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Chronica Horticulturae



Horticultural highlights

ISHS General Assembly • IHC2022 • Outlook of the agricultural extension mobile application – Abu Dhabi case study • Urban Greenhouse Challenge: exploring the potential of urban farming

Symposia and workshops

Hazelnut • Asparagus

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All major Credit Cards accepted. Always quote your name and invoice or membership number. Make checks payable to ISHS Secretariat. Money transfers: ISHS main bank account number is 230-0019444-64. Bank details: BNP Paribas Fortis Bank, Branch "Heverlee Arenberg", Naamsesteenweg 173/175, B-3001 Leuven 1, Belgium. BIC (SWIFT) code: GEBABEBB08A, IBAN: BE29230001944464. Please arrange for all bank costs to be taken from your account assuring that ISHS receives the net amount. Prices listed are in euro (EUR) but ISHS accepts payments in USD as well.

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Acta Horticulturae is the series of proceedings of ISHS Scientific Meetings, Symposia or Congresses (ISSN: 0567-7572). ISHS Members are entitled to a substantial discount on the price of *Acta Horticulturae*. A complete and accurate record of the entire *Acta Horticulturae* collection, including all abstracts and full text articles, is available online at www.actahort.org. ISHS Individual Membership includes credits to download 15 full text *Acta Horticulturae* articles. All *Acta Horticulturae* titles - including those no longer available in print format - are available on USB-drive or in the e-Acta format.

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The *European Journal of Horticultural Science* (eJHS) accepts original research articles and reviews on significant plant science discoveries and new or modified methodologies and technologies with a broad international and cross-disciplinary interest in the scope of global horticulture. The Journal focuses on applied and fundamental aspects of the entire food value chain, ranging from breeding, production, processing, trading to retailing of horticultural crops and commodities in temperate and Mediterranean regions. ISHS members benefit from a discounted publishing charge. eJHS is available in print + online Open Access. Additional information can be viewed on www.ishs.org/ejhs.

Fruits – International Journal of Tropical and Subtropical Horticulture

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

Scripta Horticulturae

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

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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.

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IHC2022 participants in the botanic garden of Angers.
Photo credit: François Lehmann. See article p.14.



News & Views
from the Board

➤ Envisaging the future of ISHS

François Laurens, President of ISHS, Peter Batt, Lukas Bertschinger, Alex Chang, Ted DeJong, Moctar Fall, Patricia Paiva, Ryutaro Tao and Peter Vanderborgh



➤ François Laurens

In early November the new Board met in Leuven, Belgium, at the ISHS Headquarters. Collectively we performed a thorough analysis of the organization and the opportunities and risks that ISHS and its stakeholders face. A new vision statement for the organization was defined:

"ISHS is the world's leading independent organization of horticulturalists acting as a globally recognized and sought-after platform for research, science-based information exchange and collaboration in support of sustainable innovation in horticulture."

Our strategic goals for 2022-2026 are:

1. To be recognized as the global leader in the exchange of scientific research and knowledge on horticultural innovation;
2. To strengthen and leverage the ISHS member network and partnerships with national and international organizations and other stakeholders;
3. To improve the visibility of ISHS in the global professional horticultural network and general public;
4. To improve the relevance of ISHS for young minds and other member categories with consideration for equity and gender balance;
5. To strengthen the sustainable financial and operational foundation of ISHS based on a diversified business model.

We also agreed that sustainability is a topic of strategic relevance for the organization, but we need more time to define an appropri-

ate sixth strategic goal. This will be addressed in the coming months.

A roadmap with specific actions for addressing the strategic objectives in the short, middle, and long term was sketched out and action items are in the process of being consolidated and prioritized. We have already highlighted a few tasks among these actions that we consider essential and plan to address before the end of 2023.

A strategic review of ISHS publications is a first priority. This concerns the scientific journals *eJHS* (*European Journal of Horticultural Science*) and *Fruits - The International Journal of Tropical & Subtropical Horticulture*, as well as the ISHS symposium proceedings, *Acta Horticulturae*, the magazine *Chronica Horticulturae*, and the series of monographs *Scripta Horticulturae*.

Furthermore, an in-depth analysis of the ISHS business model will be initiated in 2023, with the goal of diversifying the sources of revenue for the Society and eventually securing new sources of funding to ensure a sustainable financial foundation for the Society. As part of this effort, broadening the membership will be investigated, for instance by including more industry representatives involved in corporate research and development. The main outputs and benefits of ISHS for members and partners must be more clearly identified, strengthened and effectively communicated. In support of this, members will be surveyed to collect infor-

mation regarding their needs, wishes and expectations.

The ISHS website will be reviewed and reshaped to provide more essential information to our members as well as to non-members and partners. We want to actively link up with more corporate partners, international organisations, such as the Food and Agriculture Organization of the United Nations (FAO), non-governmental organizations (NGOs), and national and regional horticultural societies, and plan to approach them and establish productive win-win opportunities.

All Board members support the goal of having ISHS offer more space and opportunities for young people. Our first action for addressing this task will be to set up a "Young Minds Committee," consisting of young scientists who will provide suggestions for how ISHS can address their needs and encourage active forward-looking engagement within the Society.

Science remains our biggest challenge. In addition to the rich program of symposia, congresses and other exchange formats that are already planned, we want to launch events that not only address a specific technical topic but also include more complex contexts and challenges which the public and our Society are confronted with, such as the roles of artificial intelligence (AI) technologies in horticulture, agroecology, climate change, and the loss of biodiversity. This shall provide opportunity for provocative discussions and enhance the Society's relevance in addressing local and global issues.

Finally, the Board wants to work with full transparency with all ISHS members. When decisions are made and validated by the Board, we will inform you via *Chronica Horticulturae* and other channels. Rest assured that your Board and the ISHS Secretariat will work hard to improve the efficiency, the visibility, and the sustainability of ISHS. ●



➤ ISHS Board of Directors. From left to right: Ted DeJong, Alex Chang, Peter Batt, François Laurens, Moctar Fall, Patricia Paiva, Lukas Bertschinger, Ryutaro Tao and Peter Vanderborgh.

➤ 2018-2022 Board Report to the General Assembly – Angers, France

Yüksel Tüzel, President of ISHS 2018-2022

As required by the Statutes of ISHS, the ISHS President for the period 2018-2022 convened the General Assembly on 18 August 2022, during the 31st International Horticultural Congress in Angers, France.

The major purpose of the General Assembly is to inform ISHS members about the activities of the Society during the four-year period between congresses. The General Assembly was also the excellent opportunity for the President to announce the location of the forthcoming congresses (IHC2026, 23-28 August 2026, Kyoto, Japan, and IHC2030, 25-30 August 2030, Milan, Italy); to introduce incoming Chairs of ISHS Divisions/Commissions, to present the ISHS awards, to thank the outgoing Board and Executive Committee members, ISHS Executive Director and staff in Leuven for their commitment to ISHS; to thank the IHC2022 Committees, Vegepolys and Destination Angers staff members for their contributions to IHC2022, and finally to proclaim the names of the elected new President and Board members.

President for 2018-2022, Yüksel Tüzel, gave the Board's report. She summarized important achievements of the ISHS during the past four years, followed by an overview of the status of the amendments to the Statutes of the Society. The ISHS is based in Leuven, Belgium. The Belgian legal framework regarding societies who are non-profit organizations



➤ Yüksel Tüzel, ISHS President 2018-2022.
Photo credit: François Lehmann

was changed in 2020. Thus, ISHS Statutes had to comply with these new laws. Dr. Tüzel presented the new Code of Conduct adopted by the ISHS Board, authorized by the Council in accordance to Article 17 of the ISHS Statutes. She then proposed the amendments to the ISHS Statutes as approved by the ISHS Board

and Council earlier that week during their respective meetings.

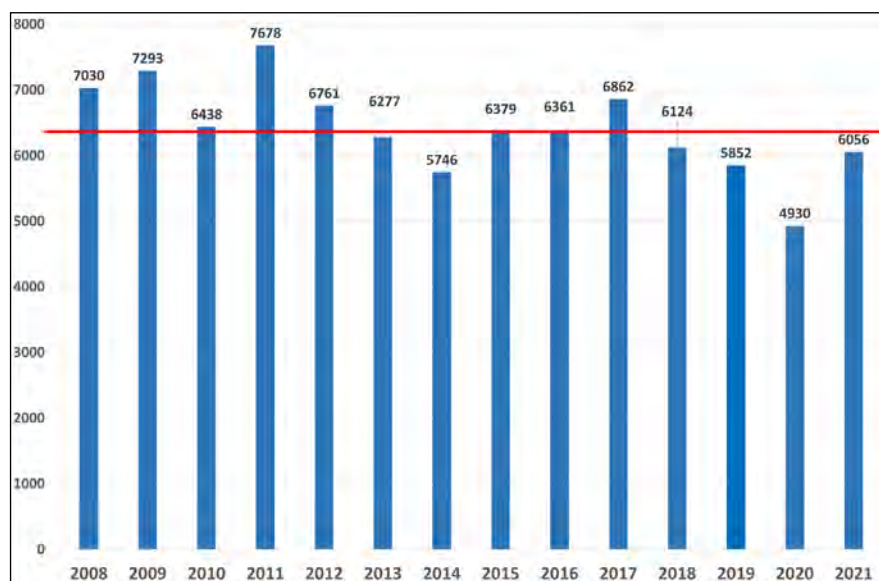
ISHS awards for the period 2018-2022 were announced and presented before the outgoing President handed the gavel over to the incoming President and Board. This article will focus on the report about the actions and achievements of the Board and the Society, which was formally accepted by the General Assembly, as was required.

Membership

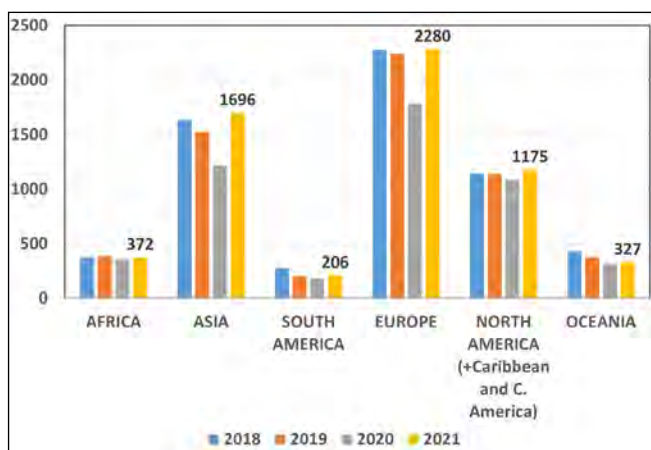
Unfortunately, the COVID-19 pandemic negatively affected our membership in 2019 and 2020. During those years travel was severely restricted and in-person meetings were cancelled. Our membership numbers are driven by attendance at symposia and congresses. The total number of members declined by 15.8% in 2020 compared with 2019, while the decrease was 27.3% in student memberships due to the pandemic. In 2021, the number of individual and institutional members rebounded to 6056 and 64, respectively. The increasing number of members in 2021 is encouraging and closer to our average of the past decade (Figure 1). We are particularly pleased at the increase in student members. In terms of the distribution of members by region, Europe has the highest proportion followed by Asia (Figure 2). As a healthy Society we need to continue to work on encouraging new members in each of the regions.

Chief corporate development

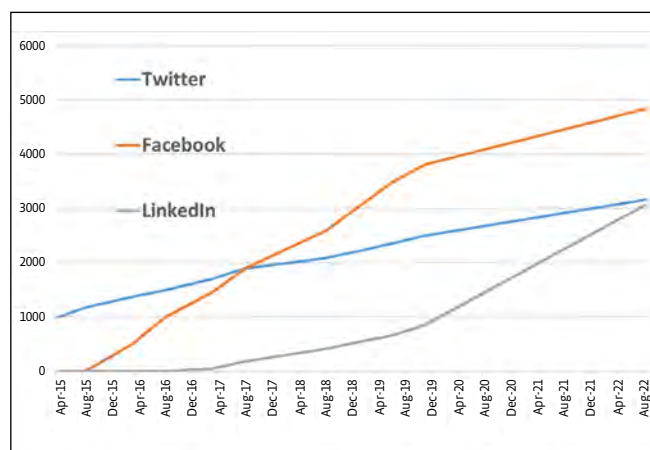
The Corporate Membership project was approved by the previous Board during the 2017 Board meeting in Xi'an, China. The initial expectation set by the previous Board, was to have 15-20 large corporate members annually. If those numbers could have been met, the Society would have benefitted greatly. Unfortunately, the projected expectation for corporate members was not met. The budget plan for 2018-2019 was therefore downsized to 10 corporate members. Even so, only 4 paying corporate members were realized. This was below the financial expectations calculated in the 2018-2019 budget plan. With this budget deficit, the Internal Audit Committee (IAC) expressed serious concerns to the Board about membership income versus costs. After much deliberation and discussion, and with regret, the ISHS Board at its Tashkent meeting in 2019 unanimously decided to ter-



■ Figure 1. Individual membership of ISHS, 2008-2021.



■ Figure 2. Individual members by region, 2018-2021.



■ Figure 3. Number of followers of ISHS on social media, 2015-2022.

minate the project due to budgetary limitations. A sub-committee was established to evaluate options. The proposed strategy will be delivered to the incoming Board.

Social media

Regarding social media, Facebook, Twitter, and LinkedIn are the communication tools of ISHS. ISHS Twitter now has >3000 followers, Facebook almost 5000 followers, and LinkedIn almost 3000 followers, with an increasing trend (Figure 3). Upcoming events, Acta and journal issues published, and scientific highlights within our journals are announced on social media.

Scientific activities

Symposia

Organizing ISHS symposia is one of the most important activities of our Society and our network. Unfortunately, the pandemic had a major effect on our scheduled meetings. The restrictions imposed by almost all countries for large group meetings and bans on domestic and foreign travel forced most of our meetings to either be rescheduled or transformed into virtual or hybrid events (Table 1). In 2019, 25 symposia were held in person, and 4 symposia were cancelled, whereas the numbers of rescheduled symposia were 36 and 18 in 2020 and 2021, respectively. In 2020, only 2 ISHS meetings could be held. In 2021, 28 symposia were held: 23 as virtual and 5 as hybrid.

Regarding the regional congresses, the Asian AHC (2020) was organized as a hybrid meeting with local participation at the end of 2020. Based upon the request of Japan, the Board approved to hold the AHC in 2023. The European SHE2020 and All African AAHC2020 were held virtually in March 2021. The Board approved the request of Romania and Morocco to hold the SHE and AAHC in 2024, respectively.

The President expressed words of thanks to all conveners who organized virtual or hybrid

■ Table 1. Number cancellations/postponements in scientific events of ISHS for 2019-2021.

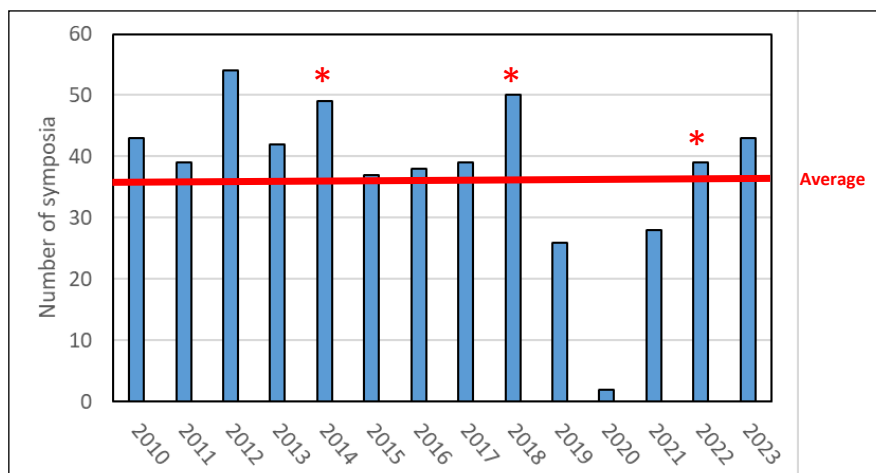
	Planned	Cancelled	Rescheduled	Total
2019	29	4	0	25 (in-person)
2020	41	3	36	2 (hybrid)
2021	47	1	18	28 (23 virtual, 5 hybrid)

meetings during the pandemic. Already in the early stage of the pandemic a set of guidelines was prepared by the Board to help conveners coping with this challenging environment. All meetings were closely monitored to avoid overlaps or other conflicts. A survey was conducted with the conveners to get feedback in order to generate solutions based upon different experiences.

In 2022, there were 13 symposia scheduled in addition to the IHC2022, which hosted 25 symposia. 2023 looks to be fairly busy with one regional congress (AHC) and a potential number of 41 symposia. If we have a look at the number of symposia during the last 10 years (Figure 4), we are returning to normal numbers.

HortDialogues

Under the title of “HortDialogues”, 23 webinars/videos were produced in 2021 (<https://www.ishs.org/hortdialogues>). These successful events became an additional instrument for communication, because in-person symposia were not an option. Subsequently, the total count of the combined views was more than 5,000 over the same time span. This was an opportunity to widen our network, and further knowledge-transfer. Thanks to all of our contributors to HortDialogues, particularly those who organized the sessions. I think we should continue this excellent communication opportunity into the future.



■ Figure 4. Number of symposia since 2010 (* ISHS Congress year).



► The 2018-2022 ISHS Board. From left to right: Kim Hummer, Treasurer; Jill Stanley, Vice-President and Scientific Coordinator; Silvana Nicola, Secretary; Sisir Mitra, Responsible for Publications; Yüksel Tüzel, President; François Laurens, President of IHC2022; Patrícia Duarte de Oliveira Paiva, Responsible for Young Minds; Isaac Ore Aiyelaagbe, Responsible for Outreach and Innovation; Peter Vanderborght, Executive Director.



► Yüksel Tüzel, ISHS President 2018-2022, presenting the ISHS Ceremonial Mace to François Laurens, ISHS President 2022-2026. Photo credit: François Lehmann

Publications

As well as the symposia/congresses, “publications” is one of the important pillars of ISHS. In 2020, a sub-committee was established to analyze the scientific publications of ISHS, namely *Acta Horticulturae*, eJHS, and *Fruits*, from different perspectives of the authors, editorial managers and ISHS, to keep or increase the scientific value, to decrease the time required for preparation of the publication and to reduce the cost. The report was discussed within the Board and some of the proposed solutions have already been implemented. There is a consensus to have one publication strategy for all publications. *Chronica Horticulturae*, the magazine of our Society, is published quarterly and circulated to about 6000 ISHS individual and institutional members. Dr. Kim Hummer was the Editor-in-Chief for the 2018-2022 term. Previous issues are available online at <https://www.ishs.org/chronica-horticulturae>. It has been available as open access since 1 January 2022. *Acta Horticulturae* is the flagship of our publications and is published as a series of proceedings of ISHS scientific meetings, symposia or congresses. Since 2018, and supported by the goal set by the Board for ISHS to operate paperless, the number of conveners opting for an e-Acta increased. The number of *Acta Horticulturae* published in 2019, 2020, and 2021, was 37, 35, and 30, respectively, yielding to an average of 33 per year. Regarding peer reviewed publications (6 issues per year), eJHS - *European Journal of Horticultural Science* and *Fruits - The International Journal of Tropical & Subtropical Horticulture*, are published bimonthly. The Board decided to change its publication system from print first to online first, starting 1 January 2022. Both eJHS and *Fruits* are Open Access journals. The Editor-in-Chief of *Fruits*

was Prof. Sisir Mitra (India) for the term 2019-2022. It's impact factor was 0.586 in 2021. The Editor-in-Chief of eJHS was Prof. Jens Wünsche until his sudden demise in January 2021. We extend our sincere condolences to his family. Subsequently, Prof. Henryk Flachowsky (Germany) became the editor. Impact factor was 1.074 in 2021. *Scripta Horticulturae* is a series of books that ISHS publishes devoted to specific horticultural issues. In the 2018-2022 term, two *Scriptas* were published: *Global Kiwifruit Industrial Development Conference* (2019) and *First International Symposium on Bonsai* (2021). The book, *Principles of Modern Fruit Science* was published in 2019. It is a translation of the original Italian version of *Arboricoltura Generale* edited by Professor Dr. Silviero Sansavini and other Italian co-editors. It is available for purchase at the ISHS Secretariat.

Table 2. Balance sheet for ISHS, 2018-2021.

	2018	2019	2020	2021
ASSETS				
Current assets				
Cash and deposits	1,567,870	1,658,251	1,404,244	1,753,973
Accounts receivable/prepayments	49,492	30,464	34,998	26,496
Inventories	24,211	22,726	19,136	13,516
Total	1,641,573	1,711,441	1,458,378	1,793,985
Long term assets				
Property, plant and equipment	15,995	10,827	8,829	6,638
Intangible fixed assets	38,655	40,486	31,252	22,017
Total	54,650	51,313	40,081	28,655
Total assets	1,696,223	1,762,754	1,498,459	1,822,640
LIABILITIES AND EQUITY				
Current liabilities				
Accounts payable & accrued charges	563,618	676,416	349,555	455,002
Equity	1,132,605	1,086,338	1,148,904	1,367,638
Total liabilities and equity	1,696,223	1,762,754	1,498,459	1,822,640

Finances

The balance sheet over the last four years shows that we are continuing to be fiscally solvent (Table 2).

The finances of the Society are solid. Revenues include membership dues (showing a decline mainly due to postponements of in-person meetings), sales (book and *Acta* sales, subscriptions, etc.) and other income (from investments and income from the journals). Revenues from 2018 through 2021 were 1,395, 1,407, 1,059 and 1,147 K Euros, respectively. For 2020, net income over expenses was 63 K Euros. For 2021, with the minimal number of management meetings and scientific structure expenses, the Society had a positive result of 218 K Euros (Table 3).

Ideally, with a non-profit organization, such as ISHS, expenses and revenues remain close together over the years, with the revenues slightly higher than the expenses. The slopes of these lines should be positive. If we look at the years from 2014 through 2019, these figures are behaving as we would like – with a positive direction for our Society. Then, after 2019, significant world events occurred. The

drop in 2020 revenues was due to pandemic restrictions forcing cancellation of in-person meetings, however, expenses were also lower, resulting in a slight profit. The change in income from 2020 to 2021 is positive (Figure 5). Most of the income is based on the publications (*Acta*) and membership dues (Figure 6).

IHC2022

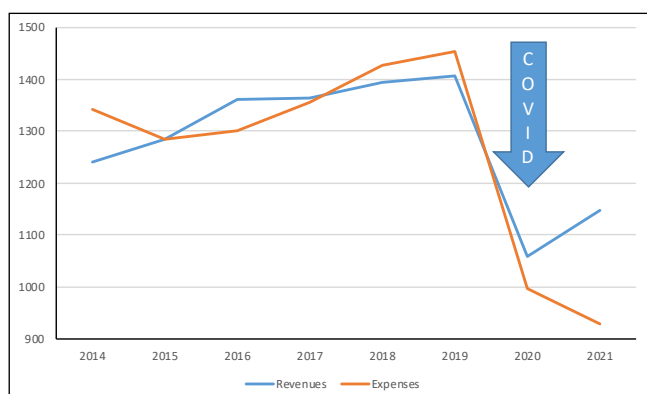
IHC2022 was very successful and was a tribute to the significant voluntary contributions by Dr. François Laurens (IHC2022 President), members of IHC2022 Executive Committee, Scientific Committee, International Committee, Educational Committee, Industry Committee, Communication Committee, Vegepolys, Destination Angers, Sponsors, FAO and all contributing organizations. The Congress was attended by approximately 2500 delegates from 88 countries. The background of 72% of the participants was research, 13% were professionals and 15% were young researchers/students. 90% of the attendance was in person while 10% had the chance to join online. In terms of the number of

participants, Europe had the highest contribution with 59%. The program included symposia, e-posters, workshops, social events and technical tours. More information on IHC2022 is available in this issue of *Chronica Horticulturae*.

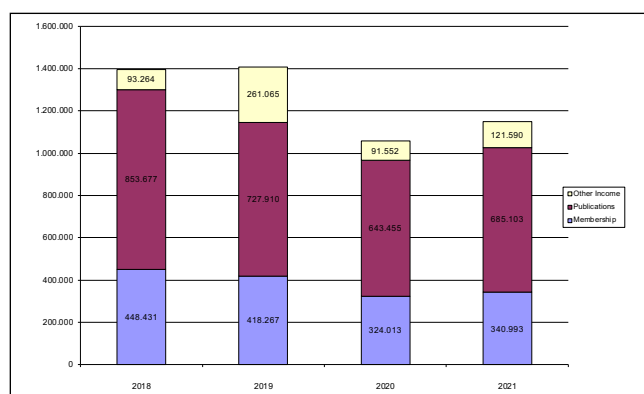
Young minds

Young minds is an important focus for ISHS. Some results of “Harnessing opinions,” a survey performed by the 2014-2018 Board, were analyzed for further activities in different regions. A summer school was planned on Beverage Crops for July/August 2020 in Brazil but it was postponed due to the COVID-19 pandemic. However it will be re-organized in that region. In addition, there are proposals from different countries/regions (e.g. New Zealand, Africa).

Between 2018-2022, since 2019 ISHS supported the UrbanFarm International Student Challenge initiative, which is on the design of an urban agriculture project. ISHS has been a part of Urban Greenhouse Challenge since 2020, which is organized by Wageningen University & Research (WUR). Student challenge



■ Figure 5. Revenues and expenses for ISHS, 2014-2021.



■ Figure 6. ISHS income for 2018-2021.

■ Table 3. Profit and loss account for ISHS, 2018-2021.

	2018	2019	2020	2021
REVENUES				
Contribution members (dues)	448,431	418,267	324,013	340,993
Sales	853,677	727,910	643,455	685,103
Other income	93,264	261,065	91,552	121,590
Total	1,395,372	1,407,242	1,059,020	1,147,686
EXPENSES				
Costs books	186,884	137,540	116,505	80,653
Costs journals	49,882	50,187	47,806	54,192
Personnel costs	727,259	904,749	611,772	606,349
Office costs	141,717	113,859	79,347	93,483
Depreciation	16,946	20,633	16,941	15,631
General management costs	298,335	232,163	124,082	78,645
Changes in provisions	7,235	(5,621)	-	-
Total	1,428,258	1,453,510	996,453	928,953
Result: revenues over expenses	(32,886)	(46,268)	62,567	218,733

■ Table 4. Number of ISHS Young Minds Awards for 2018-2022.

	ISHS Symposia	UrbanFarm International Student Challenge	Urban Greenhouse Challenge
2018	71		
2019	51	17	
2020	4	30	
2021	55	21	
2022	16	12	36
Total	197	80	36

activities were published in *Chronica Horticulturae*. ISHS Young Minds Awards are also presented at each symposium. In total 313 Young Minds Awards have been presented since 2018 (Table 4).

Outreach

In 2021, ISHS signed a Memorandum of Understanding (MoU) with FAO, which helped us to join forces and widen our capacity to play our role in overcoming the current global challenges such as food safety, food and nutrition security, and climate change. This cooperation contributed to enhancement of sustainable horticultural production systems, globally.

Based on the MoU between the ISHS and FAO and in view of the need to ensure that collaboration through partnerships is based on areas of mutual interest and benefiting and synergizing FAO's work, the areas of col-

laborative activities indicated in the Work Plan are:

- strategic partnership and awareness raising of the importance of horticulture for sustainable development by means of cooperation in meetings, information exchange and technical guidance;
- capacity building by means of developing guidance documents, manuals for farmers, contributing to the publications on sustainable horticultural production, jointly developing project proposals;
- care for genetic resources by means of conservation and sustainable use of the genetic resources of horticultural crops, advocacy for the conservation and sustainable use of neglected and underutilized species; and
- addressing specific research areas such as protected cultivation, and urban horticulture.

The UN General Assembly announced 2021 as the International Year of Fruits and Vegetables (IYFV). ISHS contributed to the action plan by being involved in the Steering Committee and joined/organized events with FAO. ISHS will continue our efforts to raise awareness on the important role fruits and vegetables play in human nutrition, food security, and health. This function can be a tool in achieving UN Sustainable Development Goals. Recently two webinars were organized as a joint activity of FAO and ISHS in June. ISHS also contributed to the Global Conference on Sustainable Plant Production, which was held on 2-4 November 2022.

Some contacts in the Africa region were realized with our national society partners. The V All Africa Horticultural Congress (AAHC2024) is also being promoted in the region.

ISHS signed an MoU with the Latin American Scientific Society of Agroecology (SOCLA), Argentina, for bilateral cooperation, including technical and personnel exchange.

Future International Horticultural Congresses

IHC2026 will be held from 23 to 28 August 2026, in Kyoto, Japan. The IHC2026 President, Prof. Ryutaro Tao, and the organising team presented information and preliminary plans for the Congress, including a presentation of Kyoto (www.ihc2026.org).

The President of IHC2030, Prof. Massimo Tagliavini, and his team presented a video



► The organizing team of IHC2026, Kyoto, Japan. Photo credit: François Lehmann

of Milan/Italy, and the support of the Italian Society for Horticultural Science to convene the Congress on 25-30 August 2030 in Milan.

ISHS Executive Committees and awards

The outgoing ISHS Division and Commission Chairs were thanked for their contributions to ISHS in the previous four years and the incoming Chairs were announced. Full details are available in an article in the September issue of *Chronica Horticulturae*. ISHS awards for new Honorary Members and Fellows were presented. Full details are available in an article in the September issue of *Chronica Horticulturae*.

Code of Conduct

The ISHS Board, authorized by the Council in accordance to Article 17 of the ISHS Statutes, has adopted an ISHS Code of Conduct including:

- Diversity and inclusion statement;
- Ethical standards;
- Conflict of interest policy;
- Collegiality, dialogue and exchange of information.

This applies to members, members of the various governing bodies, staff, service providers & any other stakeholders. It is available at <https://www.ishs.org/ishs-code-conduct>

Proposed amendments to ISHS Statutes

The ISHS Statutes needed an urgent revision to comply with the recently changed Belgian legal framework relative to societies and non-profit organizations. As a consequence of the legal requirement to have a body formally approving the accounts and audited financial statements of the Society on an annual basis, one of the most relevant changes was for the ISHS Council to act as the body legally referred to as the “General Assembly” as it is more practical for this body to meet annually. As a result the quadrennial meeting of the ISHS membership, previously referred to as “ISHS General Assembly,” had to be re-named “Members’ Forum” instead.

The President presented an article-by-article overview of the proposed amendments to the General Assembly. The amendments to the Statutes were approved by ISHS Council on 13 August 2022 and subsequently received

unanimous approval by the General Assembly on 28 August 2022 at IHC2022 in Angers.

The Statutes are now in the hands of the lawyer and notary for concluding the official process leading to the formal publication in the Belgian Official Gazette, after which the new version of the Statutes will be made available at <https://www.ishs.org/statutes-constitution-funding>

ISHS Presidents and Boards

The outgoing President thanked the outgoing Board, the Executive Director, Mr. Peter Vanderborght, and all the staff at the ISHS Secretariat in Leuven for their outstanding contribution to ISHS from 2018 to 2022. She then invited the incoming President, Dr. François Laurens, to take over chairing the meeting. The ISHS Ceremonial Mace was handed over to the incoming President, who then introduced his new Board and outlined his vision for the future of ISHS. Full details are available in the Editorial of the last issue of *Chronica Horticulturae*.

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



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European Journal of Horticultural Science

FRUITS
International Journal of Tropical and Subtropical Horticulture

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Check out www.ishs.org/ejhs and www.ishs.org/fruits for more details.

> Sisir Mitra

Position or previous position

Dean, Faculty of Horticulture and Dean, Postgraduate Studies, Bidhan Chandra Krishi Viswavidyalaya (State Agricultural University), West Bengal, India (Retired)
ISHS Board member (2018-2022)
responsible for publications

ISHS honour

ISHS Honorary Member

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

I was born in Calcutta (Kolkata), which was the capital of India until 1911 during British rule. My parents shifted to a newly setup steel township, Durgapur, about 150 km away from Kolkata, where I did my school education. During childhood I was fond of gardening, mostly working with my father in roses and other ornamental plants in our spacious garden. My parents gave us (me and my elder brother) total freedom to choose our studies, hobbies, and friends. After school education, I went to Visva Bharati University to study Agriculture with a major in horticulture. This renowned central university was established by Nobel laureate Kabi Guru Rabindranath Tagore, in 1921. There I met my wife Ipsa. We have been together for more than 30 years. I have always been involved in different sports, like soccer, hockey, and cricket. I played for East Malling, UK, team in cricket and hock-

ey when I was pursuing my post-doctoral research in the mid 1980s. My other hobbies include travelling (I went abroad more than 100 times and visited more than 50 countries), reading and window shopping.

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

After completing my bachelor's degree in agriculture, I was rather undecided on how to move forward with my education because I lost my father during my study. However, my mother and elder brother, who was also a final year student in engineering course at that time, insisted that I should continue higher education. During my graduation, I met a renowned professor, Professor T.K. Bose, who was an external examiner and shared with me the wide diversity of horticulture in India, its importance in life, and the future scope of development. When I made up my mind for higher studies, I decided two things: to pursue higher studies in horticulture and to study in the university where Professor Bose was the head of the department (Bidhan Chandra Krishi Viswavidyalaya – the only state agricultural university in my state at that time). I took my admission and Professor Bose accepted to be the chairman of my advisory committee in both master and doctoral degrees. I was offered a Senior Fellowship by the University Grants Commission to continue my doctoral research and I worked on the physiological basis of flowering in guava (*Psidium guajava* L.) in different seasons. A positive outcome of my association with Professor Bose is that I used to join him to different symposia and seminars, and

I developed my portfolio of contacts, many of which I have kept and cultivated since then.

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

I was lucky to get a job at the university as an Assistant Professor before completion of my doctoral degree. My first research project was to develop a protocol for year-round harvest of pineapple under a high-density planting system funded by the Indian Council of Agricultural Research (ICAR). We could develop the technology for harvesting pineapple year-round and the protocol was accepted by the growers. The pineapple growers in my state are still practicing the technology for out of season harvest.

A Commonwealth post-doctoral fellowship offered by the British Council (1985-86) to work at East Malling Research Station, UK (now Horticulture Research International) was very significant in terms of my professional development. I worked with Dr. Brian Howard, Head of Plant Propagation Department, on propagation of several fruit and ornamental plants and rootstocks. I learned to use manipulative treatments to induce rooting in difficult-to-root plants, a high humidity fog system, and a controlled environment for in-depth study on the physiology of plant growth and rooting. On my return to India, I tried the techniques on tropical plants and succeeded in standardization for propagation of tropical fruit plants. During my stay at East Malling, I attended a number of horticulture days at the institute and at Long Ashton Research Institute, Glass House Research Institute, Wye College, and made good collaboration with researchers. It was at that time that I came to learn about ISHS and the Plant Propagator's Society and became a member of both societies. I was staying at Ditton hostel with other doctoral/post-doctoral researchers from Greece, former Yugoslavia, Italy, Egypt, Tunisia, Germany, and Yemen. I still have good contact with some of them. Surprisingly, I met two of my old friends from Greece and former Yugoslavia after nearly 30 years in Matera, Italy, in 2013. I also had the opportunity to get in contact with leading private research groups of UK and I was offered an R&D job in one of the well-known companies in UK at that time. However, I did not accept because of my commitment back home and my agreement with the British Council.

Back in India, I started teaching graduate and postgraduate students and developed



> Sisir Mitra near the shreds of an American tank near Cu Chi tunnel, Vietnam (2005).

my laboratory with modern equipment. At that time, my state was basically rice and potato- based agriculture; vegetables and fruit were growing in some districts in a traditional way. The state government decided to increase the area and productivity of horticultural crops. My university was the only agricultural university of the state and there was no separate directorate or ministry in the state at that time. The government approached the university to develop a package of practices for important tropical fruits and vegetables suitable to grow in these regions. We received a number of research projects from state governments, ICAR, and other funding organizations to work on. In the next 10-12 years, my colleagues and I, supervised by Professor Bose, developed and recommended the crop wise production and postharvest technology of major tropical fruits, like mango, litchi, papaya, guava, pineapple, banana, and citrus. Apart from research accomplishments, my career achievements also include obtaining an M.Sc (Horticulture) degree with a straight A grade (4.0/4.0), being a Foundation Member of the Society for Advancement of Horticulture, Fellow of the Indian Academy of Horticulture (2006) and the Confederation of Horticulture Association of India (2019), Honorary member of the International Tropical Fruits Network (TFNet), being admitted as Chartered Biologist by the Institute of Biology, UK, being international expert for TFNet for nine years, FAO consultant, Advisor, CAB International, UK, as well as numerous tasks in India (e.g., expert member in different research advisory committees and Quinquennial Review Team of the National Research Institutes of Indian Council of Agricultural Research, Faculty Council and Board of Studies member of different universities, and expert member in selection committees, Board of Directors, Department of Food Processing Industries and Horticulture, Government of West Bengal, Food Processing and Agriculture Standing Committee of the Bharat Chamber of Commerce). I have been selected for a post-doctoral fellowship by the Italian Ministry of External Affairs to work on plant propagation at the Istituto per la Propagazione delle Specie Legnose, Florence, Italy. I have also served at the Università degli Studi della Tuscia, Viterbo, Italy (1991), University of Lavras, Brazil (2016), and Kyoto University, Japan (2018) as Visiting Professor mentoring postgraduate students and colleagues on tropical and subtropical fruit production and postharvest quality management.

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

I consider my greatest achievement to be the students that I have taught, mentored,



› Visiting longan orchards during a conference at Fujian, China (2008).

or supervised for over 35 years. Most of my students are well established; some of them are now working as Head of the department or Dean in the university, Director of an institute, scientist in a research institute, or officer in the government department. It gives me tremendous satisfaction to think that I may have contributed to make a difference in their life. Other than teaching, I have always worked with the growers of the state to train them what we have experimented in our university research stations. My colleagues and I trained the mango, litchi, guava, pineapple, papaya, and citrus growers of the state to adopt the best cultivars, cultivation techniques, and postharvest management, and to shift from traditional cultivation techniques to a modern concept of cultivation that we had developed over the years in university. We have developed many extension circulars in regional language to be used by the growers. We have now a good number of successful growers exporting tropical fruits to other countries maintaining all the export quality norms.

I consider that my greatest research achievements were related to work that I did over 20 years on litchi (*Litchi chinensis* Sonn.). It is an interesting subtropical fruit. It is very difficult to predict whether it will flower in a particular year, even though the tree is in a good health. We studied flowering physiology, correlated with nutrient status of the tree, pre-flowering soil water content, hormonal balance, climatic factors, and other parameters to suggest manipulative treatments to induce flowers when we understood that the trees were not going to produce normal flowering in a year. Lately, on the demand of industry, I have been working to develop a protocol for organic fruit production of important tropical fruits, like banana, litchi, guava, and pineapple. We have developed organic cultivation techniques for the mentioned fruits in my state. When I was a student in university, we did not find many textbooks on horticulture, particularly on

tropical and subtropical fruits. We published a book on tropical and subtropical fruits in 1990, and since then we have revised and enlarged it in four editions. The book is available in many university libraries of the world where tropical and subtropical fruits are grown. I have written a number of other books on nutrition, propagation, and biotechnology. During COVID-19 when I was mostly confined in my house, attending few on-line teaching, webinars and meetings, I edited books on papaya and guava, both published by CAB International, UK, in the series “Botany, Production and Uses.” The other three in the series on loquat, jackfruit, and dragon fruit will be available soon. I have also edited a national journal, “The Horticultural Journal,” for more than 20 years.

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

I have been fortunate in having good “leaders” and colleagues in my university as well as in other foreign institutes and universities where I worked. I am grateful to them for encouraging me to help myself by turning difficulties into opportunities. I also have a good memory of working with my ISHS colleagues and staff at the secretariat on the many challenges that we undertook. The only difficulty that I and most researchers from developing countries have, is to publish our good research in highly rated ISI journals. In most universities, there is no provision to pay APC/OA or to cover the cost from our research project. It often makes us sad for not being able to publish in high rated journals despite having reportable research outcomes.

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

I can remember many funny and exciting experiences. In one of our TFNet Board



> Sisir Mitra under the oldest (>1000 years old) litchi tree of the world at Huangpu district, Guangzhou, China (2008).

of Trustee Meetings at Ho Chi Minh City, Vietnam, in 2005, we visited Cu Chi tunnel network to discover the unit experience of guerrillas fighting during the Vietnam-American war. Among 20-25 of us visiting the site, me and one Indonesian dared to go down the tunnel. It was about 1 m³ tunnel and I crawled about 50 m to find the first opening to come out. It was an exciting experience to see the rest room, wash-room, kitchen, and hospital 10 m underground. It was very difficult to breathe inside the tunnel.

In 2019, I was invited to attend the International Coastal Wine Region Forum held at Penglai, China, to represent ISHS as well as to speak on the Indian wine industry. I was comfortable with both of my responsibilities, but suddenly I was requested by the organizers to sit with the several international wine tasting judges and to evaluate the quality of the wines from Italy, France, Spain, Portugal, Australia, China, and others. I have no experience in wine tasting. Initially I thought that I would not accept the invitation, however, after my long lecture on the wine industry in India, I thought that I should sit with other judges to learn wine tasting, indeed a funny experience. I learned the methods of tasting and evaluation, but I did not score the wines.

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

I came to know about ISHS when I was doing post-doctoral research in the UK and became a member in 1986. My first presentation to a large international audience was at the 23rd International Horticultural Congress (IHC) in Florence, Italy, in 1990, where I met many renowned researchers whom I knew only

from literature. Between 1990 and 1994, I attended another three ISHS symposia. It was in 1998, at the 25th IHC in Brussels, Belgium, when I met Professor Errol Hewett, who had reviewed my CABI published book on “Postharvest Physiology and Storage of Tropical and Subtropical Fruits” in *Chronica Horticulturae*, Dr. U. Menini, Head of FAO Division Plant Production and Protection, Professor H.D. Tindall, Chair of ISHS Section Tropical and Subtropical Fruits, and many others. Professor Hewett and Professor Tindall encouraged me to be actively associated with ISHS activities. Since 1986, I have attended 48 international meetings, congresses and symposia as a participant, member of the international scientific committee (28), lead speaker (19) or chair of technical sessions, edited 9 *Acta Horticulturae* publications, convened 8 ISHS symposia and published 63 papers in *Acta Horticulturae*.

I was elected Vice-Chair (2006-2010) and Chair (2010-2018) of ISHS Section Tropical and Subtropical Fruits. I served as ISHS Board member responsible for publications from 2018 to 2022. Working as Vice-Chair and Chair of the Section, I developed a number of Working Groups (WG) and served as the first Chair of WG Guava and other *Myrtaceae*, Jackfruit and other *Moraceae*, Papaya, and Avocado. I have edited and circulated 19 e-Newsletters during my tenure as Chair of Section Tropical and Subtropical Fruits. I have represented the ISHS at many symposia during my term of office. In recognition of my service to the Society, ISHS has awarded Honorary Membership in 2018. I am still working as Chair of WG Jackfruit and other *Moraceae* and Avocado and also as Editor-in-Chief of the ISHS scientific journal *Fruits: The International Journal of Tropical & Subtropical Horticulture*.



> Meeting after nearly 30 years with friends Athanasios Manganaris from Greece (right) and Valadislav Ognjanov from Serbia (left) in Matera, Italy (2013).

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

I will suggest watching a video on YouTube (<https://www.youtube.com/watch?v=M-vlFcEyAeZA>) entitled “Harvesting the Sun” produced by ISHS to understand the range and diversity of horticulture, its nutritional health, economic, community and social importance. Horticulture is the art and science of the culture of plants for food, beauty, utility, comfort, and therapy. Communicate your results in a good journal or present in an international forum. Establish contacts with researchers around the world and ISHS symposia/congresses could be used as a platform.

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

Sustainable fruit and vegetable production includes labour, input, and intensive knowledge. It provides enormous opportunities such as for specialized farm inputs, post-harvest services, and marketing. Sustainable production requires attention because the current food supply does not meet global nutrition requirements. Horticultural production can also be an efficient tool to combat the hidden hunger in developing countries. Fruit and vegetables are highly perishable, making them a “hot spot” in the fight to reduce food loss and wastage. Climate change is making extreme weather events more frequent and more intense across the world. Many regions are witnessing major heat waves for the first time that are leading to wildfires, depleting water sources, and causing drought. Climate change is driving rising temperature and



› Board members (2018-2022) in front of ISHS Secretariat at Leuven, Belgium (2019).

extreme weather events, which are not only taking a toll on public health but also hurting the economy, particularly the agricultural/horticultural sector. In the context of adapting to climate change, soils comprise a key resource, which is both little known and quantitatively significant. The integration of soil carbon storing capacity should begin with characterizing and mapping soils to limit the surface area lost to artificialization while preserving the soils with the most stored carbon. Adapting/tailoring crops via strategic breeding or management, to tolerate changing climatic conditions, especially potential water shortage, should be the immediate priority of research. Sustained fundamental and translational research is needed to provide means of increasing food supply, nutrient quality, and biodiversity for the development of a resilient production system. ●



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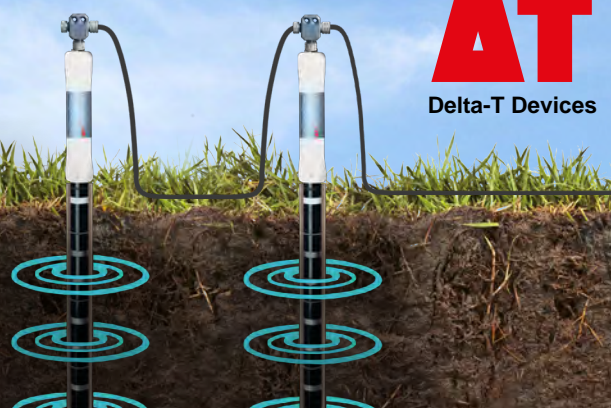
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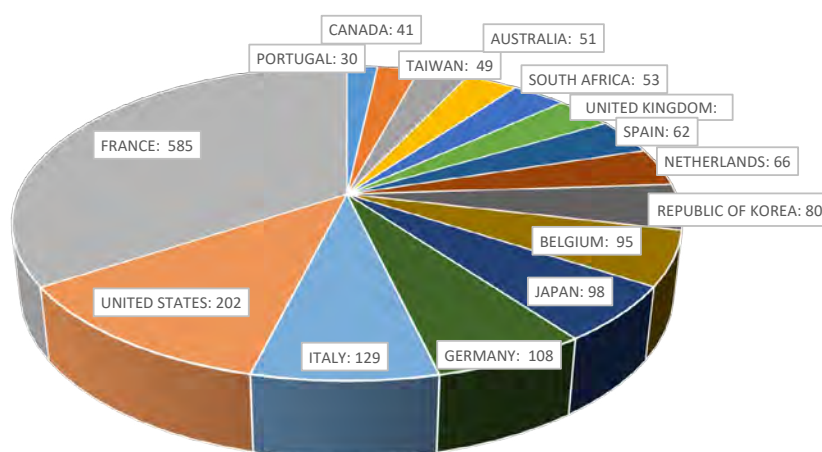
> IHC2022 – 31st International Horticultural Congress

Angers, France, 14-20 August 2022

François Laurens, Valérie Fichot, Emmanuel Geoffriau,
Rémi Kahane, Emmanuelle Rousseau and Marine Thuillot
On behalf of the IHC2022 organizing committee



The XXXI International Horticultural Congress (IHC2022) was held on 14-20 August 2022 in Angers, France. The organizing committee has been proud to add Angers, and its region Loire Valley, to the prestigious list of IHC hosts. It has been delighted to welcome 2,500 participants from 88 countries: 63% from Europe, 16% from Asia, 14% from America (North and South) (Figure 1). The majority (86%) of the participants attended in person and were able to enjoy all of the symposia and workshops, technical tours, and social events firsthand (Tables 1 and 2). Thanks to our digital platform, 325 registrants were able to attend the event online with symposium oral sessions and plenary sessions, live and on replay. The platform provided access for all participants to the 2,000 selected abstracts, 1,060 posters, participants list,



■ Figure 1. Number of participants for the 15 most represented countries.



> The IHC2022 organizing committee on the stage at the welcome ceremony. Photo credit: François Lehmann

■ Table 1. Some figures from the IHC2022 scientific program.

	Plenary sessions	Symposia	Workshops	Technical tours
# events	4	25	18	17
# speakers	8	1500	18	22
# participants	2500	2500	920	800

■ Table 2. Some figures from the IHC2022 social program.

	Opening ceremony	Evening social events	Guided tours
# events	1	4	2
# participants	2000	+4000	115



► Show at the opening ceremony.
Photo credit: François Lehmann

■ Table 3. Plenary sessions of IHC2022.

Theme of the plenary session	Adaptation to climate change and effect of mitigation	Agroecology / Sustainability of production systems	Competitiveness and skills for horticultural value chains	Food, human health and well-being of citizens
Date	Monday 15 August 2022	Tuesday 16 August 2022	Thursday 18 August 2022	Friday 19 August 2022
Facilitator	François Laurens (INRAE, France)	Emmanuel Geoffriau (Institut Agro, France)	Claudia Ramos (Vegepolys Valley, France)	Remi Kahane (Cirad, France)
1 st keynote speaker	Jean Jouzel (CEA/IPCC, France)	Ameenah Gurib-Fakim (CEPHYR, Mauritius)	Yvonne Pinto (ALINE, UK)	Jennie Macdiarmid (Aberdeen University, UK)
2 nd keynote speaker	Rachel Bezner Kerr (Cornell University, USA)	Pierre-Marie Aubert (IDDRI, France)	Jérôme Le Roy (Weenat/La Ferme Digitale, France)	Boitshepo Bibi Giyose (AUDA-NEPAD/FAO, South Africa)

INRAE: National Research Institute for Agriculture, Food and the Environment, CEA: French Atomic Energy Commission, IPCC: International Panel on Climate Change, CEPHYR: Centre for Phytotherapy Research, IDDRI: Institute for Sustainable Development and International Relations, ALINE: Agricultural Learning and Impacts Network, Cirad: French Agricultural Research Centre for International Development, AUDA: African Union Development Agency, NEPAD: New Partnership for Africa's Development, FAO: Food and Agriculture Organization of the United Nations.

and the easy app for appointment booking and chatting.

The IHC2022 ambition was to organize a worldwide event that bridged science, education, and industry: with a representation amongst the attendees of 72, 15, and 13%, respectively, the ambition was successfully met! Beyond these figures, the smiling faces, enthusiastic contributions to all proposed activities in the program, and the kind appreciations post-congress were strong confirmations of the event's success.

Plenary sessions

The plenary sessions were designed to address each of the main challenges targeted by the congress and to consider the contribution of "Horticulture for a world in transition." The four challenges were: i) Adaptation to climate change and effect of mitigation; ii) Agroecology/Sustainability of production systems; iii) Competitiveness and skills for horticultural value chains; and iv) Food, human health, and well-being of citizens (Table 3). The invited keynote speakers

were encouraged to give their own views on the topic, even outside horticulture, to open mindsets and place the scientific community in the global context and its complexity. The diversity of their experience, at scientific, business or policy level, was strongly appreciated even if sometimes challenging the audience. Every morning, the plenary sessions were strongly attended (over 1,000 people) and the recordings were available for two months after the congress.

Symposia

The IHC2022 scientific program was structured in 25 symposia (Table 4), each covering a theme open to original results, innovative methods and multidisciplinary cross-cutting views. In relation to the congress' main challenges, the symposia were organized around transversal topics: genetics, diversity, and plant material (4 symposia); green and resilient cities (3 symposia); sustainable systems and agroecology (4 symposia); plant adaptation and resource use efficiency (3 symposia); quality, health and postharvest

valorization (4 symposia); precision and digital horticulture (1 symposium); value adding and innovation management (1 symposium). Five additional symposia were crop oriented. Each symposium was organized in sessions with keynote, oral and e-poster flash oral presentations, and welcomed academic and applied communications. The program has been elaborated involving the IHC2022 Scientific Committee (30 members), the ISHS Division and Commission Chairs (16 persons), the symposium conveners (50 persons) and the scientific committees of each symposium (more than 250 persons worldwide). All symposia were well and regularly attended. All keynote and oral presentations (827) were recorded and available for viewing. E-posters (1,060) were available during and after the congress on the digital platform, with pre-recorded 3-minute comments for distant participants. The numerous presentations of young scientists, even as keynote speakers, and significant participation of the industry and technical institutes were highly appreciated.

■ Table 4. IHC2022 symposia.

IHC2022 Symposium	Conveners	# orals	# e-posters	Total
S1 - International Symposium on Breeding and Effective Use of Biotechnology and Molecular Tools in Horticultural Crops	Vincent Bus, Plant & Food Research, New Zealand Mathilde Causse, INRAE, France	64	78	142
S2 - International Symposium on Conservation and Sustainable Use of Horticultural Genetic Resources	Tiziana Ulian, Kew Royal Botanic Gardens, UK Raphaël Morillon, Cirad, France	50	44	94
S3 - International Symposium on Quality Seeds and Transplants for Horticultural Crops and Restorative Species	Daniel Leskovar, Texas A&M University, USA Olivier Leprince, Institut Agro, France	11	15	26
S4 - International Symposium on In Vitro Technology and Micropropagated Plants	Sandra Correia, University of Coimbra, Portugal Stefaan Werbrouck, Ghent University, Belgium	25	47	72
S5 - International Symposium on Innovations in Ornamentals: from Breeding to Market	Johan Van Huylenbroeck, ILVO, Belgium Fabrice Foucher, INRAE, France	36	59	95
S6 - International Symposium on Innovative Technologies and Production Strategies for Sustainable Controlled Environment Horticulture	Youssef Rouphael, University of Naples, Italy Jean-Charles Michel, Institut Agro, France	70	111	181
S7 - II International Symposium on Greener Cities: Improving Ecosystem Services in a Climate-Changing World (GreenCities2022)	Vivian Loges, Universidade Federal Rural de Pernambuco, Brazil Philippe Faucon, ARRDHOR, France	22	23	45
S8 - International Symposium on Advances in Vertical Farming	Eri Hayashi, Japan Plant Factory Association, Japan Leo Marcelis, Wageningen University, The Netherlands	25	43	68
S9 - International Symposium on Urban Horticulture for Sustainable Food Security (UrbanFood2022)	Kathrin Specht, ILS, Germany Kevin Morel, INRAE, France	38	41	79
S10 - International Symposium on Value Adding and Innovation Management in the Horticultural Sector	David Neven, FAO, Italy Syndhia Mathé, Cirad, Ghana	18	13	31
S11 - International Symposium on Adaptation of Horticultural Plants to Abiotic Stresses	Fulai Liu, University of Copenhagen, Denmark Bénédicte Wenden, INRAE, France	30	45	75
S12 - International Symposium on Water: a Worldwide Challenge for Horticulture!	Brunella Morandi, University of Bologna, Italy Marcel Kuper, Cirad, France	24	26	50
S13 - International Symposium on Plant Nutrition, Fertilization, Soil Management	Lee Kalcsits, Washington State University, USA Patrice Cannavo, Institut Agro, France	37	49	86
S14 - International Symposium on Sustainable Control of Pests and Diseases	Lucia Zappalà, University of Catania, Italy Michel Peterschmitt, Cirad, France	40	87	127
S15 - International Symposium on Agroecology and System Approach for Sustainable and Resilient Horticultural Production	Maria Claudia Dussi, Comahue National University, Argentina Sylvaine Simon, INRAE, France	26	45	71
S16 - International Symposium on Innovative Perennial Crops Management	Sara Serra, Washington State University, USA Pierre-Eric Lauri, INRAE, France	32	49	81
S17 - International Symposium on Integrative Approaches to Product Quality in Fruits and Vegetables	Alyson Mitchell, UC Davis, USA Nadia Bertin, INRAE, France	31	43	74
S18 - III International Symposium on Mechanization, Precision Horticulture, and Robotics: Precision and Digital Horticulture in Field Environments	Sindhuja Sankaran, Washington State University, USA David Rousseau, University of Angers, France	30	36	66

IHC2022 Symposium	Conveners	# orals	# e-posters	Total
S19 - International Symposium on Advances in Berry Crops	Susan McCallum, James Hutton Institute, UK Béatrice Denoyes, INRAE, France	36	47	83
S20 - International Symposium on The Vitivinicultural Sector: Which Tools to Face Current Challenges?	Ahmet Altindisli, Ege University, Turkey Benjamin Bois, University of Burgundy, France	22	21	43
S21 - XII International Symposium on Banana: Celebrating Banana Organic Production	Walter Ocimati, Alliance of Bioversity International & CIAT, Uganda Thierry Lescot, Cirad, France	35	17	52
S22 - International Symposium on Natural Colorants from Plants	Riikka Räisänen, University of Helsinki, Finland Anne de la Sayette, ARRDHOR, France	25	9	34
S23 - International Symposium on Postharvest Technologies to Reduce Food Losses	Gustavo Teixeira, University of Idaho, USA Florence Charles, University of Avignon, France	51	61	112
S24 - IX International Symposium on Human Health Effects of Fruits and Vegetables (FAVHEALTH2022)	Kaleab Baye, Addis Ababa University, Ethiopia Marie-Jo Amiot-Carlin, INRAE, France	18	18	36
S25 - International Symposium on Medicinal and Aromatic Plants: Domestication, Breeding, Cultivation and New Perspectives	Christoph Carlen, Agroscope, Switzerland Philippe Gallois, Iteipmai, France	31	33	64



➤ A full amphitheater for one of the plenary sessions. Photo credit: François Lehmann



➤ The laureate of the 3MHT competition, Marta Nunes da Silva, during her presentation. Photo credit: Emmanuel Geoffriau

Workshops

Complementary to the symposia, 18 workshops were designed and managed to stimulate discussions among participants. They were each organized around one question on a specific topic, that could be technical or of interest for non-specialists (Table 5). Interestingly, all workshops were well attended and brought to the participants the expected added value of an on-site event, made of informal exchanges and multi-disciplinary interactions. For each workshop, moderators were invited to prepare a report on the presentations and discussions, to be added to the *Acta Horticulturae* volume of the topic-related symposium.

Three-minute horticultural thesis (3MHT) competition

The 3MHT competition was held during the plenary sessions of IHC2022, especially conceived to propel young scientists at the forefront of horticulture science, sharing the stage with the most internationally recognized experts at the end of each prestigious plenary session. This first edition kept its promises and gave spectacular demonstrations of the skills and energy of young international doctors during their 3-minute show (Table 6). All finalists were awarded a certificate and the three laureates received grants from French organizations (Agropolis Fondation, National Horticultural Society of

France (SNHF) and Agreenium). No doubt this competition will become famous and attractive in the next IHCs!

Technical tours

The 17 technical tours were also very successful. They allowed the participants to discover many facets of horticulture in our region and to illustrate all the themes presented at the congress: from research to experimentation, from labs, glasshouses to fields, from vertical farming to orchards. The whole range of horticultural crops was represented: fruits, vegetables, seeds, ornamentals, grape, medicinal and aromatic plants.



➤ Full attendance at Workshop 5. Photo credit: François Lehmann



➤ e-poster session. Photo credit: Emmanuel Geoffriau

■ Table 5. Workshops of IHC2022 and related symposia.

IHC2022 workshops	Moderators	Related symposia
W1. What Alternative Uses for Horticultural Products?	L. Dreux, Astredhor, France	S10. International Symposium on Value Adding and Innovation Management in the Horticultural Sector
W2. Differences between Scientific and Empirical Research, Does It Matter and How Does It Affect Your Career?	T. DeJong, UC Davis, USA	
W3. How to Make the Transition to Sustainable Postharvest Quality Management of Ornamental Products?	F. Çelikel, Ondokuz Mayıs University, Turkey, and E. Woltering, WUR, The Netherlands	S5. International Symposium on Innovations in Ornamentals: from Breeding to Market
W4. Why Is Regulated Water Stress Not Widely Used in Commercial Horticulture?	N.A. Valverdi, Chapman University, CA, USA, E. Avila-Lovera, Smithsonian Tropical Research Institute, Panama, and G. Mupambi, University of Massachusetts, MA, USA	S12. International Symposium on Water: a Worldwide Challenge for Horticulture!
W5. How Can Plant Modelling Be a Leverage for Cropping System Improvement by Integrating Plant Physiology and Smart Horticulture?	F.D. Molina Aiz, Almeria University, Spain, and G. Buck-Sorlin, L'Institut Agro Angers, France	S6. International Symposium on Innovative Technologies and Production Strategies for Sustainable Controlled Environment Horticulture
W6. In Vitro Technology: a Marginal or a Key Tool to Implement Breeding and Conservation Strategies?	J. Canhoto, Coimbra University, Portugal	S4. International Symposium on In Vitro Technology and Micropropagated Plants
W7. Does Plant Nutrition in Fruit Production Play a Role in Future Human Health?	E. Lötze, Stellenbosch University, South Africa	S24. IX International Symposium on Human Health Effects of Fruits and Vegetables (FAVHEALTH2022)
W8. How to Transition Automated Fixed Spray Systems from Research to Commercial Market for Horticultural Crop Protection	L. Khot, Washington State University, USA	S18. III International Symposium on Mechanization, Precision Horticulture, and Robotics: Precision and Digital Horticulture in Field Environments
W9. Growing Media Terms and Definitions: Why, Which and What for?	G. Schmilewski, Growing Media Europe, J. Caron, Laval University, Canada, Y. Zheng, Guelph University, Canada, B. Alsanius, Swedish University of Agricultural Sciences, Sweden, and J.-C. Michel, L'Institut Agro, France	S13. International Symposium on Plant Nutrition, Fertilization, Soil Management
W10. What Pedagogical Innovations in Horticulture and Landscape Training?	P. Prevost, Agreenium, France, and K.S. Orvis, Purdue University, USA	S5. International Symposium on Innovations in Ornamentals: from Breeding to Market
W11. How to Harness Innovative Technologies for Crop Pollination?	A. Dag, Agricultural Research Organization, Volcani Institute, Israel, and M. Whiting, Washington State University, USA	S3. International Symposium on Quality Seeds and Transplants for Horticultural Crops and Restorative Species S16. International Symposium on Innovative Perennial Crops Management

IHC2022 workshops	Moderators	Related symposia
W12. How Can We Reach Enhanced Climate Resilience Considering Sunburn and Heat Damage in Fruit and Vegetables Production?	M. Zude-Sasse, ATB, Germany, and B. Morandi, University of Bologna, Italy	S11. International Symposium on Adaptation of Horticultural Plants to Abiotic Stresses
W13. Dissemination of Scientific Knowledge to the Society: Balance between Accuracy and Simplification?	D. Taillez, Aprifel, France	S10. International Symposium on Value Adding and Innovation Management in the Horticultural Sector
W14. How to Make Urban Farming Economically Viable?	J. Monzini, FAO-NRM, Italy	S9. International Symposium on Urban Horticulture for Sustainable Food Security (UrbanFood2022)
W15. How to Adapt Innovative Technologies and Develop Resilient Horticultural Systems for Small-Scale Farmers?	M. Medina, FAO-NSP, Italy, and R. Kahane, Cirad, France	S15. International Symposium on Agroecology and System Approach for Sustainable and Resilient Horticultural Production
W16. What Are the Relevant Topics that Organic Banana Producers Worldwide Would Like the Banana Research Community to Solve?	L. de Lapeyre de Bellaire, Cirad, France, and H.-W. van der Waal, Agro Fair Europe B.V., The Netherlands	S21. XII International Symposium on Banana: Celebrating Banana Organic Production
W17. How Are Plant Variety Rights Contributing to Growth and Sustainability?	O. Lamberti and J. Wegner, CPVO, France	S2. International Symposium on Conservation and Sustainable Use of Horticultural Genetic Resources
W18. What Innovative Technical and Technological Approaches Developed by Researchers for the Apple Orchards of the Future?	C. Coureau, CTIFL, France	S16. International Symposium on Innovative Perennial Crops Management



› The French Minister of Agriculture, Mr. Marc Fesneau, met François Laurens, President of ISHS, and Peter Vanderborght, Executive Director of ISHS, at the ISHS booth. Photo credit: Owen Doyle



› Handing over ceremony between Dr. François Laurens, President of IHC2022, and Prof. Dr. Ryutaro Tao, President of IHC2026. Photo credit: François Lehmann



› Gala dinner at Grenier Saint Jean. Photo credit: François Lehmann



› The “Trio Cover” band set the mood at the Gala dinner! Photo credit: François Lehmann

■ Table 6. Finalists of the 3MHT competition and the three laureates (in red).

Theme of the plenary session	Name of the finalists	Origin of the finalists	Topic of the thesis of the finalists
Climate change	Chiara Amitrano	University of Naples, Federico II, Italy	Characterization of plant water flows in controlled environment – Plant Smart Sensors
	Gökçe Aydoğan Çoban	Ege University, Izmir, Turkey	The effects of rhizobacteria against drought stress in tomato genotypes
Agroecology	Ana Moreno de la Fuente	Universidad Politecnica de Madrid, Spain	Global change and multitrophic interactions in agriculture: implications for biological control
	Marta Nunes da Silva	University of Porto, Portugal	Kiwifruit bacterial canker: exploring tolerance mechanisms and novel control strategies
	Cristiano Soares	University of Porto, Portugal	Mitigating glyphosate effects on crop plants and soil functions: strategies to minimize its potential toxicity
Competitiveness of the value chain	Elena Barcanu	University of Agronomic Sciences and Veterinary Medicine, Bucharest, Romania	Assessment of sweet pepper (<i>Capsicum annuum</i> L.) germplasm collection in order to establish new genotypes suitable for greenhouse growing
	Celine Gentil-Sergent	L'Institut Agro Montpellier, France	Advancing the modeling of emissions and impacts of agricultural pesticides under tropical conditions, to improve the scientific foundation of environmental assessment of tropical agri-food systems

Social program

The social program during IHC2022 included four special evening parties: the spectacular opening ceremony and its following welcome cocktail, the spirituous chenin wine tasting event, the discovery of the plant-dedicated park Terra Botanica and its night show, and the gastronomic and musical gala dinner starting in the historical Hospital St Jean and continuing in the middle-aged Greniers St Jean. These events separately or altogether operated on the numerous participants a WOW! effect that is precisely the experience of the French art of life.

A rich social program for accompanying persons was completed by diversified sightseeing tours and three day-tours in the Loire

Valley or to the Atlantic seaside to discover the highlights of western France.

Conclusion

The organizing committee is happy about the way this 31st International Horticultural Congress took place. IHC2022 was acknowledged by participants as an event of very high scientific quality, with reinforced highlighting and links with young scientists and the industry. The IHC2022 organizing committee is grateful to all authors and co-authors, invited speakers, conveners, and the various committees. IHC2022 found its strong roots in the diversity of attendees, lecturers and speakers, who brought their own skills, cultural origins, precise expertise, and back-

grounds for a successful event. The IHC has confirmed its place and role to exchange and debate major topics of science and global challenges. It highlighted horticulture as an integrative field of science and innovations, well connected to the world's needs and expectations. Let's continue to work to increase the communication efficiency of the horticultural scientific community, to make the society aware that Horticulture is part of the solution for a sustainable world. Let's wish good luck and success to Prof. Dr. Ryutaro Tao and his Japanese team to organize the next IHC2026 in Kyoto. IHC2022 organizers are more than happy to share their experience and to bring any assistance when required. ●



➤ Chenin wine tasting. Photo credit: Dorothee Mouraud



➤ Technical tour at Graines Voltz company. Photo credit: Dorothee Mouraud

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> Outlook of the agricultural extension mobile application – Abu Dhabi case study

Khawla M. Almarzooqi and Mohamed S. Alhammadi

In the recent coronavirus pandemic-like situation, when the in-person interactions became extremely restricted, e-extension played a key role in disseminating valuable technical information for the United Arab Emirates, and elsewhere in the globe.

The importance of e-extension

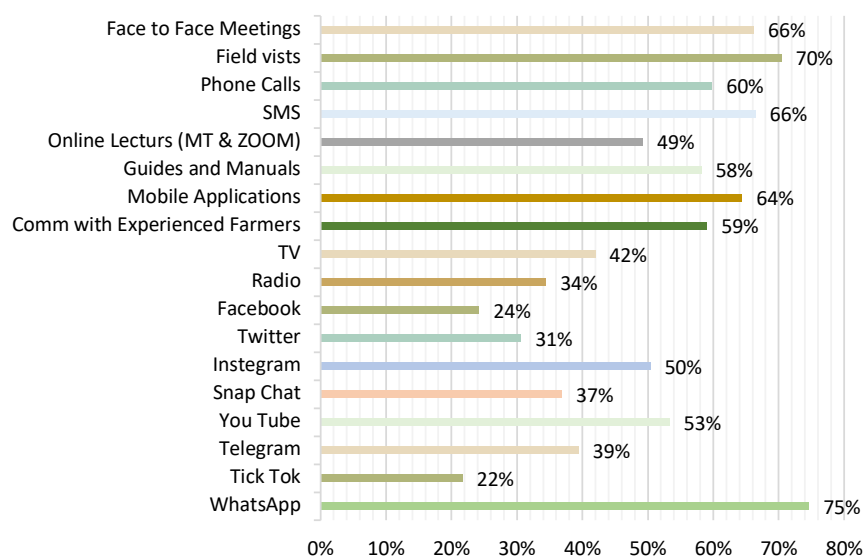
With ever growing global population, narrowing land base, and emerging climatic and unexpected pandemic challenges, technological transformation and innovation in agriculture has become an inevitable priority to enhance productivity, ensure food security and conserve the declining natural resources. Global, regional, as well as country-wide efforts are focusing to address the challenges of food security, malnutrition, declining natural resource base, as well as to protect livelihoods and enhance economic growth. The repercussions, the rapid global changes, and the huge volume of renewable agricultural data and information require the presence of more rapid and effective tools in communicating with farmers. Agricultural extension services delivery is a system that facilitates access for farmers, their groups, and other market players to information, knowledge, and technologies (FAO, 2010). To fulfill the farmer's requirements for accurate information and speed of providing correct extension information, digital communication tools are imperative in agricultural extension. These tools not only reach large audiences quickly, but also provide an opportunity to develop direct relationships with farmers. Though virtual meetings, including web presence and engaging social media platforms, were common before the pandemic, they have now become routine. During the coronavirus pandemic, the agricultural sector, including extension services and marketing, was negatively affected along with other day-to-day life activities (Aday and Aday, 2020). With the rapid development of new technology, agricultural extension that was based on face-to-face communication and daily farm visits, will predominantly vanish. Research, education, effective extension, and outreach services are the key pillars for global agricultural development and food systems. Extension

methods are tools in which new information and knowledge can pass freely between extension agents and farmers. Several models of extension have been implemented globally to serve the farming communities. There are numerous agricultural extension models, including e-extension and information and communication technologies (ICT), which consist of three main technologies – computer, communication, and information management (Saravanan and Bhattacharjee, 2013). E-extension is a perfect solution where we can deliver extension services using web tools, which allow online sharing, collaboration, and networking. Magar (2020) reported that the e-extension model, however, would need constant innovation and promotion to keep it compatible with the everchanging ICT. Most organizations, including agricultural extension services, initiated and upscaled their e-communication, including e-extension, and they are still working on improving their ICT capabilities just to be prepared for the worst-case scenario (Bright et al., 2021). Saravanan (2010) stated that an integration of new ICT is rapidly transforming the agricultural extension. Our web tools include websites, networking software, social media, online meetings, virtual lectures, blogs, sur-

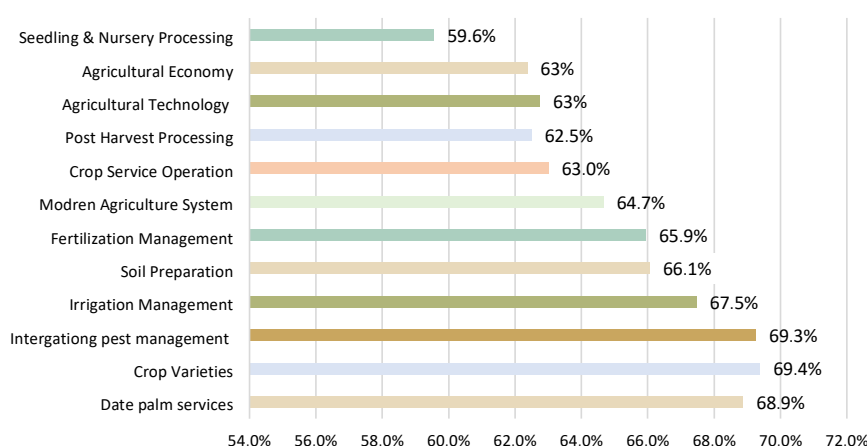
veys, video conferencing, instant messaging, and mobile phone applications.

Abu Dhabi experience in e-extension

Abu Dhabi Agriculture & Food Safety Authority (ADAFSA) implemented agricultural extension using a mobile application, in which a consultancy, technical information, and trainings were provided via online meetings using Microsoft Teams Program. The mobile application included more than 125 topics in agriculture and machine learning to identify pests and plant diseases automatically. A survey was conducted before and after the development of the mobile application through a link sent to the farmers via text messages. The study targeted Abu Dhabi's local farmers, to whom ADAFSA is responsible for providing services, training, and extension programs. The main objectives of the first survey were to determine the farmers' satisfaction of agricultural extension services, the most important communication channels that farmers preferred, and the type of technical information they needed through the whole extension process. Nearly 1,000 of the targeted farmers (representing 5% of the total farmers) participated in this



■ Figure 1. The preferred way for farmers to receive technical information.



■ Figure 2. The most important technical topics that farmers need.

survey. The data obtained from the survey were analyzed to identify the most important challenges facing farmers, the most suitable communication channels that farmers prefer, and the type of technical information they are looking for. The following are the most important components of the results:

Farmer satisfaction of agricultural extension services

The overall satisfaction percentage of farmers was 46% for the extension services. The extension center being easy to reach had the highest satisfaction level, and equally high was the easily accessible communication and technical knowledge of the extension agent, also at that percentage.

Preferred agricultural extension channel

All regular sources of information or communication channels used to reach farmers are listed in Figure 1. Results showed that the farmer's most preferred channel was "WhatsApp," which had a rating of 75%, followed by the field visit with a rating of 70%, and then face-

to-face meetings and SMS, which both had a rating of 66%. In addition, 72% of farmers preferred to receive technical information from a specialized extension agent.

Technical topics

The results showed that the topics most preferred by farmers were date palm services, crop varieties, and IPM with a percentage of 69% for each (Figure 2), noting that all topics were important for agricultural sustainability. Based on these data, a concept design for the smart phone application was made that categorized the main type of technical information and features that farmers needed. The concept design was discussed with a group of farmers to obtain their feedback and recommendations. After that, comparisons were made with the number of agricultural extension applications on smart phones to determine the state-of-the-art features, technical content, and most suitable layout of the application. These applications were "Murshiduk" (from The Kingdom of Saudi Arabia), "Picture this" and "Agrio - Precision Agriculture" (from the United States, Agricultural Extension), and

KP (from Pakistan). At the same time, a team of 16 experts were assigned to develop the up-to-date technical information in agriculture and animal production. The team was responsible for preparing the technical content in the form of guidance directed to farmers covering all aspects of agriculture, from cultivation to postharvest operations, using the latest international scientific references.

Agriculture Guide mobile application

Mobile phones have been readily accepted as a key tool of communication with experts and for peer-to-peer information sharing, with the aim of increasing awareness of farmers toward food security and agricultural sustainability. In this regard, our survey results indicated that 64% of farmers would prefer to receive technical information through a mobile application. The same fact was supported by Vimala and Ravisankar (2012). They stated that there have been positive impacts among farmers of using their mobile phone as a learning tool.

Therefore, in 2021, ADAFSA launched the "Agriculture Guide" application, which became an important virtual platform for extension information, including more than 120 agricultural topics. It is available on both App and Google Play stores. The application has a number of features and services, including:

- More than 120 technical topics and guides developed and uploaded in the application: these topics cover all technical information related to vegetables, fruit, forage, and cereals. Technical information includes planting, crop services, fertilization, irrigation, pest control, harvest, and postharvest. In addition, it addresses topics related to animal wealth, including camels, cattle, goats, sheep, poultry, and fish farming. The technical information of animal wealth includes husbandry economics, production, nutrition and feeding, and animal health. Furthermore, the application has more than 2,000 pictures on pests and diseases.
- Remote consultation: based on the survey results, this feature was designed to enable farmers to obtain technical information directly from specialized extension agents, and to communicate and share photos and videos with the agent.
- Machine learning to identify pests and plant diseases automatically.
- Interactive platform where the farmers can find the dates of the virtual lectures, which are linked to the Microsoft Teams software.
- All the activities and events organized by ADAFSA for farmers.
- Push notifications, which alert farmers on weather conditions and the spread of pests



■ Figure 3. Total number of users, application rating and weblink as of November 2022.

and diseases, and which remind farmers to attend virtual lectures and activities.

- Calendar, including all dates of spread of pests and diseases throughout the year.
- Link to ADAFSA official social media platforms (i.e., Instagram, Twitter, Facebook, Telegram, and YouTube).

Moreover, there are currently 15 countries that use the application. Since it became available worldwide, the number of users reached 3,351 to date. It has been rated 4.9 out of 5 (Figure 3), with a daily active users' interaction of 18% and 25 views per day on average.

Further improvement

After ADAFSA launched the "Agriculture Guide" application in 2021, it became an important virtual platform for extension information, including more than 120 agricultural topics.

We observed that a higher level of farmer satisfaction was achieved when agricultural extension was implemented by a mobile application. Our results showed that providing the agricultural extension using a mobile application, compared to the typical face-to-face extension, showed an increase in farmer

satisfaction level of 54.3%, between 2019 and 2021, and increased the percentage of farmer engagement dramatically by 160.7%. The application proved its economic value and lowered the total extension services costs by 86%.

We recommend further improvement of the application and adding features such as:

- Content listening (Arabic/English).
- Translation of the content to three more languages (i.e., Urdu, Bengali, Filipino).
- Fertilizer calculator, to determine the amount of fertilizer needed by each crop and in each growth stage. ●



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› Urban Greenhouse Challenge: exploring the potential of urban farming

Monica Vidal, Sarah Hoogenboom, Daniel He, Mees Deknatel and Patrícia Duarte de Oliveira Paiva



› Top 3 teams.

Feeding a growing population sustainably will require a global transition of our food systems, especially in urban areas. In the face of current demand and instability of supply chains, making these urban areas food resilient means producing food closer to people. Urban farming presents itself as one of many promising solutions to the urban food challenge. Since 2018, Wageningen University & Research (The Netherlands) explores the opportunities in the growing sector of urban farming through the Urban Greenhouse Challenge series, a series of extracurricular and multidisciplinary competitions for students throughout the world (<https://urbangreenhousechallenge.nl/>).

This Challenge series occurred every two years and was open to students from any university in the world enrolled in any study program. Students were encouraged to form multidisciplinary and multicultural teams to maximize their learning outcomes. The Challenge's objective was to develop talent among the participating students, and to stimulate sustainable and societal innovation across disciplines. Participating student teams developed their ideas with support from coaches in the private, public,

and social sectors. This ranged from corporations, governmental institutions, non-profit organizations or academia that were relevant for urban food production. The interaction between students and partner coaches, and the resulting co-creation are what made this competition worthwhile.

Each competition took place in a different socio-economic context within a major metropolitan area, giving the students a new set of variables and issues to resolve. This system captured a wide set of possibilities within the urban farming sector. The first Urban Greenhouse Challenge (2018) took place in Amsterdam with the ambitious task of rehabilitating a former prison building in the Bajes Kwartier. The second (2020) happened amid the COVID-19 pandemic in Dongguan, China, in one of the largest urban areas in the world. This Challenge was described in *Chronica Horticulturae* 60 (4), 33–37.

Following the success of the previous events, the third Urban Greenhouse Challenge brought in a new twist. Set in the heart of Washington, DC, in a low-income neighborhood, the aim was to empower the local residents to curb food apartheid and reclaim access to healthy food. This Social Impact

Edition was achieved in collaboration with the University of the District of Columbia (UDC), which brought local actors onto the scene to help students better understand their struggles.

Urban Greenhouse Challenge #3: The Social Impact edition

In November 2021, students were asked to develop an urban farming site that significantly improved the quality of life of local residents of Ward 7, Washington, DC. As usual, student submissions had to be underpinned by an economically sound business model. Around 30 teams of students, more than 260 in all, from 74 universities across 19 countries answered the call. For eight months, the students worked on their assignments with support from our partner network, our UDC partners, and a panel of local residents. After two selection rounds, the 10 finalist teams travelled to Wageningen, in the Netherlands, to experience the Grand Final of the Challenge on 29 June 2022, where they faced an international jury for the first time. Three teams emerged victorious racking up a total prize of 15.000€. The three winning concepts of the Urban Greenhouse Challenge #3, from



› Jury presentation during the Grand Finals.

Team LettUs Design, Team USC Stack (from University of Southern California), and Team AMS Caterpillars (from Amsterdam Institute for Advanced Metropolitan Solutions), are summarized below.

1st place – Team LettUs Design – The Mosaic Garden

In our effort to tackle Ward 7's challenges as a neighborhood with poor access to food, education, and economic opportunities, we propose a modular urban farming concept that can be tailored to the needs of the community.

Empowering communities block by block

Our approach would enable local participation during ideation, development,

modification, and expansion. This would be achieved via configurable modules for the functions of the site: food production, community engagement, education, and employment. Functions would be introduced at different community phases as they financially scale up to meet long-term urban farming goals.

Symbiosis

At its heart, our design includes a symbiotic and reliable, year-round aquaponic food production system that can be adapted to the required scale of operations and different crops. Mushrooms and fish provide year-round healthy protein to supplement leafy greens and tomatoes. Culturally connected produce can be grown in the indoor community garden and hydroponic research facility.

Without breaking the bank

The food production system is supported by a business model that serves and employs community members through strategies like a year-round subscription service, remote stalls, and partnering with local organizations for distribution. Modularity enables the community to finance the first few modules entirely from government funds and incentives.

And around it goes

Circularity on site is realized by recycling all primary waste flows into the food production chain. Rainwater harvesting and solar energy generation will further increase the site's self-sufficiency. At the same time, the site, as a biodiverse green space, serves as a buffer for floods and heat, thus contributing to the resilience of the site and its surroundings.

Educating for the future

Members will be engaged through the community garden, square, playground and market. The site also facilitates education for all age groups. An inclusively accessible interactive education path highlights the farming and sustainability practices on site. The site includes an extended campus for UDC Workforce Development and Lifelong Learning division, focusing on employment upskilling and personal development workshops.

A guarantee

As a team, we acknowledge the current local governance efforts to address the challenges of Ward 7 as well as the efforts of local community members. Our farm aims to create programs that safeguard the current and future vibrant character of Ward 7 by empowering communities block by block.



› 1st place – Team LettUs Design – The Mosaic Garden.





➤ 2nd place – Team USC Stack – USC Smart Farming.

2nd place – Team USC Stack – USC Smart Farming

In addressing food insecurity and promoting wellness in both Ward 7 and beyond, the issue isn't about building more grocery stores and growing more produce; rather it's about building a smarter network for food distribution and positively redefining the relationship that consumers maintain with their food supplier. This is the Stack vision.

More than food production

In many neighborhoods, obtaining fresh and healthy produce is disproportionately more expensive and difficult due to poor transportation infrastructure compared to other regions. This is especially true in food deserts. Thus, to truly combat the root issue, the solution must address not just food production, but also distribution and education and it must encourage the active engagement and investment of the community and its stakeholders.

Three verticals for a holistic vision

Stack is holistically designed with supply chain self-sufficiency and environmental circularity in mind while maximizing the three following verticals: 1) the total distribution capacity of our produce; 2) the creation of empowering employment opportunities; 3) the capture of high-value produce markets.

Mobile Market Model

To accomplish this, Stack introduces the “Mobile Market Model” – a new paradigm for scalable food distribution and community engagement. Instead of burdening customers with travelling to food suppliers, we bring the grocery store directly to them in the form of a dynamic, electric market bus. Freed from the need to build expensive, low-efficacy physical stores, Stack passes these savings to the community, along with increased accessibility and a far more

enjoyable shopping process. Being a “grocery store on wheels,” our model is designed to scale far beyond our allotted three-acre site. On site, we allocate far more acreage to growing plants and increasing our yield and stand-alone profitability. We create countless jobs with long-term career opportunities centered around food production, agri-tech operations, green-energy collection, and a full-scale mobile grocery store business. Integrating automation and machine learning agents, we combine smart farming with a streamlined market and supply chain ecosystem.

A healthier food supply chain

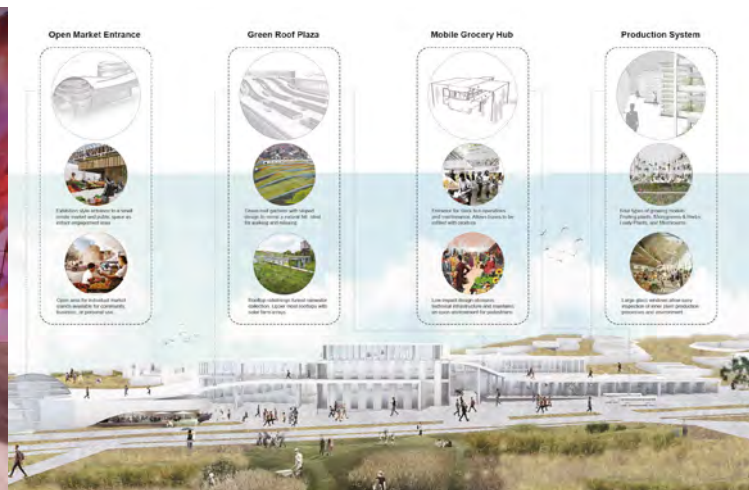
Utilizing the proven scalability of our produce delivery business models and leveraging our triple-bottom-line approach, Stack ensures the creation of first-layer distributional infrastructure in Ward 7 and a platform to develop a healthier food supply chain while maximizing opportunities for community engagement, empowerment and long-term growth. Farm On!

3rd place – Team AMS Caterpillars – Chrysalis

Fostering community spirit through an adaptive, self-sustaining urban farm that ensures local food security and economic viability, infrastructure longevity, and meaningful public space. Like the flap of the wings of a butterfly, we hope to initiate a process that adds value to the community spirit of Ward 7.

Holistic design

Guided by our vision, we propose a holistic concept design. It incorporates the social, organizational, agricultural, economic, and spatial elements needed to establish an innovative, self-sustaining urban farm that improves the food access and social cohesion of Ward 7, DC.



Triggering change

The AMS Caterpillars aim to trigger a butterfly effect. Our proposal is the single flap of a wing of a butterfly, which sets in motion a chain of events. The concept implemented by the community establishes a flourishing urban farm and educational hub for Ward 7. The building is shaped like a butterfly, and we want to let the community fill in its vibrant colors.

A living lab

Our community-centered design draws from AMS Institute's Living Lab approach that brings research into society-wide implementation through incorporating co-creation by different disciplines and stakeholders. The AMS Caterpillars consider the following five topics to be our unique differentiators, which integrate community needs and challenge outcomes with the UN Sustainable Development Goals (SDG). Through an internal integrated design framework (IIDF), we pair our living lab approach with year-round food production, circularity and sustainable design, organizational structure and economic planning.

Inspire to create

Finally, we draw on inspiration from urban farms in the US and state-of-the-art innovations developed in Amsterdam. Our proposed combination of SDG alignment, interdisciplinary high-tech proposals and global inspirations increases access to fresh produce, meaningful public space and economic opportunity, thus contributing to improving the quality of life.

Metamorphosis

Our concept embodies the metamorphosis of a caterpillar to butterfly, and the core of our mission is to preserve and support community spirit. We hope to provide the cocoon from which Ward 7's butterflies can mature.



➤ 3rd place – Team AMS Caterpillars – Chrysalis.

Local jury choice

Unlike other editions of the Urban Greenhouse Challenge, the Social Impact Edition was marked by the participation of local actors in the selection process. From the very beginning, Advisory Neighborhood Commissioner, Mr. Antawan Holmes, and the President of the Deanwood Citizens' Association, Mrs. Jimell Sanders, were part of the local selection committee, one of two committees designed to judge the student submissions on several criteria. For them, this meant evaluating the potential for social impact in their community, and awarding the "Local Residents' Prize" to a lucky team. "What I most look for in a proposal is a strong city symbol that shows the transformation in Ward 7, and simultaneously brings job opportunities, benefits local entrepreneurship, and generates economic development," says Commissioner Holmes. When asked about what she expects from her involvement in this Challenge, Mrs. Sanders mentions "We do the best to give them (the students) local context and it is amazing to see what they are able to come up with."

The concept that made the biggest impression on the local jury was that of Team AMS Caterpillars (3rd place), valued for its clear focus on creating social impact. "It is convincing and coherent, and it offers innovative solutions to local challenges. It is a very attractive design with a lot of functionality built into each room. The building has a modest profile and would be considered a landmark due to its unique design." This earned the AMS Caterpillars the "Local Residents' Prize" besides their podium qualification.

International jury winners

Ranking the three winners of the challenge was left in the hands of an international jury. Chair Nona Yehia (founder and CEO Vertical Harvest), together with Thera Rohling (Program Director Sustainable Urban Delta), Patrícia Duarte de Oliveira Paiva (ISHS Board

member) and Harry Webers (Wageningen Ambassador), picked out three outstanding teams after hearing their pitches during the final of the competition.

When justifying the choice to award the 1st place to Team LettUs Design, the jury praised them for having "by far the most inclusive proposal from the outset." As the team puts it, "the local community are the real architects," because the proposed modular urban farming concept can be tailored to their needs. But what really drove the winning concept home was the idea that this replicable and scalable approach could be easily customized to other communities within the most diverse socio-economic contexts.

The 2nd place by Team USC Stack, on the other hand, was "innovative in the way they concentrated in their food distribution network," but "they also addressed the site as a landmark, creating something that the community recognizes." For the team, the goal was to redefine consumer relationships with their food suppliers. After all, the food truck experience carries more than just food; it is also a symbolic return to the origin.

As for Team AMS Caterpillars, which took home the 3rd place and the "Local Residents' Prize," the international jury was impressed by their "balance between a productive and realistic budget and a framework for the community that was place-thinking." With their butterfly inspired community space, the team offers a design pillared by economic viability, infrastructure longevity, and a meaningful public space. A sound proposal that, in the end, was awarded by both the international and local juries.

The end of an era

After three successful competitions, we say goodbye to the Urban Greenhouse Challenge series. In total, more than 1,000 students including more than 100 teams from over 170 universities in 36 countries participated. The Challenges left their mark in the urban farm-

ing innovation world resulting in 34 finalist designs and nine winning concepts. Besides keeping pace with a fast-evolving sector, we helped expand possibilities of growing food in the city.

We are incredibly proud of the development of the Challenges, from the increased complexity of each event, to the extension of the partner network supporting it. We are proud of the student teams who had the task of presenting information with creativity and ingenuity.

Some of the opinions of our students included: "The Urban Greenhouse Challenge was a very intense, yet rewarding and fun experience." "The Challenge taught me to think outside of the box and work in a dynamic and intercultural setting." Please read about the rest of the submissions, together with an overview of all the student concepts in the latest edition of our challenge magazine (https://issuu.com/nieuweveluwe/docs/student_challenges_2022_def-issuu).

Final remarks

Both the organizers and the jury were amazed to see the student's commitment and investment in learning, expansion of their knowledge base, and creativity in seeking the best solution for the Urban Greenhouse Challenge #3. Participating in competitions such as these allowed the students to unlock professional opportunities for their future.

The ISHS fully supports this initiative because these events meet the Society's Young Minds Program goals. These competitions energized students and early career scientists to confront present-day challenges in horticultural science. Each of the participants from the three winning teams received an ISHS Young Minds Award certificate and one-year membership in the Society. ●

> About the authors



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Monica Vidal is a Project Assistant at WUR Student Challenges, a work group of Wageningen University and Research (WUR). As part of a small team, she supports the implementation of signature Challenges organized by WUR in the Netherlands. Signature WUR Student Challenges include the Urban Greenhouse Challenge series, the upcoming ReThink Waste Challenges, and the Nature-based Future Challenges. E-mail: studentchallenges@wur.nl



> Sarah Hoogenboom

Sarah Hoogenboom from Team LettUs Design is a recent Master's graduate from the Architecture Faculty at Delft University of Technology (TU Delft) in Building Technology with a thesis on bio-based materials and urban agriculture. She is interested in tackling interdisciplinary challenges in a circular economy and data-driven design in the built environment. Like many on the LettUs Design Team, she aims for holistic community-building solutions to urban challenges. E-mail: sarahhoogenboom09@gmail.com



> Daniel He

Daniel is the project lead at USC Stack: USC Smart Farming, and second year computer science student at the University of Southern California (USC) in Los Angeles. Daniel seeks to uncover the intersection between modern food systems, scalability in sustainability, and automation of CEA (controlled environment agriculture) techniques. Farm smarter, Farm On! E-mail: hedaniel@usc.edu



> Mees Deknatel

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> Patrícia Duarte de Oliveira Paiva

Patrícia Duarte de Oliveira Paiva is ISHS Board Member responsible for the Young Minds Program and Professor at the Federal University of Lavras, Brazil. As a professor, she teaches Landscaping and Floriculture and has authored many publications and books on these topics. The Young Minds program aims to engage students and early career scientists in Horticulture, supporting different initiatives worldwide. E-mail: patriciapaivaishs@gmail.com

> 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.

Seed treatments for the control of *Colletotrichum lindemuthianum* and *Pseudomonas savastanoi* pv. *phaseolicola* in organic production of bean: establishing test prerequisites



> Carlo Gamper Cardinali

The poor quality of organic seeds due to pathogen contamination is a main challenge for the development of organic farming. In conventional agriculture, chemical seed treatments can effectively manage this issue. In organic agriculture, however, only limited seed treatments are available. The goal of our project was to evaluate seed treatments compatible with organic farming against two bean diseases, anthracnose caused by the fungi *Colletotrichum lindemuthianum* and halo-blight caused by the bacteria *Pseudomonas savastanoi* pv. *phaseolicola*.

Because sourcing seed with adequate and homogenous natural pathogen infection is difficult, seed inoculation methods were established to obtain high infection rates. For *C. lindemuthianum*, a satisfactory infection rate for the seed treatment investigation was only obtained when seeds were scarified prior to inoculation in a spore suspension. After pathogen inoculation, pathogen detection and quantification tests were performed. We confirmed the efficacy of the incubation method for *C. lindemuthianum* detection established by the International Seed Testing Association. Moreover, we tested molecular detection methods, which required DNA extraction from bean seeds. We initially encountered difficulties when isolating DNA from bean seeds. We used a DNA extraction kit with a reduced sample amount with increased lysis level. This technique allowed us to molecularly detect *C. lindemuthianum* in infected and inoculated bean seeds.

The effect of the seed treatments on the germination of the seeds was evaluated in pathogen-free seeds of 'Maxi' bean. No statistical difference was observed between treatments and the negative control (not treated), however, when working on scarified seeds, the acetic acid treatment, one microbi-

al formulation treatment, and the chemical treatment (used as control) decreased germination. Our study indicated that several challenges restrain the development of seed treatments in organic bean production, from obtaining seeds with adequate pathogen infection to pathogen detection. The next steps of our research will be to fine-tune the detection and quantification of seed borne pathogens in treated seed lots and finally to validate successful treatments on naturally infected seeds.

This research is supported by the project BRESOV (bresov.eu) funded by EU H2020 under grant agreement No 774244.

Carlo Gamper Cardinali won the ISHS Young Minds Award for the best oral presentation at the International Symposium on Quality Seeds and Transplants for Horticultural Crops and Restorative Species at IHC2022 in France in August 2022.

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Leaf Area

WinDIAS 3

Image Analysis
System for Leaves

- Advanced Leaf Area Meter
- Diseased, healthy and damaged areas
- WinDIAS Video now available on our website



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Delta-T Devices

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Impact of wide range of light spectra and intensities on grafted cucumber seedlings during healing and acclimatization



► Farzaneh Bekhradi

Farzaneh Bekhradi is PhD graduate from the University of Tehran, Iran. After graduation she joined the Sepahan Rooyesh Company in Iran as a Research & Development manager. Her research concerns innovative and environmentally friendly projects such as grafting and vertical farming in addition to the effect of different LEDs lights. She collaborates in many research projects with

colleagues at universities in Iran, and has participated in many national and international symposia. Recently, at the IHC2022, in Angers, France, she received an ISHS Young Minds Award for her presentation on seed and transplant quality for horticultural crops and restorative species. She researched the effects of light spectra and intensities on the performance of grafted cucumber seedlings. She examined red, blue, green, white, red:far red, red:blue light spectra under four intensities [25, 50, 100, and 200 $\mu\text{mol m}^{-2} \text{s}^{-1}$ photosynthetic photon flux density (PPFD)] in addition to white light and darkness. Results showed that survival rate of the grafted seedlings was not significantly different among PPFDs lower than 200 $\mu\text{mol m}^{-2} \text{s}^{-1}$ except for white light and darkness. The lowest survival rate was obtained under 200 $\mu\text{mol m}^{-2} \text{s}^{-1}$ and the lowest maximum quantum yield of photosystem II (Fv/Fm) was obtained in grafted seedlings exposed to the highest light intensity (200 $\mu\text{mol m}^{-2} \text{s}^{-1}$). The maximum Fv/Fm was detected in grafted seedlings under lighting regimes that had blue light in their overall spectrum. In conclusion, since elon-

gated seedlings are not desirable and sufficient leaf areas are desirable for the grafted seedling production, spectra containing a combination of blue and red spectrum yielded better results. Because negative effects of high PPFDs were detected, and due to energy saving needs, 50 $\mu\text{mol m}^{-2} \text{s}^{-1}$ PPFDs was recommended for production of grafted cucumber seedlings.

Farzaneh Bekhradi won the ISHS Young Minds Award for the best poster presentation at the International Symposium on Quality Seeds and Transplants for Horticultural Crops and Restorative Species at IHC2022 in France in August 2022.

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Approach to induce regeneration, via somatic embryogenesis, in the peach rootstock GF677 (*P. persica* × *P. amygdalus*) and in different peach, *Prunus persica* L., cultivars



► Angela Ricci

Angela Ricci is a post-doc in the Plant Biotechnology Lab of the Department of Agricultural, Food and Environmental Sciences at Università Politecnica delle Marche, Italy, under the supervision of Prof. Dr. Bruno Mezzetti and Dr. Silvia Sabbadini. Their work is currently focused on developing efficient and reproducible in vitro protocols for regeneration and genetic transformation suitable

for peach with the aim to stably express RNA interference (RNAi)-based gene constructs with the specific goal to induce *Plum pox virus* (PPV) resistance. This study examined several techniques to stimulate regeneration via somatic embryogenesis (SE) in expanding leaves and anthers as starting explants in the commercial peach rootstock GF677 (*P. persica* × *P. amygdalus*) and in several peach cultivars. Both expanding leaves of elongated in vitro shoot cultures and anthers from unopened flowers of one-year-old dormant cuttings were placed in different SE inducing media. The media consisted of McCown Woody Plant Medium (WPM) as basal salt supplemented with N⁶-benzylaminopurine (BAP) and 2,4-dichlorophenoxyacetic acid (2,4-D) as plant growth regulators (PGRs). Although none of the media tested stimulated SE from the peach explants under evaluation, cream-colored calli, identified as pre-embryogenic structures, were obtained when anthers of peach cultivars 'Big Top', 'Tardibelle', and 'Big Bang' were placed on induction media supplemented with 4.4 μM BAP in combination with 4.5 or 9 μM 2,4-D.

Considering the establishment of a suitable regeneration system through SE in peach as useful tool for genetic resistance against PPV, we suggest adjusting the concentrations and combinations of BAP as cytokinin and 2,4-D as auxin as the next step to induce SE from this type of plant material. This research was supported by New Plant and Vitroplant Italia, Italy. It was an honour to be awarded for this work.

Angela Ricci won the ISHS Young Minds Award for the best poster presentation at the International Symposium on In Vitro Technology and Micropropagated Plants at IHC2022 in France in August 2022.

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Combining microgreens cultivation and biostimulant application in hydroponic systems accentuate yield and visual quality of functional food



› Christophe El-Nakhel

Christophe El-Nakhel is a postdoctoral researcher at the University of Naples Federico II, Department of Agricultural Sciences (DIA), Portici, Italy. His research interests include several topics within the field of horticulture, comprising soilless cultivation systems, protected cultivation, space farming, nutrient eustress, biofortification, microgreens, and biostimulant application on horticultural crops. Under the supervision

of Prof. Youssef Roupheal, he investigated preharvest factors influencing microgreens quantitative and qualitative traits. Microgreens as functional food ameliorate our dietary supplementation by adding unique colors, shapes, textures, flavors, and, most importantly, bioactive compounds. Through the implementation of improved controlled cultivation by adopting soilless systems and artificial lighting, the agri-food industry can increase the production of microgreens characterized by a significant content of phytochemicals. With adequate environment control, water and resource use efficiency can be optimized for crop production. On the other hand, plant biostimulant can improve nutrient uptake and use efficiency and boost the qualitative aspects of horticultural crops. Chiefly, protein hydrolysates (PHs) as plant biostimulant via root application have proven beneficial due to their content of signaling peptides. Root hair promoting peptides present in PHs provoke a change in root architecture, an increase in nutrient uptake, and stimulate the carbon and nitrogen metabolism.

This research aimed to evaluate the root application of legume derived PHs in the

nutrient solution of a floating raft system for microgreens production in a growth chamber. In this study, the effect on yield, dry matter, and colorimetric attributes of two microgreens species, *Lepidium sativum* L. (cress) and *Brassica oleracea* L. var. *gongylodes* (kohlrabi), was evaluated. The application of PHs in the nutrient solution resulted in a significant increase in fresh yield and an amelioration in the physical and nutritional quality traits, proving the utility of biostimulant application.

Christophe El-Nakhel won the ISHS Young Minds Award for the best poster presentation at the International Symposium on Innovative Technologies and Production Strategies for Sustainable Controlled Environment Horticulture at IHC2022 in France in August 2022.

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Native *lomas* species of Peru as potential plants for urban green in Lima



› Sofia Flores

Sofia Flores is a PhD student in the Faculty of Bioscience Engineering at KU Leuven in Leuven, Belgium, under the supervision of Dr. Van Meerbeek. She is conducting her research in her home country at the Universidad Nacional Agraria La Molina in Lima, Peru. Her research project explores the natural landscapes near the city of Lima, commonly known as “*lomas*,” to select native species (e.g. *Atriplex rotundifolia*, *Begonia octopetala*, *Ismene amancaes*, *Nolana humifusa*, *Stenomesson flavum*) adapted to these harsh

environments and incorporate them into the urban green of the arid city of Lima. Her major research objectives are: 1) to determine the current state of urban green in Latin America and the research gaps, 2) to study the ecosystem of *lomas* and evaluate the performance of native species in green roofs, 3) to determine the current and future distribution of *lomas* species. Sofia is currently working on her last two objectives as the green roof is a long-term study.

At the II International Symposium on Greener Cities: Improving Ecosystem Services in a Climate-Changing World (GreenCities2022), she presented the preliminary results of her green roof experiment. To start this study, she surveyed various *lomas* around Lima to collect native species and environmental data. After a period of growth and adaptation of about 4 months, the selected plants were transplanted into an extensive green roof, built at the university in Lima. This green roof is being irrigated at two different levels (high and low) and the performance of native plants is being compared with plants commonly used in green areas in Lima. Ten months later, the geophytic species grew out after their dormancy period and the growth of all plants was positively affected by the higher irrigation level. The number of flowers

and new individuals did not vary significantly with irrigation, however, they were influenced by the plant type because some native species had abundant flowers. Although native plants displayed a few symptoms of dehydration in the low-irrigation plots, they are growing just like the common plants, demonstrating so far that it is possible to integrate them into the urban green of Lima. Sofia Flores won the ISHS Young Minds Award for the best oral presentation at the II International Symposium on Greener Cities: Improving Ecosystem Services in a Climate-Changing World (GreenCities2022) at IHC2022 in France in August 2022.

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Antioxidant contents and texture optimization of fruit and vegetable bars and the technological characterization of South American yam flour as a functional food



► Sandra V. Medina-López

Sandra V. Medina-López is a Ph.D. candidate in the Food Science and Technology Institute at the National University of Colombia, in a joint guardianship with the doctoral Advanced Techniques in Food and Agricultural Research and Development program at the Technical University of Cartagena, under the supervision of her academic advisors, Dr. María Soledad Hernández and Dr. Juan Pablo Fernández.

Sandra's research focused on exploring sustainable ways to apply local Colombian plant biodiversity resources. She began by joining

a study of functional foods being developed for children, pregnant and nursing mothers. Sandra wanted to create a snack suitable for human consumption using local species of fruits and vegetables highlighting their natural bioactive phytochemicals such as vitamin A, fructooligosaccharides, and antioxidants. She analyzed data and developed response surface designs to improve texture using naturally rich yacon (*Smallanthus sonchifolius*) purees in combination with commercially available prebiotic fibers. The maximal combination was chosen to produce fruit and vegetable bars that were vegan, natural sugar-based, nutrient-dense snacks, and could be easily scalable to local industries or beyond. Subsequently, Sandra considered the potential of other neglected crops in the country for her doctoral thesis. She examined native species productive chains. She assessed the transformation possibilities of neglected American purple cush-cush yam (*Dioscorea trifida*), promoting the collaboration between academy and productive communities. In her initial approach, she analyzed the common value-added strategies of the productive region. She then produced anthocyanin-rich powders that could provide bioactive ingredients to other foods. The goal was to develop cost-effective, palatable,

familiar foods, that would benefit crop production in the communities while promoting consumer health. Then, she formulated biscuits with the purple powders considering one of the main concerns was the communities' marketing of the developed materials and the adoption of the products.

Sandra V. Medina López won two ISHS Young Minds Awards at IHC2022 in France in August 2022. The first was for the best poster presentation, "Fruit and vegetable bars: antioxidant contents and texture optimization with prebiotic fiber addition," at the IX International Symposium on Human Health Effects of Fruits and Vegetables - FAVHEALTH2022, and the second for the best oral presentation, "Technological potential and characterization of underutilized South American yam flour with food application," at the International Symposium on Value Adding and Innovation Management in the Horticultural Sector.

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Transcriptomic and physiological responses of *Diplotaxis tenuifolia* under heat stress



► Alice Petrini

To determine strategies to increase plant tolerance to high temperature we must examine plant physiological and metabolic processes. High temperature leads to an alteration in photosynthesis, modification of plant metabolism, plant growth reduction, and overall reduction in the quality of horticultural products. *Diplotaxis tenuifolia* L., commonly known as wild rocket, is a member of the mustard family, *Brassicaceae*. This plant is cultivated as a baby-leaf salad.

Our goal in this study was to understand the physiological and molecular responses in this plant when subjected to heat stress. This horticultural species is greatly appreciated for its sensorial characteristics and flavour. Because abiotic stresses can impact these organoleptic aspects, the aim of our study was to investigate plant changes induced by high temperature.

This was done by growing the plants in a chamber under controlled conditions (24°C) and at fully expanded leaves stage, the temperature was increased to 37°C for 4 h day⁻¹, for 4 days. For each condition (stress vs. control), in vivo analysis and sampling for both physiological parameter analysis and RNA-sequencing were conducted to identify changes induced by high temperature. Chlorophyll a fluorescence and physiological assay results confirmed the effects of heat stress, showing a reduction in chlorophyll content and leaf functionality as well as a decrease in sugars and nitrate content. Transcriptomic profile showed different regulation within the metabolic and physiological pathways under these conditions. These results provided a basis for further studies: the first plant response was to modify photo-

synthetic activity, which set off alterations in the primary metabolism and nutrient assimilation. The combination of physiological and molecular analysis helped us identify the pathways most affected by high temperature. We are also beginning to understand how to improve plant tolerance for extreme temperature events, which are increasingly common. As we go forward we are examining different strategies for plants to cope with high temperature by the application of biostimulants products to help plants recover from heat stress.

Alice Petrini won the ISHS Young Minds Award for the best poster presentation at the International Symposium on Adaptation of Horticultural Plants to Abiotic Stresses at IHC2022 in France in August 2022.

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Apple trees in garden-orchard system improve soil quality and yield of organic radish preceded by lettuce



► Toky Ramananjatovo

Maintaining healthy soil is a major challenge in agriculture. Tree-based intercropping is very promising to ensure high production and conserve soil quality, as shown in agroforestry systems. Trees improve soil fertility through the input of organic matter by litterfall and root turnover, which enhance the soil microbial activity. This study aims

to evaluate the effects of apple trees (*Malus × domestica* Borkh. 'Golden Delicious') on soil qualities and their potential to improve the yield of an unfertilized organic radish crop (*Raphanus sativus* L. 'Ostergruss'). From June to August 2020, we compared the soil properties and the yield of radish beds located either at 1.5 m (B1) or at 5 m (C) from a row of 20-year-old apple trees. Litterfall, soil organic matter, and soil bulk density were measured on each bed. To characterize the effects of apple trees on soil microbial activities biodegradation capacity, we assessed the decomposition rates of the previous crop residues (lettuce roots - *Lactuca sativa* L. 'Olana') on each bed using 5 mm-mesh litterbags buried at 15 cm depth. N mineralization rate was measured in situ using PVC tubes. Apple tree litterfall enriched the 0-30 cm soil layer in organic matter (45 g kg⁻¹ soil DW on B1 vs. 35 g kg⁻¹ soil DW on C). Soil bulk density was significantly lower on B1 (1.2 g cm⁻³) than on C (1.5 g cm⁻³). Furthermore, the decomposition rate of lettuce roots was faster on B1 than on C: on B1, 50% of the initial dry mass was decomposed in two weeks and 65% after

one month compared to only 35 and 48% on C bed, respectively. We also observed that net N mineralization rate was up to twice as high on B1 than on C. Consequently, soil NO₃⁻ content in the 0-30 cm layer was significantly higher on B1. Yield of radish was significantly higher on B1 due to higher soil mineral nitrogen content and lower soil bulk density. Our results suggest that fruit tree-based intercropping is a promising option for ensuring both soil quality and productivity of organic root vegetable crops.

Toky Ramananjatovo won the ISHS Young Minds Award for the best oral presentation at the International Symposium on Plant Nutrition, Fertilization, Soil Management at IHC2022 in France in August 2022.

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Effect of growth unit characteristics and light environment on leaf fall in the evergreen mango tree



► Emma Carrié

Leaf fall in the evergreen mango (*Mangifera indica* L.) is affected by physiological age and light environment. Details of these effects need to be determined. Previous studies have not described the dynamics of annual leaf fall of these trees. Our work aimed to decipher the effects of architectural and environmental factors on leaf fall

at the scale of the growth unit (GU) during a year. Our experiment began by describing the initial states of 240 GUs, sampled from five mature 'Cogshall' mango trees at three depths, expressed as 1, 2, or 4 GU from the terminal GU along the branch. Leaves on a GU were considered to have the same age. The depth level of a GU was used as a proxy for age because of the rhythmic growth of the mango tree. The initial state of each GU was characterized in January 2021, by the number of nodes (i.e., initial number of leaves), remaining leaves, position (apical or lateral), and length. Hemispherical photographs were used to estimate the light environment. The number of leaves per GU was then counted monthly for one year. Leaf fall was irregular over the year, occurring during the wet season of Réunion Island. Leaf fall was separated into two processes: occurrence and intensity. Leaf age (approximated by GU depth) was strongly associated with the occurrence of leaf fall. The main peak of leaf fall occurred between November and December and coincided with the vegetative flush. Light had a minor effect on leaf fall,

observed only in December 2021. At this time, young GUs placed in a shaded environment exhibited three times the leaf fall intensity of older GUs. Our work illustrated the seasonal pattern of leaf fall in the evergreen mango tree. The effects of physiological age and light environment will soon be implemented in a functional-structural plant model called *Virtual-Mango*. Determining the foliage distribution is of high importance to predict fruit production in mango.

Emma Carrié won the ISHS Young Minds Award for the best oral presentation at the International Symposium on Innovative Perennial Crops Management at IHC2022 in France in August 2022.

► Contact

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Combat climate change with biodiversity: high throughput phenotyping of banana diversity for suitability now and in the future



> Clara Gambart

Clara Gambart is a PhD student at the Laboratory of Tropical Crop Improvement at KU Leuven (the University of Leuven, Belgium) and graduate research fellow at the One CGIAR (formerly the Consultative Group for International Agricultural Research). In 2019, she obtained her Master's degree in Agricultural

Sciences at the Faculty of Bioscience Engineering (KU Leuven). Triggered by her Master thesis, in which she investigated potential agro-ecological intensification strategies on banana-based farming systems, she started a PhD in 2019. Her objective was to acquire in-depth knowledge on the diversity of physiological responses of banana varieties to the current and future abiotic stresses, occurring in different agro-ecozones. Temperature is a major abiotic factor influencing plant development and, consequently, a major driving force behind geographical shifts in productive agricultural areas. Enhanced on-farm genetic diversity has been proposed as a valuable opportunity to maintain yield and alleviate yield gaps, especially under the pressure of climate change. Using the BananaTainer, a highly climate-controlled container with vertical farm design, she modeled variety-specific growth responses of more than 70 banana cultivars in relation to temperature. These variety-specific growth models showed considerable variation and enabled the prediction of suitable agro-eco-

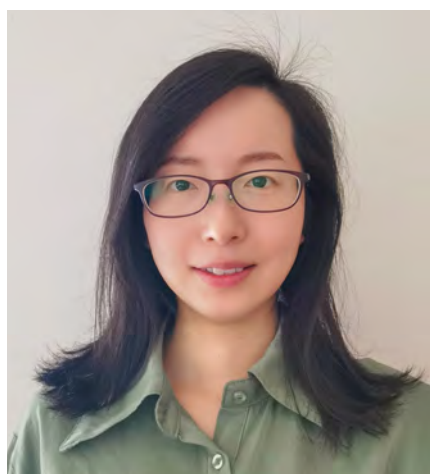
zones for each specific variety under current and future climatic conditions. Screening of a wider range of varieties for temperature and other abiotic stresses will allow for the selection of adapted varieties to a given climate, thereby complying with the cultural- and taste-specific requirements of the local community. This characterization and evaluation will not only increase the diversity of suitable on-farm cultivars but will also allow for the identification of suitable germplasm for improvement through breeding.

Clara Gambart won the ISHS Young Minds Award for the best poster presentation at the XII International Symposium on Banana: Celebrating Banana Organic Production at IHC2022 in France in August 2022.

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Mango shelf-life modelling



> Yiru Chen

Australian mangoes (*Mangifera indica*) enjoy a high reputation owing to their large size, attractive skin blush, and sweet and juicy taste. Increasing demand in overseas markets, particularly Asian, indicates a great potential for export. However, risks during export such as high storage temperature in air freight or long in-transit times of sea shipments can cause loss of fruit quality and shelf life, and consequently disappoint consumers. Yiru Chen, a horticulturist from the Supply Chain Innovation team at the

Department of Agriculture and Fisheries in Queensland Australia, worked with her colleagues on a five-year project aiming to deliver consistently high quality of fresh Australian mangoes into Asian markets. This research sought to improve decision making around export logistics through models predicting shelf-life of two Australian mango cultivars, 'R2E2' and 'Kensington Pride' (KP). Based on extensive monitoring of commercial shipments, temperature and storage duration matrices were designed to encompass the range of temperature and time conditions encountered in export supply chains. Laboratory-based simulation trials were conducted in three consecutive seasons (2018/19 to 2020/21). Statistical models were trained and validated with split dataset (70 and 30%, respectively) and verified by real-world shipment monitoring data. The results showed that the developed remaining shelf-life prediction models had demonstrated potential to empower supply chain stakeholder decision-making towards supporting consumer satisfaction. Averaged storage temperature decreasing from 17 to 13°C led to a 2.4-day increase in shelf-life of 'R2E2'. Specific regression models were required to account for differences between cultivars and between harvest times ('early' or 'late'). For 'R2E2',

shelf-life prediction intervals (PI) at 90% confidence level were ± 3.2 days and root mean square errors (RMSE) was 4.1 days. PI and RMSE of 'KP' were ± 2.8 and 4.8 days, respectively. Dry matter content at harvest as a co-variable did not improve shelf-life predictions for both cultivars. A web-based dashboard and a mobile phone application were developed for model demonstration to the industry. Meanwhile, Yiru is a part-time PhD candidate at the University of Queensland. Her research interests include maintaining postharvest quality of fresh produce along supply chains using predictive modelling approaches and technologies.

Yiru Chen won the ISHS Young Minds Award for the best oral presentation at the International Symposium on Postharvest Technologies to Reduce Food Losses at IHC2022 in France in August 2022.

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Effect of 1-MCP treatment and increasing storage temperature in 'Gala' apple grown in southern Brazil and stored under commercial conditions



► Felix Büchele

Felix Büchele is a PhD candidate from the University of Hohenheim, currently conducting research at the Kompetenzzentrum Obstbau Bodensee in Ravensburg, Germany, studying postharvest physiology of horticultural crops.

Although long-term cold storage has become an essential part of the production and marketing strategy of apples worldwide, it remains associated with significant risks, as well as high energy usage, and subsequently

high costs. Previous studies conducted in Europe suggested that increasing the storage room temperature by a few degrees could significantly reduce energy consumption though continuing to provide beneficial control of physiological or pathogen-caused disorders. Detrimental effects on the maintenance of key quality parameters, which could be expected with elevated storage temperatures, may be compensated by application of the ethylene inhibitor 1-MCP. However, this practice may not be suitable for fruit grown in humid regions in Brazil, which are faced with higher fungal decay incidences. In our study, 'Gala' apples were harvested over the course of multiple seasons from 2011 to 2016, in different orchards in southern Brazil. Fruit was picked at early and advanced maturity and subsequently stored for up to seven months in controlled atmosphere settings and temperatures of either 0.7 or 2.0°C, with and without 1-MCP application. After storage, the main quality parameters were analyzed, and the fruit were assessed for fungal decay and physiological disorder symptoms. Fruit maturity was found to have a major effect on storability, as lower retention of firmness and acidity were observed in late harvested apples, as well as signifi-

cantly higher incidence of fungal decay, flesh browning, and cracking. Applying 1-MCP improved firmness, while also reducing flesh browning and cracking symptoms in the late harvested fruit. Results showed that by increasing room temperatures to 2.0°C, the energy consumption of evaporator fans could be reduced by about 21%. Application of 1-MCP compensated for the detrimental effects of elevated temperatures on fruit quality maintenance. This study confirmed that 'Gala' apples grown in humid subtropical regions can be stored at higher room temperatures to save energy, if treated with 1-MCP.

Felix Büchele won the ISHS Young Minds Award for the best poster presentation at the International Symposium on Postharvest Technologies to Reduce Food Losses at IHC2022 in France in August 2022.

► Contact

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Analysis of bud and sylleptic shoot distribution along 1-year-old shoots of hazelnut (*Corylus avellana*)



► Francesca Grisafi

Tree architecture is important because it influences the light interception in the canopy. It determines where the different organs (e.g., leaves and fruits) are borne and, consequently, the source-sink interactions on the tree. Tree architecture directly affects the yield of filbert (*Corylus avellana* L.). In winter, four main structures are detectable on one-

year-old shoots: mixed buds, which, in summer, will bear nuts; vegetative buds, which, in spring, will sprout into new shoots; blind nodes, which do not have any bud; and sylleptic shoots, which bear the male inflorescences in the apical position. Our hypothesis was that the distribution of buds, among one-year-old shoots, followed a specific pattern. Moreover, we hypothesized that this pattern could change with age or because of the rootstock (*C. colurna* seedlings). We designed three trials (1: young trees own-rooted; 2: young trees grafted; 3: old trees own-rooted) and we sampled 120 one-year-old shoots of 'Tonda di Giffoni'. Our study highlights four regions among one-year-old shoots: the first part of the shoot was characterized by blind nodes, followed by a region of the shoot with sylleptic shoots, and then, in the median part of the shoots, a prevalence of mixed buds followed by vegetative buds in the distal part of the shoot. In grafted trees, the region with mixed buds was longer than in own-rooted trees and the last region had more vegetative buds. This led to longer new shoots in the subsequent year and, thus, a

reduction of the aging phenomenon. Huge differences were highlighted from the third trial when compared to the first. Indeed, the first (blind node) and last (vegetative buds) regions were substituted by the presence of sylleptic shoots. Aging causes a reduction in shoot length and, consequently, a decrease in vegetative and mixed buds. This study could be used to guide managerial practices, such as pruning, in a more physiological and precise fashion, to reduce the aging of the tree without losing productivity.

Francesca Grisafi won the ISHS Young Minds Award for the best oral presentation at the X International Congress on Hazelnut in USA in September 2022.

► Contact

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New sources of eastern filbert blight resistance from Turkey map to Linkage Group 2



► Brianna Heilsnis

Brianna Heilsnis is a Ph.D student in the Department of Horticulture at Oregon State University, Corvallis, Oregon, USA, under the supervision of Dr. Shawn Mehlenbacher in the Hazelnut Breeding and Genetics lab. Her research is focused on host plant resistance to eastern filbert blight (EFB), which is caused by the ascomycete *Anisogramma anomala*. Currently, the hazelnut industry in Oregon is protected by a dominant allele

on linkage group (LG) 6, originally discovered in the European hazelnut, *Corylus avellana* 'Gasaway'. However, when tested against other *A. anomala* isolates from New Jersey, 'Gasaway' resistance breaks down. In preparation for either a second accidental introduction of *A. anomala* into Oregon or a mutation of the current isolate, the Hazelnut Breeding Program has been searching for additional sources of resistance. Since the resistance gene in 'Gasaway' was first recognized, the program has identified 122 sources of very high resistance, 27 of which have been mapped and are located on LG2, 6, or 7. Once identified, the subsequent goal of the program is to pyramid resistance genes for durable protection against potentially new races of *A. anomala*. This project evaluated three new hazelnut genotypes from Turkey (OSU 1229.082, OSU 1240.131, and OSU 1289.028) which showed no signs of disease after structure or field inoculations. All three were then crossed with susceptible parents and their offspring inoculated with *A. anomala* (Oregon isolate) and evaluated for canker development. Segregation ratios from the progeny indicated all three genotypes had single dominant resistance. Disease

phenotype scores, collected 20 months after inoculations, were correlated with simple sequence repeat markers from LG2, 6, and 7 resistance loci, and any loci with marker correlation coefficients greater than 0.5 were further investigated. Each of the three genotypes mapped to the same region on LG2, but sequencing is required to determine if they are the same gene. This study doubled the number of known LG2 resistant sources and increased the germplasm diversity with which to pyramid resistance genes in future crosses.

Brianna Heilsnis won the ISHS Young Minds Awards for the best poster presentation at the X International Congress on Hazelnut in USA in September 2022.

► Contact

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Optimization of biogas production from cactus *Opuntia stricta* feedstock for use by cattle manure



► Kenneth Tembe Oduor

Kenneth Oduor is a Ph.D. Student in the Agronomy Department at the University of Florida Institute of Food and Agricultural Sciences (IFAS), under the supervision of Professor Jose Dubeux. He holds an MSc in Agronomy (2016) and a first-class honors degree in BSc. in Agricultural Education and Extension (2013), from the University of

Nairobi (Kenya), where he received a scholarship award for his master's degree. His research focused on strategies to reduce the spread of the invasive cactus species *Opuntia stricta* in Kenya. This includes using the plant to produce biogas, organic fertilizer, and livestock feed supplement. Concurrently, he is evaluating biomass accumulation and the root contribution of the plant to the below-ground ecosystem. This study was part of his initial experiments that explored the potential to optimize biogas production from cactus feedstock using cattle manure. Different levels of manure inclusion were evaluated for total gas, nitrogen, carbon, carbon isotopes, and pH. The goal was to identify the best treatment combinations to enhance biogas production for a pilot study at the community level. The highest total gas was recorded with the inclusion of 20% manure signifying a 43% increase compared to treatment with no cattle manure. Similarly, treatments with manure had higher pH values that favored methanogen activity. The C/N ratio reduced with each level of manure inclusion, enhancing microbial nutrition for

increased biogas production. Based on the results, co-digestion with cattle manure represented a valuable technique to optimize biogas production from cactus feedstock while contributing to its management. Currently, Kenneth is conducting more extended incubation experiments to identify other ways of optimizing incubation parameters that enhance the amount of methane from the cactus feedstock.

Kenneth Tembe Oduor won the ISHS Young Minds Award for the best poster presentation at the X International Congress on Cactus Pear and Cochineal in Brazil in September 2022.

► Contact

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> 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



DeJong, T.M. (2022). *Concepts for Understanding Fruit Trees* (Wallingford, Oxfordshire, UK; Boston, MA, USA: CAB International), pp.152. ISBN 978-1-80062-086-5 (paperback); ISBN 978-1-80062-085-8 (ebook). £22.50 / €25.00 / \$30.00.

A 25% discount will be received by entering the code "CCISHS25" when ordering through <https://cabidigitallibrary.org/doi/book/10.1079/9781800620865.0000>

This book takes the complexity of tree growth and development and reduces it to a few underlying concepts. It makes much of the behaviour and response of fruit trees to environmental factors or management practices easy to understand and predict. The preface indicates that the content is targeted at fruit growers, fruit tree enthusiasts, students, and fellow scientists. Nonetheless, I suspect the main readership will be students who will relate well to the clear presentations and well-reasoned logic presented within successive chapters. Although primarily written for a horticultural audi-

ence, the book will also resonate with others involved with perennial trees including forsters and ecologists.

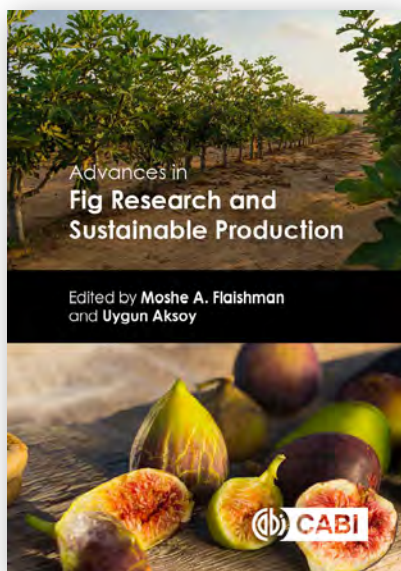
Initial chapters focus on Energy capture and carbon assimilation (Chapter 2), Uptake and assimilation of nutrient resources (Chapter 3), and The structure of trees (Chapter 4). The clear text (although brief), together with well-selected figures, photographs, and tables, provides basic descriptions of photosynthesis, respiration, essential nutrients and their uptake, and the basic anatomy of stems, shoots and roots. Subsequent chapters focus strongly on the outcomes of the research work done by DeJong and his colleagues and students at UC Davis culminating, over the past 30 years, in the development of growth and yield simulation models primarily for peach and almond. Hence, subsequent chapters focus on The carbohydrate economy of fruit trees (Chapter 5), Understanding the shoot sink (Chapter 6), Application of shoot growth rules for understanding responses to pruning (Chapter 7), Understanding the root sink (Chapter 8), Understanding the fruit sink (Chapter 9), Understanding the long-term storage sink (Chapter 10), and Integration of tree source and sink activities (Chapter 11). A very selective bibliography and an index are presented at the end of the text.

The previously published information provided in chapters 5-11, demonstrates the considerable contributions that DeJong and his colleagues have made to our understanding of fruit tree growth and development in recent years. The development of dynamic models for fruit tree growth has resulted in the need to conduct original research in areas such as defining the concept of a tree as a collection of semi-autonomous organs, describing the scale and dynamics of carbohydrate storage and use throughout both the active growing season and during the dormant phase, and the nature of bud fate patterns on fruit tree shoots. Although the book clearly states that the tree modelling is a "work in progress", the

outputs of the current models are impressive and have allowed many concepts relating to tree physiology and to commercial tree management (such as fruit thinning) to be evaluated as outlined in the final chapter. Each of the chapters is well-written and the illustrations and tables are appropriate and informative. In the Preface, DeJong indicates that although he "did not set out to write a book that summarized my academic research career, much of this book has turned out to be essentially that." Consequently, the text is strongly focused on peach, although reference is also made to other pome fruit (apple, pear), stone fruit (almond, cherry, prune, apricot), kiwifruit, grape, fig, and nut crops (walnut, pistachio). Mention of these is, however, relatively minor as they are assumed to follow the same principles as outlined in the specific examples that are presented throughout the book. The research covered is strongly influenced by the fruit-growing conditions in California, so readers in climates with harsher winters or milder temperate conditions will need to "recalibrate" their thinking about the related responses of fruit crops in their local regions – though the basic principles will remain unchanged. The main shortcoming of this text is the bibliography that, aside from reference to a few general pomology texts, comprises almost entirely of references that relate to the outputs of DeJong's group. It would have been helpful to have included other selected papers that reference areas referred to in the book, but not necessarily the focus of that group – areas such as light interception and distribution within canopies, juvenility, and rootstocks.

This text will be a welcome addition to any pomologist's reading list. If nothing else, it will challenge some existing conventions and introduce some new perspectives for those learning about and working on fruit trees.

*Reviewed by Ian J. Warrington,
ISHS Fellow and Honorary Member*



Flaishman, M.A., and Aksoy, U., eds. (2022). *Advances in Fig Research and Sustainable Production* (Wallingford, Oxfordshire, UK; Boston, MA, USA: CABI), pp.546. ISBN 978-1-78924-247-8 (hardback) / 978-1-78924-248-5 (ePDF) / 978-1-78924-249-2 (ePub). € 155.

A 25% discount will be received by entering the code “CCISHS25” when ordering through <https://www.cabi.org/bookshop/book/9781789242478/>

Fig (*Ficus carica*) is a tree crop that predates recorded history. This magnificent fruit is prominent in some of the earliest writings from ancient civilizations. It has a fascinating reproductive biology that provides one of the most well-known examples of the co-evolution of plant and animal reproductive systems. Furthermore, its fruit have perhaps the most unique anatomical structure of any commercially produced pomological crop. This book captures all of the interesting aspects of the common fig and important aspects of commercial production. Appropriately, the book begins at the earliest recorded history of figs, including domestication and appearances in art and early culture. From there the book describes the biology of the tree and fascinating aspects of its reproductive biology, including the various types of the fruit that serve unique roles in the natural reproductive cycle of the different types of figs. I encourage all serious students of pomology to become familiar with the complexities of this fruit, if for no other reason than to gain an appreciation for the biological intricacies of the reproductive cycle and structure of the fig syconium. This book explains these aspects in living color and is exquisitely illustrated with numerous photographs. The book goes on to describe pertinent horticultural practices such as propaga-

tion, orchard design, irrigation, fertilization, and general orchard management as well as sustainable organic farming practices, including use of modern technology such as robotics and remote sensing. The sections involving the management of trees and production of fruit are followed by extensive chapters on fruit maturity, harvest, and postharvest handling of fresh and dried figs. These chapters are followed by several well-illustrated chapters on fig viruses, pests, diseases, and even mycotoxins in dried fruit. Additionally, the book discusses modern “omics” research as well as traditional and molecular breeding of figs. The book concludes with descriptions of prominent fig varieties, products, medicinal uses, world trade, and marketing. Relatively few books have been written on figs. This modern, comprehensive treatise on this unique crop will be appreciated by the fig research community. Although it is an edited volume, the editors are co-authors of several of the chapters and the content logically and relatively seamlessly flows through the entire book. I recommend the book to all fruit tree enthusiasts. It introduces the reader to the fascinating world of figs, an underappreciated but important crop in human history.

*Reviewed by Theodore M. DeJong,
University of California, Davis, USA*

Former Horticultural Reviews and Plant Breeding Reviews content to be published in Crop Science

Beginning this year, content formerly published in *Horticultural Reviews* and *Plant Breeding Reviews* will cease publication in book format and will be published in the journal *Crop Science*.

The two publications, published by Wiley, will merge with *Crop Science*. Articles will be published under journal table of contents headings of the same name to maintain continuity and will be collated annually into year-end electronic collections (“virtual issues”). All articles will be reviewed using normal *Crop Science* standards and format. The review articles will be available online immediately after acceptance and authors will have the option to publish their articles with an open access license.

A new Technical Editor, Commissioning position was developed and added to the *Crop Science* editorial board to manage these commissioned papers. Dr. Irwin Goldman at the Department of Horticulture at University of Wisconsin-Madison was appointed to

the position earlier in 2022. Authors who are interested in submitting a horticultural or plant breeding review may contact Dr. Goldman for further information. Reviews will be accepted on an invitation-only basis. Many thanks are extended to Dr. Ian Warrington, Emeritus Professor at Massey University in New Zealand, for his work on prior volumes of *Horticultural Reviews* and assistance in the transition of papers to *Crop Science*.

“I’m excited about the possibilities that our new arrangement will create for our readers and authors,” said *Crop Science* Editor Dr. Paul Scott.

Look for the first of the *Horticultural Reviews* and *Plant Breeding Reviews* articles to be published in *Crop Science* by the end of 2022. The prior volumes of *Horticultural Reviews* and *Plant Breeding Reviews* as well as author and subject indices will be linked from the *Crop Science* home page on the Wiley Online Library.

> Courses and meetings

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

XI International Blueberry Conference, 9-10 March 2023, Ożarów Mazowiecki, Poland. Info: Mariusz Podymniak, e-mail: mariusz.podymiak@hortusmedia.pl, web: <https://konferencjaborowkowa.pl/en/for-participants/>

MACFRUT2023 – Fruit & Veg Professional Show, 3-5 May 2023, Rimini, Italy. Info: CESENA FIERA S.p.A., e-mail: info@macfrut.com, web: <https://www.macfrut.com/>

IBO Blueberry Summit, July 2023, Lublin, Poland. Info: Dominika Kozarzewska, e-mail: d.kozarzewska@polskiejagody.pl, web: <https://www.internationalblueberry.org/ibo-summit-2023/>



Symposia and
Workshops

➤ X International Congress on Hazelnut

Division Temperate Tree Nuts

#ishs_dnut



➤ Group photo taken outside the CH₂M Hill Alumni Center at Oregon State University, Corvallis, Oregon.

The X International Congress on Hazelnut was held 5 to 9 September 2022, at Oregon State University in Corvallis, Oregon, USA. The 129 people in attendance represented 16 countries and included 17 students. The largest delegations were from the USA (42 people), Chile (31), and Italy (22). The program included a mixture of oral and poster pre-

sentations, field trips, and social activities. The congress began with tours at the OSU research farms, followed by a visit from Caesar the No-Drama Llama, and dinner music by Wild Hog in the Woods. The research tours included the OSU hazelnut breeding program, examples of *Corylus* species, insect pest management, and control of weeds and

suckers. The all-day tour of the Oregon hazelnut industry highlighted the many changes that have occurred in the past 15 years, including an expansion from 12,000 to 38,000 hectares. The first stop at Carter Clark Farms demonstrated use of a Littau over-the-row harvester in an orchard of 'McDonald'. The second stop at Northwest Hazelnut demonstrated one of the industry's large investments in receiving hazelnuts from farmers and processing them. Lunch was served at OSU's North Willamette Research and Extension Center, followed by visits to hazelnut research plots there. Commercial micropropagation was displayed at North American Plants. The final stop on the tour at Christensen Farms included updates on plant nutrition and irrigation. The gala dinner was held at nearby Tyee Winery.

As in past hazelnut congresses, the topics included breeding and genetics, orchard management, rootstocks and propagation, pests, diseases, and the status of hazelnut in producing countries. Two country reports were delivered by Zoom, Veli Erdoğan for Turkey and Mary Qinghua Ma for China. Some topics received greater emphasis at this congress than in the past. These topics included phenology (time of flowering and leaf bud-break), which reflected concern about climate change as well as the challenges associ-



➤ The gala dinner at Tyee Winery started with glasses of wine in the old orchard of 'Barcelona' hazelnut.

ated with expansion of hazelnut plantings to new areas that are considered less than ideal for the crop. There was also an increase in the number of presentations on water needs and irrigation management, reflecting a need for knowledge as orchards are planted in hot dry areas and all countries reporting evidence of climate change. At this congress, there was a striking increase in the number of presentations on insect pests, especially brown marmorated stink bug and green shield bug, reflecting the spread of these pests around the world and the severe damage they cause to nuts and kernels. There was also a full session on weed and sucker control. Eastern filbert blight remains a huge challenge in North America, but considerable progress has been made in breeding resistant cultivars. The winners of the ISHS Young Minds Awards were announced at the close of the congress. Francesca Grisafi of Sacred Heart University (Piacenza, Italy) was awarded best oral presentation for “Analysis of bud and sylleptic shoot distribution among 1-year-old shoots of hazelnut (*Corylus avellana*).” Brian-

na Heilsnis of Oregon State University was awarded best poster presentation for “New sources of eastern filbert blight resistance from Turkey map to Linkage Group 2.” The most important exchanges at all professional meetings occur during coffee breaks, informal conversations, and social activities. We truly enjoyed seeing each other face-to-face. ●

Shawn A. Mehlenbacher

> Contact

Prof. Shawn A. Mehlenbacher, Department of Horticulture, 4017 ALS Bldg., Oregon State University, Corvallis, OR 97331-7304, USA, e-mail: mehlenbs@hort.oregonstate.edu



> Roberto Botta (left) and Shawn Mehlenbacher (right) with the winners of the ISHS Young Minds Awards, Francesca Grisafi (best oral presentation, second from left) and Brianna Heilsnis (best poster presentation, second from right).

> XV International Asparagus Symposium

Division Vegetables, Roots and Tubers

#ishs_dveg

The XV International Asparagus Symposium (IAS2022), under the aegis of ISHS Working Group Asparagus, was held on 12-15 June 2022. This symposium was organized by the University of Cordoba and occurred in their Rectorate building, Cordoba, Spain. Though initially scheduled as an in-person event in 2021, the symposium was postponed for one year due to the COVID-19 pandemic travel restrictions. It was finally hosted in Cordoba as a hybrid event with both virtual and in-person attendance. IAS2022 attracted one hundred participants including asparagus researchers, breeders, and professionals from 17 countries around the world (Argentina, Australia, Canada, Denmark, France, Germany, Italy, Japan, Mexico, Netherlands, New Zealand, Peru, Poland, South Korea, Spain, United Kingdom, and United States). The symposium was opened with a welcome and greeting speech from the convener, Juan Gil (University of Cordoba), and the Chair of ISHS Working Group Asparagus, Neil Stone. Afterwards, Dr. Akira Kanno (Tohoku Univer-

sity, Japan) gave the opening keynote presentation entitled “Applicability of a new sex-linked codominant DNA marker among asparagus cultivars and various *Asparagus* species.” The symposium hosted three other keynote speakers, who addressed specific research topics related to the different sessions. These speakers, listed in the order of the agenda, were Dr. Satoru Motoki from Meiji University, Japan (“Asparagus in the world and Japan – asparagus in Japan in the age of internalization”), Dr. Benjamin Werling from Michigan State University, USA (“Insect pest management in Michigan asparagus fields”), and Dr. Rafael Guillén from CSIC, Spain (“Valorization of asparagus by products”). Over three days, the participants had the opportunity to listen to and see 20 oral and 50 poster presentations, which were divided into five main topics: genetics and breeding; agronomy and production systems; physiology and biochemistry; pathology and pest management; and nutraceuticals, post-harvest and marketing. Posters were pre-



> Lucia Dinolfo, winner of the ISHS Young Minds Award for the best oral presentation.



› Some of the symposium participants.

sented in two ways: a printed version was displayed at the symposium location, and a digital version was available on the website for all the virtual and in-person participants. All oral and poster presentations were of interest to participants, who responded and shared knowledge and experiences with questions, suggestions, and discussions. The programme of the IAS2022 also included a field visit to the wild germplasm collection and breeding program of University of Cordo-

ba. Dr. Roberto Moreno showed the different wild species and two breeding populations with interesting characteristics like stem thickness, high branching, productivity and resistance to *Fusarium* and rust. This symposium also recognized young scientists through the ISHS Young Minds Awards. A special committee selected Lucia Dinolfo (Università degli studi di Palermo, Italy) for the best oral presentation entitled "Distribution and major morphological traits of wild

asparagus (*A. acutifolius* L. and *A. albus*) in Sicily," and Arshdeep Singh Gill (University of Guelph, Canada) for the best poster presentation entitled "Transcriptomic analysis for freezing tolerance in two asparagus cultivars with different adaptation to southern Ontario."

During the closing ceremony, Neil Stone expressed his appreciation to all participants, supporters, sponsors, and to all members of the Organizing Committee for their efforts and contributions. Despite the heat wave that hit Cordoba during those days, the participants enjoyed the symposium and had the opportunity to experience Cordoba and its culture. Overall, the XV International Asparagus Symposium, was a very successful event with high-level research presented in the different areas among ISHS Working Group Asparagus. The proceedings of the symposium will be published in *Acta Horticulturae* after editorial review.

The next International Asparagus Symposium will be hosted by South Korea in 2026. ●

Patricia Castro



› Field visit to an experimental field located at the Research Center 'Alameda del Obispo' from IFAPA, Cordoba.

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> New ISHS members

ISHS is pleased to welcome the following new members:

New Individual Members

Australia: Mr. Ian Atkinson, Dr. Moray Bowater, Mr. Kevin Dodds, Mr. Craig Godham, Andrew Gordon, Mr. Ke Wang; **Belgium:** Prof. Dr. Frederic Lebeau, Ms. Leen Van Doorselaer, Dr. Dorien Vanhees; **Brazil:** Mr. Paulo Duarte; **Canada:** Ms. Karolane Bourdon, Gwendal Breton, Ms. Florence Carrier, Ms. Saba Daeichin, Mr. Raphaël Deragon, Mr. Benjamin Feagin, Charles Frenette-Vallières, Ms. Yelena Esther Gomez Lara, Chris Hall, Dr. Soumaila Kanga Ide, Vincent Lachance, Mr. Félix L'Heureux Bilodeau, Thi Thuy An Nguyen, Mr. Andrés Felipe Silva Dimaté, Mr. Keegan Smith, Philippe Vezina, Mr. John Zandstra; **Chile:** Prof. Karen Gutter, Dr. María Dolores López Belchí, Dr. Rafael López-Olivari; **China:** Dr. Lirui Ren, Dr. Ruiqi Ren, Yunxia Zhang; **France:** Mr. Philippe Boisseau, Mr. Hugo Le Potier; **Germany:** Prof. Dr. Ruediger Anlauf, Mr. Jan Cordel, Paul Daiber, Mr. Melkamu Jate, Johannes Kopton, Tobias Reineke, Christine Schmitz; **Greece:** Dr. Miltiadis Christopoulos, Assoc. Prof. Anastasios Darras, Assoc. Prof. George Xanthopoulos; **India:** Prof. Chitta Ranjan Deb, Ms. G.K. Dhillon, Zorawar Singh Sandhu, Mr. Sandip Shah, Dr. Daljinder Singh; **Indonesia:** Dr. Karlia Meitha; **Iran:** Prof. Dr. Mohammadreza Hassandokht; **Israel:** Prof. Jhonathan Ephrath, Assoc. Prof. Abraham Gamlilel, Mr. Yechezkel Harroch, Mr. Roni Michaelovsky, Assist. Prof. Amnon Schwartz; **Italy:** Dr. Federica Alchera, Dr. Maria Calabritto, Mr. Alessandro Carella, Dr. Costanza Ceccanti, Dr. Roberto Di Biase, Mr. Pietro Levoni,

Marco Lucchetta, Dr. Roberto Massenti, Dr. Lorenzo Rosso, Dr. Alice Varaldo; **Japan:** Konuma Hiroki, Mr. Shintaro Ono, Ms. Junjira Satitmunnaithum, Ms. Miyu Yamaga, Assoc. Prof. Daisuke Yasutake; **Korea (Republic of):** Ms. Suhyun Choi, Hee Jin Park, Ms. Jeong YoungAe; **Lithuania:** Ieva Gudinskaite; **Netherlands:** Ms. Uldanay Bairam, Sjoerd Boersma, Leonie Geerdinck, Mr. Roelof Hadders, Ms. Marjolein Hunck, Dr. Eva Ketel, Charlotte Nederpel; **New Zealand:** Mr. Phil Grindle, Ms. Yujie Han, Josephine Longuet-Higgins, Carlos Lopezlozano, Ms. Raquel Lozano, Mr. Cristhian Velez; **Norway:** Dr. Oddbjorn Bergem, Dr. Trond Knapp Haraldsen; **Pakistan:** Mr. Muhammad Raheel Tariq; **Portugal:** Mr. Henrique Canha, Ms. Ana Paulino; **Romania:** Andreea Antal Tremurici, Dr. Dan Ioan Avasiloaiei, Dr. Adriana Badulescu, Dr. Mihaela Begea, Dumitru Dorel Blaga, Mr. Dumitru Bodea, Mr. Alexandru Bute, Mihaela Alina Buzatu, Ms. Mariana Calara, Delia Cristina Constantin, Assoc. Prof. Maria Dinu, Dr. Eduard Alexandru Dumitru, Mr. Ioan Catalin Enea, Paula-Maria Galan, Mr. Cezar Virgil Hatnean, Dr. Gabriel-Alin Iosob, Ioana Leti, Prof. Dr. Oana Livadariu, Dr. Stefan Nanu, Mr. Nichita Negruseri, Alina-Nicoleta Paraschiv, Dr. Ruxandra Pop, Mr. Daniel Popa, Ms. Patricia Maria Popa, Loredana Mirela Sfirloaga, Assoc. Prof. Rodica Soare, Ms. Alina Carmen Tanasa, Mariana Toma, Dr. Alexandru V. Zagrean; **Senegal:** Mr. Laurel Gbenafa; **Serbia:** Jelena Adamovic, Mr. Nikola Milutinovic; **Singapore:** Prof.

Kee Woei Ng; **South Africa:** Ms. Inge Block, Ms. Liza-Mari Dippenaar, Ms. Miche Kotze, Ms. Angelique Marais, Mr. Ubaidullah Mathews, Mr. Johannes Jacob Pretorius, Mr. Martin-John Richard, Ms. Karen van der Westhuizen; **Spain:** Isabel Egea, Ms. Eva Fernández Osorio, Dr. María José Giménez Torres, Dr. Maria Lopez Martin, Dr. Juan José Martínez-Quesada, Juan Merayo Moran, Dr. Rubén Pérez Añon, Mr. Giuseppe Picca, Dr. Manuel Talon, M Teresa Teijeiro Rodríguez, Prof. Pablo J. Zarco-Tejada; **Sweden:** Mr. William English, Jon Hartill; **Switzerland:** Mr. David Lambelet, Mr. Alex Mathis; **Tunisia:** Ms. Balkis Aouadi, Ms. Eya Yakdhane; **Ukraine:** Assoc. Prof. Yurii Andrusyk; **United Kingdom:** Ms. Michele Abi Hable, Ms. Thuraiya Al Jabri, Mr. Gabriel Comanescu, Mr. Toby Evans, Ms. Ece Imam Moustafa, David Marks, Dr. Amanda Moura, Dr. Raghavendra Prasad; **United States of America:** Imani Andwele, Jack Bobo, Emily Brown Rosen, Anne Carey, Dr. Michael Dukes, Rachel Dyal, Dr. Fernando Finger, Henry Gonzalez, Ms. Julie Grossman, Mr. Andrew Jeffers, Prof. Yufang Jin, Mr. Robert Javin, Annessa Lyle, Mr. Bruce McGraw, Kenneth Oduor, Ms. Clarissa Reyes, Dr. Jhalendra Rijal, Brenda Rudan, Mr. Brandan Shur, Assoc. Prof. Ryan Stewart, Patrick Veazie, Dr. Jared Westbrook, Zach Wick, Trevor Wittke, Caroline Wolcott, Shuxiao Zhang; **Uruguay:** Dr. Cecilia Berrueta; **Vietnam:** Mr. Hoa Xuan Mac, Mr. Pham Tung Thanh.



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> In memoriam

Dra. Maria Luisa Badenes Catalá (1963-2022)



It is with great sadness that we communicate the passing of our friend and colleague, Maria Luisa Badenes Catalá, on 2 September 2022 after an 18-month struggle with cancer. Marisa was a research professor and coordinator of the Center for Citriculture and Plant Production of the Valencian Institute of Agricultural Research (IVIA), Spain, and one of the most important scientists in the long history of the institute.

Marisa devoted her career to horticultural crops, including temperate and minor species fruits, since she finished her PhD in Agricultural Engineering from the Polytechnic University of Valencia in 1991. She was responsible for the plant breeding programs of apricot, peach, loquat, persimmon and kiwifruit for many years and a leading authority in international fruit growing. After two years of postdoctoral training at UC Davis (California), she re-joined the Fruit

Growing Unit of the IVIA with Dr. Gerardo Llácer. They started one of the first two Spanish apricot breeding programs, of which cultivars resistant to sharka were obtained, facilitating the identification of the gene responsible for resistance to this virus in apricot: a milestone of great international impact. She, along with her colleagues, participated in obtaining new varieties of apricot, peach, nectarine, loquat and persimmon, thus diversifying and improving the crop portfolio with cultivars of low chill, high fruit quality traits and expansion of the ripening calendar.

Her scientific career was extensive; she coordinated many international, national and public-private projects. She was also a professor for students seeking Master's Degrees in Plant Breeding, and Plant Molecular and Cellular Biotechnology. She served as the research supervisor for PhD and MS students at the IVIA and the Polytechnic University of Valencia. She was a proficient writer. Her scientific productivity is one of the most voluminous and impactful, including the numerous articles for the industry. She served on the editorial review boards for several scientific journals and was highly respected for her scientific expertise on adaptation of temperate fruit crops.

Dra. Badenes was very active in several scientific organizations, particularly ISHS. She was Chair of ISHS Working Group Persimmon, convened two symposia in Valencia, the VI International Symposium on Persimmon (2016) and the IV International Symposium on Pomegranate and Minor Mediterra-

nean Fruits (2017), and convened the X International Symposium on Temperate Fruits in the Tropics and Subtropics at IHC2018 in Turkey. She also served as general secretary of the European Association for Research on Plant Breeding (EUCARPIA). In Spain, she served as coordinator of Agriculture of the Spanish Agency of Evaluation and Prospective (ANEP) and the Spanish Research Agency (AEI).

Marisa was beloved for being a positive colleague and workmate. "Don't worry" was her favourite expression. She was a kind and loving friend, who appreciated everything. She enjoyed and balanced her ambitious career and her personal life as mother of one daughter, Nuria, and one son, Ezequiel, and grandmother of a 10-month-old girl, Victoria. She enjoyed travelling, both professionally and with her family, skiing or to peaceful destinations with Pasqual, her husband. They were always ready to enjoy classical concerts or opera performances in Valencia or Milan theatres.

IVIA has lost a great scientific woman and Spain has lost an irreplaceable leader and voice for the horticultural and agri-food research community.

Marisa was incredibly loved and admired by many of us who consider her a true friend.

Maria J. Rubio-Cabetas, CITA-Aragón, Spain

*Maria Ángeles Forner-Giner,
IVIA-Valencia, Spain*



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Year 2023

- January 22-26, 2023, Stellenbosch (South Africa): **XIV International Pear Symposium**. Info: Dr. Elke Crouch, University of Stellenbosch, Horticulture, Consumer Sciences Building, Private Bag X1, 7602 Matieland, South Africa. Phone: (27)218084763, Fax: (27)218082121, E-mail: elke@sun.ac.za or Prof. Karen I. Theron, Department of Horticulture, University of Stellenbosch, Private Bag X1, Matieland 7602, South Africa. Phone: (27)218084762, Fax: (27)218082121, E-mail: kit@sun.ac.za E-mail symposium: info@pearsymposium2023.co.za Web: <https://pearsymposium2023.co.za/>
- January 29 - February 2, 2023, Stellenbosch (South Africa): **X International Symposium on Irrigation of Horticultural Crops**. Info: Prof. Stephanie Midgley, Research and Technology Development Service, Western Cape Department of Agriculture, Private Bag X1, Elsenburg, 7607, South Africa. Phone: (27)218085080, E-mail: stephanie.midgley@westerncape.gov.za or Dr. Carlos Poblete-Echeverría, Stellenbosch University, Department of Viticulture and Oenology, Faculty of AgriSciences, SAGWRI, Matieland 7602, South Africa. Phone: (27)218082747, E-mail: cpe@sun.ac.za or Dr. Nicolette Taylor, Dept Plant Production and Soil Science, University of Pretoria, Private Bag X20, 0028 Gauteng Hatfield, South Africa. Phone: (27)124203666, Fax: (27)124204120, E-mail: nicolette.taylor@up.ac.za Web: <https://ishsirrigationsa2023.com> NEW
- April 18-21, 2023, Molfetta (Italy): **XI International Symposium on Artichoke, Cardoon and their Wild Relatives**. Info: Prof. Giancarlo Colelli, Dip. DAFNE Università di Foggia, Via Napoli 25, 71100 Foggia, Italy. Phone: (39) 320 4394535, E-mail: giancarlo.coelli@unifg.it or Prof. Antonio Elia, Dip. DAFNE - University of Foggia, via Napoli, 25, 71122, Foggia, Italy. Phone: (39)0881589237, E-mail: antonio.elia@unifg.it E-mail symposium: info@artichoke2023.org Web: <http://artichoke2023.org>
- April 24-27, 2023, Murcia (Spain): **III International Symposium on Beverage Crops**. Info: Rocio Gil Muñoz, Avda Ntra Sra de la Asunción N24, 30520 Jumilla, Spain. E-mail: mariar.gil2@carm.es or Prof. Dr. Encarna Gómez-Plaza, Universidad de Murcia, Fac. Veterinaria, Dep. Tecnología Alimentos, Campus Espinardo, 30071 Murcia Murcia, Spain. Phone: (34) 868887323, E-mail: encarna.gomez@um.es or Prof. Dr. Cristina Garcia-Viguera, Phytochemistry and Healthy Foods Lab, Dept Food Science Technoloy CEBAS-CSIC, Campus Espinardo 25, Espinardo, 30100 Murcia, Spain. Phone: (34) 968396200, Fax: (32)9686213, E-mail: cgviguera@cebas.csic.es Web: <https://www.bevcrops23.es/> NEW
- May 7-12, 2023, Davis, CA (United States of America): **VIII International Symposium on Almonds and Pistachios**. Info: Dr. Louise Ferguson, 2037 Wickson Hall, Plant Sciences Department Mail Stop II, UC Davis 1 Shields Ave. Davis CA 95616, United States of America. Phone: (1) 559 737 3061, Fax: (1) 530 752 8502, E-mail: lferguson@ucdavis.edu or Dr. Thomas M. Gradziel, Department of Pomology, University of California, 1 Shields Avenue, Davis, CA 95616-8683, United States of America. E-mail: tmgradziel@ucdavis.edu or Bruce Lampinen, Dept of Plant Sciences, University of California, 1 Shields Avenue, Davis, CA 95616, United States of America. E-mail: bdlampinen@ucdavis.edu NEW
- Web: https://ucanr.edu/sites/Almond_Pistachio_2021/
- May 14-16, 2023, Wageningen (Netherlands): **XII International Symposium on Postharvest Quality of Ornamental Plants**. Info: Prof. Dr. Ernst J. Woltering, Wageningen UR, Food and Biobased research, PO Box 17, 6700 AA Wageningen, Netherlands. E-mail: ernst.woltering@wur.nl or Rob Schouten, Wageningen University, Horticulture and Product Physiology, Droevendaalsesteeg 1, 6708 PB Wageningen, Netherlands. E-mail: rob.schouten@wur.nl Web: <https://www.wur.nl/en/show/Postharvest-Unlimited-Conference-Postharvest-Ornamentals-Symposium.htm>
- May 14-17, 2023, Wageningen (Netherlands): **VII International Conference Postharvest Unlimited**. Info: Prof. Dr. Ernst J. Woltering, Wageningen UR, Food and Biobased research, PO Box 17, 6700 AA Wageningen, Netherlands. E-mail: ernst.woltering@wur.nl or Rob Schouten, Wageningen University, Horticulture and Product Physiology, Droevendaalsesteeg 1, 6708 PB Wageningen, Netherlands. E-mail: rob.schouten@wur.nl Web: <https://www.wur.nl/en/show/Postharvest-Unlimited-Conference-Postharvest-Ornamentals-Symposium.htm>
- May 15-19, 2023, Uvero Alto, La Altagracia (Dominican Republic): **X International Pineapple Symposium**. Info: Mr. Joelin Santos, AsoproPimopla, C/ Altagracia 100, Monte Plata, Dominican Republic. Phone: (829)745-0318, E-mail: j.santos@asopropimopla.org E-mail symposium: xpineapple2020@gmail.com Web: <http://www.cedaf.org.do/eventos/xpineapple2020/>
- May 21-25, 2023, Beijing (China): **IX International Cherry Symposium**. Info: Prof. Dr. Kaichun Zhang, Beijing Academy of Forestry & Pomology Sci., Jia 12, Ruiwangfen, Xiangshan Str, Haidian, Beijing, 100093, China. Phone: (86)1082596007, E-mail: kaichunzhang@126.com or Prof. Li Tianhong, No. 2 Old Summer Palace West Road, Haidian District, Beijing, China. E-mail: lith@cau.edu.cn or Assoc. Prof. Guohua Yan, Jia 12, Xiangshanruiwangfen, Beijing, China. E-mail: bigjohn6524@hotmail.com E-mail symposium: cherrysymposium9@126.com Web: <http://2021.cherries.org.cn/>
- May 22-24, 2023, Chengdu (China): **VertiFarm2023: II International Workshop on Vertical Farming**. Info: Prof. Dr. Qichang Yang, 211, IEDA, CAAS, 12#, Zhongguancun South Street, Haidian District, Beijing City, 100081, China. Phone: (86)010-82105983, Fax: (86)010-82106021, E-mail: yangqichang@caas.cn
- June 6-8, 2023, Almería (Spain): **X International Symposium on Soil and Substrate Disinfestation**. Info: Dr. Miguel de Cara, IFAPA-Centro La Mojonera, Camino San Nicolás, 1, 04745. La Mojonera, Almería, Spain. Phone: (34)671532026, Fax: (34)950558055, E-mail: franciscom.cara@juntadeandalucia.es Web: <http://sdalmeria2023.com>
- June 11-16, 2023, Zhengzhou, Henan (China): **VII International Symposium on Cucurbits**. Info: Liu Wenge, Zhengzhou Fruit Research Institute, Chinese Academy of Agricultural Science, South of No.63 Middle School, Hanghai East, 450009 Zhengzhou, Henan Province, China. E-mail: lwghm@163.com E-mail symposium: ISHSCucurbits@caas.cn Web: <http://www.cucurbits2023.cn>

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- June 11-15, 2023, Quebec City (Canada): **I International Symposium on Growing Media, Compost Utilization and Substrate Analysis for Soilless Cultivation**. Info: Prof. Dr. Jean Caron, Dep Soil Sciences and Ag Engineering, Université Laval, Pavillon Envirotron, 2480 Boul Hochelaga, Quebec, QC G1V 0A6, Canada. Phone: (1)4186562131, Fax: (1)4186563723, E-mail: jean.caron@fsaa.ulaval.ca or Prof. Dr. Jacynthe Dessureault-Rompré, 2480 boul Hochelaga, Quebec, Canada. E-mail: jacynthe.dessureault-rompre@fsaa.ulaval.ca Web: <http://www.re3-quebec.org/en>
- June 11-14, 2023, Potsdam (Germany): **VII International Symposium on Applications of Modelling as an Innovative Technology in the Horticultural Supply Chain - Model-IT 2023**. Info: Dr. Pramod Mahajan, Leibniz-Institut für Agrartechnik und Bioökonomie e.V. (ATB), Max-Eyth-Allee 100, D-14469 Potsdam, Germany. E-mail: pmahajan@atb-potsdam.de or Dr. Martin Geyer, Inst. for Agricultural Eng. and Bioeconomy, Dept. Horticultural Engineering, Max-Eyth-Allee 100, D-14469 Potsdam, Germany. Phone: (49)3315699610, Fax: (49)3315699849, E-mail: mgeyer@atb-potsdam.de or Dr. Manuela Zude-Sasse, Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Max-Eyth-Allee 100, 14469 Potsdam-Bornim, Germany. Phone: (49)3315699612, Fax: (49)3315699849, E-mail: mzude@atb-potsdam.de E-mail symposium: model-it2023@atb-potsdam.de Web: <https://model-it2023.atb-potsdam.de>
- June 12-16, 2023, Grenoble (France): **IX International Symposium on Walnut and Pecan**. Info: Dr. Fabrice Lheureux, CTIFL, 28, route des nebots, 24130 Prignonrieux, France. Phone: (33)553580005, E-mail: fabrice.lheureux@ctifl.fr or Benoit Benjamin Villard, RAISONOIX, 1 Le Verger, 26730 Hostun, France. E-mail: mpouchard@senura.com or Ms. Eloïse Tranchand, Perrical, 46600 Creysse, France. E-mail: e.tranchand.creysse@orange.fr E-mail symposium: contact@francenut2023.com Web: <https://francenut2023.com/en/>
- June 13-15, 2023, Oslo (Norway): **IV International Symposium on Plant Cryopreservation**. Info: Dr. Dag-Ragnar Blystad, NIBIO - Norwegian Institute of Bioeconomy R, Division of Biotechnology and Plant Health, Høgskoleveien 7, No-1431 Ås, Norway. Phone: (47)90872588, E-mail: dag-ragnar.blystad@nibio.no Web: <https://nibio.pameldingssystem.no/cryo-2023>
- June 18-21, 2023, Zagreb (Croatia): **V Balkan Symposium on Fruit Growing**. Info: Prof. Dr. Boris Duralija, University of Zagreb Faculty of Agriculture, Department of Pomology, Svetosimunska 25, 10 000 Zagreb, Croatia. Phone: (385)12393726, Fax: (385)12393630, E-mail: bduralija@agr.hr or Prof. Dr. Martina Skendrovic Babojelic, Faculty of Agriculture University of Zagreb, Department of Pomology, Svetosimunska 25, 10000 Zagreb, Croatia. Phone: (385)1 23 94 070, Fax: (385)1 23 93 630, E-mail: mskendrovic@agr.hr E-mail symposium: info@5bsfg.com Web: <https://www.5bsfg.com/>
- June 26-28, 2023, Almería (Spain): **International Symposium on Models for Plant Growth, Environments, Farm Management in Orchards and Protected Cultivation - HorchiModel2023**. Info: Prof. Dr. Francisco Domingo Molina Aiz, Universidad de Almería, CITE II-A, Despacho 1.07, Carretera Sacramento s/n, 04120 Almería, Spain. Phone: (34)950015449, Fax: (34)950015491, E-mail: fmolina@ual.es or Dr. Lorenzo Leon, IFAPA Centro "Alameda del Obispo", Avda. Menendez Pidal s/n, E-14004, Córdoba, Spain. Phone: (34)671532697, Fax: (34)957016043, E-mail: lorenzo.leon@juntadeandalucia.es E-mail symposium: horchimodel2021@ual.es Web: <http://www2.ual.es/horchimodel2021/>
- June 26-29, 2023, Lugo (Spain): **VII International Chestnut Symposium**. Info: Prof. Santiago Pereira-Lorenzo, Universidad de Santiago de Compostela, Escola Politécnica Superior de Ingeniería, Avda. Benigno Ledo sn, 27002

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- Lugo (Galicia), Spain. Phone: (34)982823128, E-mail: santiago.pereira.lorenzo@usc.es E-mail symposium: chestnutlugo23@gmail.com Web: <http://chestnutsymposium.com/>
- June 27 - July 1, 2023, Guangzhou (China): **VII International Symposium on Lychee, Longan and Other Sapindaceae Fruits**. Info: Prof. Dr. Xuming Huang, College of Horticulture, South China Agricultural University, Guangzhou 510642, China. Phone: (86)2085283086, Fax: (86)85282107, E-mail: huangxm@scau.edu.cn Web: <https://yy.scau.edu.cn/7thLLsym/>
- July 2-5, 2023, Genoa (Italy): **XXVII International EUCARPIA Symposium Section Ornamentals - From Nature to Culture: Breeding Ornamentals for Sustainability**. Info: Prof. Mauro Mariotti, DISTAV, University of Genoa, Corso Europa 26, 16132 Genova, Italy. Phone: (39)3538139, E-mail: m.mariotti@unige.it or Dr. Margherita Beruto, Vicolo Barbarossa, 13, 18038 San Remo (Imperia), Italy. Phone: (39) 0184670781, E-mail: margheberuto@gmail.com E-mail symposium: eucarpia2022.gbh@unige.it Web: <https://gbh.eucarpia27.unige.it/>
- July 3-7, 2023, Bari (Italy): **I International Symposium on Plant Propagation, Nursery Organization and Management for the Production of Certified Fruit Trees**. Info: Prof. Salvatore Camposeo, Università di Bari, Dipt. di Scienze Agro-Ambientali e Territor, Via Amendola 165/a, 70126 Bari, Italy. Phone: (39)0805442982, Fax: (39)0805442982, E-mail: salvatore.camposeo@uniba.it or Prof. Dr. Tiziano Caruso, Department of Agricultural & Forest Science, University of Palermo, Viale delle Scienze, Edificio 4 ingresso H, 90128 Palermo, Italy. Phone: (39) 09123861207, E-mail: tiziano.caruso@unipa.it or Prof. Vito Nicola Savino, University of Bari - Microbiologia Applic., Dip. Protezione delle Piante, Via Amendola 165a, 70126 Bari, Italy. Phone: (39)0805443069, Fax: (39)0805443608, E-mail: viton.savino@gmail.com E-mail symposium: info@certfruit2020.org Web: <http://www.certfruit2020.org>
- July 10-14, 2023, Hangzhou, Zhejiang Province (China): **III International Symposium on Fruit Culture along Silk Road Countries**. Info: Prof. Dr. Yuanwen Teng, Dept. Of Hort., College of Agric.& Biotech., Zhejiang University, Zijingang Campus, Hangzhou 310058, China. Phone: (86)571-88982803, Fax: (86)571-88982803, E-mail: ywteng@zju.edu.cn or Prof. Dr. Zhen-Hai Han, Institute for Horticultural Plants, China Agricultural University, No. 2 Yuanmingyuanxilu, 100193 Beijing, China. Phone: (86)1062732467, Fax: (86)1062734391, E-mail: rschan@cau.edu.cn or Prof. Dr. Xingjiang Qi, No. 298 Desheng Middle Road, Hangzhou, China. Web: <http://www.silkroad2021.org/>
- July 16-21, 2023, Portland, OR (United States of America): **XIII International Rubus and Ribes Symposium**. Info: Assoc. Prof. Lisa DeVetter, WSU, 16650 Washington 536, Mount Vernon, WA 98273, United States of America. E-mail: lisa.devetter@wsu.edu or Dr. David Bryla, USDA ARS, Horticultural Crops Research Unit, 3420 NW Orchard Ave, Corvallis, OR 97330, United States of America. Phone: (1)541-738-4094, Fax: (1)541-738-4025, E-mail: david.bryla@usda.gov Web: <https://cvent.me/71bzGL>
- August 14-20, 2023, Weiyuan, Neijiang City, Sichuan Province (China): **VII International Symposium on Fig**. Info: Prof. Dr. Huiqin Ma, China Agricultural University, Yuan Ming Yuan Xi Lu No. 2, Beijing, China. E-mail: hqma@cau.edu.cn or Lei Sun, 42 Wenhua East Road, Jinan, 250014, Shandong Academy of Forestry Sciences, 250014 Jinan, China. Phone: (86)053188557776, E-mail: sun7776@163.com E-mail symposium: figsymposium2023@cau.edu.cn Web: <http://www.fig2023.org.cn>
- August 21-24, 2023, Cappadocia (Turkey): **XIII International Conference on Grapevine Breeding, Genetics and Management**. Info: Assoc. Prof. Arif Atak, Uludag University, Agriculture Faculty, Department of Horticulture, Bursa, Turkey. E-mail:

atakarif@gmail.com E-mail symposium: secretariat@gbg2023.org
Web: <https://www.gbg2023.org/>

- August 28-31, 2023, Tokyo (Japan): **IV Asian Horticultural Congress - AHC2023**. Info: Prof. Dr. Saneyuki Kawabata, Inst. Sustainable Agro-Ecosystem Services, The University of Tokyo, 1-1 Midori-cho, Nishitokyo, Tokyo 188-0002, Japan. Phone: (81)7064429499, Fax: (81)424644393, E-mail: skawabata@g.ecc.u-tokyo.ac.jp E-mail symposium: ahc2023@jtbcom.co.jp Web: <https://ahc2023.org>

- September 5-9, 2023, Bucharest (Romania): **IX South-Eastern Europe Symposium on Vegetables and Potatoes**. Info: Assoc. Prof. Marian Bogoesu, Bucharest, Intrarea Binelui, No.1A, Sector 4, Cod. Postal 042159, Romania. Phone: (0040)214610706, Fax: (0040)214600725, E-mail: bogoesumarian@gmail.com or Assist. Prof. Viorica Lagunovschi-Luchian, University of Agricultural Sciences, Horticulture, 59 Marasti Bld., Sector 1, 011464 Bucharest, Romania. Phone: (40)745254406, E-mail: vluchian@hotmail.com or Prof. Dr. Nazim Gruda, University of Bonn, INRES Horticultural Sciences, Auf dem Hügel 6, 53121 Bonn, Germany. E-mail: ngruda@uni-bonn.de E-mail symposium: simp.pota2023@asas.ro Web: <https://symp.2023-vegetpota.asas.ro/>

- September 10-14, 2023, Davis, CA (United States of America): **IX International Olive Symposium**. Info: Dr. Giulia Marino, Department of Plant Sciences, University of California, Davis, 1 Shields Ave., Davis, CA 95616, United States of America. Phone: (1)5303044509, E-mail: giularino@ucdavis.edu or Dr. Selina Wang, Department of Food Science and Technology, University of California, Davis, 1 Shields Ave., Davis, CA 95616, United States of America. Phone: (1)5307525018, E-mail: scwang@ucdavis.edu or Prof. Reza Ehsani, Department of Mechanical Engineering, University of California, Merced, 5200 N. Lake Road, Merced, CA 95343, United States of America. Phone: (1)2092283613, Fax: (1)2092284047, E-mail: rehsani@ucmerced.edu Web: https://ucanr.edu/sites/2021_Olive_Symposium/

- September 11-16, 2023, Dresden-Pillnitz (Germany): **XVI EUCARPIA Symposium on Fruit Breeding and Genetics**. Info: Prof. Dr. Henryk Flachowsky, Pillnitzer Platz 3a, 01326 Dresden, Germany. E-mail: henryk.flachowsky@julius-kuehn.de or Dr. Jiri Sedláč, Res. & Breeding Inst. of Pomology Holovousy, Holovousy, 50801 Horice, Czech Republic. Phone: (420) 435 692 821, Fax: (420) 435 69 33, E-mail: sedlak@vsuo.cz Web: <https://eucarpia-fruit2023.julius-kuehn.de/>

- September 24-28, 2023, Bucharest (Romania): **VI International Jujube Symposium**. 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. Dr. Mengjun Liu, Research Center of Chinese Jujube, Agricultural University of Hebei, Baoding, Hebei, 71001, China. Phone: (86)312754342, Fax: (86)3127521251, E-mail: lmj1234567@aliyun.com E-mail symposium: jujube@usamv.ro Web: <http://www.jujube.usamv.ro>

- September 25-29, 2023, Almería (Spain): **VI International Symposium on Papaya**. Info: Prof. Dr. Julian Cuevas González, University of Almería, La Cañada de S. Urbano s/n, 04120 Almería, Spain. Phone: (34)950015559, Fax: (34)950015939, E-mail: jcuevas@ual.es E-mail symposium: papaya2021@ual.es Web: <http://www2.ual.es/VI-simposium-on-papaya/>

- September 29 - October 3, 2023, Malaga (Spain): **XIII International Mango Symposium**. Info: Dr. J. Ignacio Hormaza, EE. La Mayora - CSIC, 29750 Algarrobo-Costa, Malaga, Spain. Phone: (34)952552656, Fax: (34)952552677, E-mail: ihormaza@eelm.csic.es or Dr. Víctor Galán Saucó, Isaac Albéniz 17, 38208 La Laguna, Tenerife, Canary islands, Spain. Phone: (34)922261647, E-mail: vgalan46@gmail.com E-mail symposium: mango2020@ihsm.uma-csic.es Web: <https://en.mango2023.es/>

- October 2-5, 2023, York (United Kingdom): **III International Symposium on Carrot and Other Apiaceae**. Info: Ms. Coral Russell, BGA House, Nottingham Road, LN110WB Louth, United Kingdom. Phone: 07792893336, E-mail: coral.russell@britishgrowers.org or Rosemary Collier, Warwick Crop Centre, School of Life Science, The University of Warwick, Wellesbourne, United Kingdom. E-mail: rosemary.collier@warwick.ac.uk E-mail symposium: info@carrotsymposium.com Web: <http://www.carrotsymposium.com>

- October 9-12, 2023, Palermo (Italy): **International Symposium on Tropical and Subtropical Horticulture in Mediterranean Climate**. Info: Prof. Vittorio Farina, Università degli Studi di Palermo, Dipartimento Scienze Agrarie, Alimentari e Forestali, viale delle Scienze edif 4 - 90128 Palermo, Italy. Phone: (+39)09123896090, E-mail: vittorio.farina@unipa.it or Dr. Giuseppe Sortino, Department of Agricultural & Forest Science, University of Palermo, Viale delle Scienze, Edificio 4 ingresso H, 90128 Palermo, Italy. Phone: (39)09123861234, E-mail: giuseppe.sortino@unipa.it E-mail symposium: info@tropmed2020.it Web: <http://www.tropmed2020.it>

- October 9-12, 2023, Palermo (Italy): **II International Symposium on the Role of Plant Genetic Resources in Reclaiming Lands and Environment Deteriorated by Human and Natural Actions**. Info: Prof. Francesco Marra, Department of Agricultural & Forest Science, Viale delle Scienze, Edificio 4 ingresso H, 90128 Palermo, Italy. Phone: (39)09123861236, Fax: (39)09123861211, E-mail: francescopaolo.marra@unipa.it or Dr. Emilio Badalamenti, Viale delle Scienze, Palermo, Italy. E-mail: emilio.badalamenti@unipa.it E-mail symposium: info@ispgr-it2020.it Web: <http://www.ispgr-it2020.it>

- October 18-21, 2023, 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 Web: <http://bmbh2022.com/>

- October 22-27, 2023, Cancun (Mexico): **GreenSys2023: International Symposium on New Technologies for Sustainable Greenhouse Systems**. Info: Dr. Irineo Lopez Cruz, Postgrado en Ingeniería Agrícola, Universidad Autónoma Chapingo, KM 38.5 Carretera Mexico Texcoco, 56230 Chapingo, Mexico. Phone: (52)5959521551, Fax: (52)5959521551, E-mail: ilopez@correo.chapingo.mx or Prof. Dr. Efrén Fitz-Rodríguez, Universidad Autónoma Chapingo, Ing. Mecánica Agrícola/ Posgrado IAUIA, km 38.5 Carretera México-Texcoco S/N, Texcoco, Edo. de México C.P. 56230, Mexico. Phone: (52)5959521500x6252, E-mail: efitzr@taurus.chapingo.mx E-mail symposium: greensys2023@gmail.com Web: <https://www.greensys2023.org/>

- October 22-27, 2023, Cancun (Mexico): **IV International Symposium on Organic Greenhouse Horticulture**. Info: Dr. Irineo Lopez Cruz, Postgrado en Ingeniería Agrícola, Universidad Autónoma Chapingo, KM 38.5 Carretera Mexico Texcoco, 56230 Chapingo, Mexico. Phone: (52)5959521551, Fax: (52)5959521551, E-mail: ilopez@correo.chapingo.mx or Prof. Dr. Efrén Fitz-Rodríguez, Universidad Autónoma Chapingo, Ing. Mecánica Agrícola/Posgrado IAUIA, km 38.5 Carretera México-Texcoco S/N, Texcoco, Edo. de México C.P. 56230, Mexico. Phone: (52)5959521500x6252, E-mail: efitzr@taurus.chapingo.mx or Prof. Martine Dorais, Centre de recherche & d'innovation-végétaux, Laval University, Envirotron Bldg, Room 2120, Quebec G1K 7P4, Canada. Phone: (1)418-6562131, Fax: (1)418-6563515, E-mail: martine.dorais@fsaa.ulaval.ca E-mail symposium: greensys2023@gmail.com Web: <https://www.greensys2023.org/>

- October 31 - November 3, 2023, Rotorua (New Zealand): **XII International Workshop on Sap Flow**. Info: Dr. Michael Clearwater, Department of Biological Sciences, University of

NEW

Waikato, Private Bag 3105, 3240 Waikato Hamilton, New Zealand. Phone: (64)7-8384613, Fax: (64)78384324, E-mail: m.clearwater@waikato.ac.nz E-mail symposium: sapflow2023@confer.co.nz Web: <https://confer.eventsair.com/sapflow2023>

NEW

■ November 8-10, 2023, Aracaju, Sergipe (Brazil): **III International Symposium on Moringa**. Info: Arthur Begliomini, chacara 11 Núcleo CAUB I, 71884-690 Brasília-DF, Brazil. Phone: (55)61999990031, E-mail: ahb.agro@outlook.com or Prof. Dr. Gabriel Francisco da Silva, Rua Pastor Jason Oliveira dos Anjos, 435, 49046090 Aracaju-SE, Brazil. Phone: (55)7931946556, Fax: (55)7931946556, E-mail: gabrieldasilva1961@gmail.com Web: <https://ism2023.com/>

NEW

■ December 3-8, 2023, Tatura, Victoria (Australia): **II International Symposium on Precision Management of Orchards and Vineyards**. Info: Dr. Mark O'Connell, DJPR, Agriculture Victoria, 255 Ferguson Road, Tatura, VIC 3616, Australia. Phone: (61)354831101, Fax: (61)358335299, E-mail: mark.oconnell@agriculture.vic.gov.au E-mail symposium: bradley@ccem.com.au Web: <https://ccem.eventsair.com/pm2023/>

Year 2024

NEW

■ January 16-19, 2024, Bologna (Italy): **VertiFarm2024: III International Workshop on Vertical Farming**. Info: Dr. Francesco Orsini, University of Bologna, Viale fanin, 44, Bologna 40127, Italy. Phone: (39)0512096677, Fax: (39)0512096241, E-mail: f.orsini@unibo.it or Dr. Giuseppina Pennisi, University of Bologna, Viale Giuseppe Fanin 44, 40127 Bologna, Italy. E-mail: giuseppina.pennisi@unibo.it E-mail symposium: vertifarm2024@unibo.it

NEW

■ February 11-15, 2024, 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

■ February 20-24, 2024, Mount Maunganui (New Zealand): **XI International Symposium on Kiwifruit**. Info: Dr. Sarah Pilkington, 120 Mt Albert Road, Mt Albert, 1025 Auckland, New Zealand. Phone: (64)21-809645, E-mail: sarah.pilkington@plantandfood.co.nz Web: <https://events.zespri.com/ishs-kiwifruit2024>

NEW

■ February 26 - March 1, 2024, Marrakech (Morocco): **V All Africa Horticultural Congress - AAHC2024**. Info: Prof. Dr. Abdelhaq Hanafi, Inst. Agronomique et V. Hassan II, BP 30152, Cité Founty, Agadir, Morocco. Phone: (212)48248152, Fax: (212)48248152, E-mail: hanafi.abdelhaq1@gmail.com E-mail symposium: a.hanafi@aahc2024.com Web: <https://www.aahc2024.com/>

■ 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/>

NEW

■ April 23-26, 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 Brasília-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

■ May 5-9, 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

■ 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 Horticulture & Life Science, Yeungnam University, 280 Daehak-ro, Gyeongsan, Gyeongbuk 38541, Korea (Republic of). Phone: (82)538102941, Fax: (82)538104659, E-mail: wookoh@ynu.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

■ June 9-13, 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.sandai@ssica.it or Prof. Dr. Lajos Helyes, Hungarian University of Agriculture, and Life Science, Páter K. str. 1, 2100 Gödöllő, Hungary. Phone: (36)28522071, E-mail: helyes.lajos@uni-mate.hu or Prof. Dr. Zoltán Pék, Hungarian University of Agriculture, and Life Science, Páter K. str. 1, 2100 Gödöllő, Hungary. Phone: (36) 28 522071, E-mail: pek.zoltan@uni-mate.hu E-mail symposium: symposium@worldtomatocongress.com

■ 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

■ 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 Blanus, Science Department, RHS Garden Wisley, GU23 6QB Woking, United Kingdom. E-mail: tijanablanus@rhs.org.uk or Dr. Mark Gush, Royal Horticultural Society, Wisley, GU23 6QB Surrey Woking, United Kingdom. E-mail: markgush@rhs.org.uk

■ November 11-15, 2024, Rotorua (New Zealand): **VII International Symposium on Postharvest Pathology**. 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>

For updates logon to www.ishs.org/symposia

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