

TAAO



Tephritid workers of Asia, Australia and Oceania

NEWSLETTER

Issue 09

December 2022

TO OUR READERS

Welcome to the 9th issue of TAAO Newsletter! We hope you enjoy this way to keep you informed of the exciting news of our newsletter.

Firstly, this issue contains remembrance on the memory of Prof. Antigone Zacharopoulou, a renowned Cytogeneticist all over the world, died in 27 May 2022 (pg. 2-3). Then, you may enjoy the reading on the understanding of the microbiota associated with tephritid fruit flies from India (pg. 4-5). In China, our colleagues, Prof. Zhihong Li and her team, developed a molecular identification technique for *Drosophila suzukii* (pg. 6-7). You can get a brief information of three published articles on risk analysis related to three economically important fruit fly species (pg. 8-10). We are also happy to share the good news on two recently published textbooks, AW-IPM and SIT, for everyone to access freely (pg.11-12). You can find the most valuable and informative reports with some nice photos of very recently completed two conferences related to tephritid fruit flies, one from Kuala Lumpur, Malaysia in August 2022 (pg. 13-16) and another from Sydney, Australia in November 2022 (pg. 17-18) by our respected TAAO SC Chair, Dr. Alvin Hee. Finally, you can get information about the update of TAAO SC meeting, was held in 16 November 2022, in Macquarie University Theatre room after end of the 11th ISFFEI Technical Tour (pg. 19-20). Heartiest congratulations to Dr. Sandeep Singh (India), our new TAAO Social Media Admin. Please join our TAAO Facebook community.

Happy New Year 2023!

With very best wishes to all of you.

Md. Hasanuzzaman

TAAO SC Member, EC Chair and Social Media Admin

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Reminiscence: Antigone Zacharopoulou

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I am deeply saddened to hear about the death of Professor Dr. Antigone Zacharopoulou. She passed away 27th May 2022. I have some unforgettable memory with her which I would like to express here.

In 1997, when I started my MSc thesis work on tephritid fruit fly at the Radiation Entomology Division of IFRB, I decided to do research on cytogenetics i.e. chromosome study. During that time internet facilities was not available in Bangladesh. Usually we collected the required articles by writing a letter to the corresponding author. At the beginning, this was the only communication way with me and Antigone. Later, when internet became available, I communicated with her through emails. She always guided me and helped to identify the chromosome arms, tips, centromere position, landmarks and other basic terms for cytogenetic studies through email correspondence. Thus, from that time, although we did not know each other, we did not see each other; but Prof Antigone was my unseen and unwritten supervisor as well as advisor.

2nd May 2007 was a memorable day for me. That year I got IAEA fellowship at IPCL, Seibersdorf Lab. After a long journey, when I arrived there by shuttle service from Vienna International Center (VIC), Antigone welcome me at IPCL!!!

I wondered very much because I did not know that Antigone was at IPCL!! Later, she told me that she saw my name in the IAEA offer letter at Dr. Alan Robinson (Head of IPCL) table and decided to supervise me during my fellowship program. That is she knew I am coming to IPCL but I didn't know about her presence there. Because officially Dr. Gerald Franz was my supervisor, mentioned in the offer letter. What an opportunity!!! It was just great!!

She was an excellent researcher who made a countless and valuable contribution in the field of genetics and cytogenetics. With the death of Professor Antigone

Zacharopoulou, scientific community lost a great specialist in genetics, cytogenetics and karyo-systematics of the Tephritidae.



Me and Prof Antigone at IPCL premises in 2007



We will always remember Antigone not only for her thoughtful contribution but also for her willingness to share her time and expertise with her colleagues and students. We are sorry to have lost such a good friend.

Antigone will always live in our hearts and memories. Let us pray for her and may her soul rest in peace.

Scientific community will miss a great person.

I will miss her friendship and guidance.

Sincere condolences,
Farzana

Developmental stage-associated microbiota profiling of two pestiferous fruit fly species from India

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The Dipteran flies of family Tephritidae are commonly known as fruit flies, considered as most staid and invasive pest of many horticultural crops. The peach fruit fly, *Bactrocera zonata* (Saunders) and melon fly, *Zeugodacus cucurbitae* (Coquillett, 1899) earlier known as *Bactrocera cucurbitae* are polyphagous insect pest of agriculturally important fruit crops and cucurbitaceous & other related crops, respectively (CABI/EPPO, 2013). The insect bacterial communities including fruit flies mainly reside in the gut, hemocoel, mycetomes and within the cells. These associated bacteria play a very important role in the host's nutrition, development, reproduction, resistance to pathogens, and semiochemicals production. Extensive knowledge of an insect's microbiota is an essential step toward understanding the biology and physiology of insects and may also be an initial step in the development of novel pest-management strategies. The advancement and accessibility in recent high-throughput DNA sequencing technology have permitted to metagenomics profiling of two fruit fly species viz., peach fruit fly, *B. zonata* and melon fly, *Z. cucurbitae* metagenomics across developmental stages (Naaz *et al.* 2020; Choudhary *et al.*, 2021). The study was done using high-throughput Next-Generation Sequencing (NGS) on the Illumina HiSeq platform to examine the variation in bacterial communities at different developmental stage, targeting V3-V4 region of the bacterial 16S rRNA. The final Sequence Read Achieves (SRAs) of all developmental stages were deposited in NCBI SRA database under the Bio-project PRJNA570100 & PRJNA587221 and work published in reputed journal like 3Biotech and Current Microbi-

ology. The studies revealed that distinct bacterial community association with specific developmental stages of fruit flies might suggest a specific role of microbial community to fulfill the developmental needs. The results provide a better understanding of the microbiota associated with tephritids fruit flies. The bacterial community can be used for managing fruit fly through various ways, including attracting as odors, enhancing the success of sterile insect technique, declining the pesticide resistance, mass rearing of parasitoids etc.

For more information, please refer

CABI/EPPO (2013) *Bactrocera zonata*. [Distribution map]. Distribution Maps of Plant Pests, No. December, 3rd revision, CABI, Wallingford, UK, Map 125.

Choudhary, J.S., Naaz, N., Prabhakar, C.S., Das, B., Singh, A.K. and Bhatt, B.P. 2021. High Taxonomic and Functional Diversity of Bacterial Communities Associated with Melon Fly, *Zeugodacus cucurbitae* (Diptera: Tephritidae). Current Microbiology, <https://doi.org/10.1007/s00284-020-02327-2>.

Naaz, N., Choudhary, J.S., Choudhary, A., Dutta, A. and Das, B. 2020. Developmental stage-associated microbiota profile of the peach fruit fly, *Bactrocera zonata* (Diptera: Tephritidae) and their functional prediction using 16S rRNA gene metabarcoding sequencing. 3 Biotech, Sep; 10 (9):390. doi: 10.1007/s13205-020-02381-4.

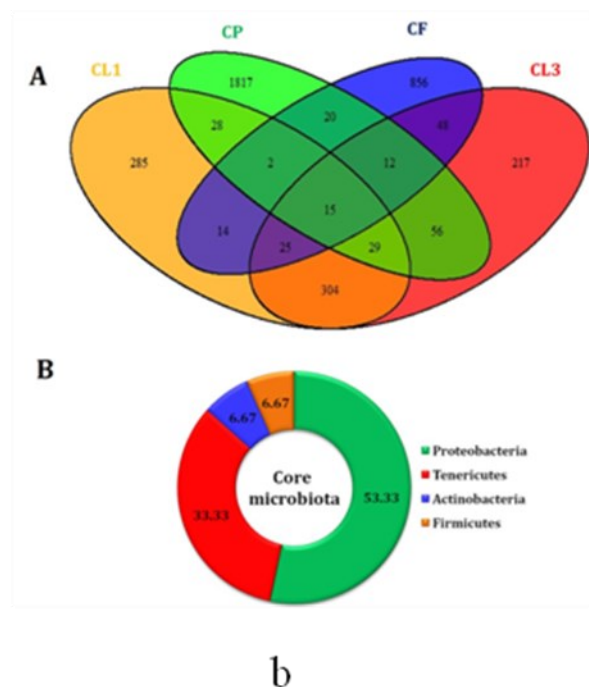
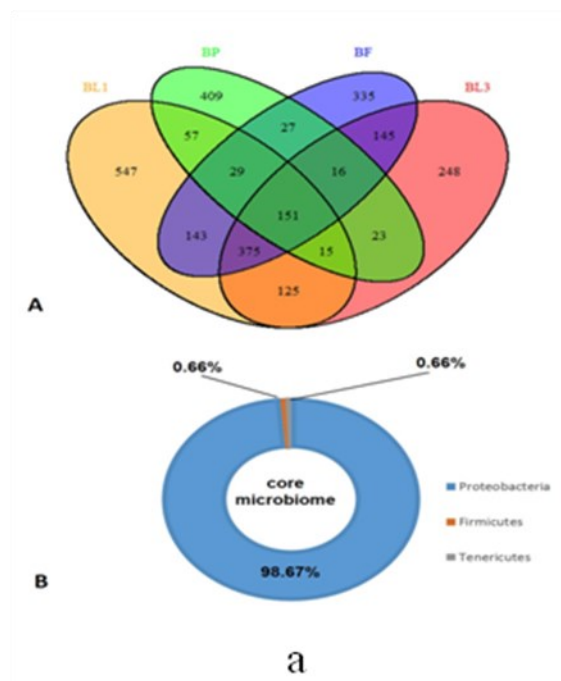


Figure 1. OTUs (Operational Taxonomic Units) analysis between different developmental stages of *B. zonata* (a) & *Z. cucurbitae* (b) at 97% similarity (A) Venn diagram showing unique and shared OTUs (B) Percentage distribution of common shared OTUs between all developmental stages at phylum level. BL/CL1, BL/CL3, BP/CP and BF/CF refer to 1st Instar larvae, 3rd Instar larvae, Pupa and Adult female of *B. zonata*/*Z. cucurbitae*. (Source: Naaz et al., 2020; 3Biotech, 10:390 & Choudhary et al., 2021; Current Microbiology, 78 (1):1-13)

Identification and disinfestation for *Drosophila suzukii* with rapid LAMP-based colorimetric assay and phytosanitary cold treatment

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The spotted wing drosophila, *Drosophila suzukii* Matsumura (Diptera: Drosophilidae), distributes in most soft-skinned fruit areas in China, is an economically important pest of fresh cherries and grapes during international trade and a quarantine pest in A2 list by European and Mediterranean Plant Protection Organization.

Considering its threat to importing countries, Dr. Zhihong Li, TAAO SC member from China, and her team developed an accurate, quick, and convenient molecular identification for *D. suzukii*. A 90-min colorimetric LAMP reaction were performed at 63°C in a constant temperature water bath with quick DNA extraction method. *D. suzukii* was distinguished from non-target fruit flies in the family Drosophilidae and Tephritidae, usually intercepted during the Sino-European cherry trade (Figure 1).

For preventing the movement of this drosophila fly, her team suggests a phytosanitary cold treatment measure for disinfestation of ‘Red Globe’ grape (*Vitis vinifera* L.) infested with *D. suzukii*. The minimal lethal time (LT) for 99.9968% mortality (95% confidence level) was about 11 d at 0°C and 12 d at 2°C (Table 1). No survivors were found among the estimated 50,385 and 57,366 treated eggs, which resulted in the efficacy of 99.9941 and 99.9948% mortality (95% CL) at 0°C and 2°C, respectively.

In conclusion, LAMP-based colorimetric identification assay combined with a quick DNA extraction method could visually detect clearly with just one portable heating device, which will be useful for the convenience of plant quarantine inspection in the field and at the points of entry (POEs). The cold phytosanitary treatment suggests a technical basis for cold disin-

festation on *D. suzukii* in cage-infested Chinese ‘Red Globe’ grape, which could provide postharvest pest control and quarantine security for international trade and could be used as a methyl bromide alternative for quarantine control of *D. suzukii*.

For more information, please visit:

Wang, X. X.¹, Liu, B.², Zhang, Y.¹, Zhai, Y. F.³, Ullah, F.¹, Li, Z. H.¹ (2021). A rapid LAMP-based colorimetric assay with quick DNA extraction for on-site identification of *Drosophila suzukii* Matsumura. J. Appl. Entomol., 145, 922–928. <https://doi.org/10.1111/jen.12923/>

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Wang, X. X.^{1,2}, Zhan, G. P.¹, Ren, L. L.¹, Sun, S. Y.³, Dang, H. Y.⁴, Zhai, Y. F.⁵, Yin, H.¹, Li, Z. H.², Liu, B.¹ (2020) Cold disinfestation for ‘red globe’ grape (Rhamnales: Vitaceae) infested with *Drosophila suzukii* (Diptera: Drosophilidae). J. of Insect Sci., 20, 1–6. <https://doi.org/10.1093/jisesa/ieaa043/>

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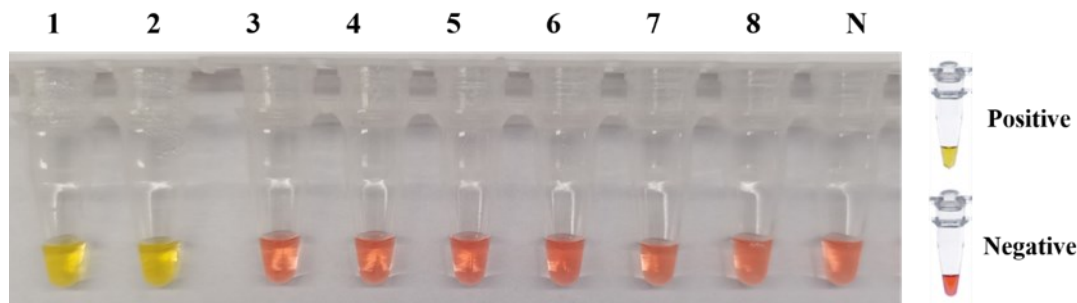


Figure 1. Colorimetric loop-mediated isothermal amplification (LAMP) assay of specificity test by using different DNA template of 1: Yunnan population of *Drosophila suzukii*, 2: Shandong population of *D. suzukii*, 3: *D. melanogaster*, 4: *Bactrocera dorsalis*, 5: *B. correcta*, 6: *Rhagoletis cerasi*, 7: *R. pomonella* and 8: *Ceratitis capitata*, N: sterilized distilled water (cited from Wang et al., 2021).

Table 1. Estimation of the minimum lethal time of the 1-d-old eggs of *Drosophila suzukii* treated at 0°C and 2°C in grapes (cited from Wang et al., 2020)

Temp. (°C)	Analyzing model (log-transformed)	Slope $\pm$ SE	LT ₉₉ (d) (95% CI)	LT _{99.9968} (d) (95% CI)	Heterogeneity
0°C	probit (with)	4.20 $\pm$ 0.19	4.18 (3.65–5.02)	10.47 (8.10–14.92)	2.95
	probit (without)	1.13 $\pm$ 0.05	3.28 (2.70–4.68)	4.76 (3.75–7.27)	24.44
	logit (with)	7.77 $\pm$ 0.37	4.67 (3.95–5.90)	25.74 (16.95–46.74)	3.33
	logit (without)	2.05 $\pm$ 0.09	3.47 (3.06–4.12)	6.28 (5.34–7.80)	2.73
2°C	probit (with)	5.23 $\pm$ 0.28	5.70 (5.14–6.55)	11.92 (9.78–15.64)	2.09
	probit (without)	0.82 $\pm$ 0.04	5.02 (4.62–5.56)	7.05 (6.38–8.00)	3.35
	logit (with)	9.89 $\pm$ 0.59	6.10 (5.33–7.40)	23.35 (16.62–38.35)	2.30
	logit (without)	1.53 $\pm$ 0.08	5.18 (4.78–5.72)	8.96 (8.07–10.21)	2.34

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Recently, Dr. Yujia Qin and Prof. Zhihong Li (Plant Quarantine and Invasion Biology Laboratory, China Agricultural University (CAUPQL)) have published three papers on risk analysis related to three economic important fruit fly species *Bactrocera correcta*, *Carpomya parvalina*, *Bactrocera zonata*. We predicted potential geographical distribution of fruit flies under climate change based on the 2021 IPCC sixth assessment report. Host availability was considered for *Carpomya parvalina*, and 56 environmental variables including elevation, monthly climate data for solar radiation, wind speed, water vapor pressure besides 19 bioclimate variables were considered for *Bactrocera correcta*. Using @RISK we attempted to predict the potential economic loss of peach industry caused by *Bactrocera zonata* in China. We also would like to thank our co-authors from other affiliations, Alice C. Hughes from Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences and Anthony R. Clarke from Queensland University of Technology (QUT), Australia.

1. Including climate change to predict the global suitable area of an invasive pest: *Bactrocera correcta* (Diptera: Tephritidae) (published on Global Ecology and Conservation, 2022, 34: e02021)

Abstract. *Bactrocera correcta* (Diptera: Tephritidae), as known as invasive pest guava fruit fly, can attack numerous host plants including many horticultural crops and cause huge destruction. Whilst its distribution is currently restricted in Southeast Asia, under the context of global trade and climate change, guava fruit fly can be transported with goods and spread with regional climate. Many countries have included the species on their quarantine pest lists, in order to offer the strategy for specific surveillance and early warnings, the research of predicting the suitable areas under climate change is essential. In this study, 56 environmental variables were initially tested, and six selected for

final analysis using MaxEnt to predict suitable habitat, ENMeval package was used in R to avoid overfitting and run the models under two different greenhouse gas emission scenarios in 2030 and 2070 based on CMIP6. The total suitable area of the historical scenario is $3235.42 \times 10^4 \text{ km}^2$, and it accounts for 24.06% of the world's total area and includes India and neighboring countries in Asia, Pacific islands, and North Australia, Central and South America, central Africa. Water vapor pressure and solar radiation were the most influential variables for *B. correcta*, the rising temperature could lead increasing of suitable area slightly. The predictive results of the research can provide support for quarantine and management for the high-risk countries.

2. Including Host Availability and Climate Change Impacts on the Global Risk Area of *Carpomya parvalina* (Diptera: Tephritidae) (published on Frontiers in Ecology and Evolution. 2021, 9: 724441)

Abstract. Fruit flies are well known invasive species and climate-based risk modelling is used to inform risk analysis of these pests. However, such research tends to focus on already well-known invasive species. This paper illustrates that appropriate risk-modelling can also provide valuable insights for flies which are not yet “on the radar”. *Carpomya parvalina* is a locally important cucurbit infesting fruit fly of Western and Central Asia, but it may present risk to other temperate countries where melons are grown. MaxEnt models were used to map the risk area for this species under historical and future climate conditions averaged from three global climate models under two Shared Socio-economic Pathways in 2030 and 2070 from higher climate sensitivity models based on the upcoming 2021 IPCC sixth assessment report. The results showed that a total of 47.64% of the world's land mass is climatically suitable for the fly, it could establish widely around the globe both under current and future climates with host availability. Our MaxEnt modelling highlights particularly that Western China, Russia and other European countries should pay attention to this currently lesser-known melon fly and the melons exporting from the present countries, current and expanding melon trade could offer direct invasion pathways to those regions. While this study offers specific risk information on *C. parvalina*, it also illustrates the value of applying climate-based distribution modelling to species still with limited geographic distributions.

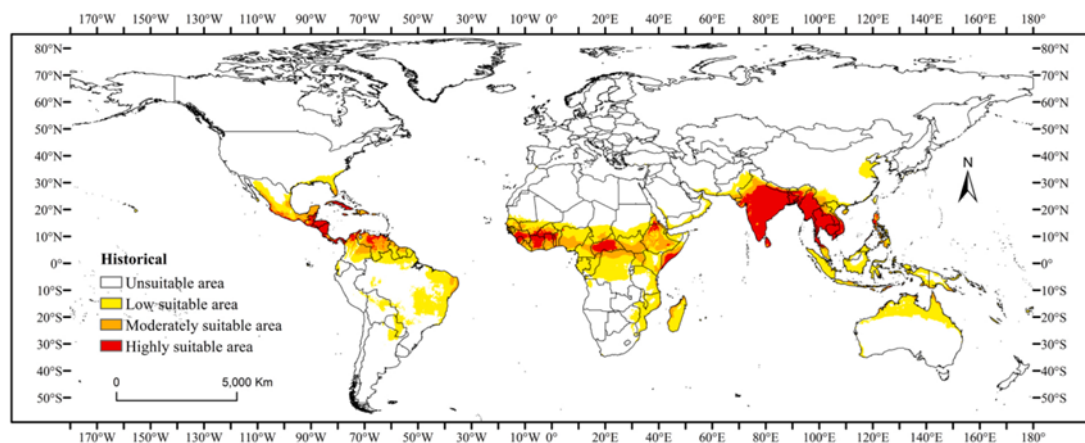


Figure 1. Historical suitable area of *B. correcta* produced by MaxEnt (3.4.1), near-current environmental data were used in this part (averaged from 1970 to 2000). Blank space indicates unsuitable area (0.00–0.08); yellow space indicates low suitable area (0.08–0.30); orange space indicates moderately suitable area (0.30–0.60) and red space indicates highly suitable area (0.60–1.00).

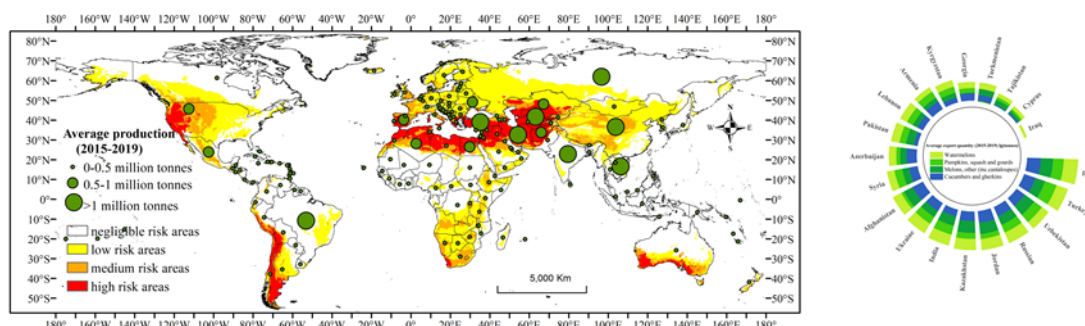


Figure 2. Historical Potential geographical distribution of *Carpomya pardalina* based on MaxEnt (v3.4.4) predictions using near-current climate data (averaged from 1970 to 2000). White indicates negligible risk areas (0.00–0.08), yellow indicates low risk areas (0.08–0.23), orange indicates medium risk areas (0.23–0.62), and red indicates high risk areas (0.62–1.00). Green points are host production data averaged. Host export quantity of present countries averaged from 2015 to 2019 after logarithm.

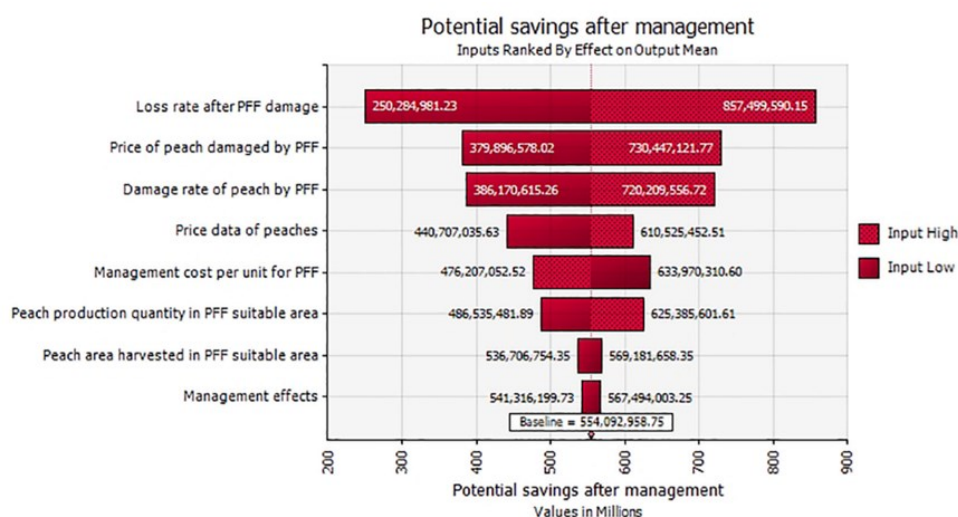


Figure 3. Change in output statistic for potential savings after management (Values in Millions (dollars)).

3. Prediction of potential economic impact of *Bactrocera zonata* (Diptera: Tephritidae) in China: Peaches as the example hosts. (published on Journal of Asia-Pacific Entomology, 2021, 24(4): 1101-1106)

Abstract. The peach fruit fly (PFF), *Bactrocera zonata* (Diptera: Tephritidae), is among the most destructive *Bactrocera* fruit fly species in Asia and Africa. The peach fruit fly is currently absent from China but has high risk of invasion to China. This study primarily quantifies the direct potential economic impact of *B. zonata* in China using Monte Carlo simulation model, taking peaches as the example hosts. The results showed that under nil management scenario, the potential economic loss in China caused by *B. zonata* would be 0.82–3.07 billion dollars (90% confidence level), and potential savings after management will be 0.20–1.00 billion dollars (90% confidence level). Quarantine measures against *B. zonata* and

field control should be strengthened to prevent its introduction and reduce the potential economic impact in China.

Open Access textbooks on area-wide integrated pest management and sterile insect technique

Alvin Kah-Wei Hee (Universiti Putra Malaysia)

Chair, Tephritid Workers of Asia, Australia, and Oceania (TAAO) Steering Committee

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We are happy to share the good news on two recently published textbooks for everyone to access freely. These are on area-wide integrated pest management (AW-IPM), and sterile insect technique. The first book, entitled “Area-Wide Integrated Pest Management: Development and Field Application” is an essential textbook dealing with various aspects of AW-IPM. Published by CRC Press, this book is edited by Jorge Hendrichs, Rui Pereira, and Marc J.B. Vreysen. This book consists of 5 sections with a total of 48 chapters written by 184 experts from over 30 countries. Major livestock and agricultural pests, plus vectors of human diseases are covered in the book. This a must-have reference book for the everyone involved in protection of plant and human/animal health including the academic, applied research community and government authorities.

The second book is entitled “Sterile Insect Technique: Principles and Practice in Area-Wide Integrated Pest Management”. Following the popular title that was first published in 2005 with only 28 chapters, this version contains large amount of new information to become the second edition. Also published CRC Press, this book is edited by V. A. Dyck, Jorge Hendrichs and Alan S. Robinson. This updated and expanded edition contains additional 6 new chapters such as managing pathogens in insect mass-rearing, using symbionts and modern molecular technologies in support of the SIT, application of post-factory nutritional, hormonal, and semiochemical treatments, application of SIT to eradicate outbreaks of invasive pests, and using the SIT against mosquito vectors of disease, that made up the 5 parts of the book. As stated in the abstract, this is an updated textbook that will be of great value to researchers, teachers, animal-, human-, and plant-health practitioners, and policy makers. We take

this opportunity to thank FAO/IAEA Insect Pest Control for providing us these invaluable references at no cost.

To download these great books or read them online, please visit the links below:

1. Area-Wide Integrated Pest Management: Development and Field Application

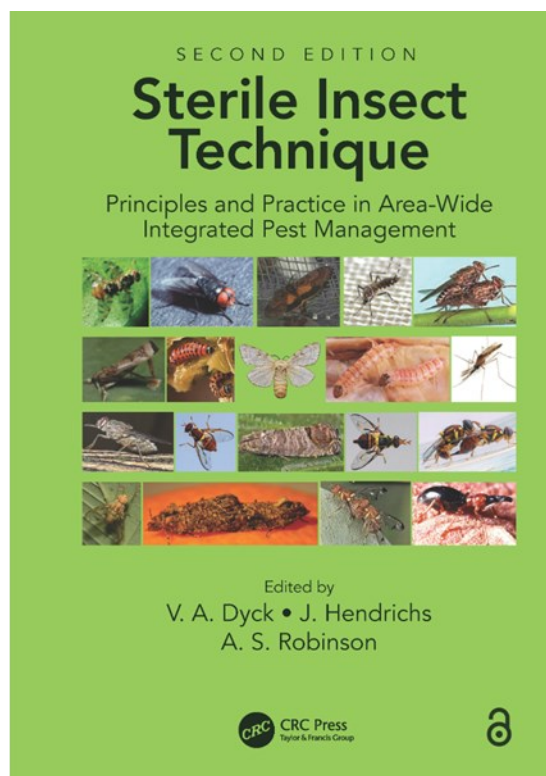
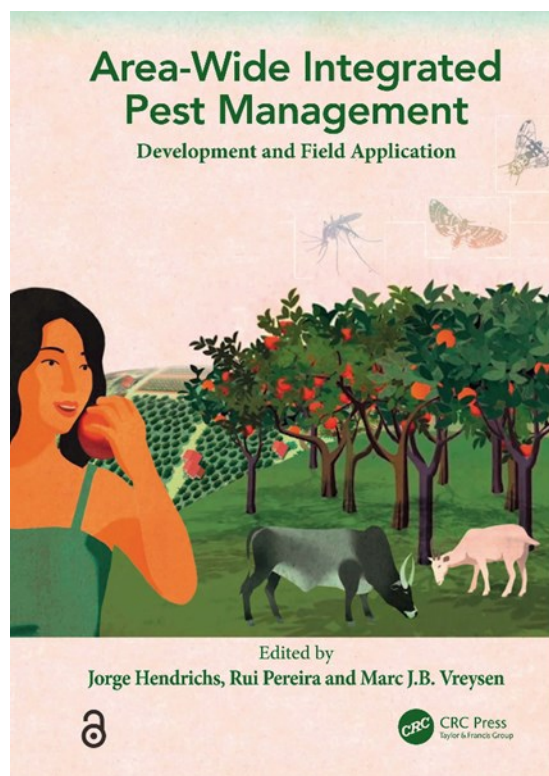
<https://www.taylorfrancis.com/books/oa-edit/10.1201/9781003169239/area-wide-integrated-pest-management-jorge-hendrichs-rui-pereira-marc-vreysen>

2. Sterile Insect Technique: Principles and Practice in Area-Wide Integrated Pest Management

<https://www.taylorfrancis.com/books/oa-edit/10.1201/9781003035572/sterile-insect-technique-victor-dyck-jorge-hendrichs-robinson?context=ubx&refId=6175ef3f-e304-4b1b-a76d-b6a8d0013408>

If you need hardcopies of these books, please contact Elena at the following email address:

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Chemical ecology of fruit fly shares centre stage at recent international chemical ecology meeting

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It has been over a century that lures and attractants for tephritid fruit flies have been discovered beginning with that of compounds such as methyl eugenol for the Oriental fruit fly, *Bactrocera dorsalis*. Today, there has been tremendous progress in understanding the ecological roles of those compounds leading to their use in management and control of pest fruit flies. Mechanisms of lure response have stirred much interest globally apart from continuing discoveries of new lures from fruit fly-plant interactions.

In the recent Joint Meeting of the 3rd International Society of Chemical Ecology (ISCE) and Asia-Pacific Association of Chemical Ecologists (APACE) that was held in Kuala Lumpur from August 8-12, 2022, chemical ecology of fruit fly again was given prominence in the form of a plenary lecture. That honour was given to our TAAO Steering Committee member, Associate Professor Dr Suk-Ling Wee from Universiti Kebangsaan Malaysia to deliver her lecture entitled “An update on Dacine fruit fly-male lure interactions”. The ecological significance of phytochemical lures in plant-fruit fly relationship leading to new insights that implicated area-wide control programmes against pest fruit flies were also discussed.

In that meeting that was attended by participants from over 29 countries, Suk-Ling was one of the 5 plenary speakers that included famous chemical ecologists such as Prof Walter Leal (University of California, Davis, USA), Prof John Pickett, CBE (Cardiff University, UK), Prof Kazushige Touhara (University of Tokyo, Japan) and Dr Andrea Clavijo-McCormick (Ministry for Primary Industries and Massey University, New Zealand). That Joint Meeting was an important milestone in the history of two of the biggest chemical ecology societies in the world just as reopening in travel and business occurred after the Covid-19

lockdowns. As a meeting that offered onsite and online participation, over 250 chemical ecologists from the industry and academia including post docs and graduate students participated.

Suk-Ling’s talk highlighted one of the 14 symposiums during that meeting, which was dedicated to fruit fly chemical ecology. In that symposium known as “Fruit fly attractants, repellents, and host interactions”, a total of 10 great talks were presented on various aspects of chemical ecology including development of various types of attractants. Special thanks to Dr Dong Cha (USDA-ARS, Hilo, USA) for organising and moderating the symposium successfully!

While the next ISCE meeting will be held in Bangalore, India from July 23-27 next year, the 4th Joint ISCE-APACE meeting will take place in Christchurch, New Zealand in 2025. We look forward to hearing more great discoveries in fruit fly chemical ecology from those two coming prestigious meetings. Thank you to Suk Ling and Dong Cha, for leading the fruit fly chemical ecology all the way in the Joint Chemical Ecology meeting!









An update on the 11th ISFFEI in Australia

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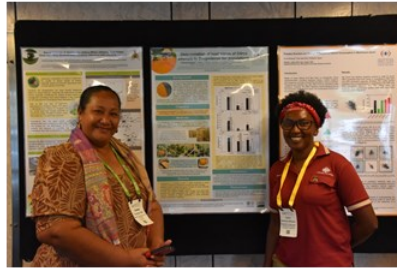
The International Symposium on Fruit Flies of Economic Importance (ISFFEI) was successfully held in Macquarie University Theatre, North Ryde campus in Sydney, Australia from November 13-18, 2022. It was a fabulous event to be celebrated particularly after enduring two years of Covid-19 lockdowns and isolation. Although some colleagues were not able to participate onsite due to travel restrictions, online participation was provided. A total of 355 participants attended the Symposium. This included 246 in person from 46 countries and 109 online from 33 countries.

A keynote lecture was delivered by Prof Ary Hoffman (University of Melbourne, Australia). A total of 60 selected talks from all over the world covering 10 sessions were presented. Those sessions were on Biology, Ecology, Physiology and Behavior (Session 1), Morphology and Taxonomy (Session 2), Genetics and Biotechnology (Session 3), Chemical Ecology and Attractants (Session 4), Risk Assessment, Quarantine and Post-harvest (Session 5), Sterile Insect Technique (Session 6), Natural Enemies and Biological Control (Session 7), Other Control Methods or New Developments (Session 8), Area-wide IPM and Action Programs (Session 9) and Social, Economic and Policy Issues of Action Programs (Session 10). Tributes were also made to our beloved colleagues, Dr Roger Vargas who left us suddenly in 2018, and Dr Antigone Zacharopoulou who left us in May this year. Dr Nicholas Manuokis (USDA-ARS) led in the tribute for Roger, who was one of the greatest fruit fly ecologists, and Dr Kostas Bourtzis (IAEA) for Antigone, our greatest fruit fly cytogeneticist. In the posters' section, 157 posters were presented and discussed in dedicated forums. Two technical tours (Sydney Markets and EMAI-Belgeny Farms) were conducted and for the social function, a tour of the Sydney Harbour ferry cruise was organised.

This symposium marked the 11th time that such a meeting of global importance was held in Sydney, Australia since the 1st symposium took place in Athens, Greece in 1982. Since then, this symposium has been held successfully every four years in Colymbari, Crete in Greece (1986), Antigua, Guatemala (1990), Sand Key, Florida, USA (1994), Penang, Malaysia (1998), Stellenbosch, South Africa (2002), Salvador, Bahia, Brazil (2006), Valencia, Spain (2010), Bangkok, Thailand (2014) and Tapachula, Mexico (2018). We are also pleased to share the news that the venue of the next 12th ISFFEI will be in Agadir, Morocco in 2026. Finally, on behalf of the TAAO community, we wish to thank the organising chair, Dr Polychronis Rempoulakis and his team including FAO-IAEA, plus the Local Organizing Committee and International Fruit Fly Steering Committee for the successful 11th ISFFEI in Sydney, Australia! Congratulations!

References:

1. <https://www.11isffe.com>
2. <https://nucleus.iaea.org/sites/naipc/twd/Pages/International-Fruit-Fly-Symposia.aspx>
3. <https://nucleus.iaea.org/sites/naipc/twd/Pages/Groups.aspx>
4. <https://nucleus.iaea.org/sites/naipc/twd/Pages/Newsletters.aspx>



TAAO SC members met up again after 6 years!

Alvin Kah-Wei Hee (Universiti Putra Malaysia)

Chair, Tephritid Workers of Asia, Australia, and Oceania (TAAO) Steering Committee

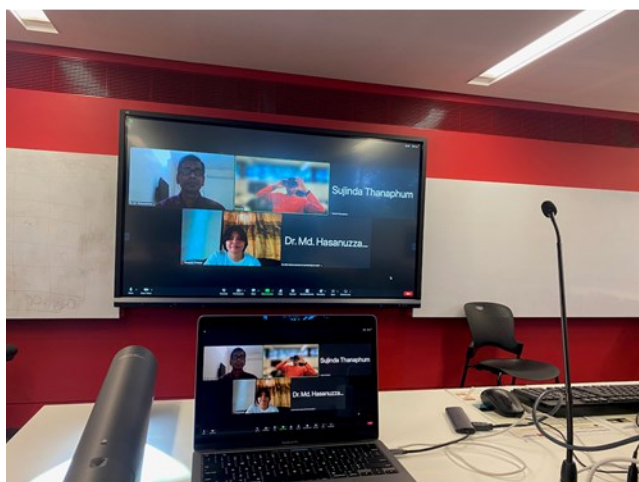
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With most travel restrictions lifted and global reopening happenings following the Covid-19 pandemic, the International Symposium on Fruit Flies of Economic Importance (ISFFEI) that was held in Macquarie University, Sydney, Australia provided the best opportunity for the TAAO Steering Committee to meet up again after 6 long years! Thus, on November 16, 2022, in Macquarie University Theatre room, a TAAO SC meeting was held after end of the 11th ISFFEI Technical Tour. Although not all TAAO SC members were able to be there, a Zoom link was created and everyone onsite and online was able to exchange pleasantries and catch up on things in the last few years before the start of the meeting. Those present onsite for the SC meeting included Dr Mark Schutze, Dr Sandeep Singh, Dr Nguyen Thi Thanh Hien, Dr Suk-Ling Wee and Alvin Hee whilst those present online were Prof Zhihong Li, Dr Sujinda Thanaphum, Prof Tati Suryati Syamsudin, Ms Sunyanee Srikachar and Dr Hasanuzzaman. Several items were discussed including the appointment of TAAO SC members. However, due to Covid-19 resulting in postponement of the 2020 2nd TAAO Symposium in Beijing, China, appointments of the new TAAO SC were not made. However, in this meeting, it was unanimously agreed that the present SC be maintained until the 2nd TAAO Symposium is held. Terms of reference for future SC were also discussed and will be ratified soon.

In this SC meeting, it was reaffirmed the date and venue of the 2nd TAAO Symposium to be held in May, 2024 with Prof Zhihong Li hosting the TAAO Symposium in Beijing, China. The dates have been carefully chosen to coincide with the pleasant weather in Beijing and most importantly, not overlapping with the meetings of our sister regional groups in 2024- the Tephritid Workers of Western Hemisphere (TWWH), the Tephritid Workers of Africa, Europe and the Mid-

dle East (TEAM) and the International Congress of Entomology that will be held from August 25-30, 2024 in Kyoto, Japan. Our first TAAO Symposium was held in Putrajaya, Malaysia. Although the 2nd Symposium was postponed before, Zhihong has been upbeat about it to organise our much-awaited Symposium. We're all excited to meet up in Beijing again in less than 2 years' time. We wish Zhihong and her team the very best in organizing the 2nd TAAO Symposium! Notifications on the second TAAO Symposium will be issued to all members, once updated information is received. Special thanks also, for Dr Polychronis Rempoulakis, the organising chair of the 11th ISFFEI and Ben Clark from The Conference Company for organising and facilitating the use of the meeting room free of charge for the TAAO SC!

On the social media front, a Facebook page for TAAO has also been created under the TAAO Newsletter Editorial Committee. We hope that it is not too late for everyone to join the group! The objectives of the TAAO are to foster greater and effective collaborations amongst tephritid fruit fly workers including researchers, academics, regulators, funding bodies, and all those involved in plant protection agencies and phytosanitary operational programmes. We hope that the use of social media means will also be able to advance the goals of TAAO. Dr Sandeep Singh will be assisting in leading the social media updates in Facebook. Thank you to Dr Hasanuzzaman, our TAAO Newsletter EC Chair, Dr Sandeep Singh, our new TAAO social media leader. Please sign up and be a part of the TAAO Facebook community!



UPCOMING EVENTS AND DATES TO REMEMBER

3rd Global Soil Biodiversity Conference (GSB 2023) from 13-15 March, 2023 to be held in Dublin, Ireland. <https://gsb2023.org/>

4th International Congress on Biological Invasions (ICBI2023) from 1-4 May, 2023 to be held in Christchurch (Ōtautahi), New Zealand. <https://www.scienceevents.co.nz/icbi2023>

10th International Congress on Dipterology from 16-21 July 2023 to be held in Reno, Nevada, USA. <https://dipterists.org/icdx/index.html>

38th Annual Meeting of International Society of Chemical Ecology from 23-27 July 2023 to be held in Bengaluru, India. <https://www.chemecol.org/futuremeetings.shtml>

SIP Annual Conference 2023, Society for invertebrate Pathology from July 30 - August 3, 2023 to be held in Maryland, USA. <http://www.sipweb.org/meetings.html>

Plant Health 2023, The American Phytopathological Society (APS) Annual Meeting from 12-16 August, 2023 to be held in Denver, Colorado, USA. <https://www.apsnet.org/meetings/annual/PH2023/Pages/default.aspx>

Ento23, annual event of the Royal Entomological Society from 5-7 September, 2023 to be held in Cornwall, UK. <https://www.royensoc.co.uk/event/ento23/>

12th European Congress of Entomology from 16-20 October, 2023 to be held in Crete, Greece. <https://ece2023.com/>

Entomology 2023, Annual Meeting of Entomological Society of America from 5-8 November, 2023 to be held in National Harbor, Maryland, USA. <https://entsoc.org/events/annual-meeting/entomology-2023>

20th International Plant Protection Congress (IPPC 2024) from 1-5 July, 2024 to be held in Athens, Greece. <https://www.ippcathens2024.gr/en/>

27th XXVII International Congress of Entomology (ICE2024) from 25-30 August, 2024 to be held at Kyoto, Japan. <https://ice2024.org/>

12th ISFFEI will be held in Agadir in Morocco in 2026

Meetings and Activities Related to International Organization for Biological and Integrated Control (IOBC). <https://www.iobc-global.org/events.html>



**The 2nd TAAO Symposium,
May 2024, Beijing, China**

**Will give update information when it
is available. Stay tuned!!**

Tephritid Workers Database (TWD)

Tephritid Workers Database link:

<http://nucleus.iaea.org/sites/naipc/twd/Pages/default.aspx>

Please keep your TWD profile updated to stay connected with the whole tephritid fruit fly community in the world.

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TAAO NEWSLETTER

The TAAO Newsletter is produced by the TAAO editorial committee from contributions made by fruit fly workers from across the region encompassing Asia, Australia, and Oceania. While focused on this region, contributions are also welcome from tephritid workers. The newsletter is distributed electronically and free of charge to members of the TAAO mailing list. Please contact the TAAO EC Chair (hasan.baec@gmail.com and/or mhasanuzzaman72@yahoo.com) if you wish to be added or removed from this list, or if you have a note that you would like to contribute to future issues of the Newsletter.

All issues of the **TAAO Newsletter** are available here:

<https://nucleus.iaea.org/sites/naipc/twd/Pages/Newsletters.aspx>

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