11th International Symposium on
FRUIT FLIES
of Economic Importance
13-18 NOV 2022 • SYDNEY • AUSTRALIA

The conference

Minette Karsten attended the 11th International Symposium on Fruit Flies of Economic Importance (ISFFEI) at Macquarie University, Sydney, Australia between 13 - 18 November 2022. The symposium was held in hybrid format with 246 in-person delegates from 46 countries and a further 109 participants attending online (33 countries). A number of other South African delegates also attended: Prof. Pia Addison (Stellenbosch University), Prof. Aruna Manrakhan (Citrus Research International), Prof. Chris Weldon (University of Pretoria), Dr Anandi Bierman (Stellenbosch University), Dr Kevin Malod (University of Pretoria).

The group from Stellenbosch University was involved in four posters that were presented:

1. **Unraveling the distribution of *Ceratitis rosa* and *Ceratitis quilicii* (Diptera: Tephritidae) in southern Africa.** Seth Tsatsu[1,2], Laura Canhanga[3], Domingos Cugala[3], Maxi Snyman[1], Aruna Manrakhan[1,2], **Minette Karsten[1]**, Pia Addison[1], John S. Terblanche[1], Massimiliano Virgilio[4] & Marc De Meyer[4]. Marc De Meyer[4]
2. **So close, yet so far: the story of *Ceratitis rosa* and *Ceratitis quilicii* (Diptera: Tephritidae).** Seth Tsatsu[1,2], Aruna Manrakhan[1,2], Pia Addison[2], **Minette Karsten[2],** John S. Terblanche[2], Maxi Snyman[2], Massimiliano Virgilio[3], & Marc De Meyer[3]
3. **Limited adaptive capacity of climate stress resistance traits in an invasive agricultural pest.** Anandi Bierman[1], Henriek Bosua[1], **Minette Karsten**[1], Carla M. Sgró[2], Kevin Malod[3], Christopher Weldon[4] & John S. Terblanche[1]
4. **Genomic characterisation of the population structure of *Ceratitis rosa* and *C. quilicii* (Diptera, Tephritidae) in Southern Africa.** Esselens L.[1], Mullens N.[1,2], Addison P.[3], Canhanga L.[4], Cugala D.[4], Deschepper, P.[1], **Karsten M**.[3], Manrakhan A.[5], Snyman M.[3], Tsatsu S.[5], Terblanche J.S.[3], Vanbergen S.[1], De Meyer M.[1], Virgilio M.[1]

The programme

The programme consisted of 10 sessions covering a variety of topics (see below). The detailed Scientific programme is attached to this report as a PDF (11ISFFEI-Program.PDF).

13 November	Registration and Welcome	
14 November	**Session 1**: Biology, Ecology, Physiology and Behaviour	Nikos Kouloussis, Sonya Broughton
	Session 2: Taxonomy and Morphology	Marc de Meyer, Penny Measham
15 November	**Session 3**: Genetics and Biotechnology	Anna Malacrida, Alexie Papanicolaou
	Session 4: Chemical Ecology and Attractants	Alvin Hee, Bernie Dominiak
	Session 5: Risk Assessment, Quarantine and Post-Harvest	Yoav Gazit, Solomon Balagawi
16 November	Technical tours	
17 November	**Session 6**: Sterile Insect Technique	Abdel Bakri, Phil Taylor
	Session 7: Natural Enemies and Biological control	Diana Perez-Staples, Lloyd Stringer
	Session 8: Other Control Methods or New Developments	Nicholas Manoukis, Markus Riegler
18 November	**Session 9**: Area-wide IPM and Action Programmes	Pablo Liedo, Satendra Kumar
	Session 10: Social, Economic and Policy Issues of Action programmes	Atsushi Honma, Carol Quashie-Williams

Interesting presentations, posters and general comments

Researchers and other stakeholders involved in phytosanitary programmes and/or plant protection agencies were represented at the Symposium and shared knowledge and technologies with regards to the development and improvement of management strategies for different fruit fly pest species. Several talks were of interest and relevant to deciduous fruit growers in South Africa.

Cugala et al. reported on the distribution of *Zeugodacus cucurbitae* (Melon fly) in Mozambique. *Zeugodacus cucurbitae* (Melon fly) was detected in several sampling sites in the northern and central parts of Mozambique where it has not been reported from previously, indicating a southward range expansion. The southern provinces (Inhambane, Gaza and Maputo) are still free from the pest. This fly is not yet present in South Africa.

Faveri et al. reported on flight tests conducted using Harmonic radar tags (constructed from nitinol wire) to track different fruit fly species (Australia) in different environments. This technology has the potential to enhance the study of tephritid movement to improve detection or control of fruit fly pests.

Piper et al. utilised DNA metabarcoding, employing COI and EIF3L, to develop a rapid screening method for specimens collected from fruit fly traps. Although some challenges with identification of species from complexes were encountered, the method does show promise for use in situations where technical expertise is lacking or large numbers of flies need identification.

Caceres et al. (IAEA) presented information on the development of new generation sexing strains for Mediterranean fruit fly (*Ceratitis capitata*) colony refreshment to increase the genetic variation in the colony. The novel GSS strains developed had similar characteristics to the popular Vienna 8 (also in use at FruitFly Africa), but offers the benefit of controlled introduction of new genetic material to mass-reared colonies for colony improvement.

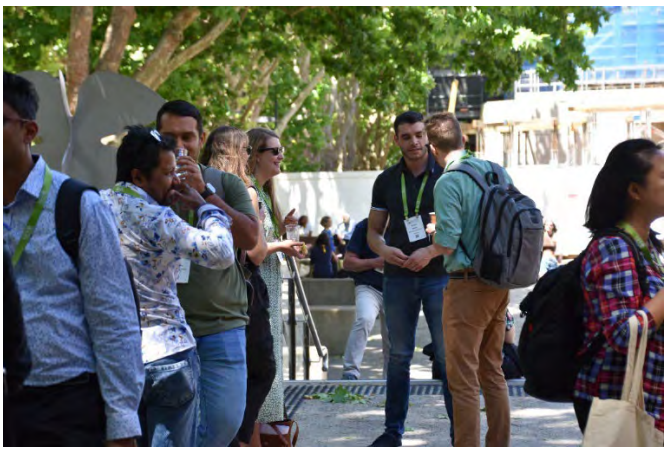
Cha et al. reported updates on the development/improvement of female attractants for *Bactrocera dorsalis* (Oriental fruit fly). The authors identified fruit volatiles to which female *B. dorsalis* (Oriental fruit fly) antennae responded and evaluated the compounds in bioassays (laboratory) and in the field. Interestingly, mated females responded better to lures based on fruit odours compared to protein-based lures. In addition, the authors provided updates on the development of oviposition deterrents for *B. dorsalis* (Oriental fruit fly). Improved female lures will be very valuable for this species.

Morrow et al. assessed the transmission (horizontal and vertical) of three insect specific RNA viruses, *Iflavirus*, *Cripavirus* and *Rhabdovirus* in *Bactrocera tryoni* (Queensland fruit fly). They showed that *Iflavirus* and *Cripavirus* can be transmitted horizontally and *Iflavirus* can also be transmitted vertically. Additional work is required to explore the use of these viruses in an IPM programme or making sure that mass-rearing facilities remain virus free. A potential avenue of research for other fruit fly species.

Pereira et al. provided an overview of the revised International Standards for Phytosanitary Measures (ISPMs) for fruit flies. The ISPMs for fruit flies have recently been reorganized: ISPM 26 (Establishment of pest free areas for fruit flies), ISPM 35 (Systems approach for pest risk management of fruit flies), ISPM 37 (Determination of host status of fruits to fruit flies) were revised and also 9 annexes/appendices added.

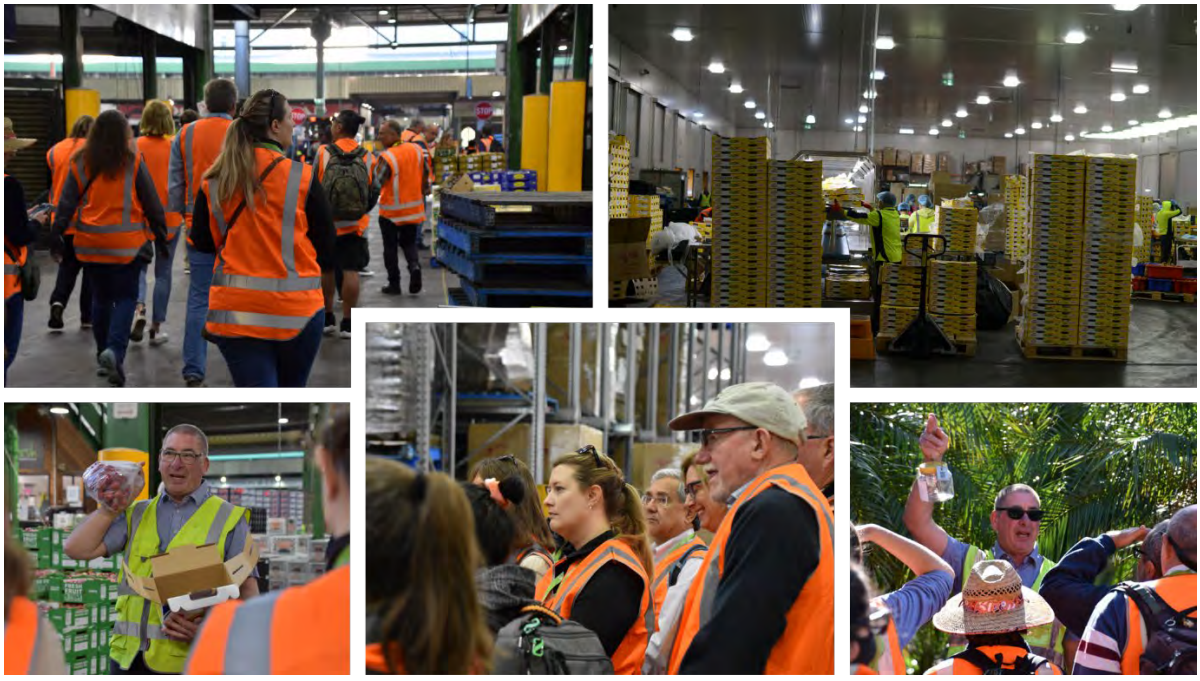
Schneider et al. reported on 40 years of monitoring and eradication strategies of exotic fruit flies in the Torres Strait. Fruit fly eradication has been ongoing in this area since 1993. Interesting take on ongoing efforts to eradicate incursions of exotic fruit flies to mainland Australia.

Several presenters/posters reported research on *Drosophila suzukii* (spotted wing drosophila). Papanastasiou et al. investigated the interspecific competition between *Rhagoletis cerasi* (European cherry fruit fly) and *D. suzukii* (spotted wing drosophila) in sweet-cherry. Higher infestation levels and adult emergence numbers was achieved by *D. suzukii* (spotted wing drosophila) and in most cultivars *R. cerasi* (European cherry fruit fly) infestation levels decreased when *D. suzukii* (spotted wing drosophila) was present. A three-day head start for *R. ceraci* (European cherry fruit fly) resulted in lower *D. suzukii* (spotted wing drosophila) infestation levels. Malacrida et al. showed that *D. suzukii* (spotted wing drosophila) females remate in the wild and can also store sperm from mating's with different males. Remating in *D. suzukii* (spotted wing drosophila) can influence the success of methods such as the sterile insect technique (SIT). Guilhot et al. reported on the progress of IPCL developing SIT in *D. suzukii* (spotted wing drosophila), this includes mass-rearing, quality control and irradiation methodology.

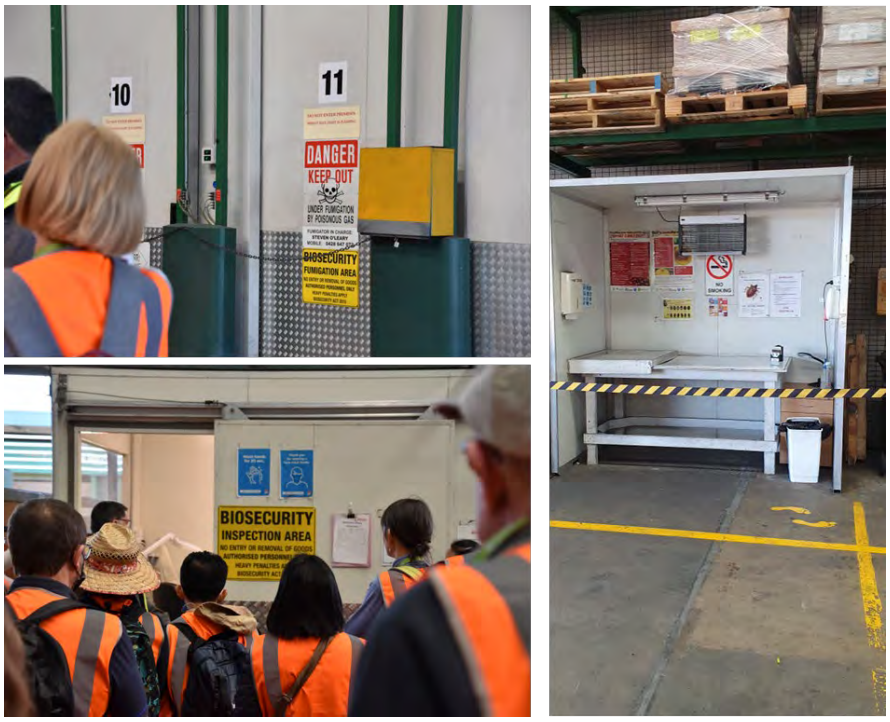


Technical tour

On Wednesday, 16 November Minette Karsten attended the technical tour to the Sydney Markets. The Sydney markets are the largest wholesale fruit, vegetable, and flower markets in Australia and one of the largest food distribution centres in the Southern Hemisphere. Approximately, $100 million of fresh produce are exported from the Sydney Markets annually. The markets cover about 42 ha and has a large trapping network setup specifically for fruit flies. The network includes different types of lures, targeting different fruit fly species.



A systems approach is implemented pre-harvest for pests and diseases for all consignments delivered to the markets and are also subject to on-site biosecurity inspections. Produce through the market are fumigated with Methyl bromide for all markets**.**



Relevance to Industry

- The Symposium provided up to date distribution information on important phytosanitary pests not yet present in South Africa, but in neighbouring countries. I spoke to Luis Bota, he runs the National Fruit Fly Laboratory, Provincial Directorate of Agriculture and Food Security, in Mozambique and will keep us up to date with developments. This provides a direct line for any potential future fruit fly invasions.

- The new generation sexing strains research talks I attended could be important for medfly SIT in South Africa and FruitFly Africa in the future.

- Monitoring of the Oriental fruit fly is critical for the deciduos fruit industry. The development of a female attractant could be important in the future, since currently we only have access to a male lure.

- Spotted wing drosophila (*D. suzukii*) is a real biosecurity concern for the deciduous fruit industry in RSA as hosts include: pome fruit (apple and pear) and several Prunus species including apricot, plum and peach. It is listed on the EPPO alert list and has been present in Kenya since 2019. Methods for monitoring, control and SIT will be important to industry if Spotted wing drosophila is ever detected in RSA. The contacts and informatio will be extremely useful in compiling an action plan when needed.

- Link with Corey Bazelet the National Science Program Coordinator – fruit fly programs at USDA APHIS PPQ Science and Technology allowed discussion of cold disinfestation programmes to be explored at PHYLA for all fruit fly phytosanitary regulations.

- Many other key contacts have been made (see below) that could provide support for future collaborations.

Key contacts

Prof. Phil Taylor, Head of Applied BioSciences, Macquarie University; Director of ARC Centre for Fruit Fly Biosecurity Innovation. Expertise: Sustainable insect pest (fruit fly) management and Sterile Insect Technique.

Dr Corey Bazelet, National Science Program Coordinator – fruit fly programs at USDA APHIS PPQ Science and Technology, USA.

Prof. Nikos Papadopoulos, Head of Entomology and Agricultural Zoology laboratory, University of Thessaly, Greece. Expertise: Insect Ecology and management of Tephritidae.

Dr Marc de Meyer, Head of Biology Department, Invertebrates, Royal Museum for Africa, Belgium. Expertise: Taxonomy of Diptera (Tephritidae), Phylogeny and insect-plant relationships.

Dr Hélène Delatte, CIRAD, Madagascar. Expertise: Population genetics and biological invasions in island agroecosystems.

Mr. Rui Cardoso Pereira, Chair of the International Fruit Fly Steering Committee, Insect and Pest Control Section for Joint FAO/IAEA Division in Food and Agriculture, IAEA. Expertise: Research and development on fruit fly control globally.

Dr Kevin Cloonan, USDA-ARS, USA. Expertise: Chemical ecology of tropical fruit pests.

Dr Anna Szyniszewska, CABI. Expertise: Modelling host distribution, pest environmental suitability and pathway risk analysis.

Dr Katharina Merkel, Senior Entomologist, Primary Industries and Regions, South Australia. Expertise: Fruit fly behavioural ecology and population ecology.

Dr Rieks van Klinken, Senior Research Scientist, CSIRO Biosecurity, Australia. Expertise: Lead of market access within the “Trusted Agrifood Exports Mission” of CSIRO.

Dr Simon Fellous, French National Institute for Agriculture, Food and Environment (INRAE). Expertise: Ecology and evolutionary biology of insect pests, specifically *D. suzukii*.