THE INTERNATIONAL ORGANIZATION OF CITRUS VIROLOGISTS - IOCV

Message from the Chair

Dear IOCV members,

It is appropriate to start with acknowledging and thanking Nerida Donovan for her term as chairperson which was an extended period. She was the perfect person to head up the IOCV through the covid era where members connected via the online meeting. Nerida served as chair until hosting the XXIII IOCV in Australia with her team in March this year. It was a most successful and enjoyable meeting, and the memories are shared in this newsletter with a link to photos of the event. Thankfully, Nerida remains on the IOCV board as the past chair and her inputs are highly valued.

Robert Krueger was elected as chair-elect, and it was unfortunate that political influences at the time prevented his attendance of the XXIII IOCV meeting. There were other members from the USA that were similarly impacted and missed.

Irene Lavagi-Craddock, our Secretary and Treasurer is another person who deserves our thanks and acknowledgement for the behind-the-scenes work. Having assumed chairmanship, I have come to understand the administration load she aptly deals with apart from her own work functions.

The board additionally opts members to an advisory council. Georgios Vidalakis remains a passionate IOCV board member and is a driving force to maintain the IOCV as an important body to maintain connections in our niche field. Thank you to all that have assisted and are willing to assist in the advisory capacity.

I previously indicated how I valued the IOCV when I entered the realm of citrus. It was individuals such as Prof Elliott Watanabe Kitajima, Dr Raymond Yokomi and Prof Zhou Changyong who shared a vision and contributed to this organisation. We honour these members as Fellows of the IOCV. I further encourage active participation especially from the younger members. It is to everyone's benefit to stay connected and share experiences. A note of thanks to Moshe Bar Joseph who still imparts his experience even in retirement. Please read Moshe's submission and note his recent publications.

Thank you to those that contributed to this edition.
Enjoy the read.

Glynnis

IOCV Business

IOCV Business meeting

A business meeting of the IOCV was held at the XXIII IOCV conference on 18 March 2025.

During the meeting, additions to the By Laws were accepted by the membership. The current By Laws can be found at https://iocv.ucr.edu/laws-iocv.

Three members were nominated as IOCV Fellows; Professor Zhou Changyong (China), Professor Elliott Watanabe Kitajima (Brazil), and Dr Raymond K Yokomi (United States).

Members agreed to change to annual membership fees to avoid the ambiguity around the renewal process and to raise membership fees to USD$50 per year for full membership and USD$35 per year for students. Memberships for those who renewed shortly before or during the 2025 conference will be honored through 31 December 2027, with the next membership fees due on 1 January 2028.

For more information or to renew your membership, please visit the following link:

http://journalofcitruspathology.com/iocv_membership.html

Members agreed to continue on the path to include all citrus diseases and related topics in the IOCV.

Secretary / Treasurer's Report

Annual membership dues are now USD $50.00 for full members and USD $35.00 for students.

A membership platform is under development, and more information on membership renewal will be provided once it is finalized.

Newsletter contributions

Thank you to those who have contributed to the current and past editions of the IOCV newsletter.

If you have something that you would like published in the newsletter, please send your contribution to iocvsecretary@gmail.com .

If you know of an IOCV member who has retired or is no longer with us, please email their name and, if possible, a tribute to iocvsecretary@gmail.com so that we can honor their contribution to IOCV.

Save the Date

IOCV-XXIV will be held in conjunction with IRC HLB in São Paulo in 2027.

- **IOCV-XXIV: October 25, 2027**
- IRCHLB: October 26–29, 2027

Additional information is available from Fundecitrus announcement

Advertise your event in the IOCV newsletter email iocvsecretary@gmail.com

Prof. Elliot Watanabe Kitajima

Academic background

Prof. Kitajima obtained a Ph.D. in Agronomy (Plant Pathology) from the Escola Superior de Agricultura Luiz de Queiroz, University of São Paulo in 1967. His doctoral work on the morphology of plant viruses and ultrastructural changes in infected tissues laid the foundation for his career in plant virology. Elliot was a research scientist at the Agronomic Institute of Campinas (1959-1973), professor at the University of Brasília (1973-1995) and a visiting professor and coordinator of the Electron Microscopy Research Group at the University of São Paulo (1995-2006). His distinguished career spans over six decades, focused primarily on electron microscopy of viruses and their cytopathic effect on host plants. He has more than 530 scientific publications that attest to his impact. Elliot formally retired in 2006 but continued as a dedicated volunteer and collaborator with unwavering commitment to scientific advancement.

Scientific contributions

His work on citrus leprosis-associated viruses and their transmission by Brevipalpus mites was foundational to understanding citrus leprosis. In 1972, he was the first to provide images of viral particles associated with leprosis symptoms in sweet orange. He later demonstrated that more than one type of viral particle was associated with these symptoms, indicating that leprosis was caused by different viruses, an insight confirmed in the following decades. His name has been immortalized in science with the establishment of the family Kitaviridae by the International Committee on Taxonomy of Viruses (ICTV) and the new species of mite *Tenuipalpus kitajimai* sp.nov.

Prof. Kitajima's work was also key to the understanding of other citrus pathogens. He was the first to observe viral particles in citrus plants exhibiting symptoms of tristeza confirming the viral nature of the disease. He published this widely cited finding in Nature in 1964.

His work on citrus graft-transmitted bacteria included some of the best known and used micrograph images of *Xylella fastidiosa* and '*Candidatus* Liberibacter asiaticus'.

Commitment to the IOCV and Scientific Community

Throughout his career, Prof. Kitajima was actively engaged in international scientific collaborations and academic mentorship. His leadership roles at institutions such as the Universities of Brasilia and São Paulo (ESALQ) shaped new generations of plant virologists and his dedication as a mentor has inspired numerous researchers who continue his legacy in citrus virology and plant pathology.

Elliot was an active participant of the IOCV with an openness to interact and share information. We honour him for imparting his knowledge, his lifelong dedication to the advancement of citrus virology, his instrumental contributions to the scientific community and his unwavering support for the mission of the IOCV.

Dr. Raymond K. Yokomi

Academic background

Dr. Yokomi earned his B.S. in Entomology (1969) and Ph.D. in Entomology (1979) from the University of California, Davis, specializing in insect vectors of citrus pathogens. Early in his career, he conducted pioneering research on aphid transmission of citrus tristeza virus (CTV) and epidemiological studies of insect-borne citrus diseases, laying the foundation for a distinguished career in citrus pathology. Since 1997, he has served as a Research Plant Pathologist at the USDA Agricultural Research Service (ARS) in Parlier, California, where he has developed diagnostic tools, improved disease management strategies, and contributed to the understanding of citrus pathogen transmission and epidemiology.

Scientific contributions

Dr. Yokomi's career has been marked by major breakthroughs in citrus virology that impacted how the industry and citrus programs detect, manage, and mitigate viral and bacterial threats. He has over 80 peer-reviewed publications to his name and further contributed to 12 book chapters. His research on CTV has been instrumental in improving disease surveillance and control strategies, particularly in California, where he played a key role in identifying resistance-breaking strains affecting trifoliate orange rootstocks. His work on CTV transmission mechanisms has informed our understanding of aphid-mediated spread, contributing to more effective vector control programs. In addition, his studies on CTV mild strain cross-protection have been widely cited and have informed disease management strategies in multiple citrus-growing regions worldwide.

Beyond CTV, Dr. Yokomi contributed to HLB research. Since 2017, he focused on improving diagnostics and disease progression models for 'Candidatus Liberibacter asiaticus' (CLas). His work led to the development of advanced molecular detection methods, including duplex droplet digital PCR assays for absolute quantification of CLas, which provide greater precision in pathogen detection. His research also contributed to the identification of seasonal fluctuations in pathogen titers, informing best practices for sampling and early detection.

Dr. Yokomi's contributions to citrus stubborn disease (*Spiroplasma citri*) have been equally impactful. His studies have clarified the molecular characteristics of *S. citri* strains, leading to enhanced detection accuracy with real-time PCR diagnostics. His research further focused on the role of leafhopper vectors in stubborn disease transmission, providing critical insights into vector-pathogen interactions that inform integrated pest management (IPM) strategies.

In addition to his extensive work on viroids and bacterial pathogens, Dr. Yokomi played a critical role in early detection and characterization of emerging threats such as the citrus yellow vein clearing virus (CYVCV). His recent research on CYVCV has helped identify host range, transmission dynamics, and genomic diversity, contributing to regulatory efforts aimed at containing this newly detected virus in California.

Dr. Yokomi has been at the forefront of diagnostic innovation, leading the development of rapid molecular assays for detecting citrus pathogens. The implementation of various qPCR, droplet digital PCR (ddPCR), and loop-mediated isothermal amplification (LAMP) assays have significantly aided pathogen detection. He further facilitated the development of portable field-based detection methods, allowing for real-time pathogen monitoring in citrus groves.

Commitment to the IOCV and Scientific Community

Dr. Yokomi has been a dedicated IOCV member since 1980 and actively contributed through leadership, research dissemination, and mentorship. He attended and presented at 11 of the last 12 IOCV conferences. His contributions to the IOCV Conference Proceedings include 21 peer-reviewed papers. He also served as a Co-Editor of the Proceedings of the 13th and 14th IOCV Conferences, ensuring the dissemination of high-quality citrus virology research.

Beyond IOCV, Dr. Yokomi has played a pivotal role in advising and supporting industry and government efforts to shape the research agenda for citrus disease mitigation. He is also a dedicator mentor and educator to many researchers and helped cultivate the next generation of citrus virologists, ensuring a legacy. We honor Ray for his real-world impact.

IOCV Fellows 2025

Prof. Zhou Changyong

Academic background

Professor Zhou graduated from Southwest Agricultural University in 1986 and completed his graduate studies at the Chinese Academy of Agricultural Sciences (CAAS) in 1989 whereafter he worked at the Citrus Research Institute of CAAS. In 1997 he was awarded the John Allwright Fellowship and obtained his PhD in 2001 in Plant Pathology at the University of Sydney, Australia. His doctoral research was primarily conducted at the Elizabeth Macarthur Agricultural Institute, and he received the John Dillon Memorial Award from the Australian Centre for International Agricultural Research (ACIAR) for his research which identified the reason for CTV cross-protection failure in red-fleshed grapefruit and proposed measures that were adopted by Australia's virus-free propagation system.
Professor Zhou became the Director of the Plant Protection Division at the Citrus Research Institute of CAAS and led the establishment of the "National Centre for Citrus Virus Exclusion." He developed a virus-free citrus germplasm propagation system, which supported the rapid development of China's citrus industry. Since 2007, he served as the Director of the Pest and Disease Control Functional Laboratory of the National Modern Agricultural (Citrus) Industry Technology System and as the Chief Scientist for Citrus Plant Protection. Prof Zhou guided the "National Plan for Citrus Pest-Free Zone Construction" for the Ministry of Agriculture of China leading to the establishment of a citrus pest-free zone in Chongqing. He further led the development of citrus industry plans for major citrus-growing regions and participated in the development of the "National Advantageous Agricultural Products Regional Layout Plan". In 2007 he headed up the "National Citrus Engineering Research Center". He went on to lead a project on integrative control technology for fruit virus diseases.

Scientific contributions

As HLB was impacting Chinese citrus Prof Zhou was integral in developing control strategies. Under his technical guidance, a national monitoring and early warning system for HLB and citrus psyllids was established. HLB research achievements include the establishment of a semi-in vitro culture system for CLas used for rapid screening of CLas control agents, discovery of multiple effectors of CLas involved in citrus autophagy defense mechanisms, the editing of CLas lyase genes to enhance citrus resistance and the elucidation of regulatory mechanisms of several transcription factors of CLas.
Prof Zhou also led the team that identified citrus yellow vein clearing virus (CYVCV) in Yunnan and identified the natural vectors. He established an integrated control strategy to minimize losses in nearly one million acres of lemon plantations.
Prof Zhou has published numerous scientific papers and contributed to 6 books on citrus and diseases of citrus.

Commitment to the IOCV and Scientific Community

Prof Zhou was IOCV chairperson from 2013 to 2016. He hosted several international conferences in Chongqing, China, including the 8th International Congress of Citrus Nurserymen in 2008 and the 20th IOCV Conference in 2016. Over the span of his career, Prof Zhou has supervised and trained over 10 postdoctoral researchers, more than 40 doctoral students and over 50 master's students. He has mentored many outstanding researchers in citrus pathology in China, laying a solid foundation for the future.

We honor Changyong for his impact on the citrus industry of China by establishing research capabilities and facilities, for the development of HLB control strategies in China, for his overall contribution to citrus pathology and for his service to the IOCV and continued support of the organization.

Journal of Citrus Pathology

What's new in your journal?

Volume 12, Issue 1, 2025

A case study on the risk of spread of citrus huanglongbing in family farming in São Paulo and Minas Gerais States, Brazil

California Statewide Action Plan for Asian Citrus Psyllid and Huanglongbing

Volume 12, Issue 2, 2025

The abstracts of the oral and poster presentations of the 23rd Conference of the International Organization of Citrus Virologists (IOCV), held in Mildura, Australia, March 16-20, 2025.

Access and submit manuscripts @
https://escholarship.org/uc/iocv_journalcitruspathology

Please consider submitting manuscripts for presentations of the XXIII IOCV conference. Students and those financially supported by IOCV to join the conference are requested to do so.

Interesting Phenomena

Not always the expected!

By Glynnis Cook, Kobus Breytenbach, Rachelle Bester and Hano Maree
Citrus Research International, South Africa

Galls were observed on branches of isolated trees of a seedless (irradiated) lemon cultivar planted on Rough Lemon rootstocks in the Eastern Cape province of South Africa in 2023. The galls were seen in the tree canopy, confined to single branches but not found on the trunk or rootstock (Fig. 1A, B, C). Symptomatic trees were scattered through the orchard. Gall formation on citrus has been ascribed to either the citrus gall wasp, citrus vein enation virus (CVEV) or *Rhizobium radiobacter*.

Samples were collected at two orchards at separate time frames during the investigation. Galls were dissected and no wasp larvae were found. Numerous attempts to isolate pathogenic bacteria were unsuccessful, but epiphytic bacteria were isolated from some samples. High-throughput sequencing (HTS) for the first samples yielded bacterial sequences with low sequence identity (90%) to a *Rhizobium* spp. (syn. *Agrobacterium*) but also CVEV sequences. These findings were confirmed with PCR/RT-PCR. Neither *Rhizobium spp*. nor CVEV were detected with PCR/RT-PCR in samples collected from the second orchard which was established on the X639 rootstock.

Patch-grafts to Mexican Lime, Etrog Citron and Rough Lemon seedlings were done from the galled field material collected from the second orchard. Bark from non-galled sections of the affected branches were used for grafting. Galls developed a month after grafting on the bark patches grafted to all three hosts (Fig. 1D). These galls were restricted to the patch-grafts and no further galls developed along the stems of the three host plants, two years after grafting. These galls significantly increased in size over time but remained restricted to the patch-grafts (Fig. 1E). Attempts to isolate bacteria from the recipient hosts were unsuccessful and no CVEV was detected.

Galls appear similar to burr knots, reported for other fruit crops and results suggest a probable genetic cause for this gall formation. Affected trees showed only single branches that were galled and each bud on the affected branch developed into a gall (Fig. 1B). A genetic cause for the gall formation is supported by their restriction to the graft-patches on the indicator hosts and no pathogen could be detected either by isolation or RT-PCR. We therefore conclude that the cultivar is likely prone to develop galls following unknown genetic triggers.

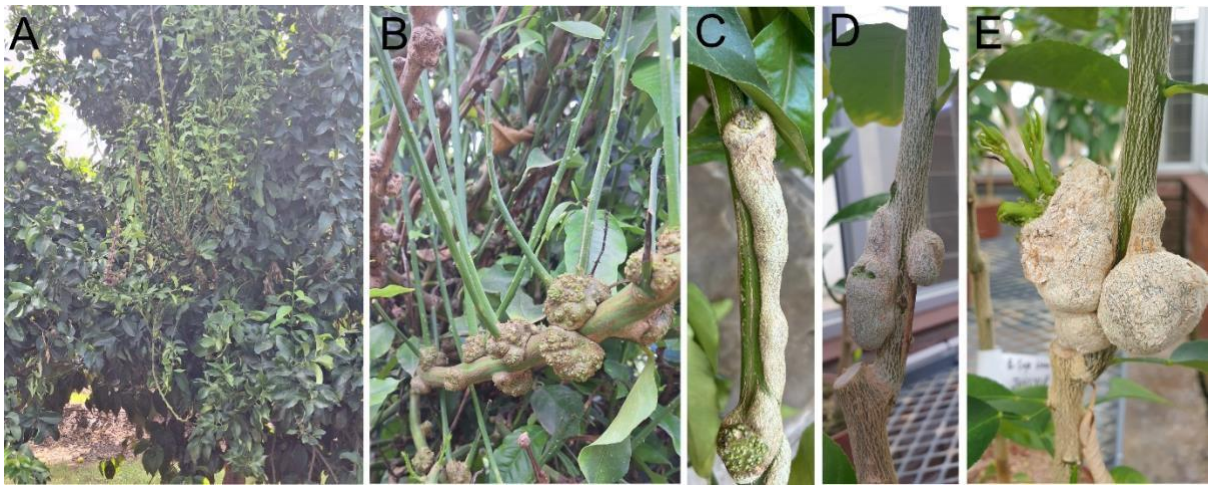


Figure 1. Lemon tree with galled branch (A). Galls developing from each bud along the stem and multiple shoots developing from each bud (B & C). Galls that developed on graft-patches on the indicator hosts (D & E).

Regional or Core Lab Updates

Sicily, Grazia Licciardello

Researchers of the Research Centre for Olive, Fruit and Citrus Crops of the Council for Agricultural Research and Economics (CREA-OFA), and the Agrobiotech company, a spinoff of Science and technology Park of Sicily, have advanced studies on how no-seedling yellows (no-SY) Citrus tristeza virus isolates suppress homologous SY variants of the VT genotype. The team, coordinated by Grazia Licciardello, focuses on unravelling the mechanisms of CTV cross-protection to streamline the potential use of cross-protecting variants of CTV to defend citrus plants grafted on sour orange (SO). This strategy is aimed to overcome some limitations of alternative CTV tolerant rootstocks in Sicily's sub-optimal soils, the occurrence of dry root rot in wet soils, and some graft incompatibility disorders.
Six Sicilian mild no-SY VT isolates, proved to be effective in the protection of three severe local SY VT isolates, differing in eight conserved positions of p23, p33, and Orf1a genes. Multiple approaches based on NGS sequencing and a High Resolution Melt assay designed on the G/A mutation of the p23 gene demonstrate that the SY isolate fails to establish infection or replicate in plants pre-inoculated with no-SY isolates. Transcriptomic data indicates that the SIE mechanism triggered by M39D no-SY isolate induces a response in SO distinct and less severe than the response induced by the aggressive isolate. Results lead us to confirm that a superinfection exclusion (SIE) mechanism is involved.
Long term field plots show that selected mild VT isolates are still asymptomatic on sour orange even after 10 years and protect SO seedlings and sweet orange grafted on SO even after 6 years from the inoculation of homologous aggressive (SY) VT isolates. Those without pre-inoculation yellowed and declined in a short time.
Further evaluations will clarify the evolution of the variants' interplay in coinfected plants, other factors involved and the physiological effects of multiple infections.

(Licciardello, G.; Scuderi, G.; Russo, M.; Bazzano, M.; Paradiso, G.; Bar-Joseph, M.; Catara, A.F. 2025. Progress in Our Understanding of the Cross-Protection Mechanism of CTV-VT No-SY Isolates Against Homologous SY Isolates. Pathogens, 14, 701. https://doi.org/10.3390/pathogens14070701)

Pre-immunized Tarocco sweet orange on sour orange plant.

Regional or Core Lab Updates

China, Changyong Zhou

The most important task for the National Center for Citrus Virus Exclusion (NCCVE) located at Citrus Research Institute, Southwest University, is to study the prevention and control of citrus Huanglongbing (HLB). In 2025, my leading state key R/D project (Study on catastrophe mechanism of HLB and its sustainable prevention and control technology) has passed the acceptance. One of the highlights of the project cooperated with Dr. Jian Ye's group from the Institute of Microbiology, Chinese Academy of Sciences, is identification of citrus E3 ubiquitin ligase gene PUB21 as a susceptibility gene for CLas, of which the PUB21DN paralogous homologs present in distant relatives of citrus, such as pepper and curry, exhibit a dominant negative effect due to a critical amino acid variation at position 39, which enhances the stability of MYC2 protein, activates multiple anti-disease proteins and secondary metabolite synthesis pathways, thereby conferring high resistance or even immunity to citrus against HLB (Science, 388, 191–198). Another two papers recently published by my group might interest you: 1) A secretory protein from CLas targets SNARE protein CsVTI13 to suppress autophagosome-vacuole fusion and promote bacterial infection (Autophagy, https://doi.org/10.1080/15548627.2025.2569683); 2) Single-nucleus transcriptomics reveals the cellular immune responses to CLas in rough lemon (Horticulture Research, https://doi.org/10.1093/hr/uhaf265), revealing that CLas infection suppresses phloem cell differentiation while promoting the differentiation of cambium cells into defense-related xylem cells. Currently my lab is focusing on in vitro culture of CLas, interactions between CLas and hosts, and screening of its cure active molecules.

Another key task for NCCVE is to study the prevention and control of citrus virus and virus-like diseases. Although quite a few new citrus virus species (strains) have been found, the main work is focusing on the pathogenicity of CP and cysteine-rich protein (CRP) of citrus yellow vein clearing virus (CYVCV) [Horticulture Research,12(1): uhae287; Journal of Virology,99(6):10.1128/jvi.02237-24]. Another highlight is the discovery of 43 viroid-like RNAs across 16 plant species, including a novel viroid-like RNA in citrus, which may not be directly infectious to citrus but is potentially linked to endophytic fungi, and a novel RHVd-1 (rose hammerhead viroid 1) with the largest genome (506 nt) among known viroids (Plant Biotechnology Journal, https://doi.org/10.1111/pbi.70462).

Regional or Core Lab Updates

Australia

The XXIII IOCV conference was held in Australia in March 2025 – see the conference update later in this newsletter. Three grower events were held prior to the conference in Griffith (New South Wales), Loxton (South Australia) and Mildura (Victoria) which provided international perspectives on citrus disease threats with guest presenters Dr Silvio Lopes from Brazil, Professor Hans Maree from South Africa and Professor Georgios Vidalakis from the United States. Dr Nerida Donovan also presented on Australian preparedness activities for key citrus biosecurity threats. The events were well attended by industry and lasted several hours with rigorous discussion given the concern over the devastating threat that huanglongbing poses to the Australian citrus industry if it breaches our border. The group also engaged with Australian growers during field visits in the Riverina, accompanied by Andrew Creek (Industry Development Officer, Griffith), and at Tooleybuc, accompanied by Steven Falivene (Industry Development Officer, Dareton).

From L to R: Georgios Vidalakis, Vito Mancini (Riverina, Australia), Mark Doecke (Riverland, South Australia), Silvio Lopes, Andrew Creek and Hans (Hano) Maree at Vito's orchard

Regional or Core Lab Updates

South Africa, Citrus Research International (CRI)

Two laboratories within CRI support the research and diagnostic needs related to graft transmissible diseases (GTDs) of the southern African citrus industry. These are the Citrus Research Centre in Nelspruit and the Citrus Biotechnology Laboratory in the Department of Genetics at Stellenbosch University. Only three GTD pathogen complexes impact our industry to various degrees. Of these, African Greening (HLB-CLaf) is the most significant. The disease is successfully being managed locally, but with the detection of HLB-CLas on the African continent, research was intensified and surveillance prioritised. Citrus tristeza virus (CTV) remains a focus area due to the CTV cross-protection programme of the Citrus Improvement Scheme (CIS). Although the industry has not experienced significant CTV-related problems in recent years, continued research is maintained to ensure preparedness should problems arise (10.1094/PDIS-04-25-0873-RE). The same applies to citrus viroids. A successful plant improvement scheme is the foundation of a healthy industry, but that may change with changing practices such as top-working existing orchards to new cultivars. We are investigating the impact of viroids on rootstock-scion combinations for this reason. Extensive research has been undertaken to validate the use of high-throughput sequencing (HTS) for the routine detection of citrus viruses and viroids. These efforts included detailed evaluations of the repeatability, reproducibility, and sensitivity of HTS in comparison with conventional RT-PCR assays. In addition, various RNA extraction methods were assessed to optimise the simultaneous detection of both citrus viruses and viroids, and different sequencing platforms were systematically evaluated for their diagnostic performance. Beyond routine screening, HTS also serves as a powerful tool for the discovery and characterization of previously unknown viruses in citrus. Based on these advances, procedures for the routine application of HTS in the CIS are being optimized to ensure that all new cultivar introductions, processed through the shoot-tip grafting pipeline, are accurately screened and verified to be pathogen-free. Occasionally we encounter atypical scenarios, such as an orchid fleck virus leprosis outbreak which has fortunately been contained. We have also recently detected a citrus-infecting emaravirus (10.1007/s00705-025-06424-0).

Reflections of a non-retired Retiree

Israel, Moshe Bar Joseph

We celebrated the week of *Sukkot*, the Tabernacle Festival, marked by the *etrog* (citron fruit), a young palm frond (*lulav*), branches of willow, and myrtle. The holiday is also known as the "Festival of Ingathering," the season when ancient farmers in this region gathered their produce of dried figs, raisins, and other crops for long-term preservation in their home storerooms.

Unlike the edible produce meant for storage, the four ritual plant species symbolize other traditional uses of plants:

- The *etrog* was valued as an ornamental fruit for its beauty and fragrance.
- The young palm frond served as material for weaving baskets.
- The willow leaves were known for their pain-relieving properties — the active compound of aspirin, salicylic acid, in fact derives from *Salix*, the Latin name for willow.
- The myrtle was prized for its pleasant scent, used to refresh the modest homes of our ancestors.

In this spirit of *Sukkot*, a time of reflection and gathering the fruits of one's labour, I would like to share my own "harvest" from the past year: the results, thoughts, and observations that have ripened through research, writing, and collaboration.

Bar-Joseph M. On the Trail of the Longest Plant RNA Virus: Citrus Tristeza Virus. Viruses. 2025 Mar 31;17(4):508. doi: 10.3390/v17040508. PMID: 40284951; PMCID: PMC12031271.

Bar-Joseph M. On the Trail of Viroids a Return to Phytosanitary Awareness. Pathogens. 2025 May 29;14(6):545. doi: 10.3390/pathogens14060545. PMID: 40559553; PMCID: PMC12196519.

Bar-Joseph M On the Trail of Stubborn Bacterial Yellowing Diseases. *Microorganisms*, (2025). *13*(10), 2296. https://doi.org/10.3390/microorganisms13102296

As a citrus pathologist, I also followed the HLB (huanglongbing) problem long before Bové replaced its earlier common name, *greening*, with the Chinese term. I first saw greening-diseased trees in 1972, during my first IOCV meeting in Swaziland and the pre-conference tour in South Africa. There, the late A. P. D. McLean showed us a small experimental plot of greening-infected trees. Later, at Nelspruit, Ralph Schwarz and John Moll demonstrated their control attempts using antibiotic injections. The practice was discontinued after two years, allegedly due to resistance development—though that claim was not strongly supported by evidence. The South African form of greening was always much more erratic in its appearance compared with the Asian type.

On my way back from South Africa, an Israeli advisor in Kenya asked me to look into a new problem affecting some orchards. I stopped for three days, visited the Tica station at high elevation, and observed several trees suspected of greening. We then visited a large private farm owned by a British gentleman—who, I later heard, got into trouble. He showed us a grove where many trees displayed symptoms he blamed on fertilizer deficiency. The uneven distribution and erratic appearance of symptoms convinced me that fertilizers were not the problem. Upon returning home, I wrote a short report, and the Kenyan government invited FAO to send Dr. Schwarz as an expert. Sadly, about a year later, Ralph was killed in a road accident there. He had lived with his elderly mother, which made the tragedy even more painful.

I came across greening again in 2005 while lecturing on the disease at Alelix. Two agronomists from Citrovita attended and asked me to divert a planned tour to visit some HLB-diseased trees at Cambuhy. We were first shown an older grove with a few typical greening-diseased trees, followed by a young two-year-old grove where every tree showed typical symptoms—but only on the apical branch. I had never seen such a pattern. After about an hour there, I noticed that the grove had been inarched several months earlier, and to promote the inarch, the workers had performed massive girdling around almost the entire circumference of the trunks, blocking carbohydrate flow and producing greening-like symptoms. When I pointed this out, they seemed almost angry for not realizing it themselves. We left the farm without so much as a thank-you or a goodbye.

It was a late lesson in my career—one every farm advisor eventually learns: never leave clients with the impression that their problem was simple and that they could have solved it on their own.
Two years later, I was reading the trade periodical *Fresh Plaza*, which featured an article on Cuban citrus exports to Europe. You may recall Luis Navarro's lecture at one of the IOCV meetings, where he praised the wonders of Cuban citrus. After the collapse of the Soviet Union, Cuba lost its Russian market, and the citrus industry was taken over by a private company whose experts I knew. In that article, some photos of Cuban groves looked suspiciously like greening. I wrote to a colleague, who replied that the trees suffered from fertilizer shortages, since most fertilizer was diverted to home gardens—the main food source for many workers.
Remembering my experience in Kenya, I advised them to check for greening. They invited me in December 2007, and what I observed there was the worst type of epidemic. I pointed out the problem and warned about the grim prognosis, which they absolutely disliked. Their concern was understandable—the citrus plantation was the main food supplier for a large community, and the prospect of losing their livelihood was terrifying. Unfortunately, the situation unfolded exactly as predicted. I still hope they will recover someday.

In Memoriam

Tribute to Professor Zhao Xueyuan

Professor ZHAO Xueyuan, IOCV Fellow, passed of illness on August 18th, 2025, at the age of 93 !

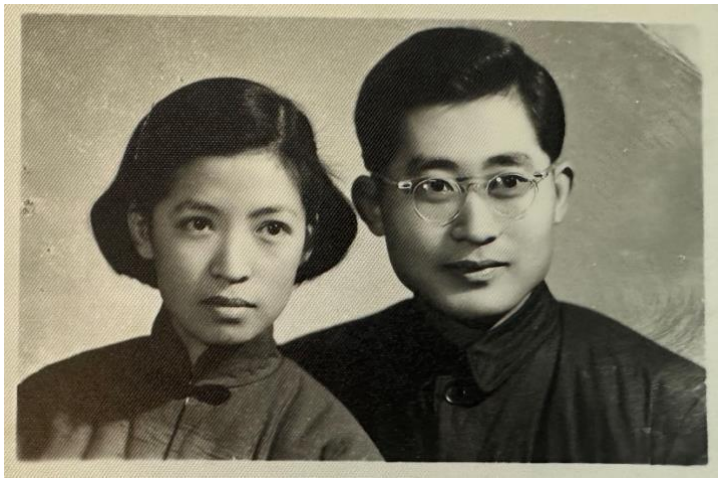
Prof. Zhao was a China National Model Worker, a former member of National Committee of Chinese People's Political Consultative Conference, former representative of Chongqing Municipal People's Congress, former deputy director of Citrus Research Institute, Chinese Academy of Agricultural Sciences (CRIC) and a well-known plant pathologist in China.

Prof. Zhao dedicated his life to the prevention and control of citrus graft-transmissible diseases, becoming one of the founding pioneers in research on citrus Huanglongbing (HLB) in China after immersing himself in field frontline scientific work in Liuzhou, Guangxi province for decades assigned by CRIC. His pioneer work "Application of Antibiotics in HLB Prevention" won the China National Science Conference Award in 1978, and the "Three Fundamental Prevention and Control Measures for HLB" initially summarized by him and coordinators, has been continuing to guide HLB management in China and even throughout the world. He also made significant contributions to the development of the Citrus Virus-free Propagation Scheme in China. With rigorous scholarship and industrial dedication, his achievements have benefited countless citrus growers. The spirit of scientists who "write their papers on the land" remains our cherished legacy, a timeless legacy in the Orange Homeland!

Prof. Zhao was devoted to the cause of science and had a great love in his heart; his passing is a great loss to the citrus industry. He voluntarily chose to donate his body for medical research and education after his death. This noble act of kindness was the last manifestation of his selfless dedication and set an immortal example for successive scholars.

His wife, Prof. JIANG Yuanhui, sadly passed on November 18th 2025. They are survived by their two daughters and families. They will be dearly missed.

The tribute was provided by Professor Zhou Changyong.



Prof. Zhao and Jiang in 1958 and March 2025

Conference Update

The XXIII IOCV conference was held in AUSTRALIA.

The XXIII IOCV conference was held in Mildura, on the banks of the Murray River in the Sunraysia citrus growing region from 16-20 March 2025.

The conference was attended by 74 delegates from 14 countries who spent four days reconnecting, sharing knowledge and discussing how best to protect our global industry from citrus diseases.

See images from the conference at: https://drive.google.com/drive/folders/1vnuYr4jPAqVi3MYVmqVaZBG8HCf-Dh-P?usp=sharing

Submit your conference paper to the:

Journal of Citrus Pathology

The **conference program** included 14 sessions covering huanglongbing and other bacterial diseases, citrus viruses and viroids, fungal diseases, diagnostics, vectors and citrus programs. There were eight keynote talks, including a summary of the career of Australian citrus entomologist Professor George (Andrew) Beattie and an opening keynote by Dr Richard Davis (Australia) about plant health surveillance in remote locations. Two discussion sessions, led by Dr Juliana Freitas-Astúa (Brazil), Dr Glynnis Cook (South Africa), Dr Daniel Bogema (Australia) and Dr Fiona Constable (Australia), considered changes in the naming of pathogens and diagnostic innovations for different applications.

On the **mid-conference tour**, delegates visited the Auscitrus propagation scheme, an industry driven program which has been in operation since 1928, and the Department of Primary Industries and Regional Development Dareton research station where citrus researchers and industry development officers gave a tour of their field trials and variety evaluation blocks.

The **conference dinner** was held in the Mildura Powerhouse. The night ended with a traditional Pacific Island dance beautifully performed by Angelika Tugaga (Samoa) and Semi Hausia (Tonga).

On the **post-conference tour** to Sydney, delegates visited Eyles Citrus wholesale nursery and the citrus research and diagnostic program at the NSW DPIRD Elizabeth Macarthur Agricultural Institute.
Delegates interacted with native fauna at Featherdale Wildlife Park and enjoyed the scenic coastal drive from Wollongong to Bondi beach. The tour ended with a cruise around Sydney Harbour, eating lunch with views of the Sydney Harbour Bridge and Opera House.

IOCV awards were presented to Australian citrus researchers Patricia (Broadbent) Barkley, George (Andrew) Beattie and Paul Holford and Australian industry organisations Auscitrus and Citrus Australia were recognised for their contributions and support for the IOCV mission to protect citrus globally.

The conference was **sponsored** by Auscitrus, Horticulture Innovation Australia, and Mildura Rural City Council. The Australian Centre for International Agricultural Research (ACIAR) sponsored conference attendance for 5 delegates. Syngenta and Victorian Citrus Farms sponsored conference items and Eyles Citrus provided morning tea to the post-conference tour delegates.

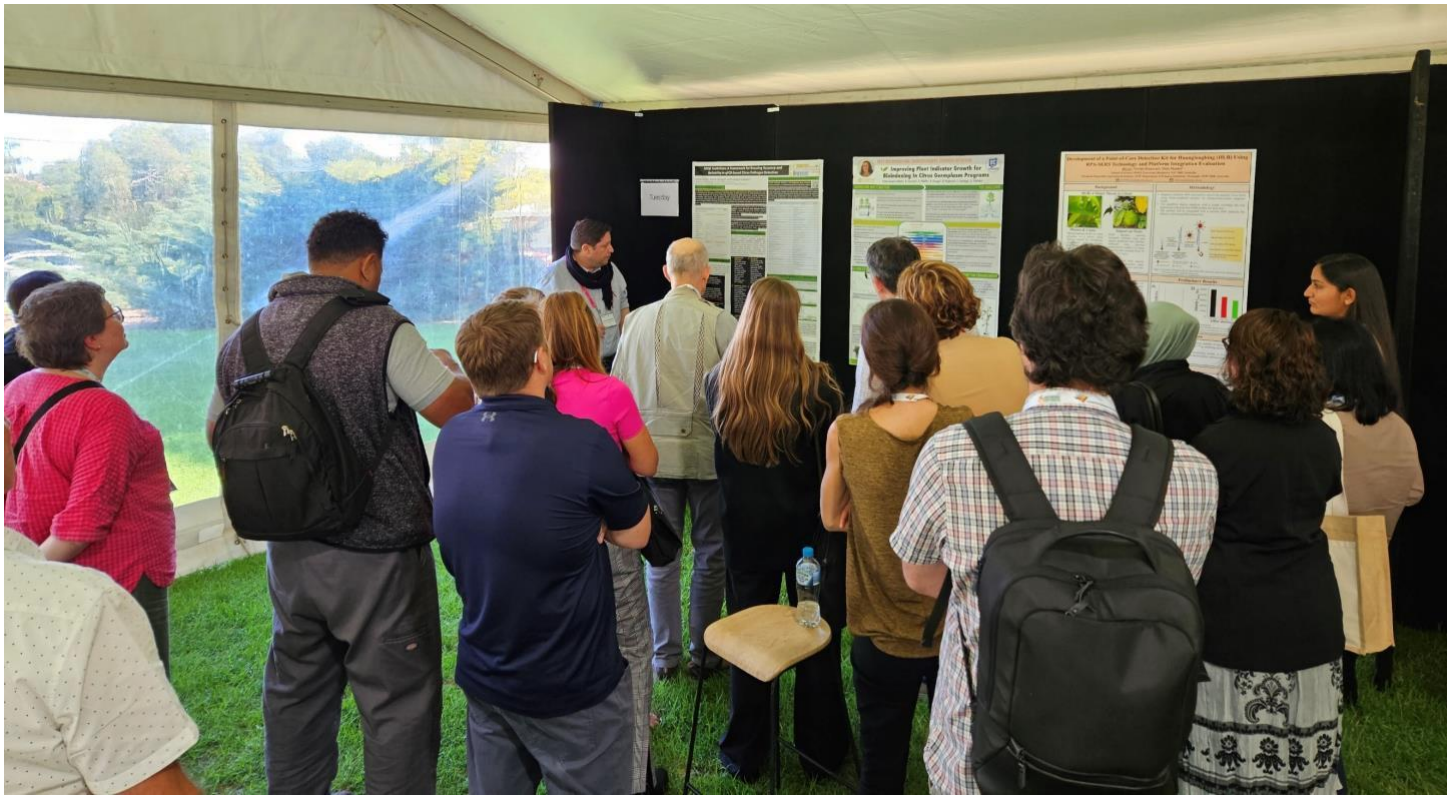
The conference was organised by Nerida Donovan (Chair), Grant Chambers, Anna Englezou and Wendy Forbes (NSW DPIRD) and Tim Herrmann and Mandy Jones (Auscitrus).

Nathan Hancock (CEO, Citrus Australia)

Traditional welcome ceremony

Opening network event with ACIAR sponsored delegates

Opening keynote by Dr Richard Davis



Delegates had the opportunity to present their posters

IOCV 2025 Conference Dinner

Patricia Barkley accepting her award from Professor Zhou