

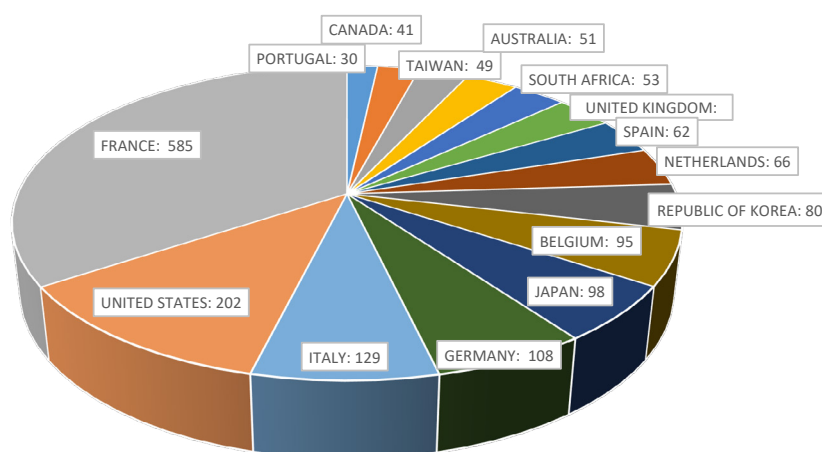
# > IHC2022 – 31<sup>st</sup> International Horticultural Congress

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 <sup>st</sup> keynote speaker	Jean Jouzel (CEA/IPCC, France)	Ameenah Gurib-Fakim (CEPHYR, Mauritius)	Yvonne Pinto (ALINE, UK)	Jennie Macdiarmid (Aberdeen University, UK)
2 <sup>nd</sup> 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 31<sup>st</sup> 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



## › About the authors



› François Laurens

François Laurens, Agronomist, geneticist (PhD), INRAE, Research Institute on Horticulture and Seeds (IRHS, Angers, France), is President of the ISHS since August 2022 and chaired the IHC2022 Executive Committee. As a geneticist, he has bred few promising disease resistant apple varieties. He has led many international research projects (FP7 Fruit Breedomics, Climate-Kic Friendly fruit, H2020 Invite) and is the Director of the French Fruits Scientific Interest Group ([www.gis-fruits.org](http://www.gis-fruits.org)). E-mail: [francois.laurens@inrae.fr](mailto:francois.laurens@inrae.fr)



› Valérie Fichot

Valérie Mathieu-Fichot is Head of the Business Development & Partnerships Convention Bureau at Destination Angers, the Principal Congress Organizer (PCO) of IHC2022. She has worked with Angers Loire Tourism, now Destination Angers, for more than 28 years and contributed to let Angers become a first-class business place for national and international events. E-mail: [valerie.fichot@destination-angers.com](mailto:valerie.fichot@destination-angers.com)



› Emmanuel Geoffriau

Emmanuel Geoffriau is Professor in genetic diversity and agronomy of vegetable crops at L'Institut Agro and researcher at the Research Institute of Horticulture and Seeds, Angers, France. His research deals with genetic diversity, management of genetic resources and genetic determinism combined with environment adaptation of quality traits. He is a French representative to the ISHS Council and Chair of ISHS Working Group Carrot and other *Apiaceae*. He was Vice-President of IHC2022, Chair of the Scientific Committee. E-mail: [emmanuel.geoffriau@institut-agro.fr](mailto:emmanuel.geoffriau@institut-agro.fr)



› Rémi Kahane

Rémi Kahane has been in charge of horticultural research for development at CIRAD in Montpellier, France, since 2002. He was an onion breeder for a farmers' cooperative in France for 15 years, and the Executive Secretary of the Global Horticulture Initiative from 2006 to 2013. He was Vice-President of IHC2022, Chair of the International Committee, and co-organizer of the international 3MHT competition of the congress. E-mail: [remi.kahane@cirad.fr](mailto:remi.kahane@cirad.fr)



› Emmanuelle Rousseau

Emmanuelle Rousseau is the communication advisor of VEGEPOLYS VALLEY, the international plant cluster based in Angers in France. The cluster gathers 500 companies, research and training centers, and was one of the IHC2022 convening institutions. Emmanuelle coordinated the Industry and the Communication Committees of IHC2022. E-mail: [emmanuelle.rousseau@vegepolys-valley.eu](mailto:emmanuelle.rousseau@vegepolys-valley.eu)



› Marine Thuillot

Marine Thuillot is part of Destination Angers staff and was the project manager of IHC2022. E-mail: [marine.thuillot@destination-angers.com](mailto:marine.thuillot@destination-angers.com)