Faculty of Horticulture, and expert on fruit growing technologies, including planting systems, canopy and organic orchard management. He is senior researcher on new fruit species, breeder of kiwifruit, jujube, pawpaw, peach and apricot. Since 2006, he is the Romanian representative in the European Fruit Research Institutes Network (EUFRIN) Board and he used to be EUFRIN Secretary and President. Prof. Florin Stănică is the Chair of ISHS Working Group Peach Culture and the Romanian representative in the ISHS Council. He is the President of the V European Horticultural Congress (EHC2024) that will be held in Bucharest. E-mail: florin.stanica@usamv.ro, Web: www.ehc.usamv.ro

› 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.

Cryopreservation for the conservation of endangered *Gossia* species



› Jingyin Bao

Jingyin Bao, a PhD candidate at the University of Queensland, under the supervision of Dr. Alice Hayward, is focused on conserving endangered Australian flora. Armed with a Master of Biotechnology, her prior work has focused on optimizing cryopreservation protocols for the endangered *Gossia fragrantissima*. Expanding on this foundation, her current PhD project is dedicated to broadening the application of cryopreservation to other endangered Australian native plants, particularly *Gossia* and *Decaspermum*. These species currently face a severe threat from the invasive fungal disease myrtle rust, which entered Australia in 2010. As prior attempts to eradicate the disease were unsuccessful, the focus shifted to ex situ conservation efforts. Jingyin's research spans cryopreservation and ecological restoration. Her ongoing work involves developing tissue culture systems to ensure an ample supply of plant material for cryopreservation experiments and regenerating cryo-stored plants. Additionally, she is actively working on refining cryopreservation protocols, investigating physiological responses during cryopreservation, and studying the ecological restoration potential of in vitro generated plants. Preliminary results of cryopreserving *G. fragrantissima* shoot tips were presented at the IV International Symposium on Plant Cryopreservation. Having already successfully rooted and acclimatized in vitro plants and regenerated cryo-stored *G. fragrantissima* plantlets, Jingyin has demonstrated the feasibility of cryopreserving germplasm for subsequent revegetation efforts. Her next steps involve growing the generated plants in nursery settings and implementing revegetation initiatives in habitat-like fields with the collaborative support of Landcare groups. This research, poised at the intersection of cutting-edge cryopreservation techniques and ecological restoration, holds significant promise for the conservation of Australia's threatened native plant species. Once the protocol is developed, it will be used by the Australian Plant Bank to conserve these species.

Jingyin Bao won the ISHS Young Minds Award for the best poster presentation at the IV International Symposium on Plant Cryopreservation in Norway in June 2023.

›Contact

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Changes in fruit quality during ripening of two European plum cultivars

› Aleksandra Korićanac

Aleksandra Korićanac is a PhD student at the University of Belgrade, Faculty of Agriculture, and a Research Assistant at the Fruit Research Institute, Čačak, Serbia. Her research is largely focused on fruit quality changes during ripening, harvest, storage, and postharvest management of temperate zone fruit species, particularly plums. Little is currently known about how European plums (*Prunus domestica*) ripen. Harvest time is one of the main determinants of quality and storability of plums for fresh market consumption, but defining the ideal harvest time is only possible when the physical and biochemical changes during ripening are known. Furthermore, a significant variation in the ripening process between cultivars has been observed. The aim of this research was to evaluate the physical, chemical, and sensory properties during ripening of two European plum cultivars: the widely grown cultivar 'Stanley' and a new late-ripening cultivar 'Petra', released by the Fruit Research Institute, Čačak. Although similar patterns of change in some important quality parameters were observed in both cultivars (a decrease of fruit firmness and total acidity, an increase of soluble solids, total sugars, inverted sugars and sucrose), almost all examined physical attributes changed significantly between the two cultivars. Quality changes during ripening of 'Stanley' plum were marked and consequently fruit characteristics and suitability for fresh consumption differed significantly between harvests. On the other hand, the fruit quality of 'Petra' was more constant during the observed period, although the harvest window was much shorter.

Aleksandra Korićanac won the ISHS Young Minds Award for the best oral presentation at the V Balkan Symposium on Fruit Growing in Croatia in June 2023.

› Contact

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The genome of 'Mgaloblishvili', a *Vitis vinifera* cultivar resistant to grapevine downy mildew

› Valentina Ricciardi

The employment of *Vitis vinifera* germplasm for the development of downy mildew resistant cultivars could greatly shorten and simplify breeding programs. 'Mgaloblishvili' is a *V. vinifera* cultivar that has shown some resistance to grape downy mildew (*Plasmopara viticola*), one of the most destructive diseases affecting grapevines. A genome wide association study was able to identify three new loci associated with the 'Mgaloblishvili' resistant phenotype: *Rpv29*, *Rpv30* and *Rpv31*. Nonetheless, the protein-coding genes responsible for the resistance remain elusive. To address this gap, the 'Mgaloblishvili' genome was sequenced and assembled using PacBio HiFi reads. The obtained chromosome-level diploid genome (986 Mb) was used to identify the target loci, which were successfully characterized for their gene content and expression after infection with *P. viticola*. The genome structure of the regions of interest was analyzed comparing 'Mgaloblishvili' haplotypes to the grapevine reference genome PN40024. Furthermore, using DNA sequencing data of two resistant and two susceptible accessions from 'Mgaloblishvili' self-cross progeny, *Rpv30* and *Rpv31* resistance haplotypes were successfully identified. These findings will increase our knowledge about the downy mildew grapevine pathosystem. Moreover, they will accelerate the potential employment of these valuable traits for the development of elite cultivars with durable resistance to downy mildew.

Valentina Ricciardi is a PhD student at the Department of Agricultural and Environmental Sciences, University of Milan, Italy, where she is studying the identification of grapevine genetic resources to be used in breeding programs for the improvement of viticultural practices. Valentina won the ISHS Young Minds Award for the best oral presentation at the XIII International Conference on Grapevine Breeding, Genetics and Management in Turkey in August 2023.

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Genetic factors driving variation of stomatal density in apple

› Francesca Zuffa

Severe drought and extreme temperatures are two main impacts of climate change, resulting in increased abiotic stress response from plants and an increased demand for fresh water. Breeding for functional traits such as stomatal density can enhance the climate resilience of plants. As stomata control plant-water relations, their function makes them promising targets for improving crop performance in response to climatic stresses.

We assessed the variation in stomatal density in a genetically diverse collection of 269 apple (*Malus × domestica* Borkh.) accessions located in Waedenswil, Switzerland, across the years 2019, 2020, and 2021. Results showed that stomatal density resembled a normal distribution across the population with a median of 361, 340 and 339 mm^{-2} for 2019, 2020, and 2021, respectively. Although no significant variation was observed between the three years, stomatal density was significantly different among the diverse accessions, from a minimum of 181 mm^{-2} to a maximum of 531 mm^{-2}. Stomatal density was negatively correlated with intrinsic water-use efficiency ($rs = -0.51$, $p<0.001$), as determined by leaf gas-exchange. We identified single nucleotide polymorphisms (SNPs) associated with stomatal density on chromosomes 2, 9, and 10 through genome-wide association studies. Specifically, on chromosome 9, a key genetic regulator of stomatal development was identified in the haploblock including the most significant SNP. This haploblock is composed of six biallelic SNPs within 102.3 kbp. Within this haploblock, specific allelic combinations varied in stomatal density by nearly 100 mm^{-2}. Furthermore, two additional candidate genes were identified close to the haploblocks including SNPs associated with stomatal density on chromosome 10. The physical distances to these genes were greater: approximately 530 and 1,810 kbp away from the associated SNPs. Our study identified the genomic regions driving the variation of stomatal density in apple, providing the foundation for targeted breeding of stomatal traits to enhance resilience to climate change.

Francesca Zuffa won the ISHS Young Minds Award for the best poster presentation at the XVI EUCARPIA Symposium on Fruit Breeding and Genetics in Germany in September 2023.

› Contact

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Ziziphus mauritiana L. (Indian jujube): a potential fruit tree for livelihoods in arid regions

› Utpal Das

The Indian jujube (*Ziziphus mauritiana* L.), a member of the family *Rhamnaceae*, is widely distributed in tropical and subtropical regions of the world. The tree can withstand highly alkaline and slightly waterlogged soils and has potential to prevent soil erosion and desertification. However, the cultivation of Indian jujube may also provide opportunities for smallholder farmers to improve their livelihoods. Fruits may be dehydrated and processed into different products like pickles, murabba, candy, and chutney. Furthermore, various studies have reported that different parts of the plant such as fruit, seeds, leaves, roots and flowers, contain bioactive constituents that have antioxidant activity and may have anticancer, antimicrobial, and antidiabetic properties. As the crop requires very little attention, it can help mitigate the impact of climate change and reduce the risk of severe soil and climatic conditions like drought resistance, strong winds, erosion, high salinity, and flooding. To highlight the potential pharmacological properties of Indian jujube, its industrial uses and its potential role in livelihood development and climate resilience, Utpal Das undertook a systematic review of the literature. His efforts were rewarded when he won the ISHS Young Minds Award for the best poster presentation at the VI International Jujube Symposium in Romania in September 2023.

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Understanding the genetic mechanisms controlling seed shattering to reduce seed loss in *Pastinaca sativa*

› Heather Wickson

As a member of Cranfield University's Plant Science Laboratory, Heather is currently completing a PhD project entitled "Reducing seed loss and waste in umbelliferous crops" as part of the FoodBioSystems DTP program in partnership with Elsoms Seeds Ltd. The project focuses on understanding the genetic background of flower and seed development in parsnip (*Pastinaca sativa*) with a view to developing a marker-assisted-selection pipeline to improve seed production efficiency for current and new varieties.

For the III International Symposium on Carrot and Other *Apiaceae*, Heather presented a poster on a section of her project, which focused on identifying seed shattering phenotypes within parsnip breeding lines.

One known source of seed loss in parsnip seed production is the high propensity for mature seed to shatter, separating from the mother plant and falling to the ground where it cannot be harvested. Non-shattering phenotypes have been identified and selected in other crops such as wheat and rice. However, the occurrence and genetic control of this trait in *Apiaceae* is not well understood.

To investigate shattering propensity in current breeding lines, a new method was developed. A mechanical separation technique, previously used in brassica, was adapted for large, field grown plants. This allowed for a quantitative measure of shattering propensity and therefore the ability to distinguish and select lines based on this trait. This also allowed for the production of F_2 hybrid plants, offspring of lines with consistently high and low shattering effect, with the aim of genotyping to identify QTLs associated with this trait in parsnip.

Heather Wickson won the ISHS Young Minds Award for the best poster presentation at the III International Symposium on Carrot and Other *Apiaceae* in the United Kingdom in October 2023.

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Effect of light intensity and branch origin position on *Cannabis sativa* inflorescence density and THC content

› Sebastian Dam

Sebastian Dam is a former undergraduate student of Dr. Youbin Zheng (University of Guelph) and is currently a crop consultant at Cultivation Coaches in Canada. Sebastian's research consists of optimizing cannabis cultivation techniques. Throughout the world, as the cultivation of cannabis is becoming legal for both medicinal and recreational use, documented research for this new crop is in high demand. The important quality metrics for production are consistent inflorescence density and tetrahydrocannabinol (THC) content throughout the plant and between cultivation cycles. To achieve a homozygous plant, understanding the factors influencing THC content and bud density are crucial. This study aimed to unravel the potential impact of branch origin on cannabis inflorescence characteristics. To isolate the branch origin as a variable, environmental parameters were controlled, and light intensity was measured and isolated as a result. The treatment plants were trained to receive equal amounts of light through a technique called 'topping' and physical manipulation of the branches. Untreated plants were grown naturally resulting in differential light intensities. Branch origin was found to have no impact on the inflorescence density or THC content. However, inflorescence density was shown to be significantly impacted by light intensity. Trained plants exhibited uniform density between top and bottom inflorescences, whereas untrained plants displayed lower density in the bottom inflorescences. While light intensity did impact inflorescence density, THC content analysis revealed no significant differences between top and bottom inflorescences in both trained and untrained plants. Through these findings and the emerging body of research on this topic, it is expected that the THC content will not be affected by light intensity above a certain minimum threshold. The study supports Dr. Zheng's hypothesis that the potential minimum threshold for light intensity to impact THC content is around 200 µmol m^{-2} s^{-1} but further research is necessary to confirm this.

Sebastian Dam won the ISHS Young Minds Award for the best oral presentation at GreenSys2023: International Symposium on New Technologies for Sustainable Greenhouse Systems in Mexico in October 2023.

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Influence of silicon application on the agronomic and nutritional performance of container grown highbush blueberries

› Eve-Marie Boudreau-Forgues

Biostimulants can improve nutrient uptake by plants, growth, productivity, fruit quality, as well as plant resilience to abiotic and biotic stresses. Among them, silicon (Si) is reported to be beneficial in mitigating stresses such as plant diseases, salinity, drought, and nutrient imbalances. For organic highbush blueberries, the ability to enhance crop resilience and produce high quality berries is essential to the success of the organic sector in international markets. Since the health-promoting compounds in fruit are often associated with secondary metabolites involved in plant defense, Si could enhance the nutritional value of berries. Indeed, it has been observed that Si increases sugar content and certain phenolic compounds. In a split-plot design over one growing season, in a greenhouse at Laval University, Quebec, we compared two different types of silicon sources: 1) organic wollastonite (58% SiO_2, 23% CaO, 6% MgO) at a rate of 4 g L^{-1} of growing media; 2) potassium silicate (18% SiO_2, 50% K) at a rate of 1.7 mM added to the irrigation water; and 3) a control receiving no Si. Eight highbush blueberry cultivars were selected for this study including early- and late-maturing cultivars, which were grown in a 10-L container with an organic peat-based growing medium provided by Berger (Saint-Modeste), which was supplemented with organic fertilizers. From an analysis of the Si leaf content, potassium silicate was absorbed in greater quantities than wollastonite. The silica content in the leaves varied from one cultivar to another: 'Earliblue' and 'Liberty' exhibited lower leaf silica content at 34 and 35%, respectively, in comparison to the average silica content of the eight cultivars included in the study. This observation implies that there is variation in the ability of highbush blueberries to absorb silicon. 'Bluegold' showed the highest content of Si with a total of 370 ppm. Potassium silicate had a positive effect on microbial enzymatic activity by increasing the hydrolysis of fluorescein diacetate (FDA) content of the samples when compared to plants without silica. With regard to the phenolic compounds, 'Earliblue' and 'Liberty' exhibited the lowest levels of polyphenols and anthocyanins. In contrast, 'Bluegold' showed the highest levels of polyphenols and anthocyanins, highlighting a correlation between Si content and phenolic compounds in highbush blueberries.

Eve-Marie Boudreau-Forgues won the ISHS Young Minds Award for the best poster presentation at the IV International Symposium on Organic Greenhouse Horticulture in Mexico in October 2023.

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Sap flow dynamics of young and mature pomegranate orchards under semi-arid conditions

› Muthianzhele Ravuluma

Muthianzhele Ravuluma is a PhD candidate at the University of the Free State, South Africa. His research is focused on estimating the current and future use of water in pomegranate orchards in the Western Cape, South Africa. Establishing crops tolerant to water stress is essential to improve food availability. As the climate in South Africa is semi-arid and prone to droughts, climate change is exacerbating the situation with increasing temperatures, increased evaporative demand, more frequent occurrence of droughts, more erratic rainfall and shifts in rainfall patterns. To mitigate these challenges, South Africa must improve water use efficiency and introduce drought-tolerant crops such as pomegranate. This study aims to model current and future water use of selected pomegranate orchards under future climate change scenarios for two study sites in the Western Cape. Weather parameters are being collected to calculate reference evapotranspiration (ETo), which will be related to tree and orchard water use to obtain crop coefficients for irrigation scheduling. Transpiration and evapotranspiration are being measured using the heat ratio method (sap flow) and the eddy covariance (surface renal). Data has been collected for the 2022/23 growing season, and more is currently being collected for the 2023/24 growing season. The sap flow measurements will be used to get the basal crop coefficient, and the eddy covariance measurements will be used to get the single crop coefficient. Light interception will be measured to relate to the canopy structure to develop an alternative way to estimate the crop coefficients. ET will be estimated using a conformal-cubic atmospheric model (CCAM) with the data obtained from global climate models (GCMs).

Muthianzhele Ravuluma won the ISHS Young Minds Award for the best poster presentation at the XII International Workshop on Sap Flow in New Zealand in October-November 2023.

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Red-flesh kiwifruit inner quality scoring by a computer vision system

› Mirko Piani

Red-fleshed kiwifruit have recently entered the international market. As their nutraceutical properties have generated significant consumer interest, to establish a quality standard along the supply chain, the internal quality of the fruit must be accurately evaluated. Evaluating the redness of kiwifruit flesh poses a complex challenge due to the inherent variability in color localization and spottiness, as well as the wide range of red shades and intensities within each fruit. The current evaluation protocol employs experienced human raters to visually assess the internal quality of red-fleshed kiwifruit. Quality assessment requires the evaluator to score the red quantity and both inner and outer pericarp red intensities to determine the fruit category. As a consequence, this method suffers from complexity, subjectivity, limited repeatability, and is a slow process. In this study, computer vision and unsupervised learning algorithms were used to develop a computer vision system capable of scoring fruits according to both red quantity and red intensity. RGB images of equatorially sliced fruits were segmented into the Hue-Saturation-Value color space to generate the red shades mask (*RSmask*). The latter was used to extract quantity descriptors for the K-means classifier, namely "*red quantity*" classifier. Simultaneously, the *RSmask* was applied to segment a red-related image from which the red intensity descriptors were obtained through a matrix conversion to the CIELAB color space. Similarly, the "*red intensity*" classifier was used to score the red intensity of the flesh. A total of 102 sample fruits were classified into 36 categories based on the combination of the red quantity and intensity scores. The results demonstrated that red color quantity is much more predictable than red color intensity due to human eye color perception issues such as color constancy and simultaneous contrast.
Mirko Piani won the ISHS Young Minds Award for the best oral presentation at the II International Symposium on Precision Management of Orchards and Vineyards in Australia in December 2023.

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Applying a solar model to LiDAR images of an agrivoltaic pear orchard

› Lorenzo Bonzi

Agrivoltaics is the practice of growing crops underneath solar panels. Using photovoltaic arrays above tree canopies has several potential benefits such as limiting transpiration and water use, and protecting trees and fruit from damage (extreme heat, sunlight, hail). Nevertheless, above-canopy photovoltaic arrays reduce light availability. This study aimed to measure the light availability and crop load distribution under two different west-facing solar panel configurations – 45 degree (45W) and near horizontal 5 degree (5W) – and compared it to a control (no photovoltaic arrays). A solar model was applied to LiDAR images obtained with a manual laser imaging scanner in a 'ANP-0118' pear orchard. The output of the scan was elaborated with 3D processing software and a high-definition 3D reconstruction of the experimental orchard obtained. An algorithm was then applied to determine the canopy radiation interception to recreate light distribution throughout the canopy. The point cloud with the illuminance scalar field was portioned into three different canopy level layers (high, medium, and low) and processed with MATLAB to extract the average values of fraction of light intercepted (%). The number of fruit on the trees was obtained by filtering the points of the selected cloud using their associated scalar value and RGB properties. The lowest light availability was recorded in the 5W. The 5W treatment had the lowest number of fruit (35.6% less than the control) whereas the 45W treatment had a similar crop load to the control. Using LiDAR technology to study the effects of photovoltaic cells on canopy solar radiation interception, distribution and fruit number is a viable option. The research was supported by the AgrHySMo laboratory of the Department of Agriculture, Food and Environment of the University of Pisa, Italy, and by the Agriculture Energy Investment Plan of the Victorian Government (Australia).
Lorenzo Bonzi won the ISHS Young Minds Award for the best poster presentation at the II International Symposium on Precision Management of Orchards and Vineyards in Australia in December 2023.

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Integrated management of the passion fruit woodiness disease in Santa Catarina State, Brazil

Henrique Belmonte Petry, Edson Bertolini, Daniel Remor Moritz, Diego Adílio da Silva, Darlan Rodrigo Marchesi and Márcio Sônego

The *Passifloraceae* family comprises more than 500 species (Cerqueira-Silva et al., 2014), with the *Passiflora* genus being the most representative, with 157 species (Bernacci et al., 2023). Of all the species, the sour passion fruit (*Passiflora edulis* Sims) is of greatest economic significance (Anderson et al., 2022). According to FAO (2018), in 2017, world production of passion fruit was around 1.5 million tonnes per annum, with Brazil being the largest producer (65%), followed by Colombia (9%) and Indonesia (7%). Although typically found in tropical climates, the coastal lands of Santa Catarina State are proving to be highly suitable for the production of passion fruit (Figure 1) (Petry et al., 2022).

Regrettably, the passion fruit plant is susceptible to several phytosanitary problems that reduce both their longevity and their productivity (Fischer and Rezende, 2008). Viruses, in particular, are of great economic importance, negatively affecting productivity, and constraining the further expansion of the industry. Passion fruit woodiness disease (PWD) is the main viral disease in Brazil, where infection may reduce yields by as much as 30% (Colariccio et al., 2018). It is characterized by symptoms (Figure 2) of severe mosaic, roughness, distortion of the leaves, a reduction in plant development, fruit hardening and deformation (Fischer and Rezende, 2008). The first report of PWD in Brazil was in the late 1970s in Bahia state. The disease then spread to other states and is currently found in all passion fruit producing regions of the country (Petry et al., 2022).

PWD is caused by several different viruses, including passion fruit woodiness virus (PWV), South African passiflora virus (SAPV), East Asian passiflora virus (EAPV), Ugandan passiflora virus (UPV), and cowpea aphid-borne mosaic virus (CABMV), which is most often found in Brazil. The range of hosts of CABMV is particularly wide and includes several species of *Passifloraceae*, *Fabaceae*, *Amaranthaceae*, *Pedaliaceae*, and *Solanaceae* (Kitajima, 2020).

Figure 1. Passion fruit production in Santa Catarina State.

Figure 2. Symptoms of Passion fruit woodiness disease (PWD).

In passion fruit, the main route of transmission for the virus is through several species of aphids in a non-circulative and non-persistent way (Colariccio et al., 2018). The progress of PWD depends, among other factors, on the abundance of a given aphid species in the growing environment and their efficiency in transmitting the virus (Moritz et al., 2021).

There is no specific control measure for PWD. Currently, several integrated disease management strategies are combined emphasizing the use of a sanitary break period of at least 30 days, the use of healthy seedlings, early detection of infection, and the systematic eradication of infected plants (Petry et al., 2022). Integrated management of PWD

Figure 3. Greenhouse with a plastic cover, antechamber, and anti-aphid screens to passion fruit seedlings production.

was first introduced in Santa Catarina State in 2016, following the detection of CABMV in some passion fruit orchards. Published by the Department of Agriculture of Santa Catarina State, the standardized management of PWD included a sanitary break period and the production of seedlings in a protected environment (Petry et al., 2022).

In the State of Santa Catarina, a synchronized sanitary break period for sour passion fruit was the first measure for coping with fruit hardening, with the aim of achieving a significant reduction of the initial inoculum of the disease and delaying the transmission of the disease to the following crop (Petry et al., 2022). The adopted sanitary break period of 30 days coincided with the end of the harvest period when passion fruit prices were at their lowest in the supply centers of São Paulo, Rio de Janeiro, and Minas Gerais (Almeida et al., 2017).

To further reduce the risk of infection, seedlings had to be produced in a greenhouse, with a plastic cover, antechamber, and anti-aphid screens (Figure 3) (Petry et al., 2022). The use of seedlings over 80 cm tall at planting time enabled the plants, with favorable growing temperatures and a photoperiod greater than 12 hours, to start flowering earlier and to come into production earlier, reducing the impact of the virus on productivity and fruit quality (Narita et al., 2012). Another advantage of using tall seedlings is that it reduces the need for pruning in the field, which if carried out and without appropriate disinfestation of hands and tools, provides another mode for the transmission of the virus.

The planting of grasses as green manure – mainly black oats (*Avena strigosa*) – a non-virus-host species during the sanitary break period (Figure 4) and the use of windbreaks also helps to reduce the transmission of the virus (Petry et al., 2022).

Removing plants with symptoms of PWD further reduces the impact of the virus on production and fruit quality, breaking the viral cycle in orchards. However, for it to be effective, weekly inspections are necessary to assess and remove infected plants prior to flowering (Spadotti et al., 2019).

The application of mineral or vegetable oil has proven effective in interfering with the acquisition and transmission process of CABMV by aphid vectors, reducing virus transmission by more than 60% in greenhouse experiments (Moritz et al., 2021). Field trials are currently being conducted to prove the effectiveness of such management practices in orchards, as well as testing other products that show potential to interfere with the virus transmission process.

With the adoption of an integrated disease management program to control CABMV, the production of sour passion fruit in Santa Catarina is economically feasible.

Figure 4. Sanitary break period with black oat (*Avena strigosa*) cultivated as green manure.

About the authors

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Márcio Sônego has a PhD in Crop Physiology (2000) from Lincoln University, New Zealand, an MSc in Agricultural Meteorology (1987) from the Federal University of Viçosa, Brazil, and a BSc in Agronomy (1984) from the Federal University of Santa Catarina, Brazil. He does agriculture research at the Santa Catarina State Agricultural Research and Rural Extension Agency (EPAGRI), Brazil, mainly on tropical fruits cultivated in subtropical climates. Márcio has been involved in the passion fruit research program since 2013 dealing with issues such as agrometeorology, irrigation and crop management. E-mail: sonego@epagri.sc.gov.br

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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

› Cover image: Mugen Farm, created by Oishii, growing Omakase berries in an indoor vertical farm. 2022. ©Tsutomu Fujimoto.

Kozai, T., and Hayashi, E., eds. (2023). Advances in Plant Factories: New Technologies in Indoor Vertical Farming, Burleigh Dodds Series in Agricultural Science, Vol. 141 (Cambridge, UK: Burleigh Dodds Science Publishing), pp.520. ISBN 9781801463164 (hardback). £160 / $210 / €190.

A 25% discount will be received by entering the code "ISHS25" when ordering through https://shop.bdspublishing.com/store/bds/detail/workgroup/3-190-125660

Plant factories with artificial lighting (PFALs), also called indoor vertical farms, employ vertical racks for plant cultivation, reducing land use and enhancing resource use efficiency. As the technologies associated with PFALs have rapidly evolved, this newly published book provides the latest updates. Comprising seven parts and a total of 21 chapters, the book features contributions from 47 distinguished authors worldwide. Edited by esteemed experts and PFAL pioneers, Emeritus Professor Toyoki Kozai and Dr. Eri Hayashi, it offers a comprehensive overview of the advancements in PFAL technologies and their applications in modern plant production.

Part One consists of three chapters and covers the background, concept, and methodologies associated with sustainable PFALs. Chapter one starts with the characteristics, potential and challenges faced by PFALs, exploring their potential for phenotyping, and expanding target plant types other than leafy greens. The second chapter discusses the concept of environmental design and management principles of PFALs, considering resource use efficiency, scalability, adaptability, and energy autonomy. The third chapter gives a comprehensive overview of the past, present, and future of PFALs in six technological categories: architecture and automation, lighting, climate control, sensors and algorithms, the rootzone, and genetics.

Part Two consists of five chapters with a primary focus on energy and other resource performance. It starts with a discussion on life cycle assessment and its application in PFALs, highlighting the strengths and limitations, followed by exploring methods and potential strategies for reducing carbon emissions, optimization of energy and other resource use, the potential for optimizing resource use efficiency by examining factors like light, temperature, CO_2 enrichment, and plant cultivation practices. The final chapter introduces concepts of circular economy for PFALs, offering three examples: growing mushroom and plant co-culture, co-culture of fish and plants, and combined systems for plant production and methane fermentation in urban agriculture.

Part Three, with its two chapters, delves into phenotyping. The first chapter provides an overview of machine vision technologies used in plant growth monitoring, robotics, fruit grading, the application of deep learning, and challenges faced by machine vision in PFALs. The second chapter offers an overview of the evolution of phenotyping technology in open fields, greenhouses, and indoor farms. The technologies reviewed in both chapters are primarily from field or greenhouse crop production and application of these technologies to PFALs is discussed.

Part Four, consisting of three chapters, provides an overview of the latest research studies on controlling growth and quality of lettuce and other leafy greens by manipulating light spectra. The first two chapters discuss the effects of different light spectra (from monochromatic light to full spectrum) on photosynthesis, biomass production, morphology, and quality of leafy crops. The final chapter gives a summary of the recent research on the effects of light spectra with a focus on the nutritional quality of leafy greens. Similarly, Part Five, comprising two chapters, offers an overview of the effects of light spectra on the growth and quality of fruit vegetables like tomatoes, herbs, and ornamentals. The discussion encompasses technologies and strategies applicable to commercial production.

Part Six unfolds with five chapters featuring insightful business case studies. The first chapter delves into lessons learned from commercial operations and closed vertical farms. Given the absence of formal literature on this subject, the authors conducted in-depth discussions with 20 participants from 18 companies. The second chapter explores the design and management of globally networked vertical farms, using Infarm as a specific case. The third chapter recounts the success story of Oishii Farm. Beginning with a compelling justification for the necessity of indoor vertical farming, the chapter provides a brief history of Oishii Farm, details R&D and production challenges in scaling up strawberry production in a PFAL and concludes with areas for improvement and insightful future perspectives. The subsequent chapter shares another success story of '808 FACTORY' with lettuce cultivation. The final chapter introduces the design and management of industrial scale vertical farms, the Intelligent Growth Solution (IGS), an innovative company headquartered in Scotland.

Part Seven concludes the book with a summary highlighting challenges and opportunities for sustainable PFALs. Emphasis is placed on the reduction of carbon emissions, energy consumption, and other resources, and the advancement of technologies associated with PFALs.

The audience for this book, which includes researchers, students, educators, engineers, and industry professionals, will discover an informative, well-written book featuring current research that is enriched by insightful business case studies. Each chapter provides a "where to look for further information" section, which is very helpful. Beyond serving as an outstanding reference, this book encourages readers to actively participate in shaping the future of indoor vertical farming systems.

Reviewed by Genhua Niu, Texas A&M AgriLife Research and Extension Center, Texas A&M University, USA

› Courses and meetings

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

Plant Health 2024, the American Phytopathological Society's annual meeting, 27-30 July 2024, Memphis, TN, USA. Info: The American Phytopathological Society (APS), 3285 Northwood Circle, Suite 100, Saint Paul, Minnesota 55121, USA, phone: 1.651.454.7250, e-mail: apshq@scisoc.org, web: https://www.apsnet.org/meetings/annual/PH2024/Pages/default.aspx

Join the International "Fascination of Plants Day" around May 18, 2024 – a global celebration of plants!

Fascination of Plants Day May 18th 2024

The European Plant Science Organisation (EPSO), together with over 60 National Coordinators across the globe, proudly announce the launch of the seventh edition of the Fascination of Plants Day (FoPD), scheduled to take place on and around May 18, 2024. A celebration of the captivating world of plants, FoPD invites individuals of all ages to engage in plant-based interactive events and activities organised by scientific institutions, universities, botanical gardens, museums, schools, farmers, and companies worldwide.

Since its inception in 2012, FoPD has gained global recognition. In 2022, over 800 events were held in more than 50 countries. Working with National Coordinators and hundreds of plant enthusiasts as event organisers, this coordinated effort is a testament to the enduring significance of plant science in addressing social, environmental, and economic challenges. The FoPD covers all plant related topics, including basic plant science, agriculture, horticulture, forestry, plant breeding, plant protection, food and nutrition, environmental conservation, climate change mitigation, smart bioproducts, biodiversity, sustainability, renewable resources, plant science education and art.

Anyone who would like to contribute to the FoPD is welcome to join. Please contact your National Coordinator (click on "countries" at www.plantday18may.org) to discuss and get access to all the supporting materials.

EPSO, the European Plant Science Organisation, coordinates the FoPDs. EPSO is at the forefront of advancing plant science, advising policy makers, promoting collaboration, and fostering awareness of the crucial role plants play in our lives. Learn more about EPSO at http://www.epsoweb.org

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VI International Jujube Symposium

Division Horticulture for Human Health #ishs_dhea

The VI International Jujube Symposium was held at the Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania, between September 24-28, 2023, under the auspices of the Romanian Academy, the International Society for Horticultural Sciences (ISHS) and the Romanian Society of Horticulturists (SRH). More than 90 attendees from 12 countries participated and shared their knowledge and experience during this important event for global jujube research and innovation.

The symposium hosted five oral sessions: New trends in jujube breeding; Sustainable jujube orchard management; Physiology and metabolomics; Fruit quality, postharvest and processing technologies; and miscellaneous topics. Each session had at least one keynote speaker presenting some important achievements regarding: Hotspots and trends of jujube research; Construction of visual molecular ID cards for elite new Chinese jujube (*Ziziphus jujuba* Mill.) cultivars; Jujube cultivation in Turkey; Present and perspectives for jujube cultivation in Europe; and Cultivar metabolite profiles as a tool for differentiation through metabolomics analysis. Latest results about the characterisation and field behaviour of newly released jujube (*Ziziphus jujuba* Mill.) and ber (*Ziziphus mauritiana* L.) cultivars, and local genotypes from China, Taiwan, South Korea, India, Turkey, USA and Romania were discussed. Considerable attention was given to the safe preservation and effective utilization of jujube germplasm resources, their genetic evaluation using microsatellite markers, functional substances content, and ploidy tests.

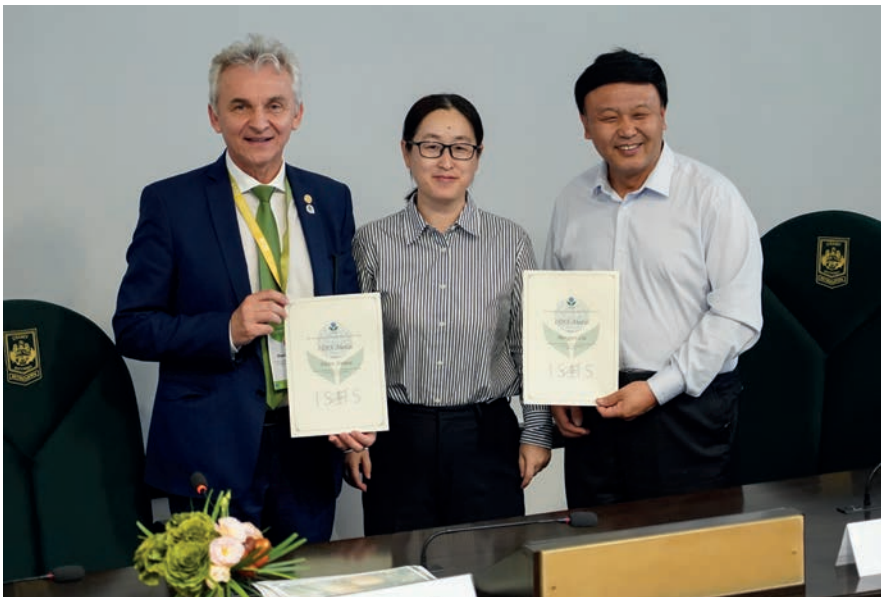
› Participants of the symposium.

Chinese and Indian jujube (ber) cultivation under different local and technological conditions and their resilience to climate change and extreme weather conditions like drought and high temperature were also presented, highlighting the resilience of the two species, due to some special physiological characteristics.

The session on fruit quality, postharvest and processing technologies, started with a keynote speaker presentation on the effects of different drying and storage methods on the quality of jujube fruit. Then, several other papers focused on fruit composition, cracking, drying methods, storage behaviour, and some ideas on jujube processed products for the European market.

A one-day technical tour was organized to visit the Istrița Station for Research and Development for Fruit Growing where a jujube demonstration orchard is planted. Among the many jujube cultivars, several new hybrid selections were shown and their fruit tasted.

An important side event was the fruit exhibition and tasting organized in front of the



› Prof. Zhihui Zhao, Chair of ISHS Working Group Jujube, presenting the ISHS medal award to Conveners Florin Stănică (left) and Mengjun Liu (right).

› Conveners Mengjun Liu (left) and Florin Stănică (right) presenting the ISHS Young Minds Awards to A) Elena Gabriela Stan for the best oral presentation, and B) Utpal Das for the best poster presentation.

amphitheater, which included a large number of cultivars and hybrid selections from Bucharest, Istrița and Dăbuleni. Processed jujube products, freeze dried jujube, dried jujube with walnut and almond, jujube and sesame balls, fruit bars, soup, jujube liquor, and alcoholic jujube in chocolate, were displayed and tasted. One of the most important jujube processing companies – Miss You – from Henan Province, China, presented its top products.

During the ISHS business meeting, the two conveners, Prof. Florin Stănică (University of Agronomic Sciences and Veterinary Medicine of Bucharest) and Prof. Mengjun Liu (Hebei Agricultural University, Baoding, China) presented the ISHS Young Minds Awards for the best oral presentation entitled "Some new jujube processed products for European market" to Mrs. Elena Gabriela Stan (USAMV of Bucharest, Romania) and for the best poster presentation entitled "*Ziziphus mauritiana* (Indian jujube): a potential fruit tree for serving livelihood in arid region" to Mr. Utpal Das (Vellore Institute of Technology, Tamil Nadu, India).

The two conveners received the ISHS medal award from Prof. Zhihui Zhao, Chair of ISHS Working Group Jujube.

A post-symposium technical tour was organized in the south and southwestern part of Romania with visits to the Dăbuleni Research & Development Station for Plant Cultivation on Sandy Soils and several jujube and stone fruit farms at Drobeta-Turnu Severin and Svinița on the Danube River Gorge. The perfect adaptation of jujube trees to the local conditions and the high fruit quality was noted by all participants.

The next International Jujube Symposium is scheduled to take place in 2026, but the venue has yet to be confirmed, with interest from South Korea, Turkey and China to host the event.

Florin Stănică and Mengjun Liu

› Visit of Istrița Research & Demonstration jujube orchard.

› Exhibition of jujube cultivars and hybrid selections.

› Contact

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› IV International Symposium on Plant Cryopreservation

Division Plant Genetic Resources and Biotechnology #ishs_dbio

The IV International Symposium on Plant Cryopreservation took place from June 13-15, 2023, in Norway, organized by the Norwegian Institute of Bioeconomy (NIBIO), under the auspices of the ISHS. After a two-year postponement due to the COVID-19 pandemic, the symposium was held with 77 participants from 23 countries, including 18 who joined virtually. The focus of the symposium was on sharing expertise related to cryopreservation in the context of plant genetic resources and plant health, encompassing both basic and applied research in cryobiology and plant gene banking. Throughout the event, a total of 34 oral presentations and 20 posters were presented.

The keynote speaker, Mr. Åsmund Asdal, Coordinator of the Svalbard Global Seed Vault, spoke firstly on crop biodiversity and plant genetic resources. Åsmund offered insights into the Nordic collection comprising 35,000 accessions of seed crops and the back-up storage for 1.2 million accessions in the Svalbard Global Seed Vault. Dr. Sarada Krishnan from the Global Crop Diversity Trust provided an overview of initiatives to secure funding and advance cryopreservation for globally significant genetic resources.

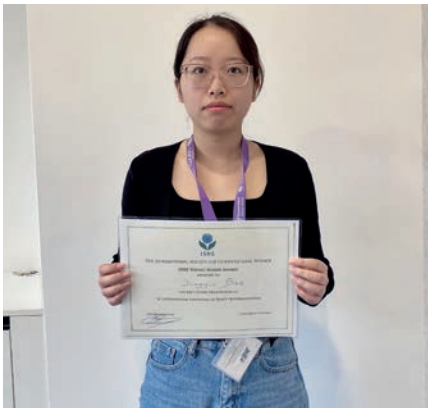
Dr. Bart Panis, Senior researcher on cryopreservation at Bioversity International, reminded participants on the critical importance of conservation of food crops. Representatives of gene-banks in China, Peru, Germany, the Czech Republic and USA provided concise overviews of their efforts in safeguarding economically important crops, including but not limited to potato, sweet potato, hop and various wild species.

Dr. Gayle Volk from USDA-ARS National Laboratory for Genetic Resources Preservation spoke about the advances and challenges associated with shoot tip and dormant bud preservation. The American gene-bank system, with over 600,000 accessions of seed

› Conveners Dr. Zhibo Hamborg (A) and Dr. Dag-Ragnar Blystad (B) receiving the ISHS medal award from ISHS representative Dr. Bart Panis for arranging the symposium.

› Participants of the symposium (photo Erling Fløistad).

› ISHS representative Dr. Bart Panis (left) presenting the ISHS Young Minds Award for the best oral presentation to Dr. Sakari Välimäki (right) (Photo Dag-Ragnar Blystad).



› Jingyin Bao, winner of the ISHS Young Minds Award for the best poster presentation.

crops and 40,000 vegetatively propagated accessions, was presented. However, only 15% of the clonal species are backed up through cryopreservation. Selected presentations under the topic of advances in fundamental cryobiology covered vitrification, lipid remodeling, cell death, and studies on cryoprotective agents.

Prof. Qiaochun Wang, from Northwest A&F University of China, provided insights into cryotherapy, highlighting its crucial role in tackling the challenges associated with eradicating virus and virus-like pathogens in cultivated crops worldwide. The potential of cryopreservation for virus conservation has captured our attention in recent years. Additional presentations delved into various aspects, exploring cryotherapy applications for raspberry, potatoes, shallots and kiwifruit.

Under the topic of advances in applied cryobiology in plant preservation, talks covered elm genetic resources in Finland, cassava conservation in Senegal, cryopreservation of macadamia in Australia, avocado in California, magnolia, aloe, agave, allium, seed cryopreservation of *Salicaceae* in China, and conservation of Hawaiian fern in the USA. Innovative solutions, such as a cryo-box for long-term co-preservation of biological materials, were also presented.

The ISHS Young Minds Awards went to Dr. Sakari Välimäki from LUKE, Finland, for the best oral presentation entitled “Elm genetic resources conservation in Finland supplemented by dormant bud cryopreservation” and Jingyin Bao from the University of Queensland, Australia, for the best poster presentation entitled “Cryopreservation for the conservation of endangered *Gossia* species”.

The symposium was followed by an ISHS business meeting where Dr. Manuela Nagel, IPK, Germany, was elected as new Chair of ISHS Working Group Conservation of Plant Genetic Resources and Genebank Management. It was also decided that the V International Symposium on Plant Cryopreservation will be organized by Dr. Haiping Wang at the Institute of Vegetables and Flowers, Chinese Academy of Agricultural Sciences, China, in 2025.

Morten Rasmussen, Zhibo Hamborg and Dag-Ragnar Blystad

› Contact

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› An interested audience listening to Dr. Valerie Pence, Cincinnati Zoo & Botanical Garden, USA (photo Erling Fløistad).

› GreenSys2023: International Symposium on New Technologies for Sustainable Greenhouse Systems and IV International Symposium on Organic Greenhouse Horticulture

Division Precision Horticulture and Engineering	#ishs_deng
Division Protected Cultivation and Soilless Culture	#ishs_dpro
Division Landscape and Urban Horticulture	#ishs_durb
Division Vegetables, Roots and Tubers	#ishs_dveg
Commission Agroecology and Organic Farming Systems	#ishs_cmor

› GreenSys2023 participants.

The GreenSys2023: International Symposium on New Technologies for Sustainable Greenhouse Systems was held in the Convention Center of the Iberostar Selection Cancún Hotel, Mexico, from October 22-27, 2023, under the aegis of the ISHS. The symposium was hosted by the Department of Agricultural Mechanical Engineering (DIMA) of the Universidad Autónoma Chapingo, Mexico.

For the first time, this symposium incorporated the IV International Symposium on Organic Greenhouse Horticulture, with the joint efforts of several working groups of ISHS Division Precision Horticulture and Engineering and ISHS Division Protected Cultivation and Soilless Culture.

Both symposia were successfully carried out during five days of intensive activities, with the participation of 250 attendees from 27 different countries. After the welcome reception on the first day, three full days of presentations included three keynote speakers, 175 oral and 90 poster presentations, and four workshops. On the fifth day, a technical tour included a visit to PAMASUR farm, where different specialty crops are grown under the Yucatan Peninsula's harsh environmental and rocky soil conditions. The cenote Hubiku and the majestic Chichén Itzá Mayan archeological site were also visited as part of the technical tour.

Both symposia brought together specialists in all aspects of controlled environment agriculture (CEA) systems, where the theme of sustainability was always present.

Each of the three keynote speakers masterfully presented a broad and in-depth view of the technologies and the state of the art in CEA. The first keynote speaker presented an evolution of sensor technologies from the "speaking plant" approach to recent advancements in artificial intelligence and the future for intelligent greenhouse process automation. The second keynote lecture presented the evolution of greenhouse robotics, highlighting the status, challenges, and opportunities. Finally, the third keynote

› Greensys2023 opening ceremony.

› GreenSys2023 Conveners. Dr. Irineo L. López-Cruz (left) and Dr. Efrén Fitz-Rodríguez (right).

speaker stressed the importance of greenhouse horticulture in the context of the circular economy.

Four workshops under the motto "cultivating a sustainable future" were delivered with the themes: Computational fluid dynamics (CFD) in greenhouses; Machine learning and IoT in greenhouses; a networking session on machine learning and data science; and an FAO workshop on sustainable vegetable production in small-scale farmer greenhouses, where several ideas were presented to bridge greenhouse theory and practical applications for small-scale greenhouses in the developing countries.

At the GreenSys2023 symposium, the topics discussed in the oral and poster presentations were very diverse, such as greenhouse climate control and modeling, greenhouse crops modeling and management, CFD in greenhouses and plant factory systems, lighting technology for indoor farming and greenhouses, plant factories, vertical farming, fertigation, water and growing medium, sensors, automation, robotics in greenhouses, and recent advances in artificial intelligence (AI), machine learning, data science, machine vision, deep learning, digital twins, and virtual crops. The organic greenhouse horticulture symposium discussed topics related to soil health and biological assessments, horticulture crop systems and management, soil fertility, plant health, the circular economy, and the zero-waste approach.

It is worth mentioning that the topics of lighting technology, the plant factory, and vertical

› ISHS Young Minds Awards of GreenSys2023: A) Sebastian Dam (best oral presentation), B) Yu Kyeong Shin (best poster presentation).

› Prof. Martine Dorais presenting the ISHS Young Minds Awards of the IV International Symposium on Organic Greenhouse Horticulture to A) Robab Mahmoudi for the best oral presentation, and B) Ève-Marie Boudreau-Forgues for the best poster presentation.

› GreenSys2023 technical tour visiting PAMASUR farm.

farming were the most numerous and the most interesting for the participants as these sessions had the largest number of attendees. The ISHS Young Minds Awards winners for the GreenSys2023 symposium were Sebastian Dam from the University of Guelph, Canada, for the best oral presentation entitled "Effect of light intensity and branch origin position on *Cannabis sativa* inflorescence density and THC content", and Yu Kyeong Shin from Jeonbuk National University, Republic of Korea, for the best poster presentation entitled "Profiling of individual desulfo-glucosinolates and sugar content among cabbage germplasm and selection of multi-functional genotypes for commercial breeding".

The ISHS Young Minds Awards winners for the IV International Symposium on Organic Greenhouse Horticulture were Robab Mahmoudi, a Ph.D. student from Laval University, Quebec, Canada, for the best oral presentation entitled "Black Soldier Fly Frass: a new organic fertilizer or biostimulant?", and Ève-Marie Boudreau-Forgues, Ph.D. student from Laval University, Quebec, Canada, for the best poster entitled "Influence of silicon application on agronomic and nutritional performance of container-grown organic highbush blueberries".

Irineo L. López-Cruz, Efrén Fitz-Rodríguez and Martine Dorais

› Contact

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› GreenSys2023 technical tour visiting Chichén Itzá Mayan archeological site.

› IX International Olive Symposium

Division Temperate Tree Fruits **#ishs_dfru**
Division Plant Genetic Resources and Biotechnology **#ishs_dbio**

› Participants of the symposium.

The IX International Olive Symposium was held September 10-14, 2023, at the University of California, Davis, USA, and convened by Drs. Giulia Marino, Selina Wang and Louise Ferguson from the University of California, Davis, and Dr. Reza Ehsani from the University of California, Merced. Over 115 attendees from 15 different countries participated, exchanging innovative ideas and cutting-edge research findings. This convergence of global knowledge sparked new partnerships to advance the olive industry towards a more sustainable and resilient future.

Opening speakers included ISHS Vice-President Ted DeJong, who gave an overview of the International Society for Horticultural Science (ISHS), Louise Ferguson and Dan Flynn who presented the history of the California table and olive oil industries, and Javier Fernandez-Salvador, Director of the UC Davis Olive Center, who introduced the role of the Center as a bridge between academia and industry.

Sessions covered a wide range of topics, including biodiversity and propagation, physiology, irrigation and soil management, crop protection, planting systems, and olive products. There was some dynamic discussion regarding developing resilient olive varieties, understanding physiology aids in optimizing tree health and fruit yield, and sustainable agriculture in varied climates. The exploration of olive products extended the scope of research to postharvest processing and market dynamics, which are key to the industry's economic viability.

California's diverse climate and progressive agricultural technologies made it an ideal host location. Attendees were treated to a full-day field tour that included visits to three pivotal locations in olive research and production. The tour began at Agromillora Nursery, renowned for its advanced olive tree propagation techniques, where the President Cliff Beumel demonstrated the different stages of propagation. Next, the tour stopped at a table olive orchard managed

› A) Lightening talk style poster presentations were held in the courtyard; B) A Young and Early Career Scientist Panel was held at lunch.

by Dennis Burreson, owner of Musco Family Olive Co., who showed us various ages of moderate density table olive orchards trained for mechanical trunk shaking. The final stop was California Olive Ranch, a leader in super high density olive oil production, where Logan Jennings, Vice-President of Operation, and Lizandro Magana, Vice-President of Agriculture, explained how the company was setting new standards for sustainability and quality in the industry. Each site provided a unique perspective on the progress and potential of California's olive industry and research.

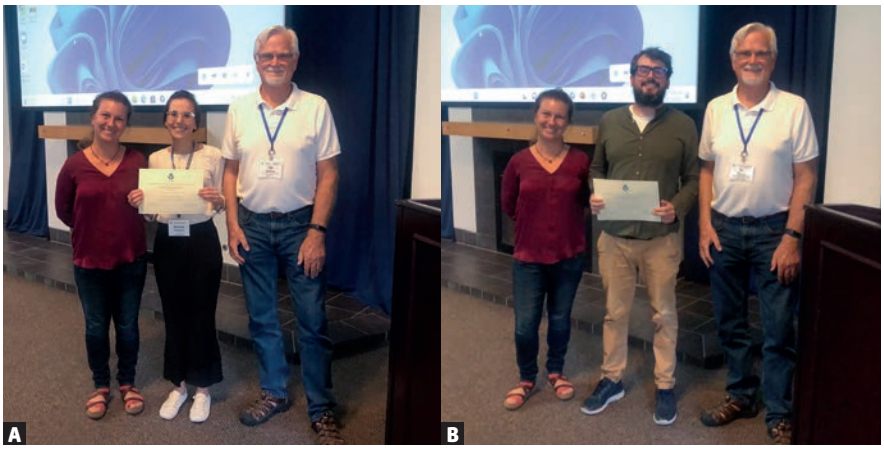
The symposium also featured a California Olive Oils showcase (sponsored by the Olive Oil Commission of California), providing attendees with an opportunity to experience a non-guided tasting of a diverse array of extra virgin olive oils. Additionally, a post-symposium tour was organized, featuring visits to the Wolfskill research trials with the UC Davis Olive Center, and the olive germplasm collection in the USDA ARS National Clonal Germplasm Repository.

The IX International olive Symposium featured a significant presence of young researchers, and a Young and Early Career Scientist Panel structured around the diverse career paths available within horticulture science. Active participation in this symposium and the panel underscored the growing interest among the new generation in advancing olive science for a sustainable future. There were eight competitors for the ISHS Young Minds Awards. The winners were Ramona Abbattista from the University of Davis, USA, for the best oral presentation entitled "Development of a deep proteomic pipeline for recalcitrant olive leaf tissue" and Matteo Zucchini from the Università Politecnica delle Marche, Italy, for the best poster presentation entitled "Vegetative and productive response of olive trees under anti-insect nets". We were thrilled by the accomplishments of the ISHS Young Minds Award winners and eagerly anticipate the profound impact they will have.

The symposium ended with a business meeting, where it was decided that the X International Olive Symposium would be convened by Prof. Tiziano Caruso and colleagues from the University of Palermo in Italy. Dr. Giora Ben-Ari, Agricultural Research Organization, Volcani Institute, Israel, was elected as the new Chair of ISHS Working Group Olive Culture.

We express our gratitude to the generous sponsors of the symposium, California Olive Ranch, Todolivo, the Olive Oil Commission of California and the Department of Plant Sciences at UC Davis, whose support made this meeting possible.

Emily Santos and Giulia Marino



› Dr. Giulia Marino, symposium convener and Chair of ISHS Division Temperate Tree Nuts (left) and Dr. Ted DeJong, ISHS Vice-President in charge of scientific programs (right), presenting the ISHS Young Minds Awards to A) Ramona Abbattista (best oral presentation) and B) Matteo Zucchini (best poster presentation).

› A) Dynamic discussion with California family farmer Dennis Burreson; B) Participants visiting the California Olive Ranch super high-density systems.

› Prof. Tiziano Caruso presenting the candidacy of Italy for the X International Olive Symposium.

› Celebrating an excellent symposium with good food at the final gala.

› Contact

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› XVI EUCARPIA Symposium on Fruit Breeding and Genetics

Division Temperate Tree Fruits	#ishs_dfru
Division Horticulture for Development	#ishs_ddev
Division Landscape and Urban Horticulture	#ishs_durb
Division Plant Genetic Resources and Biotechnology	#ishs_dbio
Division Protected Cultivation and Soilless Culture	#ishs_dpro

The XVI EUCARPIA Symposium on Fruit Breeding and Genetics was held in Pillnitz, Germany, from September 11-16, 2023. The symposium was hosted by the Institute for Breeding Research on Fruit Crops located in Dresden-Pillnitz, which belongs to the Julius Kühn Institute (JKI) – the Federal Research Centre for Cultivated Plants in Germany, in partnership with the European Association for Research on Plant Breeding (EUCARPIA) and the International Society for Horticultural Science (ISHS). The symposium was supported by the Saxon State Office for Environment, Agriculture and Geology (LfULG), whose main auditorium hosted all the lectures, and the University of Applied Sciences Dresden (HTW), whose lecture halls and seminar rooms hosted the poster sessions and workshops. Additional support for the symposium was provided by Pillnitz Park and Castle, the German Fruit Grower Association, the German Plant Breeder Association (GPZ), Hansabred GmbH & Co. KG, Artevos GmbH, the Association of German Nurseries (BdB), Deutsche Saatgutgesellschaft mbH and BIOFA.

The idea for holding this symposium in dresden-Pillnitz arose from the long-standing work of three senior scientists of the Institute for Breeding Research on Fruit Crops namely: Dr. Monika Höfer, Dr. Andreas Peil and Dr. Mirko Schuster. Monika Höfer has headed JKI's fruit gene bank for many years and coordinates the network of the German Fruit Gene Bank. She is renowned for her work in cryopreservation and leads the ECPGR berry network. Andreas Peil has been in charge of the apple and pear breeding programmes for many years, where his focus, amongst other things, has been on improving resistance of apple and pear to fire blight. Mirko Schuster heads the breeding programmes for sweet cherry and sour cherry and is an internationally respected leading scientist in this field. As all three scientists will soon be retiring, JKI organised the symposium to recognise their achievements in their respective fields.

One hundred and fifty-one scientists and experts from 25 countries participated in the symposium. JKI's President, Prof. Dr. Frank Ordon, opened the symposium. The scientific part consisted of 10 sessions with 57 oral and 64 poster presentations and 3 workshops. Prof. Dr. Kai Voss-Fels, Geisenheim University (Germany), Prof. Dr. Uli Schurr, Institute of Plant Sciences at Forschungszentrum Jülich (Germany) and Dr. Jean-Marc Audergon, INRAE Avignon (France) gave keynote lectures. The lecture of Kai Voss-Fels was titled "Genetic algorithm-guided allele stacking to develop high yielding, resistant varieties". The topic of Uli Schurr was on "Plant phenotyping – technologies and targets" and Jean-Marc Audergon presented the European InnOBreed project in his lecture entitled "A targeted approach for maximizing techno-

› The participants of the symposium in front of the auditorium of the Saxon State Office for Environment, Agriculture and Geology (LfULG) in Dresden-Pillnitz, Germany.

› The deserved veterans of the Pillnitz fruit-breeding institute. Left: Dr. Mirko Schuster (stone fruit breeding); center: Dr. Monika Höfer (genetic resources and cryopreservation); right: Dr. Andreas Peil (pome fruit breeding).

› Conclusion of the symposium with a thank you to the scientific committee.

› Convener Prof. Dr. Henryk Flachowsky presenting the ISHS Young Minds Awards to A) Valeria De Rosa for the best oral presentation, B) Francesca Zuffa for the best poster presentation.

› Field tour and visit to the variety evaluation programme of the Saxon State Office for Environment, Agriculture and Geology (LfULG). Christian Kröling from LfULG gives information on the field trial.

logical, environmental, and social innovation impacts through all over the fruit chain".

Oral presentations were grouped into ten sessions: Genetic resources; Resistance evaluation and QTL detection; Genome wide association studies and genomic prediction; The use of pedigree information in breeding research; Fruit breeding; QTL mapping and molecular markers; Fruit quality traits; Flowering time and dormancy control; Digitalization and phenotyping; and New breeding technologies and whole genome sequencing. Most oral and poster presentations focused on classical fruit breeding, the collection, conservation and use of fruit genetic resources, structural and functional genome analyses as well as the latest methodological developments in omic technologies, new breeding technologies (NBT) including genome editing, and the application of digital methods for phenotyping.

Fruit growing is currently facing major challenges and must adapt to the changing climate, while simultaneously increasing yields and maintaining the quality demanded by the trade and consumers. At the same time, it must significantly reduce the use of plant protection products to achieve the goals of the European Green Deal. Breeding new and multi-resistant varieties is a crucial strategy to meet these challenges. How this goal can be achieved in a reasonable amount of time was one of the crucial topics of the symposium.

The oral and poster presentations at the symposium demonstrated the latest developments in the field of genotyping and digital phenotyping, as well as the use of pedigree data to increase the efficiency of breeding and breeding research in different fruit species.

In addition to the technical part, participants had an opportunity to visit the most famous historical districts of Dresden on a guided bus tour. On the evening of the first day, participants were provided with a barbecue in the courtyard of the HTW and on the evening of the penultimate day, a banquet in a rustic Pillnitz restaurant on the banks of the Elbe River. The scientific sessions, coffee and lunch breaks, poster sessions, workshops and the social nights provided an excellent opportunity for participants to discuss the possibilities for future cooperation, internships and excursions.

The tradition of encouraging young scientists in the field continued. A special committee comprising the ISHS President Dr. François Laurens, Dr. Andrea Patocchi from Agroscope Wädenswil (Switzerland), Prof. Dr. Larisa Gustavsson from SLU Alnarp (Sweden) and Dr. Jiří Sedlák from VŠÚO Holovousy (Czech Republic) selected two outstanding candidates for the ISHS Young Minds Awards. Valeria De Rosa, University of Udine, Italy, won the Young Minds Award for the best oral presentation for her talk entitled "Early epigenetic changes are involved in bud dormancy release in grapevine". Similarly, Francesca Zuffa, ETH Zurich, Switzerland, won the Young Minds Award for the best poster entitled "Genetic factors driving variation of stomatal density in apples".

The XVI EUCARPIA Symposium on Fruit Breeding and Genetics concluded with a business meeting, at which it was unanimously agreed that the Swedish University of Agricultural Sciences in Alnarp, Sweden, will be the organizer for the next symposium in 2027. Prof. Dr. Larisa Gustavsson will be the convener. In addition, Prof. Dr. Henryk Flachowsky was elected as the new chair of EUCARPIA fruit section, replacing Dr. Jiří Sedlák from VŠÚO Holovousy (Czech Republic).

Participants who extended their stay were treated to a social tour on the following day. Participants got an insight into the strawberry breeding work of Hansabred GmbH & Co. KG company. After a carriage ride, they visited the Moritzburg Castle, which is the pretti-

est moated castle in Saxony. Afterwards they finished the day in a nearby winery.
We want to thank all the participants of the XVI EUCARPIA Symposium on Fruit Breeding and Genetics for the great scientific content, and for their presence, without which the symposium would not have been successful.

Henryk Flachowsky and Ofere Francis Emeriewen

› Contact

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› Visit of the strawberry breeding program of the company Hansabred GmbH & Co. KG.

› First International Symposium on Plant Propagation, Nursery Organization and Management for the Production of Certified Fruit Trees

Division Temperate Tree Nuts **#ishs_dnut**
Division Plant Genetic Resources and Biotechnology **#ishs_dbio**

Researchers from 13 countries took part in the I International Symposium on Plant Propagation, Nursery Organization and Management for the Production of Certified Fruit Trees (Certfruit2020), held in Locorotondo, Italy, from July 2-5, 2023. The symposium was organized by the University of Bari Aldo Moro and the University of Palermo, in collaboration with Centro di Ricerca, Sperimentazione e Formazione in Agricoltura (CRSFA) Basile-Caramia and the Società di Ortoflorofrutticoltura Italiana (SOI), under the aegis of the International Society for Horticultural Science (ISHS), Division Temperate Tree Nuts. Over 70 people attended the event, with 26 oral and 23 poster presenters. Five plenary lectures were presented, by Prof. Daniele Bassi (University of Milano, Italy) and Dr. Maurizio Lambardi (CNR-IBE, Italy), Dr. Thaer Yaseen (FAO Regional Office for Near East and North Africa, Cairo, Egypt), Dr. Jordi Mateu (Agromillora Catalana SA, Barcelona, Spain), Dr. Maria Saponari (National Research Council – Institute for Sustainable Plant Protection, Unit of Bari, Italy) and Dr. Stefano Musacchi (Washington State University, USA). The symposium was inaugurated by Prof. Salvatore Camposeo (Department Soil, Plant and Food Science, University of Bari, Italy), Prof. Franco Nigro (CRSFA Basile-Caramia, Italy), Dr. Giulia Marino (Chair of ISHS Division Temperate Tree Nuts), Prof. Antonio Ferrante (SOI, Italy), Prof. Francesco Gentile (Department Soil, Plant and Food Science, University of Bari, Italy), Dr. Luigi Catalano (CIVITALIA, Italy), Dr. Donato Pentassuglia (Ministry of Agriculture and Food Security Regione Puglia, Italy), and Dr. Orazio Corbo (Department of Central Phytosanitary Service of Agriculture, Italy).
The aim of the symposium was to bring together researchers, teachers, students and entrepreneurs from both applied and industrial research and development and innovation, as well as basic researchers in the areas of fruit tree propagation methods and technologies, plant genetic and sanitary certification, nursery organization and management,

› Participants of the symposium.

› Conveners of the symposium (from left to right: Prof. Salvatore Camposeo, Prof. Tiziano Caruso and Prof. Vito Nicola Savino) and Chair of ISHS Division Temperate Tree Nuts, Dr. Giulia Marino.

plant breeding rights, exchange and transfer, and agronomic behavior of propagated fruit trees.

This international event presented the latest research in these fields, being the first ever symposium on these topics, and provided a platform for interaction and strengthening of knowledge networks with colleagues and researchers from all over the world. The program of activities consisted of four oral presentation sessions and three poster sessions. On July 4 a workshop was organized by CIVI Italia, focused on European and international certification schemes to qualify fruit nursery propagating material, followed by the ISHS business meeting of Division Temperate Tree Nuts and the gala dinner. During the ISHS business meeting, it was decided that the II International Symposium on Plant Propagation, Nursery Organization and Management for the Production of Certified Fruit Trees will be organized by Dr. Silvia Ten Have-Lopez of the Centre Technique Interprofessionnel des Fruits et Légumes (CTIFL) in Montpellier (France) in 2027.

On the last day of the symposium, a technical visit to the facilities of the CRSFA was made, followed by the concluding remarks and closing ceremony. During the ceremony, two ISHS Young Minds Awards for junior scientists were presented. Francesco Maldera, a student from the University of Bari, Italy, was the winner for the best oral presentation entitled "Micropropagation affects tree architecture of two olive cultivars: a field evaluation", and Andrei Florin Tabacu, a student from the University of Bucarest, Romania, won the award for the best poster entitled "Preliminary results regarding the behavior of pawpaw (*Asimina triloba* L. Dunal) cultivated in Bucarest area".

The symposium was closed by Prof. Tiziano Caruso (University of Palermo, Italy), a convener of the symposium. He pointed out that

› Andrei Florin Tabacu, winner of the ISHS Young Minds Award for the best poster presentation.

› Opening ceremony.

› Convener Prof. Salvatore Camposeo (right) presenting the ISHS Young Minds Award for the best oral presentation to Francesco Maldera (left).

› Visit to pre-multiplication field of vinegrapes, table grape cultivars and grape rootstocks of the CRSFA (Centro di Ricerca, Sperimentazione e Formazione in Agricoltura) Basile-Caramia of Locorotondo.

› Oral presentation of Dr. Stefano Musacchi, Professor and Endowed Chair of Tree Fruit Physiology and Management at Washington State University.

the papers presented highlighted the high level of specialization achieved by the nursery sector, a necessary requirement to meet the growing demand for certified plants. Indeed, nursery farming today represents the core of plant innovation, both with regards to rootstocks and cultivars. For this reason, along the production chain, nursery farming is today a sector where exchanges take place on a global scale, and technical skills and tools to trace all the different phases and actors in the production process are required. It also gave a glimpse of the importance that the participants in this first symposium place on scientific discussion of topics that favor the development of economic, social and environmental sustainability of the fruit sector.

After the symposium, a post-symposium tour was held in the north of Italy, visiting the "Centro Innovazione Vivaistica" (CIV) and the city of Ravenna. We want to thank every participant for the relevant new insights brought to this event, all the organizers that helped to realize it, and also the sponsors. We look forward to seeing you in 2027!

Salvatore Camposeo

›Contact

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› II International Symposium on Precision Management of Orchards and Vineyards

Division Temperate Tree Nuts	#ishs_dnut
Division Physiology and Plant-Environment Interactions of Horticultural Crops in Field Systems	#ishs_dphy
Division Precision Horticulture and Engineering	#ishs_deng
Division Temperate Tree Fruits	#ishs_dfru
Division Tropical and Subtropical Fruit and Nuts	#ishs_dtro
Division Vine and Berry Fruits	#ishs_dvin

The II International Symposium on Precision Management of Orchards and Vineyards (PMOV2023) was held at Tatura, Victoria, Australia, from 3-8 December 2023. The symposium brought together over 135 scientists, industry experts and leading growers to present and discuss the latest innovations and technologies in:

- irrigation and water relations;
- yield, traceability, harvest monitoring and supply chain logistics;
- canopy management, soil management, fertility and nutrition;
- disease and pest detection and/or control;
- fruit physiology, growth, ripening, quality and postharvest;
- mechanisation, automation and robotic management of harvesting, pruning, thinning and spraying;
- SmartFarms, IoT, digital orchards and vineyards.

The symposium shared interdisciplinary knowledge about the implementation and application of contact, proximal and remote

› Delegates of the symposium.

› Agritech demonstrations at Tatura SmartFarm, Tatura, Victoria, Australia.

sensing systems, mechanization and robotics, and control systems for precise real-time management of orchards and vineyards such as irrigation, nutrition, pest and disease control, flowering, pruning, fruit quality, harvesting, product traceability and soil health.

The symposium explored synergies between 'technology for crops' and 'crops for technology', known as the 4th Agricultural Revolution (Agriculture 4.0).

The winners of the ISHS Young Minds Awards were:

- Oral presentation: "Red-flesh kiwifruit inner quality scoring by a computer vision system" by Mirko Piani, University of Bologna, Italy;
- Poster presentation: "Applying a solar model to LiDAR images of an agrivoltaic pear orchard" by Lorenzo Bonzi, University of Pisa, Italy.

› Prof. Luca Corelli Grappadelli, Chair of ISHS Division Temperate Tree Fruits, presenting the ISHS Young Minds Awards to A) Mirko Piani for the best oral presentation, and B) Lorenzo Bonzi for the best poster presentation.

The PMOV2023 symposium was well supported by Agriculture Victoria, together with the International Society for Horticultural Science (ISHS), Australian Society for Horticultural Science (AuSHS), and a team of dedicated colleagues on the local Organizing Committee.

Delegates enjoyed discussion on the latest findings and technologies around precision crop management, were stimulated by field days and Agritech demonstrations, soaked up the atmosphere at social events (welcome function, orchard BBQ, gala dinner) and made or reconnected with friends and colleagues from around the world.

At the business meeting, it was decided that the III International Symposium on Precision Management of Orchards and Vineyards would be held in Fresno, California, USA.

Mark O'Connell

› Contact

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› XIII International Mango Symposium

Division Tropical and Subtropical Fruit and Nuts #ishs_dtro

The XIII International Mango Symposium was held in Málaga, Spain, from September 29 to October 3, 2023, organised by the IHSM La Mayora CSIC-UMA, under the aegis of the International Society for Horticultural Science. Over 230 people attended the event, with 42 oral and 30 poster presentations from 22 different countries.

The symposium was inaugurated by Mr. Francisco de la Torre (Mayor of the City of Málaga), Dr. Carlos Closa (Vice-President of the Spanish Council for Scientific Research), Mr. Manuel Marmolejo (Málaga Province Government), Dr. Eduardo Rodríguez Bejarano (Director of the IHSM La Mayora CSIC-UMA) and Dr. Iñaki Hormaza (Co-convener of the symposium).

The aim of the symposium was to bring together researchers, teachers, students and entrepreneurs from both applied and industrial research, development and innovation. The event was organized in eight different sessions with simultaneous translation English-Spanish in which the most recent advances in markets and production; crop management; breeding; germplasm and diversity; genomics; biotic stresses; flowering, fruit set and abscission; harvest, postharvest and stress were presented.

› Some of the participants during the technical tour.

A total of 12 plenary lectures were presented by Dr. Iñaki Hormaza (IHSM La Mayora CSIC-UMA, Spain), Dr. Víctor Galán Saúco (ICIA, Spain), Dr. Leonardo Ortega (National Mango Board, USA), Dr. Ian Bally (Agri-Science Queensland, Australia), Dr. Frédéric Normand (CIRAD, France), Dr. Yuval Cohen (Volcani Research Center, Israel), Dr. Noris Ledesma (University of Florida, USA), Dr. Noe Fernández-Pozo (IHSM La Mayora CSIC-UMA, Spain), Dr. Stanley Freeman (Volcani Research Center, Israel), Dr. Maria Hilda Perez Barraza (INIFAP, Mexico), Dr. Ítalo Herbert Lucena Cavalcante (Universidade Federal do Vale do São Francisco, Brazil) and Dr. Ping Lu (Chair of ISHS Working Group Mango).

The program of activities, organised for both the participants and their companions, consisted of a welcome party at the symposium venue, a guided tour of the city of Málaga, a gala dinner and a field visit to the largest mango producing area in Europe.

During the gala dinner two ISHS Young Minds Awards for junior scientists were presented by Dr. Ping Lu. Norman Munyengwa from the University of Queensland (Australia) was the winner for the best oral presentation entitled “Increased accuracy of genomic predictions for tree vigour in mango (*Mangifera indica* L.) by utilizing preselected variants from a genome-wide association study using sequence data” and Marcos Adrián Ruiz-Medina from the University of La Laguna (Spain) won the award for the best poster entitled “Comparative analysis of morphoanatomical characteristics in mango trees (*Mangifera indica* L.) with different ploidy levels”. The prize also included a copy of the book “Achieving sustainable cultivation of mangoes” donated by Burleigh Dodds Science

› Participants of the symposium.

› Inauguration of the symposium. From left to right: Iñaki Hormaza (Co-convener), Carlos Closa (Vice-President of CSIC), Francisco de la Torre (Major of Málaga), Manuel Marmolejo (Vice-President of the Provincial Council of Málaga) and Eduardo Rodríguez-Bejarano (Director of IHSM La Mayora CSIC-UMA).

› Professor Sergio Roberto Márquez Berber, convener of the XIV International Mango Symposium that will take place in Mexico, flanked by (from left to right) Ramon Ojeda (Executive Director of the National Mango Board, USA), Francisco Antonio Seva Rivadulla (Expert in mango communication), Ping Lu (Chair of ISHS Working Group Mango), Víctor Galán Saúco and Iñaki Hormaza (Co-conveners of the XIII International Mango Symposium).

› Norman Munyengwa, winner of the ISHS Young Minds Award for the best oral presentation, during his presentation.

› The organizing committee during the gala dinner of the symposium.

Publishing (Cambridge, UK). During the gala dinner, a special award, the Málaga silver Biznaga, was offered to Mrs. Zehava Waiser, widow of Dr. Eli Tomer, a prominent Israeli scientist, with the following inscription: "In memory of Dr. Eli Tomer and his contribution to the world's mango research. XIII IMS. Málaga 2023".

On the last day of the symposium, the business meeting of ISHS Working Group Mango was held. Dr. Ping Lu was re-elected as Chair of the Working Group, and Dr. Ian Bally was elected as the Vice-Chair. After a vote by the ISHS members, it was decided that the XIV International Mango Symposium will be held in Mexico in May 2025, where Professor Sergio Roberto Márquez Berber from the Universidad Autónoma Chapingo will be the convener.

Iñaki Hormaza and Víctor Galán Saúco

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› III International Symposium on Carrot and Other *Apiaceae*

Division Vegetables, Roots and Tubers #ishs_dveg

York Racecourse in the UK welcomed more than 270 delegates from over 30 countries to the III International Symposium on Carrot and Other *Apiaceae* from 2-5 October 2023. This three-day event was organised and hosted by the British Growers Association and the International Society for Horticultural Science, with key sponsors including the seed companies Bejo, Elsoms and Vilmorin-Mikado. Rosemary Collier from the University of Warwick chaired the Scientific Committee.

With speakers from across industry and academia, the symposium provided valuable insights into various aspects of the sector, including breeding, growing and processing, through to marketing, retail and consumption. With global production of these crops approaching 40 million tonnes, the symposium gave an excellent perspective of the 'bigger picture' in terms of production and consumption. Introductory talks were given by Martin van der Voort from Bejo and Steven Shields from Huntapac, one of the UK's largest carrot-producing companies, who focused on challenges faced by the carrot industry and how they are working towards solutions. The retail side of the industry was discussed by Joel Sorrell-Roberts (Kantar Worldpanel), who also considered consumer trends in terms of food options.

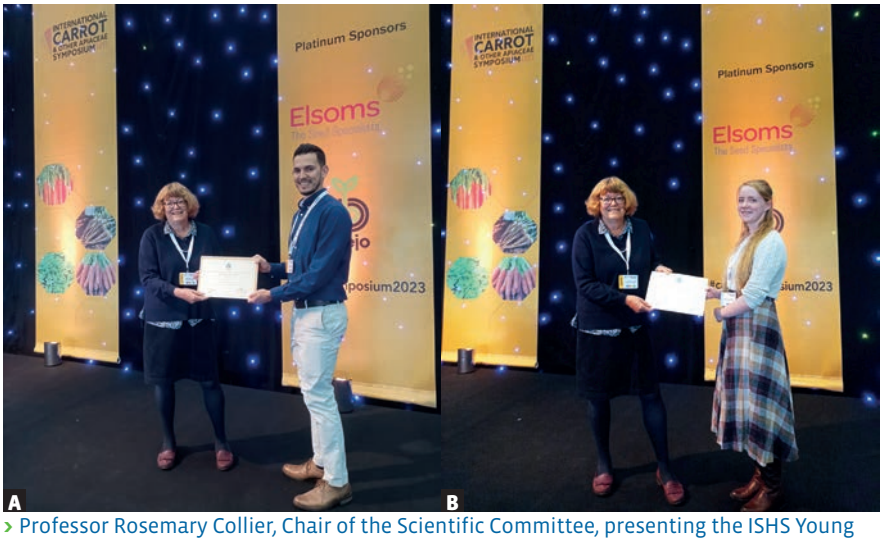
Due to the wide array of topics, the symposium was divided into technical and scientific sessions. Themes for the scientific sessions on the first day were: environment and nutrition effects on product quality, consumption and health, agronomy – disease, weeds and pests. On the second day, sessions focused on seeds and breeding, with presentations on genetics and genomics, genetic diversity, phenotyping for breeding, breeding and carrot wild relatives. In all, there were 32 scientific presentations and 14 posters. The keynote speaker was Massimo Iorizzo from North Carolina State University, USA, who provided a detailed update on the latest work to characterize the carrot genome, which included a fascinating explanation of the genetic factors involved in determining orange colour in carrots.

› Professor Emmanuel Geoffriau, Chair of ISHS Working Group Carrot and other *Apiaceae*, presenting the ISHS convener award to A) Coral Clark and B) Rosemary Collier.

› Steven Shields from Huntapac, one of the UK's largest carrot-producing companies, speaking in the introductory session. His presentation focused on challenges faced by the carrot industry and how his company is working towards solutions.

Talks on the first day of the scientific programme included the effects of drought and soil compaction on carrot production (Mette Goul Thomsen, Norway), control of foliar fungal diseases in carrots with natural plant extracts (Simone Chrapačienė, Lithuania) and evaluating biocontrol agents for control of foliar diseases (Valerie Le Clerc, France) and carrot fly (Richard Binks, Koppert). Kirsten Brandt (UK) provided new insights on the role of carrots in relieving malnutrition and cancer. Research at the University of Warwick, UK, on carrots and related crops was discussed by several speakers including Lauren Chappell, who outlined the development of screening assays to assess varieties for resistance to willow carrot aphid and *Carrot red leaf virus*, Nicole Pereira, who discussed progress towards developing artificial inoculation systems for cavity spot, and Rosemary Collier, who explained details of the European SmartProtect platform, which contains details of smart tools available to support crop protection in vegetables.

The scientific session on the second day of the symposium had a strong focus on carrot breeding and genetics. During the morning



› Professor Rosemary Collier, Chair of the Scientific Committee, presenting the ISHS Young Minds Awards to A) Andrey Vega-Alfaro for the best oral presentation and B) Heather Wickson for the best poster.

session, talks included the development of carrot mapping populations and a study on genetic diversity in the crop arracacha (Carlos Arbizu, Peru). Talks later in the morning turned to phenotyping, including Cindy Torres from Vilmorin-Mikado on using AI to phenotype carrots using images. The morning concluded with a talk about the need to better understand genotype x environment interactions, especially with the increasing challenge of climate change, by Juliette Chevalier (Vilmorin-Mikado). The afternoon scientific sessions continued the broad theme of breeding. Emmanuel Geoffriau (France) described work with organic carrot farmers in France to develop new varieties, while Mohammad Abdur Rahim (Bangladesh) discussed the screening of carrot wild relatives for useful traits.

The first day of the technical session was entitled 'Production, Marketing & Consumption Around the World' and included speakers discussing global carrot consumption trends, production techniques and future consumers. The first day also saw the first session on carrot agronomy, where Dr. Adrian Fox discussed his work on virus management. Breeding was the main topic as the second technical session got underway. Bejo's carrot breeding program was detailed by Floris Martens, and Richard Tudor, Elsoms Seeds, gave the delegates insights on how to breed the perfect parsnip. Later in the day, sustainability and the future of the sector were explored, together with robotics, vertical farming and carbon reduction.

The symposium ended with the presentation of the ISHS Young Minds Awards to Andrey Vega-Alfaro, Department of Horticulture, University of Wisconsin-Madison, USA, for the best oral presentation entitled "QTL mapping utilizing F2:3 linkage mapping populations reveals regions of chromosomes 2 and 6 are significantly associated with root width in carrot" and to Heather Wickson, Plant Science Laboratory, Cranfield University, UK, for the best poster entitled "Understanding the genetic mechanisms controlling seed shattering to reduce seed loss in *Pastinaca sativa*". The symposium organisers gave a special award to Simone Chrapačienė, Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry, for her excellent presentation on 'Control of foliar fungal disease in carrots with plant extracts'. Emmanuel Geoffriau, Chair of ISHS Working Group Carrot and Other *Apiaceae*, awarded ISHS medals to the symposium conveners, Coral Clark and Rosemary Collier.

On the third and final day of symposium activities, delegates attended the annual British Carrot Growers Association Demonstration Day, in Sherburn, North Yorkshire. Among the standard UK carrot market varieties was an impressive display of international varieties and an array of yellow, red and purple varieties, as well as rooted parsley. After two days of in depth technical and scientific discussions it was a great way to round off the symposium.

Rosemary Collier, Nicole Pereira, Sarah Trinder and Lauren Chappell

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› British Carrot Growers Association Demonstration Day.

From the Secretariat

› New ISHS members

ISHS is pleased to welcome the following new members:

New Individual Members

Armenia: Dr. Khachatur Mayrapetyan; **Australia:** Prof. Dr. Elizelle Juanee Cilliers, Ms. Hanyue Feng, Mr. Nigel Fleming, Dr. Peter Irga, Ms. Jashanpreet Kaur, Ms. Ida Lawrance, Dr. Josh Mackie, Mr. Declan McCauley, Jonathan McDonald, Assoc. Prof. Fraser Torpy, Dr. Pete Whittle; **Austria:** Franz Praskac, Dr. Zuzana Vaneková; **Belgium:** Sandy Adriaenssens, Mr. Arnaud Bouvry, Helena Clauw, Dr. Marcel de Jong, Ms. Eva Reybroeck, Dr. Abderahman Sghaier, Greta Straetmans; **Benin:** Mr. Abdou Rachidi Francisco, Dr. Nicolas Paget; **Bosnia and Herzegovina:** Prof. Dr. Boris Pasalic; **Brazil:** Dr. Perla de Oliveira, Mr. Guilherme Macedo, Victor Vargas; **Bulgaria:** Assist. Prof. Elena Grancharova, Mr. Milan Rizakov, Dr. Sava Tabakov, Assoc. Prof. Mariyan Yanev; **Burkina Faso:** Dr. Djibril Aboubakar Souna, Dr. Drabo Edouard, Mr. Issouf Sanga; **Canada:** Ms. Eve Marie Boudreau Forgues, Ms. Bhagya C. 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› In memoriam

Prof. Dr. h.c. Fritz Lenz (1931-2023)

On June 28, 2023, Prof. Dr. h.c. Fritz Lenz, former director of the Institute for Fruit and Vegetable Crops at the Faculty of Agriculture, University of Bonn, Germany, passed away at the age of 91.

Dr. Lenz was born in Greifswald on October 27, 1931. He was first exposed to agriculture during his practical training, which led him to various farms and schools, before he spontaneously decided to study agricultural sciences at the University of Hohenheim. He began his studies in 1954, initially as a guest student, as he had not yet qualified for university entrance. He acquired the latter through evening studies, just in time for admission to the intermediate diploma examination. Fritz Lenz completed his undergraduate studies in 1957. When obtaining his Diploma in Agricultural Sciences, with honors, he was invited to participate in a graduate study program. Three years later, in 1960, Fritz Lenz was awarded a doctorate (Dr. agr.), with honors, at the Faculty of Agricultural Sciences in Hohenheim.

Immediately after graduation, Dr. Lenz accepted a post-doctoral position with the CSIRO (Commonwealth Scientific and Industrial Research Organisation) in Griffith, Australia. In the Irrigation Research Department of CSIRO, his work focused on the optimization of irrigation techniques in fruit growing. After completing a 5-year postdoc in Griffith, he and his family returned to Germany, where Dr. Lenz continued his academic studies on plant physiology and photosynthesis at the Institute for Fruit Growing of the Technical University (TU) in Berlin from 1965 to 1969 under the supervision of Prof. Dr. G. Bünemann. In 1969, he was offered a professorship for fruit crops.

Three years later, after returning from a one-year postdoc at the University of Malaysia in Kuala Lumpur, he was appointed head of the Institute for Fruit Crops at TU Berlin. The following four years were marked by significant research innovations, such as providing evidence for the stimulation of photosynthetic activity of leaves by employing a gas exchange measuring system. Prof. Lenz also designed and built a novel, technical device (a lysimeter) for the quantitative monitoring of nutrient uptake and distribution. These developments met with a great response from experts and attracted renowned visiting scientists from high-level international institutions.

Accepting a call to the University of Bonn as Director of the Institute for Fruit and Vegetable Crops – with the associated Experimental Station for Fruit Cultivation and the Experimental Farm for Vegetable Cultivation in 1976 – Fritz Lenz expanded the spectrum of activities to provide basic to applied research, as well as extension services for fruit, vegetable and viticulture science.

His research primarily focused on photosynthesis and plant physiology, and the quality of horticultural products under the influence of dynamically changing site and climate conditions. Very early he recognized the significance and impact of global climate change on horticulture and developed strategies for adapting cultivation methods in collaboration with renowned guest scientists from Germany and abroad. Under the leadership of Dr. Lenz, the Institute of Fruit and Vegetable Growing developed into an institution with a high international profile and reputation.

To promote the scientific discourse, Dr. Lenz initiated numerous conferences in Bonn with international participation on selected key topics such as the nitrate problem in vegetable cultivation (1982), causes and remediation of soil fatigue in apples, the improvement of fruit quality in pome fruit (1996) and several conferences on photosynthesis in fruit trees (1982, 1990 and 1992).

Dr. Lenz was a pioneer and trailblazer for environmentally friendly fruit and vegetable cultivation. He was one of the leaders in the European-wide introduction of integrated production in fruit growing. These activities also formed the basis for the European Fruit Research Institutes Network (EUFRIN), founded in Bonn in 1993 on his initiative. This network celebrated its 30th anniversary in 2023.
Transferring the concept and goals of EUFRIN to CIS countries and the Baltic States, Dr. Lenz contributed to the development of integrated production in these fruit-growing regions. To promote cooperation with the Russian Federation, Dr. Lenz founded the Russian German Fruit Research Network (RUGEFREN, https://rugefren.wordpress.com/) in the style of EUFRIN, publishing regular newsletters and stimulating the professional exchange of knowledge through mutual excursions.

Dr. Lenz received many international awards for his outstanding scientific achievements. In 1995, the Agricultural Academy in Lublin awarded him an honorary doctorate for his special contributions in the field of fruit tree physiology and in recognition of his strong efforts to intensify cooperation with scientific institutions in Poland. In 2008, the American Society for Horticultural Sciences awarded him the Fellow Award.
Dr. Lenz was always closely connected to fruit and vegetable growing practices, sharing the rich experiences he had acquired during his many international and overseas research appointments. He shared his knowledge through regular seminars offered to students, farm managers and extension services, and he contributed his expertise to numerous bodies and committees from scientific institutions and the horticultural industry at large. In recognition of his services to horticultural practice, the Provincial Society of Rhine fruit and vegetable growers awarded him the Hans Tenhaeff Medal in 1999.
More than 300 publications and over 100 doctoral theses provide an impressive testimony to his extraordinary achievements. Six of his former students today hold professorships in horticultural sciences.
Even after his retirement in 1997, Prof. Lenz enriched many professional events with his contributions, his wealth of knowledge and experience. Many of us have very fond memories of Prof. Lenz. We have lost a great academic teacher, mentor, colleague and friend. Few people are granted the opportunity to look back on such a long, fulfilled life and work, with humility, great satisfaction and sincere gratitude.
We extend our deepest sympathy to his family.

Georg Noga, former ISHS Board member

Dr. Walter Müller (1941-2023)

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It is with great sadness we communicate the passing of our dear colleague and friend Dr. Walter Müller, who died on October 6, 2023, at the age of 82. “No summit is too high, no goal unattainable, in small steps – if necessary”. This was his life motto. Always open to new developments and highly committed to innovations in agriculture/horticulture, Walter lived his life with great satisfaction and sincere gratitude.
Walter Müller was born on April 14, 1941, in Roggwil, Switzerland. He grew up on his parents’ orchard and dairy farm, and at a very early age got interested in optimizing agricultural production and processes to make the farm more profitable. Driven by this motivation, he started his professional career with an agricultural apprenticeship on farms in the German and French speaking part of Switzerland and at the Arenenberg Agricultural College (1957-60), followed by internships on several farms. Then, after passing university entrance examinations, Walter conducted his agronomic studies at the Swiss Federal Institute of Technology (ETH) Zürich (1963-1967), followed by postgraduate studies at the Edinburgh School of Agriculture, Scotland, for 1 year.
In 1968, he was offered a position in the fruit-growing section of the former Swiss Federal Research Station for Fruit Growing, Viticulture and Horticulture in Wädenswil (FAW, now Agroscope), where he discovered his passion for new fruit varieties. He decided to broaden his view through a sabbatical stay at Pennsylvania State University under Prof. Loren Tukey. This 6-month visit prepared the ground for a PhD on the variability of tree and fruit growth in apple and the planning of field trials at FAW. In 1976, Walter was awarded a PhD degree from ETH Zürich and 2 years later was appointed as Director of the Wädenswil Engineering High School (now the Department of Life Sciences and Facility Management at the Zürich University of Applied Sciences ZHAW). During his tenure from 1978 to 1984, his excellent management and organizational skills allowed him to expand horticultural education and training in Switzerland. He expanded the high school and his ability to build a good relationship with government and professional authorities was instrumental in obtaining public support and the financial resources for this extraordinary project. Dr. Müller’s technical and managerial leadership skills were honored in 1984 when he was appointed as Director of the Swiss Federal Research Station for Fruit Growing, Viticulture and Horticulture Wädenswil (FAW).

Being the 5th successor after the late and globally recognized Professor Hermann Müller-Thurgau, as FAW’s director from 1984 to 2001, Walter expanded the scope and spectrum of FAW’s activities. These covered a wide range of applied research activities – with extension services – and, when needed, basic research, all while maintaining Müller-Thurgau’s impact and sustainability-driven research spirit. Walter Müller responded decisively and flexibly to federal administration demands that arose in the 1990s, which were aimed at downsizing the institution. He consequently strengthened fundraising efforts through third party project research and opened up the way for forward-oriented reorganization, adapting the operations of the research station to new circumstances.
Under the leadership of Walter Müller, FAW scientists developed remarkable contributions for solving relevant problems for the industry and society, for example:

- development of organic methods and guidelines for integrated production in pome, stone and soft fruit cultivation, tree nurseries, viticulture, vegetables, and ornamental plants;
- development of new, more efficient and environmentally friendly cultivation techniques in fruit growing, viticulture and horticulture, including apple and vegetable breeding;
- improved knowledge-based methods for reduced pesticide use;
- clarification of the formation of and prevention of ethyl carbamate during distillate production;
- development and patenting of a process for the production of de-alcoholized wine;

- reduction of nitrate content in vegetables based on new science-based production guidelines;
- deciphering the chemical structure of the cherry fruit fly pheromone and the development of new approaches to control the pest;
- improved understanding of grapevine physiology of grape quality with its practical management implications.

Under the leadership of Walter Müller, the Research Station became internationally renowned and was a highly esteemed partner for cooperation projects (e.g. EU joint projects with Wageningen University, The Netherlands, and Bonn University, Germany). Dr. Müller was convener of five international scientific conferences (e.g. in Wädenswil, Zürich, Einsiedeln, Belgium and Poland). Due to his international outreach, his competence and experience enriched many workshops, symposia and conferences, especially when invited as a keynote speaker.

While furthering FAW's research, Walter Müller always remained closely connected with horticultural practice and education. He supported intensive knowledge exchange via regular workshops and seminars with farm managers and extension services. He contributed to more than 100 publications in scientific journals and shared his comprehensive knowledge with students of ETH Zürich when teaching "Introduction to grape, fruit and vegetable production", which was offered from 1994 to 2005.

From 1984-2004, Dr. Müller was the editor-in-chief of the Swiss Journal for Fruit Growing and Viticulture. He was also a member of the editorial board of the German Journal *Gartenbauwissenschaft* (1994-2003), which would later be launched as the *European Journal of Horticultural Science* in 2003, and he served on the Editorial Board of the Journal *Horticultural Science Prague*.

In 2002, Walter Müller was appointed as Delegate of the Federal Office of Agriculture for International Agricultural Research to analyze European and global agricultural and food research and from that work, to develop appropriate recommendations for Switzerland.

Environmentally respectful fruit production and horticulture was of particular concern to Dr. Müller. Hence, he was one of the leaders in the Europe-wide introduction of integrated production guidelines in fruit growing and was one of the founders of the European Fruit Research Institutes Network (EUFRIN), which was established in Bonn in 1993. Due to his comprehensive expertise and experience, Walter was elected as a member of the Board of EUFRIN where he served from 1992-1999.

In the 90s, integrated fruit production became a hot topic within the ISHS. Dr. Müller represented Switzerland on the ISHS Council. He successfully launched the ISHS Working Group Integrated Fruit Production, where he was Chair from 1994-1998. He led the Working Group with great enthusiasm and professionalism, expanding its agenda from fruit in the temperate zones to fruit in all climate zones.

Walter Müller also served as an elected member of the Internal Audit Committee of ISHS from 1998 to 2002. His critical-constructive comments were particularly appreciated, when he, jointly with his colleague Dr. Rob Bogers, encouraged the ISHS Board to introduce clearly defined Terms of Reference (TOR) for better risk management of ISHS finances. These were established and approved by Council in 2002 and have served subsequently as a guideline for all internal audits.

Walter Müller's profound knowledge and experience in the horticultural sector, his outstanding leadership and analytical ability, his strategic foresight and his pleasant nature made him a highly sought-after and highly respected reviewer for scientific papers and evaluator for assessing grant proposals and institutions, as well as facilitating the strategic development of high-ranking institutions, faculties and universities. With his many years of experience and expertise in the field of agricultural and horticultural sciences, his advice was frequently sought by others, both in his specialist discipline and beyond, even after his formal retirement in May 2004.

Dr. Müller's critical-constructive reviews were always well thought out and to the point. His voice carried great weight, wherever he raised it. His CV and professional career were very impressive, but his leadership was also in demand in other areas of public and private life. He reached the rank of Major in the Swiss Army, he served as President of his political party Free Democrats Wädenswil for 4 years, and he became Governor of the Rotary Club in Eastern Switzerland. However, Walter Müller's greatest pride was his family with two daughters and grandchildren. His lifetime passion, besides fruit growing, was hiking and mountain tours. One of his greatest achievements was to climb Kilimanjaro, a year after which Walter was struck down by Alzheimer's disease in 2019.

We have lost a great companion and colleague, who has made an indelible mark on the furthering of horticultural research and sustainable horticulture in Switzerland and in Europe. On behalf of ISHS our deepest sympathy is extended to his daughters Kathrin and Regula and their families. We will forever remember Walter Müller.

Georg Noga, former ISHS Board member
Lukas Bertschinger, ISHS Board member

Cesare Intrieri (1938-2023)

For almost 50 years, Cesare Intrieri, Emeritus Professor at the University of Bologna, dedicated himself to the viticulture sector. The results of his research, focused on the physiology of vines, training systems, mechanization of the vineyard, clonal selection and the breeding of grapevines and rootstocks, are still recognized and used today in Italy and other wine-producing countries around the world.

Cesare was an active member of ISHS from 1974 to 2023, initially joining ISHS Section Viticulture in 1992 and later contributing to ISHS Working Group Vineyard Mechanization. In 1996, he served as the editor of the *Acta Horticulturae* Proceedings of the Workshop on Strategies to Optimize Wine Grape Quality, and in 2012, he was a member of the Scientific Committee for the "First International Workshop on Vineyard Mechanization and Grape and Wine Quality." In addition, Professor Intrieri was the author of numerous *Acta Horticulturae* papers.

His passion for research, his determination to explore innovative topics, and his exceptional ability for the dissemination of knowledge and technical improvements allowed Professor Intrieri to make a significant contribution to both the national and international viticultural sector.

Ilaria Filippetti, University of Bologna, Italy

Professor Ivo Miljković (1932-2023)

On October 29, 2023, Professor Ivo Miljković, one of the most prominent Croatian horticulturists, an eminent scientist and internationally recognized expert, died at the age of 91.

Professor Miljković completed his postgraduate studies at the International Center for Advanced Studies in Mediterranean Agriculture in Bari (1962) and at the Agronomic Institute of the Mediterranean in Montpellier (1963). After graduation, he spent a month in Greece as an OECD scholarship holder participating in the International Seminar on the Organization of Agricultural Teaching and Training. He received his doctorate in 1965 from the University of Zagreb, Faculty of Agriculture, where he continued his career as an Associate Professor (from 1977) until becoming a full professor in 1982.

From 1976 to 1999, he was head (director) of the Institute of Fruit Growing. Prof. Miljković was active in teaching at the faculty for 40 years and led postgraduate and doctoral studies in the fruit growing department. He published numerous scientific papers in foreign journals and contributed significantly to making Croatian fruit growing science known in the world. These included over 150 original scientific papers, 30 of which he published in leading foreign journals, including 11 in *Acta Horticulturae*, where he was also a member of the editorial board, as well as contributions to 9 ISHS conference proceedings. He also authored over 200 professional articles and 300 popular science articles. He supervised 20 master's theses and 12 doctoral theses. Of the 12 doctoral students he supervised, 11 have become college professors (5 in Croatia, 1 in Slovenia, 1 in Serbia, 2 in Bosnia and Herzegovina and 2 in Kosovo).

Prof. Miljković was a visiting professor at several European universities. He retired in 1999 but continued to teach at the Faculty of Agriculture in Osijek, Croatia (1997-2002), at the Faculty of Agriculture in Mostar, Bosnia and Herzegovina (1997-2004) and at the Polytechnic in Požega, Croatia (1999-2004).

Prof. Miljković was an FAO expert on olive cultivation and nuts and received a Certificate of Recognition from FAO for the development of olive cultivation in the Mediterranean region as well as recognition from UNDP/FAO for many years of successful cooperation in studying the ecophysiology of olives and introducing new technologies in olive cultivation. His area of expertise was pomo-ecology, pomo-physiology and elajography.

Prof. Miljković was the founder of eco-physiology in Croatia. He was a member of several scientific societies in Croatia and abroad, a full member of the Academy of Agricultural Sciences in Croatia, and actively participated in numerous international scientific conferences and chaired three international congresses on fruit science. Prof. Miljković was a member of the scientific committee for the organization of the III International Hazelnut Congress in 1992 in Alba (Italy) and the IV International Hazelnut Congress in 1996 in Ordu (Turkey).

For his fruitful scientific, teaching and professional work, he received several awards for biotechnical sciences in his home country, including the State Prize for his life's work in the field of biotechnical sciences. Prof. Miljković was made an honorary member of the Croatian Agronomic Society, where he was chair of the publications committee for 38 years and editor of the oldest Croatian agronomic journal Agronomski glasnik (Agronomic Journal). He was unanimously elected as the first president of the Croatian Fruit Society and was a co-founder of the first Croatian fruit growing journal, Pomologia Croatica. He also published numerous specialist articles, studies, and projects for the construction of orchards, olive groves and related facilities.

Prof. Miljković's scientific and professional work is rich and extensive, from fruit growing to olive growing. He authored 24 books, either by himself or in co-authorship, and enriched the Croatian fruit growing literature. In the field of olive growing, he developed an extensive research activity and published several scientific papers at home and abroad, co-authoring the book "Olive and olive oil: a gift from God to Croats" in 2011, and prepared a book "The awakening of Croatian olive growing and the production of high-quality olive oil with special reference to the Istrian region" in 2022. For his scientific contribution in the field of olive growing and olive production, he was awarded the national prize "Stanko Ozanic" in 2023.

Professor Miljković was a longtime head of the Department of Agriculture at Matrix Croatica and a longterm collaborator and professional editor at the Miroslav Krleža Institute of Lexicography. As a sign of gratitude and respect for their esteemed teacher and mentor of doctoral, master's and diploma theses, the successors and heirs of his scientific and pedagogical work published a special edition on his 90th birthday.

Martina Skendrovic Babojelic, University of Zagreb, Faculty of Agriculture, Croatia

› Calendar of ISHS events

For updates and more information go to www.ishs.org › calendar of events. For a comprehensive list of meetings in each Division or Working Group use the "science" option from the website navigation menu. To claim reduced registration for ISHS members, your personal membership number is required when registering - ensure your ISHS membership is current before registering. When in doubt sign in to your membership account and check/renew your membership status first: www.actahort.org or www.ishs.org

Year 2024

- April 14-17, 2024, Warsaw (Poland): **XIV International Symposium on Flower Bulbs and Herbaceous Perennials.** Info: Dr. Dariusz Sochacki, Warsaw University of Life Sciences, Dept of Ornamental Plants, Nowoursynowska 166, 02-787 Warsaw, Poland. E-mail: dariusz_sochacki@sggw.edu.pl E-mail symposium: info@flowerbulb2024.pl Web: http://www.flowerbulbs2024.pl
- April 21-25, 2024, Matsue, Shimane (Japan): **V International Symposium on Woody Ornamentals of the Temperate Zone.** Info: Prof. Dr. Nobuo Kobayashi, Faculty of Life and

Environmental Science, Shimane University, Nishikawatsu, Matsue 690-8504, Japan. Phone: (81)852-32-6506, Fax: (81)852-32-6506, E-mail: nkobayashi@life.shimane-u.ac.jp or Dr. Takashi Handa, Meiji University, School of Agriculture, Higashimita 1-1-1, Tama-ku, Kawasaki, 214-8571 Kanagawa, Japan. Phone: (81)449347814, Fax: (81)449347814, E-mail: thanda@meiji.ac.jp Web: http://wotz2024.jshs.jp/

- April 22-25, 2024, Avignon (France): **I International Symposium on Apricot and Plum.** Info: Jean-Marc Audergon, INRA Centre PACA, UR1052 GAFL, Domaine St Maurice - 67 Allée des Chênes, CS60094, F84143 Montfavet, France. Phone: (33)4.32722668, Fax: (33)4.32722702, E-mail: jean-marc.audergon@inrae.fr or Dr. Bénédicte Quilot-Turion, INRAE, GAFL, Allée des Chênes, 84143 Montfavet, France. E-mail: benedicte.quilot-turion@inrae.fr Web: https://ishs-plum-apricot-2024.colloque.inrae.fr/
- May 12-16, 2024, Bucharest (Romania): **V European Horticultural Congress - EHC2024 (SHE2024).** Info: Prof. Dr. Florin Stanica, University of Agronomic Sciences, Faculty of Horticulture, B-dul Marasti, 59, Sector 1, 011464, Bucuresti, Romania. Phone: (40)722641795, Fax: (40)213182888, E-mail: flstanica@yahoo.co.uk E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/

Symposia at EHC2024:

- May 12-16, 2024, Bucharest (Romania): **International Symposium on History of Horticulture in Europe.** Info: Ms. Ana Cornelia Butcaru, Sector 3, str.Branduselor nr.9, bl.G4, Bucharest, Romania. E-mail: anabutcaru@gmail.com or Dr. Michael Blanke, Institut Obstbau Bonn, Auf dem Hugel 6, 53121 Bonn, Germany. Phone: (49)228735142, Fax: (49)228735764, E-mail: mmblanke@uni-bonn.de or Dr. Luca Dondini, Università di Bologna, Dip. Scienze e Tecnologie Agro-Alimentari, Via Fanin 46, 40127 Bologna, Italy. Phone: (39)0512096400, Fax: (39)0512096401, E-mail: luca.dondini@unibo.it E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Sustainable Vegetable Production from Seed to Health Booster Sources.** Info: 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 or Prof. Dr. Yüksel Tüzel, Ege University, Agriculture Faculty, Department of Horticulture, 35100 Bornova Izmir, Turkey. Phone: (90)2323111398, Fax: (90)2323881865, E-mail: yuksel.tuzel@ege.edu.tr or Prof. Dr. Vasile Stoleru, Iasi, M. Sadoveanu 6, Romania. E-mail: vstoleru@uaiasi.ro E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Fruit Production Systems for Sustainable and Resilient Development.** Info: Prof. Dr. Florin Stanica, University of Agronomic Sciences, Faculty of Horticulture, B-dul Marasti, 59, Sector 1, 011464, Bucuresti, Romania. Phone: (40)722641795, Fax: (40)213182888, E-mail: flstanica@yahoo.co.uk or Prof. Luca Corelli Grappadelli, Department of Agricultural Sciences, Università di Bologna, Via Fanin 46, 40127 Bologna, Italy. Phone: (39)0512096434, Fax: (39)0512096401, E-mail: luca.corelli@unibo.it or Prof. Dr. Mekjell Meland, Nibio Ullensvang, Norwegian Institute of Bioeconomy Research, N-5781 Lofthus, Norway. E-mail: mekjell.meland@nibio.no E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Viticulture and Winemaking between Tradition and Innovation.** Info: Prof. Dr. Oana Arina Antoce, Univ. of Agronomical Sci. & Veterinary Medicine of Bucharest, 59, Marasti Ave., Sector 1, 011464 Bucharest, Sector 1, Romania. E-mail: aantoce@yahoo.com or Prof. Gregorio Muñoz Organero, Autovía de Aragón Km, 38.2, Finca El Encí, 28800 Madrid, Spain. E-mail: gregorio.munoz@madrid.org or Assoc. Prof. Arif Atak, Bursa Uludağ University, Faculty of Agriculture, Department of Horticulture, 16059 Bursa, Turkey. Phone: (90) 224 2941578, E-mail: arifatak@uludag.edu.tr E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Berries between Opportunities and Challenges.** Info: Prof. Dr. Adrian Asanica, Facutly of Horticulture Bucharest, Bd Marasti 59 sector 1, 011464 Bucharest, Romania. E-mail: asanica@gmail.com or 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. Nesibe Ebru Kafkas, Department of Horticulture, Faculty of Agriculture, TR-01330 Adana Balcali, Turkey. Phone: (90)5365227774, E-mail: ebruyasakafkas@gmail.com E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Ornamental Horticulture for the Service of Society.** Info: Dr. Margherita Beruto, Vicolo Barbarossa, 13, 18038 San Remo (Imperia), Italy. Phone: (39) 0184670781, E-mail: margheberuto@gmail.com or Dr. Erzsebet Buta, 3-5 Manastur Street, 400372 Cluj - Napoca, Romania. E-mail: ebuta2008@yahoo.com or Sandra Gonçalves, University of Algarve, Fac. of Sciences &Tech., Campus de Gambelas, 8005-139 Faro, Portugal. E-mail: smgoncalves@ualg.pt E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Urban Horticulture: from Vertical Farming to Planting Design.** Info: Prof. Dr. Leo F. M. Marcelis, Wageningen University, Horticulture & Product Physiology, Droevendaalsesteeg 1, 6708 PB Wageningen, Netherlands. Phone: (31)317485675, E-mail: leo.marcelis@wur.nl or Dr. Ioana Tudora, Bdul Marasti, nr. 59, 011464 Bucuresti, Romania. E-mail: ioana.tudora@horticultura-bucuresti.ro or Dr. Trine Hvoslef-Eide, Norwegian University of Life Sciences, NMBU, Dept. of Plant Sciences, Boks 5003, 1432 Aas, Norway. E-mail: trine.hvoslef-eide@nmbu.no E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Genetic Resources in Horticulture: Screening, Propagation, Use, and Conservation.** Info: Dr. Dorin-Ioan Sumedrea, NRDIBH Stefanesti, General Director, Bucureşti-Pitesti Str, 37, Stefanesti, Stefanesti 117715, Romania. Phone: (40)248266838, Fax: (40)248266808, E-mail: dsumedrea@yahoo.com or Dr. Emmanuel Geoffriau, Institut Agro, Institute Research Horticulture Seeds, 2 rue Le Notre, 49045 Angers, France. Phone: (33)241225431, E-mail: emmanuel.geoffriau@institut-agro.fr or Dr. Geza Bujdosó, MATE - Hungarian University for Agriculture, Life Sciences, 2100 Godollo, Pater K. u. 1, Hungary. Phone: (36)13621596, E-mail: resinfru@yahoo.com E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/
- May 12-16, 2024, Bucharest (Romania): **International Symposium on Robotics, Mechanization and Smart Horticulture.** Info: Dr. Luigi Manfrini, Università di Bologna, 40127 Bologna, Italy. E-mail: luigi.manfrini@unibo.it or Dr. Konni Biegert, Kompetenzzentrum Obstbau Bodensee, KOB, Schuhmacherhof 6, D-88213 Ravensburg, Germany. Phone: (49)751 7903-343, E-mail: konni.biegert@kob-bavendorf.de or Dr. Mihai Gabriel Matache, Ion Ionescu de la Brad, nr 6, sector 1, 013813 Bucharest Bucharest, Romania. E-mail: gabimatache@yahoo.com E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/

- May 12-16, 2024, Bucharest (Romania): **International Symposium on Postharvest and Horticultural Products Quality.** Info: Prof. Dr. Liliana Aurelia Badulescu, Bd Marasti nr 59, 011464 Bucharest Bucharest, Romania. Phone: (40)745368989, E-mail: liliana.badulescu@usamv.ro or Dr. Dirk Köpcke, Chamber of Agriculture in Lower Saxony, Fruit Research Station Jork (OVA), Moorende 53, 21635 Jork, Germany. Phone: (49) 4162 6016 120, E-mail: dirk.koepcke@lwk-niedersachsen.de or Dr. Krzysztof Rutkowski, Research Institute of Horticulture, Konstytucji 3 Maja 1/3, 96-100 Skierniewice, Poland. Phone: (48) 468345363, E-mail: krzysztof.rutkowski@inhort.pl E-mail symposium: secretariat@ehc.usamv.ro Web: https://ehc.usamv.ro/ NEW
- May 19-22, 2024, Seoul (Korea (Republic of)): **X International Symposium on Light in Horticulture.** Info: Prof. Dr. Myung-Min Oh, Dept. of Horticultural Science, Chungbuk National University, Cheong-Ju, 28644, Korea (Republic of). Phone: (82)43-261-250, Fax: (82)43-271-0414, E-mail: moh@cbnu.ac.kr or Prof. Dr. Seung Jae Hwang, Division of Horticultural Science, College of Agriculture & Life Science, Gyeongsang National University, Jinju, 52828, Korea (Republic of). Phone: (82)55-772-1916, Fax: (82)55-772-1919, E-mail: hsj@gnu.ac.kr or Prof. Dr. Wook Oh, Department of Horticultural Science, Jeju National University, 102 Jejudaehak-ro, Jeju 63243, Korea (Republic of). Phone: (82)7543327, Fax: (82)7254905, E-mail: wookoh@jejunu.ac.kr or Prof. Dr. Jung-Eek Son, Dept of Agriculture, Forestry & Bioresources, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul 08826, Korea (Republic of). Phone: (82)28804564, Fax: (82)28732056, E-mail: sjeenv@snu.ac.kr E-mail symposium: info@lightsym2024.org Web: http://lightsym2024.org
- June 3-6, 2024, Foggia (Italy): **V International Conference on Fresh-Cut Produce: Maintaining Quality and Safety.** Info: Prof. Dr. Maria Luisa Amodio, Via Napoli 25, 71100 Foggia, Italy. Phone: (39)0881-589105, Fax: (39)0881-589244, E-mail: marialuisa.amodio@unifg.it or Prof. Giancarlo Colelli, Dip. DAFNE Università di Foggia, Via Napoli 25, 71100 Foggia, Italy. Phone: (39) 320 4394535, E-mail: giancarlo.colelli@unifg.it E-mail symposium: freshcut.2024@unifg.it Web: http://www.unifg.it/freshcut.2024
- June 9-12, 2024, Budapest (Hungary): **XVII International Symposium on Processing Tomato - XV World Processing Tomato Congress.** Info: Dr. Luca Sandei, SSICA, Tomato Department, Viale f.Tanara 31/a, 43121 Parma (PR), Italy. Phone: (39) 0521795257, Fax: (39) 0521771829, E-mail: luca.sandei@ssica.it or Prof. Dr. Lajos Helyes, Hungarian University of Agriculture, and Life Science, Páter K. str. 1, 2100 Gödöllö, Hungary. Phone: (36)28522071, E-mail: helyes.lajos@uni-mate.hu or Prof. Zoltán Pék, Hungarian University of Agriculture, and Life Sciences, 2103 Gödöllö, Páter Károly u. 1., Hungary. Phone: (36)28522071, Fax: (36)28410804, E-mail: pek.zoltan@uni-mate.hu E-mail symposium: symposium@worldtomatocongress.com Web: https://15thworldtomatocongress.com
- June 14-17, 2024, Nanjing (China): **V International Symposium on Biotechnology and Molecular Breeding in Horticultural Species.** Info: Jun Wu, Nanjing Agricultural University, College of Horticulture, Nanjing, Jiangsu, 210095, China. E-mail: wujun@njau.edu.cn or Prof. Dr. Shaoling Zhang, Nanjing Agricultural University, 1 Weigang, 210095 Nanjing, China. E-mail: nnzsl@njau.edu.cn or Prof. Dr. Xiuxin Deng, Huazhong Agricultural University, College of Horticulture & Forestry, Shizishan Street No. 1, Wuhan, Hubei Province 430070, China. Phone: (86)2787281712, Fax: (86)2787280016, E-mail: xxdeng@mail.hzau.edu.cn Web: http://www.bmbh2023.com
- June 24-27, 2024, Wenatchee, WA (United States of America): **X International Symposium on Plant Nutrition of Fruit Crops.** Info: Assoc. Prof. Lee Kalcsits, Washington State University, WSU-TFREC, Wenatchee, WA 98801, United States of America. Phone: (1)5096638181, E-mail: lee.kalcsits@wsu.edu Web: https://ishsplantnutrition.com/
- July 10-12, 2024, Reading (United Kingdom): **XVI International People Plant Symposium.** Info: Prof. Dr. Sin-Ae Park, 225 Life and Environment Science building, 05029 Seoul, Korea (Republic of). E-mail: sapark42@konkuk.ac.kr or Ms. Rebecca Haller, 1432 Grape Street, Denver, CO 80220, United States of America. E-mail: rhaller@htinstitute.org or Mr. Damien Newman, Thrive, The Geoffrey Udall Centre, Beech Hill, RG7 2AT Berks Reading, United Kingdom. Phone: 01189 885688, E-mail: damien.newman@thrive.org.uk
- August 24-29, 2024, Halifax, Nova Scotia and Charlottetown, Prince Edward Island (Canada): **XIII 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
- September 17-20, 2024, Warsaw (Poland): **IV International Organic Fruit Symposium and II International Organic Vegetable Symposium.** Info: Assoc. Prof. Eligio Malusa, Instytut Ogrodnictwa-PIB, ul. Konsty, 96-100 Skierniewice, Poland. E-mail: eligio.malusa@inhort.pl or Joanna Pulawska, Instytut Ogrodnictwa - PIB, ul. Konstytucji 3 Maja 13, 96-100 Skierniewice, Poland. Phone: (48)468345366, E-mail: joanna. pula wska@inhort.pl or Prof. Dr. Lidia Sas Paszt, National Inst. of Horticultural Research, Dept. Microbiology & Rhizosphere, Pomologiczna 18, 96-100 Skierniewice, Poland. Phone: (48)468345235, Fax: (48)468333228, E-mail: lidia.sas@inhort.pl E-mail symposium: info@orghort2024.pl Web: https://orghort2024.pl/
- September 23-26, 2024, Athens (Greece): **I International Symposium on Protected Cultivation, Nettings and Screens for Mild Climates.** Info: Dr. Dimitrios Savvas, Agricultural University of Athens, Laboratory of Vegetable Production, Iera Odos 75, 11855 Athens, Greece. Phone: (30)2105294510, Fax: (30)2105294504, E-mail: dsavvas@aua.gr or Assoc. Prof. Thomas Bartzanas, Agricultural University of Athens, Laboratory of Farm Structures, Iera Odos 75, 11855, Athens, Greece. Phone: (30)2105294045, Fax: (30)2105294045, E-mail: t.bartzanas@aua.gr E-mail symposium: info.ishsathens2024@afea.gr Web: https://promicli.athens2024.org
- September 25-28, 2024, Wisley, Woking (United Kingdom): **III International Symposium on Greener Cities: Improving Ecosystem Services in a Climate-Changing World (GreenCities2024).** Info: Dr. Tijana Blanusa, Science Department, RHS Garden Wisley, GU23 6QB Woking, United Kingdom. E-mail: tijanablanusa@rhs.org.uk or Dr. Mark Gush, Royal Horticultural Society, Wisley, GU23 6QB Surrey Woking, United Kingdom. E-mail: markgush@rhs.org.ukE-mailsymposium:greencities2024@rhs.org.uk Web: https://www.rhs.org.uk/science/green-cities-2024
- October 1-4, 2024, Brasília, DF (Brazil): **VII International Symposium on Tomato Diseases.** Info: Prof. Eduardo Mizubuti, Departamento de Fitopatologia, Universidade Federal de Viçosa, 36570-900 Viçosa-MG, Brazil. Phone: (55) 31 3899 1090, E-mail: mizubuti@ufv.br or Dr. Alice Kazuko Inoue-Nagata, Embrapa Vegetables Km 09,BR060, 70275970 Brasilia-DF, Brazil. Phone: (55)6133859053, E-mail: alice.nagata@embrapa.br or Prof. Dr. Nadson Pontes, BR 153, km 633. CP 92, Zona Rural, 75650-000 Morrinhos-GO, Brazil. Phone: (55)64-34137900, E-mail: nadson.pontes@ifgoiano.edu.br E-mail symposium: 7istd@7istd.com Web: https://7istd.com/
- October 20-25, 2024, Yangling (China): **VIII International Symposium on Persimmon.** Info: Prof. Yong Yang, Northwest A&F University, Yangling, Shaanxi 712100, China. Phone: (86)29-87082613, E-mail: yang.yong521@163.com or Prof. Dr. Zhengrong Luo, National Key Lab for Germplasm Innovation &, Utilization

of Horticultural Crops, Huazhong Agricultural University, Shizishan, Wuhan, Hubei 430070, China. Phone: (86)27-8728-2677, Fax: (86)27-8728-2010, E-mail: luozhr@mail.hzau.edu.cn or Dr. Qinglin Zhang, National Key Lab for Germplasm Innovation &, Utilization of Horticultural Crops, Huazhong Agricultural University, Wuhan, Hubei, 430070, China. Phone: (86)27-8728-2677, E-mail: zhangqinglin@mail.hzau.edu.cn E-mail symposium: persimmon@mail.hzau.edu.cn

- October 28-30, 2024, Coimbra (Portugal): **International Symposium on Arbutus unedo (Strawberry Tree) and Related Species: from Biology to Biotechnology.** Info: Prof. Dr. Jorge Canhoto, Department of Life Sciences, University of Coimbra, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal. Phone: (351)917859860, E-mail: jorgecan@ci.uc.pt or Dr. João Martins, Department of Life Sciences, University of Coimbra, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal. Phone: (351)239240700, E-mail: joao.martins@uc.pt Web: https://www.uc.pt/en/uid/biotec/events/arbutus2024

NEW

- November 4-7, 2024, Srinagar, J&K (India): **VII International Symposium on Saffron Biology and Technology.** Info: Prof. Haroon Rashid Naik, SKUAST Kashmir India, Srinagar, 190025, India. E-mail: directorresearch@skuastkashmir.ac.in or Prof. Dr. Dil Mohammad Makhdoomi, SKUAST Kashmir India, Shalimar, Srinagar, Jammu and Kashmir, 190025, India. E-mail: deeskuastk@gmail.com or Prof. Dr. Arshad H Mughal, SKUAST Kashmir India, Shalimar, Srinagar, Jammu and Kashmir, 190025, India. E-mail: ahmughal1@gmail.com or Assoc. Prof. Bashir Alie, SKUAST-Kashmir, India, Srinagar, 193401, India. Phone: (91)01951272477, E-mail: baelahi@gmail.com E-mail symposium: saffronsymposium2024@gmail.com

NEW

- November 10-15, 2024, Jeju (Korea (Republic of)): **XV International Citrus Congress.** Info: Prof. Dr. Kwan Jeong Song, Dept. of Horticultural Science, College of Applied & Life Sciences, Cheju National Unversity, 1 Ara 1-Dong, Jeju City, Jeju-Do 690-756, Korea (Republic of). Phone: (82)647543328, Fax: (82)647254905, E-mail: kwansong@jejunu.ac.kr E-mail symposium: info.icc2024@gmail.com Web: https://www.icc2024.kr/
- November 11-15, 2024, Rotorua (New Zealand): **VII International Symposium on Postharvest Pathology: Next Frontiers for Improved Knowledge and Management of Postharvest Disease.** Info: Dr. Kerry Everett, PB 92169, Mt Albert, 1142 Auckland, New Zealand. Phone: (64)9-9257133, E-mail: kerry.everett@plantandfood.co.nz Web: https://www.scienceevents.co.nz/postharvest2024
- November 11-15, 2024, Rotorua (New Zealand): **X International Symposium on Human Health Effects of Fruits and Vegetables - FAVHEALTH2024.** Info: Dr. Carolyn Lister, New Zealand Institute for Plant and Food Research Limited, Lincoln, New Zealand. Phone: (64)3-3259453, E-mail: carolyn.lister@plantandfood.co.nz Web: https://www.scienceevents.co.nz/postharvest2024
- November 11-15, 2024, Rotorua (New Zealand): **IX International Postharvest Symposium.** Info: Dr. Allan Woolf, Plant and Food Research, Mt Albert Research Centre, 120 Mt Albert Road, Sandringham, 1025, Auck, Private Bag 92169, Auckland, New Zealand. Phone: (64)99257267, Fax: (64)99258628, E-mail: allan.woolf@plantandfood.co.nz or Prof. Andrew East, Massey University, Private Bag 11222, Palmerston North, New Zealand. E-mail: a.r.east@massey.ac.nz Web: https://www.scienceevents.co.nz/postharvest2024

Year 2025

- January 19-24, 2025, Napier (New Zealand): **XIII International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems.** Info: Dr. Adam Friend, 55 Old Mill Road, RD 3, Motueka 7198, Tasman, New Zealand. Phone: (64)3-9073622, Fax: (64)3-9073596, E-mail: adam.friend@plantandfood.co.nz or Dr. Ben van Hooijdonk, Plant and Food Research, Hawkes Bay, Private Bag 1401, Havelock North, 4130, New Zealand. E-mail: ben.vanhooijdonk@plantandfood.co.nz Web: https://www.scienceevents.co.nz/orchard-systems

NEW

- February 10-13, 2025, Sde Boker (Israel): **II International Symposium on Reproductive Biology of Fruit Tree Species.** Info: Prof. Avi Sadka, ARO, The Volcani Center, Department of Fruit Trees Sciences, 68 HaMaccabim Rd., P.O. Box 15159, Rishon LeZion 7528809, Israel. Phone: (972)3-9683343, Fax: (972)3-9669583, E-mail: vhasadka@volcani.agri.gov.il or Prof. Noemi Tel-Zur, Ben-Gurion University of the Negev, Beersheba, Israel. E-mail: telzur@bgu.ac.il Web: https://www.reproductive-biologyfruittree.org.il/

NEW

- March 16-21, 2025, Yancheng city, Jiangsu Province (China): **X International Strawberry Symposium.** Info: Dr. Jian Sun, Institute of Forestry and Pomology, Beijing Academy of Agriculture and Forestry, NO.12, Ruiwangfen Jia, Xiangshan, Haidian, Beijing, 100093, China. Phone: (86)10-82598882, E-mail: sjroad@126.com or Dr. Yuntao Zhang, BJ Academy Forestry & Pomology Sciences, Rui Wang Fen, Xiang-Shan, Hai Dian District, Beijing 100093, China. Phone: (86)1082598882, Fax: (86)1062598882, E-mail: zhytao1963@126.com Web: https://www.iss2025.org.cn
- May 5-9, 2025, Rimini (Italy): **International Symposium on Biotechnological Tools in Horticulture.** Info: Dr. Silvia Sabbadini, Via Brecce Bianche 10, Ancona, Italy. E-mail: s.sabbadini@staff.univpm.it or Dr. Luca Capriotti, Dept Agric., Food & Environmental Sciences, Università Politecnica delle Marche, Via Brecce Bianche 10, Ancona, Italy. Phone: (39)3662844234, E-mail: l.capriotti@staff.univpm.it or Dr. Angela Ricci, Dept Agric., Food & Environmental Sciences, Università Politecnica delle Marche, Via Brecce Bianche 10, Ancona, Italy. E-mail: angela.ricci@pm.univpm.it

NEW

- May 10-15, 2025, Beijing (China): **IX International Symposium on Rose Research and Cultivation.** Info: Prof. Junping Gao, China Agricultural University, Beijing, 100193, China. E-mail: gaojp@cau.edu.cn
- May 19-21, 2025, Wenatchee, WA (United States of America): **XIV International Controlled and Modified Atmosphere Research Conference - CAMA2025.** Info: Dr. Carolina A. Torres, Washington State Univ, 1100 N. Western Ave, Wenatchee, WA 98801, United States of America. Phone: (1)206 331 4780, Fax: (1)509 848 2231, E-mail: ctorres@wsu.edu E-mail symposium: info@cama2025.com Web: https://cama2025.com
- June 22-27, 2025, Almeria (Spain): **GreenSys2025 - International Symposium on Advanced Technologies and Management for Sustainable Greenhouse Systems.** Info: Prof. Dr. Diego L. Valera, Dpto. Ingeniería, Universidad de Almería, Ctra Sacramento sn, 04120 Almería, Spain. Phone: (34)950015546, E-mail: dvalera@ual.es or 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 E-mail symposium: greensys2025@ual.es
- July 10-11, 2025, Kuala Lumpur (Malaysia): **III International Symposium on Tropical and Subtropical Ornamentals.** Info: Prof. Dr. Asmah Binti Awal, Faculty of Plantation and Agrotechnology, UiTM Cawangan Melaka, Kampus Jasin, 77300 Melaka Merlimau, Malaysia. E-mail: asmah138@uitm.edu.my
- August 4-8, 2025, Beijing (China): **XI International Congress on Hazelnut.** Info: Prof. Jianguo Zhang, Research Institute of Forestry, Chinese Academy of Forestry, Dongxiaofu 1, Haidian District, Beijing, China. E-mail: chinahazelnut2025@163.com E-mail symposium: chinahazelnut2025@163.com

NEW

- September 7-12, 2025, Freising (Germany): **II International Symposium on Growing Media, Compost Utilization and Substrate Analysis for Soilless Cultivation.** Info: Dr. Dieter Lohr, Weihenstephan-Triesdorf University, Institute of Horticulture,

Am Staudengarten 14, 85354 Freising, Germany. E-mail: dieter.lohr@hswt.de or Dr. Elke Meinken, Am Staudengarten 14, 85354 Freising, Germany. E-mail: elke.meinken@hswt.de or Prof. Dr. Nazim Gruda, University of Bonn, INRES Horticultural Sciences, Auf dem Hügel 6, 53121 Bonn, Germany. E-mail: ngruda@uni-bonn.de Web: https://www.growingmedia2025.com/

- September 16-19, 2025, Bogor (Indonesia): **IX International Symposium on Edible Alliums.** Info: Dr. Awang Maharijaya, Pakuan Regency, cluster Lingga Buana, Blok E6 no 24, 16680 West Java Bogor, Indonesia. E-mail: awangmaharijaya@apps.ipb.ac.id
- September 22-24, 2025, Bari (Italy): **VI International Symposium on Pomegranate and Minor Mediterranean Fruits.** Info: Assoc. Prof. Giuseppe Ferrara, Università di Bari, Dpt. Scienze Suolo, Pianta e Alimenti, Via Amendola 165/a, 70126 Bari, Italy. Phone: (39)805442979, Fax: (39)805442979, E-mail: giuseppe.ferrara@uniba.it or Prof. Dr. Stefano La Malfa, Di3A, Catania University, Via Valdisavoia 5, 95123 Catania, Italy. Phone: (39)095-354641, Fax: (39)095-234406, E-mail: stefano.lamalfa@unict.it
- October 20-23, 2025, Kalamata (Greece): **X International Symposium on New Ornamental Crops.** Info: Assoc. Prof. Anastasios Darras, University of the Peloponnese, Antikalamos, Kalamata, 24100 None Kalamata, Greece. Phone: +306974396588, E-mail: a.darras@uop.gr
- November 11-13, 2025, Shizuoka (Japan): **VI Asia Symposium on Quality Management in Postharvest Systems.** Info: Prof. Dr. Masaya Kato, Faculty of Agriculture, Shizuoka University, Ohya, Suruga, Shizuoka 422-8529, Japan. Phone: (81)54-238-4830, Fax: (81)54-237-3028, E-mail: kato.masaya@shizuoka.ac.jp E-mail symposium: asqp2025@gmail.com Web: https://asqp2025.org/

Year 2026

NEW
- March 16-20, 2026, Skukuza (South Africa): **IV International Symposium on Beverage Crops.** Info: Prof. Dr. Olaniyi Fawole, Postharvest and Agroprocessing Research Lab, Department of Botany & Plant Biotechnology, University of Johannesburg, APK Campus, South Africa. E-mail: olaniyif@uj.ac.za

NEW
- May 4-8, 2026, Lleida (Spain): **IX International Symposium on Almonds and Pistachios.** Info: Dr. Xavier Miarnau, IRTA-Fruitcentre, Parc Agrobiotech, Parc de Gardeny, 25003 Lleida, Spain. Phone: (34)675788825, E-mail: xavier.miarnau@irta.cat or Dr. Joaquim Bellvert Rios, Parc de Gardeny, IRTA Fruitcentre, 25003 Lleida Lleida, Spain. Phone: +34669012747, E-mail: joaquim.bellvert@irta.es
- May 17-22, 2026, Athens (Greece): **X Southeastern and Eastern Europe Symposium on Vegetables and Potatoes.** Info: Dr. Dimitrios Savvas, Agricultural University of Athens, Laboratory of Vegetable Production, Iera Odos 75, 11855 Athens, Greece. Phone: (30)2105294510, Fax: (30)2105294504, E-mail: dsavvas@aua.gr or Assist. Prof. Georgia Ntatsi, Agricultural University of Athens, Laboratory of Vegetable Crops, Iera Odos 75, 11855 Athens, Greece. Phone: (30)2015294532, E-mail: ntatsi@aua.gr or Prof. Dr. Nazim Gruda, University of Bonn, INRES Horticultural Sciences, Auf dem Hügel 6, 53121 Bonn, Germany. E-mail: ngruda@uni-bonn.de
- June 22-24, 2026, Jejudo (Korea (Republic of)): **XVI International Asparagus Symposium.** Info: Prof. Dr. Yang Gyu Ku, Department of Horticulture Industry, College of Agriculture and Food Sciences, Wonkwang University, Iksan-city, Korea (Republic of). Phone: (82)638506672, Fax: (82)638507308, E-mail: ygku35@wku.ac.kr or Prof. Dr. Young Yeol Cho, Collage of Applied Life Sciences, Department of Horticultural Science, Jeju National University, Jeju, Korea (Republic of). Phone: (82)647543325, Fax: (82)647254905, E-mail: yycho@jejunu.ac.kr or Prof. Dr. Jong Hyang Bae, Department of Horticulture Industry, College of Agriculture and Food Sciences, Wonkwang University, Iksan-city, Korea (Republic of). Phone: (82)638506671, Fax: (82)638507308, E-mail: bae@wku.ac.kr or Prof. Dr. Young Rog Yeoung, Department of Plant Science, College of Life Science, GangneungWoju National University, Gangwon-Do, Korea (Republic of). Phone: (82)336402356, Fax: (82)336402909, E-mail: yryeoung@gwnu.ac.kr
- August 23-28, 2026, Kyoto (Japan): **XXXII International Horticultural Congress: IHC2026.** Info: Prof. Dr. Ryutaro Tao, Lab. Pomology, Fac. Agric., Kyoto University, Kitashirakawa Oiwake-cho, Sakyo-ku Kyoto 606-8502, Japan. Phone: (81)757536053, Fax: (81)757536497, E-mail: tao.ryutaro.8c@kyoto-u.ac.jp E-mail symposium: ihc2026@convention.co.jp Web: https://www.ihc2026.org/
- November 18-20, 2026, Bastia, Corsica (France): **V International Symposium on Citrus Biotechnology.** Info: Dr. Francois Luro, AGAP Corse Equipe SEAPAG, station INRAE, 20230 San Giuliano, France. Phone: (33)495595946, E-mail: francois.luro@inrae.fr

Year 2027

- July 11-16, 2027, Pergine Valsugana (Italy): **XIV International Rubus and Ribes Symposium.** Info: Gianluca Savini, Sant'Orsola Sca., Via Per Trento n. 11/E loc. Cirè, 38057 Pergine Valsugana TN, Italy. E-mail: gianluca.savini@santorsola.com or Lara Giongo, Fondazione Edmund Mach via E. Mach,1, San Michele aA, Italy. E-mail: lara.giongo@fmach.it

NEW
- September 6-9, 2027, Matera (Italy): **XII International Symposium on Kiwifruit.** Info: Prof. Dr. Bartolomeo Dichio, Università degli Studi della Basilicata, DICEM, Via S.Rocco, 75100 Matera, Italy. Phone: (39)08351971422, E-mail: bartolomeo.dichio@unibas.it or Prof. Cristos Xiloyannis, vico san leonardo,35, DICEM, Via S.Rocco, 75100 Matera, Italy. Phone: (39)0835314347, E-mail: cristosxiloyannis15@gmail.com or Dr. Alba Mininni, Università degli studi della Basilicata, DICEM, via passarelli 113, 75100 Matera (MT), Italy. E-mail: alba.mininni@unibas.it

Year 2030

- August 25-30, 2030, Milan (Italy): **XXXIII International Horticultural Congress: IHC2030.** Info: Prof. Dr. Massimo Tagliavini, Faculty of Sciences and Technology, Free University of Bolzano/Bozen, Via Sernesi 1, 39100 Bolzano/Bozen, Italy. Phone: (39)0471 017120, Fax: (39)0471 017009, E-mail: massimo.tagliavini@unibz.it Web: https://www.ihc2030.org/

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› *Chronica Horticulturae* author information

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

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

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

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

Spotlight on Honoured ISHS Members. ISHS Fellows and Honorary Members complete an interview on how they started and progressed in their careers, what affected their decisions and attitudes and how their involvement with the ISHS assisted them. In addition, they are invited to comment on how they see the future of horticultural science for young people. Articles in this section are by invitation only.

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

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

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

The World of Horticulture. Articles in this section highlight horticultural industries and research institutions of particular countries or geographic regions throughout the world. Illustration with figures and tables is extremely helpful and highly advised. This section also includes book reviews that are requested by the Editor. Members who wish to recommend a book review should arrange for a copy of the book to reach the Secretariat.

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

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

Authors who wish to submit articles for publication in *Chronica* should contact ISHS headquarters and their request will be transmitted to the Editor. Authors should be aware that most articles should have a broad international focus. Thus, articles of strictly local interest are generally unsuited to *Chronica*. Illustrated articles are usually 1500 to 5000 words long. There are no page charges for *Chronica Horticulturae*. Photographs submitted should be of high resolution (≥ 300 pixels per inch). Send articles or ideas for articles to:

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