

Fruit Fly News

FFN#47 - February 2024

Photo credit Samira A. Mohaned

*Interview with
Samira Abuelgassim
Mohamed
P.3*

FRUIT FLY NEWS

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FRUIT FLY NEWS EDITORS

Francesca Scolari

Alvin Hee

Pablo Liedo

Abdeljelil Bakri

Brian Barnes

Olivia Reynolds

There was a need to cover tephritid news from Europe and Asia. That is why FFN editorial team is glad to welcome two new editors, Francesca Scolari (Italy) and Alvin Hee (Malaysia).



ALVIN HEE KAH WEI



FRANCESCA SCOLARI



Guest of honor Samira Abuelgassim Mohamed



First and foremost, I am honoured by the invitation from Fruit Fly News (FFN) to feature my profile and contributions to the fruit fly R&D. Below is a synopsis of the same.

1) Introduction of yourself

My name is Samira Abuelgassim Mohamed. I was born and raised in Altimairab, which is one of the many beautiful villages within the widely recognized oldest sub-Saharan African territories, the Kush Kingdom (1069 BCE and 350 CE). Altimairab is located on western bank of River Nile, about 110 Km north of the ancient Meroë, the capital city of the Kush Kingdom, and about 14 Km south of Atbara town where the Nile River joins with its last tributary (Atbara River), forming an estuary and finally running into the Mediterranean Sea.

Growing up in Altimairab was fun. As a child, I enjoyed observing the splendid architecture of the stone temple complexes, including solid pyramids found in Meroe. Even though the architecture of Meroe City and popularity of Kush Kingdom portrayed a prepossessing or otherwise a luxurious life of the imperial subjects, it was not true for majority of the people post-the Kush. My elementary school days was not a walk in the park. Yes, I could walk on foot for over 7Km, starting the journey early from my home to school, and covering the same distance in the evening. I was fortunate to join a boarding school for my intermediate and high education, just because those schools were not available in our village. I joined the University of Gezira, Wad-Medani (Sudan), where I studied BSc. Agriculture and specialised in Crop Protection. I did my MSc (Crop Protection), at Wageningen Agricultural University, Wageningen (the Netherlands) and later on, PhD (Crop Protection, Entomology), University of Gezira, Wad-Medani



Meroë Pyramids and Temples of the Kush Kingdom

(Sudan), while on German Academic Exchange Service (DAAD) within the African Regional Post-graduate Programme in Insect Science (ARPPIS) hosted at *icipe*.

2) How (Why) did you choose to be an entomologist? Your interest in fruit flies?

Being a daughter of a subsistence farmer, together with my siblings, we used to go to the farm and do farm-related work, but sometimes our harvest was severely hampered by pests and diseases. When it was the time to join the university, I was admitted to pursue a degree in agriculture and having seen what my communities were struggling with, in term of managing the pests, I opted to do crop protection and later majored in entomology hoping I could offer some help.

To be honest, at my young age I did not have a particular interest in fruit flies since in our area we were not growing fruit trees. All I knew then, which I later learned was a fruit fly (*Ceratitis quinarian*), is that a pest attacked the fruits of a wild tree (*Ziziphus spina-christi*), the fruits which we enjoyed harvesting and eating during our childhood.

My interest in fruit flies started 25 years ago when I joined *icipe* to undertake my Ph.D. within the framework of the ARPPIS. Since then, I became very fascinated with this group of insects.

3) What are you most proud of in your career?

Several achievements during my career have been very fulfilling. The one I am most proud of is contributing to the transformation of lives of millions of small-scale famers in eastern and southern Africa, as well as helping them to make ends meet from their mango production through management of fruit flies using nature-based approaches (e.g., use parasitoids and biopesticides), which otherwise could have gone to wastes as result of heavy infestation of fruit flies especially *Bactrocera dorsalis*.



I vividly recall one time during one of our farmers' field days in Kenya, one of the female mango growers gave a powerful testimony, while she was shedding tears, that her life was transformed since she started applying the IPM fruit flies approach that are promoted by *icipe*, adding that she was able to pay for her child's school fee after dropping out due to lack of financial resources to meet their education needs.

4) Who were the people who inspired you most?

There were/are several people who inspired me, but my greatest inspiration was my mother. Even though she was illiterate, she had a firm believe that education is a key to success and stemming from her strong conviction that "educating a girl/mother is educating the entire nation." She made sure, against all the odds, that me and my other three sibling got educated and in my case to higher degrees.

5) What are your hobbies?

In the field of science, there are so many fascinating things, apart from the discoveries that we make on the pests, their interaction with the natural ecosystem and the socio-impact that our research outputs continue to generate across the world. However, I enjoy travelling and walking (among other sporting activities). I also like to interact with different people and knowing about their people culture and religious beliefs.

6) Where do you and your family like to go on vacation?



Image captured on a ferry, on our way from Mwanza City, crossing over to the neighbouring smaller islands.

My preference to visiting museums and archives is drawn from the influence of my upbringing in proximity of Meroe town, and from my previous stay in Shendi, during my high school education a town close to Naga, another ancient historic site. The two towns (Meroe and Naga) are homes to some of the world's uniquely and amazingly designed temples and pyramids, which are currently considered as one of the UNESCO heritage sites. Travelling by bus, and watching curiously the outside architecture, and getting a chance to view the interior artistic drawings in the walls of what places now regarded as a contemporary of the ancient Egypt, cultural and archival sites are enchanting to me. East Africa is home to some of the historical sites such as Fort Jesus in Mombasa, Kenya, and the blooming cities with rich historical foundations such as Mwanza "Rock City" in Tanzania. Even though it is somehow difficult to balance the demand from work, travelling back home, in Sudan, occasionally, I visit the East African cities to appreciate the magnificent old architectures, interact and learn about the cultural diversity and to cherish architectonics of the contemporary cities.

Of all the places that I have visited in east Africa, I find coastal cities to be rich in cultural diversity, and relatable to Sudani culture.



Image of Mwanza City, showing how some of the uniquely built houses in between rocks



Visit to Egypt

Outside eastern Africa, I have travelled to north Africa (e.g., Egypt), Asian countries, Europe, and America. In all the places I have travelled to, I enjoyed my visit to Hawaii.



Visit to Egypt

7) Where was your best foreign destination, and where else would you like to go?

My best foreign destination was Hawaii which I had a chance to visit twice. Hawaii is naturally a beautiful tourist destination, where tourists relax by its beach. During my visits, I enjoyed the culture and customs of the people, tried the local and international cuisines, and participated in various dynamic activities along the beach. It is in my plan to visit Hawaii again.

Another fascinating destination that I have visited, albeit during the fruit fly meetings, was in Kolymbari on the island of Crete, Greece.

8) Do you have any advice for young colleagues or fellow students?

Owing to my experience, and having passed through the professional and academic ladder, my advice to scholars and young scien-

tists is that the road to success is not rosy. Sometimes, it can be very bumpy and challenging; however, this should not lead to despair rather should be viewed as a stepping



The lovely tourist site, Hawaii

stone towards success. They should remain focus, having an ultimate goal and work towards achieving it.

Over the years, I have mentored more than 30 scholars and it gives me great satisfaction and pleasure that some of them are among top achievers as highlighted in the photo below.

In addition to supervision of postgraduate students, I have also mentored several young researchers across Africa.

9) Do you have any suggestions for improving the international cooperation on fruit flies?

Fruit flies, particularly the alien invasive species, *B. dorsalis* exhibits a transboundary characteristic. Fruit production, income of small-holder farmers, as well as the livelihood of millions of populations in underdeveloped and developing countries across the world continue to be affected by the ravaging effect of *B. dorsalis*. Our project on Af-

ican Fruit Fly IPM at *icipe* has embraced international and local partnerships and collaborations, some of which have led to some of the most celebrated milestones in the management of fruit flies.

Even though international collaborations have had significant contribution to the management of the pest, and consequently improved income and food security across Africa, there is still much more that should be done. The concept of biological control of pests in general, particularly in Africa continue to lag behind. Owing to the important role that biological control plays in area-wide management of the fruit flies to below-economic threshold, as an African Scientist, I appeal for more collaborations on the biological control of these pests, especially in term of harmonization of policies on import and export of biocontrol agents. Overall, continued cooperation in the management of fruit flies is vital in providing a springboard for the scientific breakthroughs, including sustainable economic and social development between continents, countries, and individual researchers.



Group of Tanzanian youths aspiring to be Scientists



2nd International Symposium of TEAM Kolymbari 3-6 July 2012, in Kolymbari on the island of Crete, Greece.

 FIRST RUNNER UP Pascal Osa Aigbedion-Atalor (PhD Scholar)	 WINNER Rehemah Gwokyalaya (PhD, Uganda)	 WINNER Miano Raphael Njurai (PhD, Kenya)
 WINNER Komi Mensah Agboka (PhD, Togo)	 SECOND RUNNER UP Nelson Litunya Mwando (PhD, Kenya)	 SECOND RUNNER UP Sahadatou Mama Sambo (PhD, Benin)

icipe Governing Council Awards

During its Annual General Meeting, the *icipe* [Governing Council](#), which consists of globally renowned scientists, honoured several outstanding post-graduate scholars, undertaking their research at the Centre. Here, scholars mentored by Samira A. Mohamed: Best published science paper and best poster.

10) What is one of the most interesting/important discoveries or contribution you made about fruit flies during your career?

In East Africa, I was the first investigator to evaluate the efficiency of the indigenous African parasitoid species, especially in the genus *Psytalia*, against the native African fruit flies. I carried out this work within the framework of the USDA funded project “African Tephritidae: Invasive Species Threatening U.S. Fruit & Vegetable Products”. This research sought to identify an efficient parasitoid for controlling of *Ceratitis capitata* in the US. Following the invasion of the African continent by the most devastating fruit fly, *Bactrocera dorsalis* (initially described as *B. invadens*), which nearly crippled the fruit industry in Africa, I have been at the forefront in the development and dissemination of classical biological control program targeting this pest. Notably, I spearheaded the introduction, evaluation, and subsequent release of two efficient exotic parasitoid species (*Fopius arisanus* and *Dacnusa areolaris*) in over 15 African countries.

In the arena of post-harvest management of fruit flies, our research findings have provided evidence-based data that has facilitated re-gaining access to export market for Kenyan mango to the European Union after 7 years of self-imposed ban, as the result of fruit fly infestation, and this is a phenomenal breakthrough.

Article showing post-harvest disinfestation treatment for mangoes from Kenya to the European Union.

Furthermore, we have established the non-host status of avocado to *B. dorsalis*, a contribution “Ware, A. B., du Toit, C. N., du Toit, E., Collins, R., Clowes, R., Ekesi, S., & Mohamed, S. A. (2016). Host suitability of three avocado cultivars (*Persea americana* Miller: Lauraceae) to oriental fruit fly (*Bactrocera (invadens) dorsalis* (Hendel) (Diptera: Tephritidae)). *Crop Protection*, 90, 84-89.” that facilitated the negotiation for the re-access of Kenyan avocado to South African market (See article image below).

Capacity building is the key to sustainability of the IPM intervention of fruit flies. To this end, I am proud to have mentored, and continue to train postgraduate students/post docs, extension, and quarantine officers, as well as farmers on various aspects of fruit fly management.



Icipe develops water technology qualifying mangoes from Kenya for EU markets

By CAROLINE MWENDWA

Fruit fly (*Bactrocera dorsalis*), a pest originating from Asia and came to Kenya in 2002, has been a major reason why fruits such as mangoes, citrus and avocados from Kenya have been turned down in Europe. International Centre for Insect-Phytopathology and Entomology (Icipe)

is effective. The process does not affect the nutrient value of the mangoes and can only be applied on mature fruits. This technology uses a post-harvest machine to treat the mangoes. The fruit fly has a sharp projection on its abdomen which injects eggs into mangoes, that hatch into small maggots. This treatment kills the eggs and all stages

the European Union, and mangoes that have undergone this process are compliant to all other export requirements are now qualified for the European markets. A pilot shipment of hot water treated mangoes has already been exported and the consignment was well received in the EU (Italy) and passed all tests. As



Thao Ogo, Chief Commercial Officer at Fy, Phyto-sanitary Inspector KEPHIS, at Icipe

FRUIT FLY MEETINGS IN 2024



Current Sections Devoted to Fruit Flies!

Section 14-17

Novel approaches in the management of invasive fruit flies (Diptera: Tephritidae)

Organizer: Nikolaos T. Papadopoulos, Marc F. Schetelig, George Tsiamis

Section 14-18

Fruit fly management technologies

Organizer: Pattara OPADITH, Stefano De Faveri, Atsushi Honma

Section 12-2

Advancing Fruit Fly Biosecurity Research: Applying New Tools in Microbial Ecology, Genomics, and Chemical Ecology

Organizer: Sheina Biason Sim, Dong Ho Cha, Charles Mason



5th TEAM MEETING 2024

FROM 15 TO 18 APRIL 2024

Belle Mare, Mauritius



Tephritid workers of Asia, Australia and Oceania

2nd TAAO Symposium 2024

May 6-10, 2024

Beijing, China

<https://taao.scievent.com>



11th TEPHRITID WORKERS OF THE WESTERN HEMISPHERE (TWWH) MEETING

11^{ta} REUNIÓN DEL GRUPO DE TRABAJO EN MOSCAS
DE LA FRUTA DEL HEMISFERIO OCCIDENTAL (TWWH)

Montego Bay, Jamaica, June 3 - 7, 2024

REACT

Rapid Elimination of Invasive Insect Agricultural Pest Outbreaks by Tackling them with Sterile Insect Technique Programs

The REACT initiative, standing for "Rapid Elimination of Invasive Insect Agricultural Pest Outbreaks by Tackling them with Sterile Insect Technique Programs," is an ambitious project funded by the European Union with 6.65 million Euros under the Horizon Europe framework. Its goal is to safeguard European agriculture from invasive fruit flies, specifically *Bactrocera dorsalis* and *Bactrocera zonata*, which pose increasing threats due to climate change and the importation of infested fruits. This multinational project, launched in November 2022 and slated to run for four years, brings together 17 research groups from Europe, Israel, Mauritius, South Africa, and the UK. Prof. Marc F. Schetelig from the Justus-Liebig-University (JLU) of Giessen, Germany, an expert in Insect Biotechnology, leads this project.

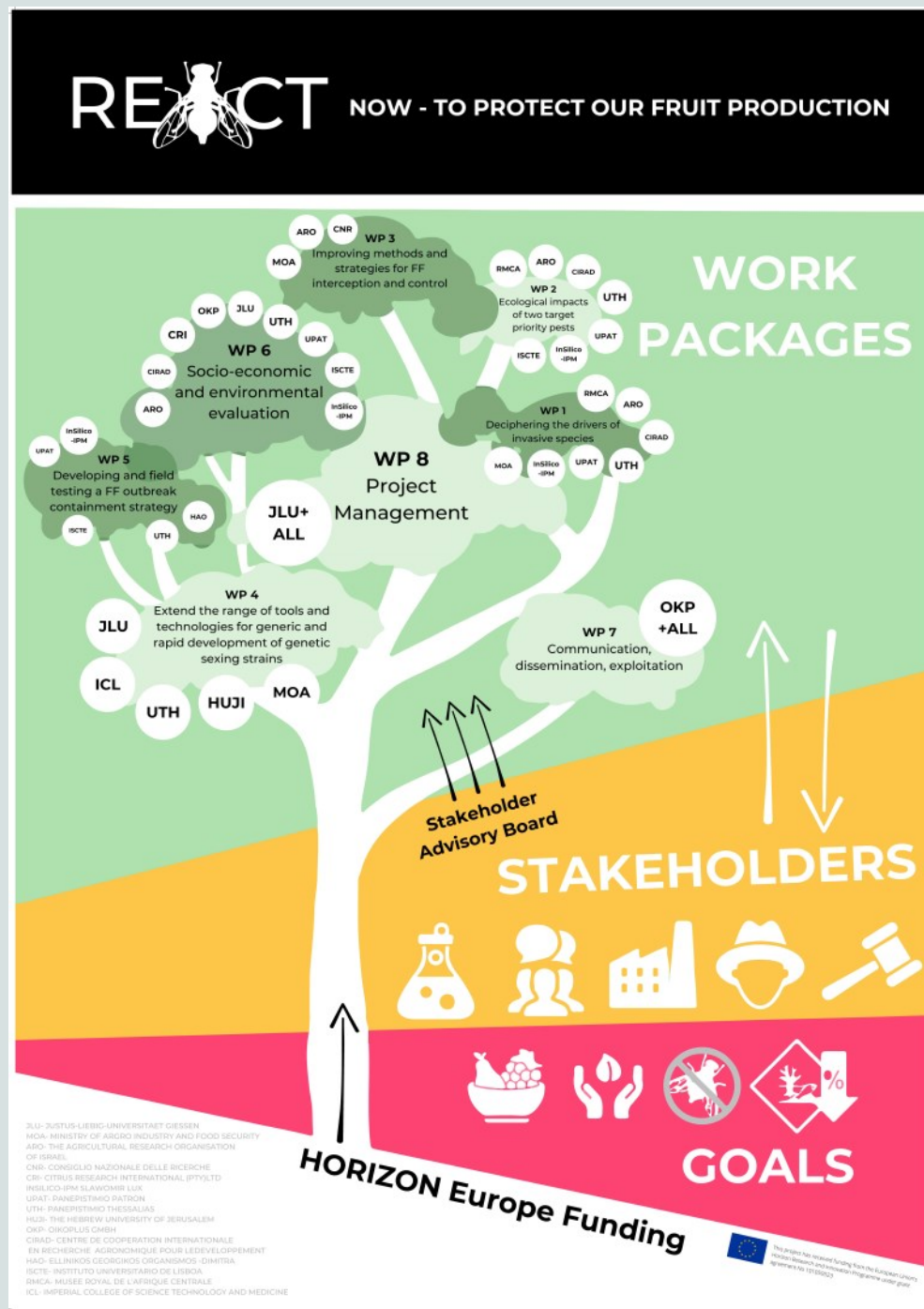
REACT's core strategy is to develop an advanced form of Genetic Sexing Strains (GSS) for the targeted fruit flies and a cost-effective small-scale SIT strategy for the rapid elimination of fruit fly invasions. The new generation of GSS addresses the issue of semi-sterility seen in classical GSS, thereby enhancing genetic stability and making Sterile Insect Technique (SIT) programs more cost-effective. The approach is comprehensive, integrating insights from farmers and delving into eco-

logical factors like competition with native species and microbial interactions. Additionally, the project is dedicated to identifying European host fruits for these pests and analyzing how different climate scenarios affect their population dynamics, aiming to effectively manage their spread.

Another crucial part of REACT's work is the development of a diagnostic tool that is both rapid and cost-effective, suitable for analyzing pooled larval samples. This tool employs CRISPR/Cas12a technology in combination with recombinase polymerase amplification (RPA), enhancing early detection and management capabilities. Furthermore, the project leverages cutting-edge metabolomics and transcriptomics to identify new markers of male quality, crucial for improving mass-rearing processes in SIT programs.



REACT is not only about technological advancements but also about timely application. The initiative is focused on quickly making these innovations accessible to farmers, especially those in small-scale farming environments who are dealing with invasions of agricultural quarantine pest insects. The collaboration within the REACT consortium exemplifies international teamwork in addressing agricultural challenges.



It underscores a shared commitment to sustainable and environmentally-friendly pest control methods, ultimately benefiting the broader agricultural community.

For more information, please visit www.react-insect.eu.

Source: Francesca Scolari, Institute of Molecular Genetics (IGM-CNR) Luigi Luca Cavalli-Sforza, Pavia, Italy. Marc F. Schetelig, Institute for Insect Biotechnology, Department of Insect Biotechnology in Plant Protection (IBPP), Justus-Liebig-University (JLU) Giessen, Germany.

Q-fly don't bother me: SA releases 1 billion sterile fruit Flies

South Australia has now dispersed 1 billion sterile Queensland fruit flies (*Bactrocera tryoni*) into its Riverland fruit-growing region in response to an outbreak of the destructive citrus pest.

Bactrocera tryoni is commonly referred to as Queensland fruit fly or 'Q-fly' and is found across Australia's northern tropics and east coast. It is less commonly found in South Australia and Western Australia, though outbreaks have been known to occur.

South Australia has strict biosecurity laws and polices the importation of certain fresh food products from outside its borders. The state's citrus-growing Riverland region bordering the Murray River is experiencing 47 Q-fly outbreaks.

Source: [cosmosmagazine](#) - sourced on 09 January 2024.

Milestone reached: One billion sterile fruit flies released to combat Riverland fruit fly outbreaks



Photo credit: Department of Primary Industries and Regions, the Government of South Australia (PIRSA), [link](#)

The threat of the Mediterranean fly in the Galapagos Islands



Satellite image showing Galapagos islands in the Pacific Ocean and mainland Ecuador

The Galapagos Islands are famous for Charles Darwin's observations of biodiversity on the different islands, which ultimately served in the construction of his theory of evolution through natural selection. This archipelago, which is part of Ecuador, is a protected natural area and a world heritage site due to its natural wealth. Despite the measures implemented for its conservation, it is not free from biological invasions. One of the greatest risks has been the invasion of the parasitic fly *Philornis downsi*, which lays its eggs in the nests of land birds, including the 13 iconic species known as Darwin's finches, where the larvae parasitize the nestlings. Some finch species are now in danger of extinction.

A new invasion since 2008 has been that of the Mediterranean fruit fly. Although there is no fruit industry in the archipelago, it affects the fruits that are consumed by local inhabitants (approx. 33,000) and those who visit the islands. Being a protected natural area, the measures that can be used to suppress or eradicate this species are very limited. However,

the sterile insect technique represents an alternative due to its specificity, proven effectiveness and the fact that sterile insects do not self-replicate.

For more information see the FAO/IAEA [Insect Pest Control Newsletter No. 102](#):



Darwin finches. The famous song-bird in the Galapagos islands.
Photo credit M. Yuval



Galapagos Islands
Photo credit M. Yuval

Reconsidering Risk for Fly/Host Relationships

Dr Bernie Dominiak

Fruit are grown on every continent except Antarctica. Fruit is used to feed and sustain good health for people everywhere. The gifting of fruit is key to many societies. Increasingly for most countries, world trade is essential for their economies and to feed their people. Unfortunately, most fruit is subject to insect attack and the most serious pests are fruit flies. Adult flies lay eggs into fruit: these eggs hatch into larvae which cause the fruit to degrade and become inedible. Therefore, fruit flies need to be managed to optimise human health and world trade.

To optimise fruit fly management, fruit producers monitor fruit fly populations using traps. A more informed knowledge of fruit fly hosts will result in better placement of traps. However, existing surveillance systems frequently do not incorporate knowledge regarding preferred or non-preferred hosts – a host tree is just a host tree.

Currently, potential fruit fly hosts are considered a host or a non-host as in **ISPM37**¹. This all-or-nothing approach is less appealing in the current climate change environment. Why should regulators subject poor hosts to the same level of disinfection as very good hosts which pose far larger risks? Further, the reliance of single end-point treatments removes any flexibility for trade and does not account for different levels of risk.

The risk posed by any host varies (often based on evolution), and varies between hosts and different species of fruit flies. This risk is measured by the number of adults that can emerge from a kilogram of fruit. This metric has been called several names in the past but was recently coined the “Host Reproduction Number” or **HRN**². HRN can be used to optimise surveillance traps for endemic fly management and theoretically to improve

surveillance for exotics. HRN can be used to identify non-commercial hosts which may act as a fruit fly reservoir for nearby commercial production areas.

In trade, the current single end-point treatment approach has some limitations. The use of methyl bromide carries some human health concerns and is a greenhouse gas contributor. Disinfestation techniques using high or very low temperature treatments for many days results in a considerable carbon footprint on that produce. In response to climate change, some countries are treating low carbon footprint imports more favourably.

Rather than relying on single end-point treatments, the “**systems approach**” offers options to demonstrate that risks have been managed and that the traditional end-point treatment is not required³. Part of a systems approach is likely to involve HRN. In their Pacific review, **Follett et al. (2021)**⁴ grouped HRN into five “Host Suitability Index” categories. Using HRN, marginal hosts (1-10 adults/kg) pose a much lower risk compared to very good hosts (>100 adults/kg). Therefore, surveillance, management and trade could be more informed if HRN were considered as part of the overall risk mitigation regime.

Unfortunately, **literature reviews** so far have found HRN values for only about 25% of all hosts for any particular tephritid^{5,6}. Similarly, HRN data is incomplete for several reviewed regions^{2,4}. HRN offers new opportunities for future fruit fly management, surveillance and trade. More work is required to be conducted and published to optimise the use of HRN for a range of fruit fly activities. These issues were raised at the 11th International Symposium on Fruit flies of Economic Importance at Sydney Australia in November 2022.

INVITATION

FFN Interview with Young Scientists

The YSC interview has been designed for newly graduated Ph.D. scientists in the field of tephritid fruit flies. The aim is to introduce yourself, share your experience and promote your research work with the community of tephritid workers around the world.

A standard format with six questions is used just as a guideline for your narrative. You can modify the questions at your convenience. We expect a text with approximately **600** words. Please keep it 'short and sweet' so our readers will enjoy reading your story. You may want to see examples of previous contributions as a guideline. The following link takes you to previous issues of FFN. We also encourage you to subscribe to be member of the tephritid workers' community (TWD) and receive the Newsflash, so you will not miss important events.

For more information, please contact one of the FFN editors (page 2)

Deadline to submit your story: June and December



Andrea Moyano

Institute of Molecular Genetics,
Italian National Research Council (CNR),
Pavia, Italy

1 - Tell us something about yourself; where did you born and grow up, and where did you study, and what degree did you obtain?

I was born in San Miguel de Tucumán, a small city located in the North-West of Argentina. I studied at the Universidad Nacional de Tucumán in the Facultad de Ciencias Naturales e Instituto Miguel Lillo, where I graduated as a Biologist and a Biology teacher. After that, I started a PhD in entomology at the same university, focusing on ecology and the sexual behaviour of tephritid species under the supervision of Dr. Juan Rull and Dr. Guido Van Nieuwenhove.

2 - What inspired you to choose your field of research; why fruit flies?

I've always been interested in research. From my childhood, I envisioned myself wearing a lab coat and conducting experiments. In a sense, I can affirm that this was my lifelong dream. Studying fruit flies opened up an entirely new world for me because during my degree I studied the chemical properties of native plants seeds, but I'm delighted with this choice. Not only does it contribute to the advancement of my career, but it also introduces me to outstanding colleagues and individuals.

3 - Tell us about your research project. Can you share some general findings, and how they might be important?

My PhD studies delved into the ecology and sexual behaviour of tephritid species inhabiting var-

ious areas within my city in Argentina, aiming to further elucidate the life-history and biological traits of poorly known species (*Rhagoletotrypeta pastranai*, *Rhagoletis blanchardi* and *Anastrepha schultzi*) in a subtropical environment. Additionally, in Argentina we grapple with the presence of two important pests, *Ceratitis capitata* and *Anastrepha fraterculus*. We believe there are aspects of their host utilization and population dynamics that merit attention for a more effective implementation of pest control strategies.

Since April 2023, I have been holding a postdoctoral position at the Institute of Molecular Biology (IGM) of the National Research Council in Pavia, Italy, under the leadership of Dr. Francesca Scolari. My work is part of the Horizon Europe project REACT (www.react-insect.eu), which seeks to develop sustainable, long-term strategies to protect agriculture from two invasive insect pests of EU priority: *Bactrocera dorsalis* and *Bactrocera zonata*. Specifically, my role involves producing and analyzing metabolomes to identify potential new markers of male quality for SIT mass-rearing. This research is conducted in collaboration with the Insect Pest Control Laboratory at the FAO/IAEA in Vienna, Austria.

4 - What were some of the challenges you faced during your study and the lessons learned?

My current postdoctoral work has taken me away from home, leading me to live between Italy and Austria for two years,

marking one of the most challenging experiences I have ever encountered. However, it is entirely worth it. I am acquiring a wealth of knowledge about the strategies and tools that researchers have developed for the management and control of fruit flies. I am grateful to my supervisors for providing me with this invaluable opportunity.

5 - What do you have in mind for a future career – what would you most like to do with your qualification?

In my future career, I aspire to work in a research institute or organization that not only enables me to apply the knowledge I have acquired so far but also allows me to further my expertise by exploring the physiological and molecular aspects of tephritid fruit flies. I am particularly intrigued and optimistic about contributing to the development of bioinformatic tools aimed at enhancing the management and control of pest species.

Relevant publications

MOYANO, A., ABRAHAM, S., OVRUSKI, S., VAN NIEUWENHOVE, G., & RULL, J. 2021. Life history, dormancy regulation, reproductive physiology and basic behaviour of the subtropical fruit fly *Rhagoletotrypeta pastranai* (Diptera:Tephritidae). *Bulletin of Entomological Research* 111, 238 – 245. <https://doi.org/10.1017/S0007485320000590>

DÍAZ, V., MOYANO, A., GIUDICE, A., COLLARAOZ, M. V., PÉREZ-STAPLES, D. ABRAHAM, S. 2023. Male exposure to guava volatiles affects female remating behavior in *Anastrepha fraterculus*. *Entomologia Experimentalis et Applicata* 171, 828 – 837. <https://doi.org/10.1111/eea.13359>



Rhagoletotrypeta pastranai, target of laboratory behavioral assays during my PhD

Thank you!

Fruit Fly News Editorial Team

Fátima Fernández

Facultad de Agronomía, Zootecnia y Veterinaria (FAZV-CONICET), Tucumán, Argentina



Figure 1. *Anastrepha fraterculus* on mango. This fruit was chosen to normalize the fly offspring from different geographical origins.

I am from Tucumán, a province located in the northwest of Argentina. Since my childhood I have always been interested in biology. I have obtained a bachelor's degree and a professorship in biological sciences at Facultad de Ciencias Naturales

which belongs to Universidad Nacional de Tucumán (UNT). When I was studying, I discovered my passion for entomology, so I decided to go deeper into this area. I began doing internships as an undergraduate student in projects that involved *Chrysoperla argentina* (Neuroptera) and then pollinating insects. After completing my studies, I wanted to start a PhD in Biology and an opportunity arose to study the South American fruit fly, *Anastrepha fraterculus*, with the working group of Teresa Vera, Josefina Ruiz and Lucía Goane. I obtained a PhD scholarship from CONICET in 2022 to start a PhD project at Facultad de Agronomía, Zootecnia y Veterinaria (UNT). *Anastrepha fraterculus* (Wiedemann) (Figure 1) is an important pest in Argentina with a wide



Figure 2. Forced infestation of different host fruits by *Anastrepha fraterculus*.

geographical distribution, which suggests a high level of climatic adaptability. Added to the high number of species of economic importance that it attacks, this species has a significant economic impact.

I have always liked research and especially research related to insects that have an economic impact by negatively affecting crops, so fruit flies caught my interest. In this context, the sterile insect technique (SIT) attracted my attention since it represents a natural, sustainable and environ

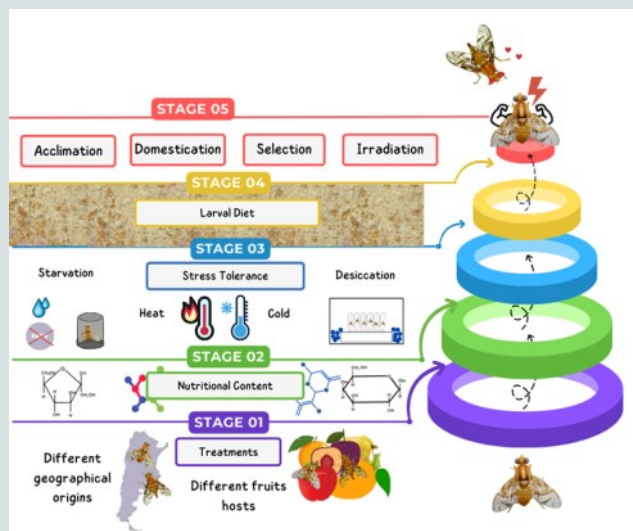


Figure 3. represents a graphical summary of my PhD topic. Each of the stages represents one of the objectives to be evaluated and the “hoops” represent advances in research to obtain fruit flies tolerant to environmental stress. It is important to highlight that stress tolerance in *A. fraterculus* has not been studied so far.

mentally friendly control method. As a result, I have started my PhD to achieve my goals.

My PhD project consists of determining a feeding program for the sterile flies that allows them to maximize their tolerance to environmental stressors that they will face after being released in climatically diverse regions with commercial fruit production in Argentina and other countries of South America. To this end, I will determine the effect of the geographical origin of the flies, and the host fruit in which the larva has developed in flies (Figure 2), on the carbohydrate, glycogen, lipid, and protein content; and on stress tolerance (starvation, desiccation, heat and cold).

In a second instance, I will evaluate the effect of artificial larval diet, domestication, acclimation on fly stress tolerance. These experiments will be carried out with fertile flies. As a final objective, the stress tolerance and nutritional content of sterile males rear with the larval diet that improved the stress tolerance of the flies will be evaluated.

Immersing myself in the world of fruit flies was a challenge for me, since I knew about them but not in depth. During my PhD so far, I have learnt to rear insects under laboratory conditions, collect infested fruit, design and run an experiment, and everything that this entail. I learnt to be patient and to work in a team, which is allowing me to grow professionally.

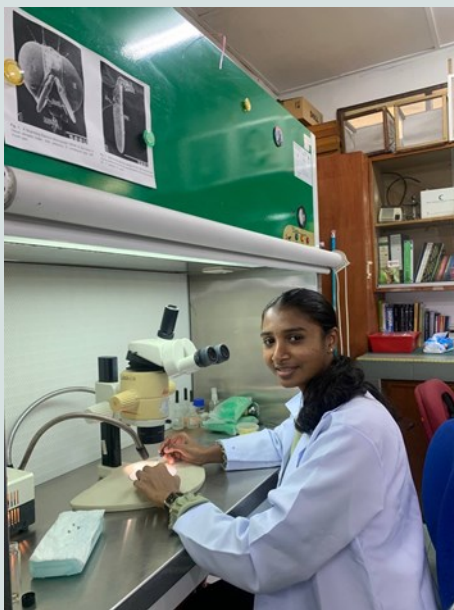
I would like to continue my training in the world of fruit flies. I hope these results will allow a more successful implementation of the SIT against *A. fraterculus*. Looking to the future, my challenge will be to make my results visible since they represent the first research about stress tolerance in *A. fraterculus*.

I have no publications about my results yet. The progress of my research will be discussed at the 11th Tephritid Worker of the Western Hemisphere (TWWH) Meeting June 3-7, 2024 in Jamaica, which I expect to attend.

Rishabapriya Rajasegar

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I am Rishabapriya Rajasegar from Malaysia. I was born in Selangor, Malaysia and grew up in a small town known as Telok Panglima Garang, Selangor. I did my foundation in science at Malacca Matriculation College before pursuing my Bachelor's Degree at the Universiti Putra Malaysia. In 2021, I graduated with a Bachelor of Science in Biology with a first-class honours, and proceeded to pursue my studies via a fast-track PhD programme. Currently, I'm completing my 2nd year of PhD in Entomology in the Department of Biology, Faculty of Science, Universiti Putra Malaysia.



The person who inspired me to pursue my studies in Fruit Fly Research is none other than my very own supervisor and mentor, Associate Professor Dr Alvin Hee Kah Wei who's currently the APACE President, International Fruit Fly Steering Committee member, and TAAO Chair. His passion, immense knowledge and outstanding contributions in this field have truly inspired me to follow his path of success. Also, the Oriental Fruit Fly, *Bactrocera dorsalis*, is a distinctive species from the Tephritidae family that cleverly interacts with its environment for survivability. Fascination towards the uniqueness of this economically important fruit fly pest sparks the curiosity in me to learn more on it.

The subject of my research, the Oriental Fruit Fly (Figure 1) is a highly destructive and invasive species



Figure 1: Laboratory strain of the Oriental fruit fly, *Bactrocera dorsalis*



Figure 2: Conducting individual feeding bioassays under stereo microscope.

known to cause damage to commercial fruits such as mango, guava and starfruit. The males of this species are strongly attracted to and feed on methyl eugenol (ME) found in nature, and could cleverly detoxify it into sex pheromonal components 2-allyl-4,5-dimethoxyphenol and (E)-coniferyl alcohol. Due to this association, ME has been used for the male annihilation technique (MAT) that traps and kills the flies to eradicate the male population. We are currently testing a new plant-based chemical, also a potential inhibitor of the male cytochrome P450 system enzymes, the main route of methyl eugenol detoxification. I am conducting bioassays and behavioural studies mainly to test mortality, mating success, and temporal changes in vivo upon consumption of the treat-

ment (mixture of ME and the chemical additive), and are ongoing. Recently, by using a well-designed individual feeding method we discovered that this environment friendly chemical causes mortality to male flies 24 hours post treatment. The flies were fed with treatments individually using micro capillary tube and the mortality data were subjected to Probit analysis to generate lethal dose value (Figure 2). I believe by interpolating this discovery in MAT, it will open new avenues for the control of fruit flies that have been an incessant problem in the agricultural industry.

One of the challenges that I faced during my study is the rearing of laboratory strain Oriental Fruit Fly (Figure 3). Rearing the flies right from collecting eggs until it develops into adult flies and maintaining healthy fruit fly cultures are few of the tedious routine that I must carry off with sheer commitment. Not to mention, spending hours in the laboratory separating male and female out of thousand flies (Figure 4), is in the list too. Another challenge is to keep up with the timeline of my study. The fly stocks would not be available all the time to conduct bioassays, which makes it difficult to keep up with the timeline. Thus, what I learned from my work is to be patient and determined, and to persevere despite all the challenges I have to face.

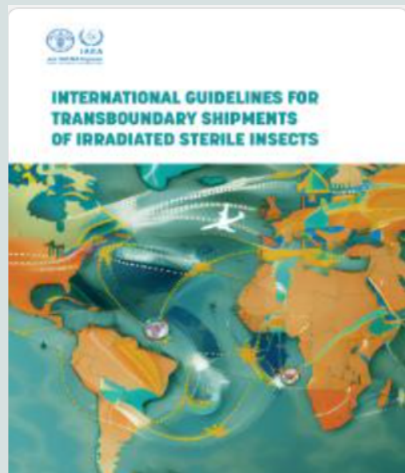
For the future, I dream to be not only a lecturer but also a well-recognised fruit fly researcher. With the knowledge and skills that I possess, I aspire to develop a MAT formulation that could be implemented on a global scale to combat pestiferous fruit fly epidemic.



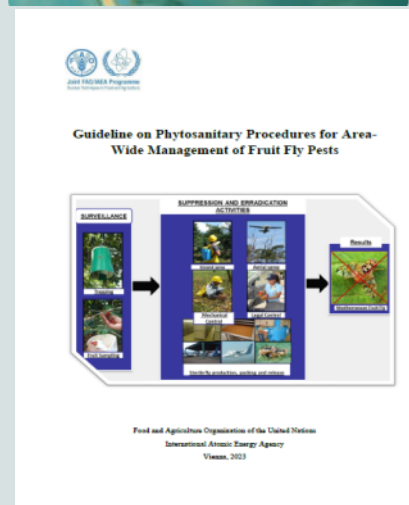
Figure 3: Adult cages in the insectary of Department of Biology, Faculty of Science, Universiti Putra Malaysia



Figure 4: Separating male and female flies for bioassay tests.



[FAO/IAEA. \(2023\).](#) International Guidelines for Transboundary Shipments of Irradiated Sterile Insects. W.R. Enkerlin, C. Nelson, M. Quinlan, R. Griffin, R. Bellini, G. Yaacobi, J. Bouyer & R. Pereira, eds. Vienna, Austria. 43 pp.



[FAO/IAEA. \(2023\).](#) Guideline on Phytosanitary Procedures for Area-Wide Management of Fruit Fly Pests, Jesus Reyes Flores, Walther R. Enkerlin, Jorge Hendrichs and Rui Pereira (eds.), Food and Agriculture Organization of the United Nations/International Atomic Energy Agency. Vienna, Austria. 224 pp.



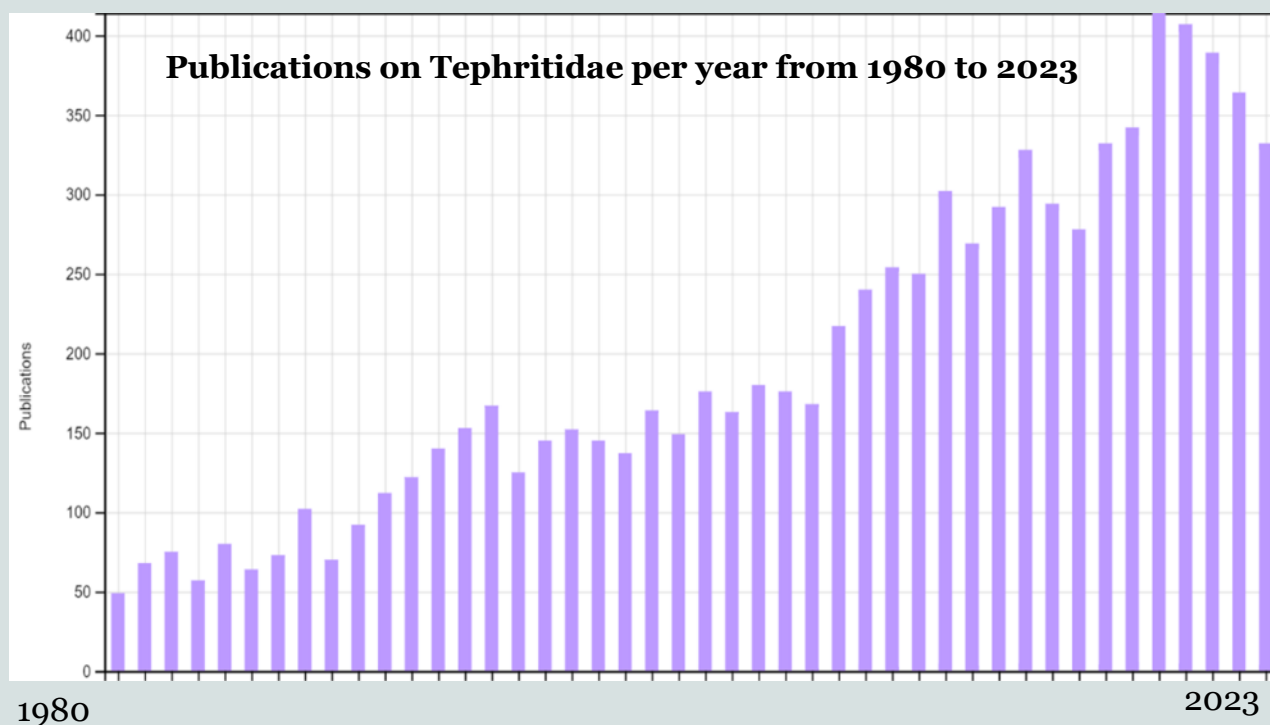
[Ruane, J., Mba, C., Boettcher, P., Koskela, J., Mair, G. & Ramasamy, S., eds. 2023.](#) *Case studies of the use of agricultural biotechnologies to meet the needs of smallholders in developing countries.* Rome, FAO.

Scientific publications on Tephritidae and citations

1980 – 2023

A search was carried out for scientific publications in the Web of Science with the word "Tephritidae" for the period 1980-2023. In total 8,619 publications were found. Here we include a graph indicating the 20 organizations that published the most works, the number of publications per year, and a list of the 10 most cited papers.

Tree map chart with the 20 affiliations with the greatest number of publications on Tephritidae 1980-2023.



Publications on Tephritidae most cited from 1980 to 2023

PUBLICATIONS	CITATIONS
The gut microbiota of insects - diversity in structure and function Engel, P; Moran, NA FEMS MICROBIOLOGY REVIEWS. 2013	1451
Essential Oils in Insect Control: Low-Risk Products in a High-Stakes World Regnault-Roger, C; Vincent, Ch; Arnason, JT ANNUAL REVIEW OF ENTOMOLOGY. 2012	707
Statistical inference on associated fertility life table parameters using jack-knife technique: Computational aspects Maia, AHN; Luiz, AJB; Campanhola, C JOURNAL OF ECONOMIC ENTOMOLOGY. 2000	591
Slowing of mortality-rates at older ages in large medfly cohorts Carey, JR; Liedo, P; Orozco, D; Vaupel, JW SCIENCE. 1992	461
Invasive phytophagous pests arising through a recent tropical evolutionary radiation: The <i>Bactrocera dorsalis</i> complex of fruit flies Clarke, AR; Armstrong, KF; Carmichael, AE; Milne, JR; Raghu, S; Roderick, GK; Yeates, DK ANNUAL REVIEW OF ENTOMOLOGY. 2005	422
Host fidelity is an effective premating barrier between sympatric races of the apple maggot fly Feder, JL; Opp, SB; Wlazlo, B; Reynolds, K; Go, W; Spisak, S PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE USA. 1994	354
Ecologically relevant measures of tolerance to potentially lethal temperatures Terblanche, John S; Hoffmann, AA; Mitchell, KA; Rako, L; le Roux, PC.; Chown, SL. JOURNAL OF EXPERIMENTAL BIOLOGY. 2011	319
Bionomics and management of Anastrepha Aluja, M ANNUAL REVIEW OF ENTOMOLOGY. 1994	309
Natural selection and sympatric divergence in the apple maggot <i>Rhagoletis pomonella</i> Filchak, KE; Roethele, JB; Feder, JL NATURE. 2000	306
<i>Wolbachia</i> - induced cytoplasmic incompatibility as a means for insect pest population control Zabalou, S; Riegler, M; Theodorakopoulou, M; Stauffer, C; Savakis, C; Bourtzis, K PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE USA. 2004	287

Source: Web of Science

Books, Proceedings, Newsletters**Proceedings of the 4th
TEAM meeting, La Grande
Motte, France****5 to 9 October 2020**

The proceedings of the 4th TEAM meeting that took place in La Grande Motte in 2020 (France), which was mainly attended virtually by TEAM members, is now published in the latest issue of 'Fruits' the International Journal of Tropical and Subtropical Horticulture, [volume 76, issue 6](#)

All articles are open access and accessible [here](#).

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