3rd International Congress of Biological Control

Scientific Programme

San José, Costa Rica 24-27 June 2024

CABI · IOBC OILB · Universidad de Costa Rica · IICA · Ministerio de Agricultura y Ganadería · Gobierno de Costa Rica

JOIN THE IOBC!

If you are interested in making the world a better place by reducing the amount of pesticide sprayed, consider joining the International Organization for Biological Control. This not-for-profit organization brings together the community of biological control scientists from all over the world to discuss, debate and study nature-based solutions for crop pests and invasive alien species. The IOBC organizes meetings and provides support for scientists to attend these meetings. It further provides insight into new developments into the discipline.

Membership

Membership of the organization is open to all individuals and all organizations, public or private, that desire to promote the objectives of the organization.

There are four categories of membership:

Individual Members
Individual membership is open to all individuals engaged or interested in biological control.

Institutional Members
Institutional membership is open to any institution, including government departments, academies of science, universities, institutes and societies, participating in biological control activities.

Supporting Members
Supporting membership is open to any person or institution interested in promoting the objectives of the organisation.

Honorary Members
Honorary membership may be conferred by Council upon anyone who has made outstanding contributions to biological control.

Membership Application
Application for individual membership can be made to the Treasurer of the organization (treasurer@iobc-global.org). The applicant can request affiliation to any Regional Section. For other categories of membership, please contact the Secretary General (secretary-general@iobc-global.org). The Council decides on admission and will determine the appropriate category of membership, if any, of each applicant.

Acknowledgements

We are very grateful to the following individuals for their help in organizing the 3rd International Congress of Biological Control, which is the flagship event of the International Organization of Biological Control (IOBC). The congress is held every three to four years and the 2024 congress is being co-organized by IOBC and CAB International (CABI) and locally supported in Costa Rica by the Inter-American Institute for Cooperation on Agriculture (IICA), the Ministry of Agriculture and Livestock of Costa Rica (MA&L), and the University of Costa Rica (UCR).

Overall Organization & Local Organizing Support:

Ulli Kuhlmann (CABI, Switzerland), Martin Hill (President IOBC Global, Rhodes University, South Africa), George Heimpel (Past President IOBC Global, University of Minnesota, USA), Yelitza Colmenarez (CABI c/o UNESP, Brazil), Harold Gamboa (IICA, Costa Rica), Karla Maria Mena (MA&L), Maria del Milagro Granados (UCR) and Heike Kuhlmann (KCS Convention Service, Switzerland).

Scientific Session & Panel Organizing Members:

Session 1: Julie Coetzee (Rhodes University, South Africa), Alejandro Sosa (Fundación para el Estudio de Especies Invasivas- FUEDEI, Argentina) & Melissa Smith (USDA ARS Invasive Plant Research Lab, Florida, USA); Session 2: Kris Wyckhuys (Chrysalis Consulting, Vietnam) & Lessando Gontijo (University of São Paulo – Esalq, Brazil); Session 3: Yelitza Colmenarez (CABI c/o UNESP, Brazil) & Lorena Barra Bucarei (Instituto de Investigaciones Agropecuarias, Chile); Session 4: Martin Hill (Rhodes University, South Africa) & Ulli Kuhlmann (CABI, Switzerland); Session 5: Laura Varone (Fundación para el Estudio de Especies Invasivas, Argentina) & Maria Belén Aguirre (Fundación para el Estudio de Especies Invasivas- FUEDEI, Argentina); Session 6: Tara Gariepy (Agriculture and Agri-Food Canada, Ontario, Canada) & Jason Schmidt (University of Georgia, Georgia, USA); Session 7: Gonzalo Avila (The New Zealand Institute for Plant and Food Research Limited, New Zealand) & Jana Collatz (Agroscope, Switzerland); Session 8: Matthew Tinsley (Stirling University, United Kingdom) & Yelitza C. Colmenarez (CABI c/o UNESP, Brazil); Session 9: Michelle Fountain (NIAB, United Kingdom) & Liam Harvey (Biobest Group, United Kingdom); Session 10: Tania Zaviezo (Universidad Catolica de Chile, Chile), Simone Mundstock Jahnke (Universidade Federal do Rio Grande do Sul, Brazil) & Yelitza Colmenarez (CABI c/o UNESP, Brazil); Session 11: Lynn M. LeBeck (Association of Natural Biocontrol Producers, California, USA); Session 12: Alejandro Tena (IVIA, Spain), Iain Paterson (Rhodes University, South Africa), Greg Wheeler (USDA/ARS Invasive Plant Research, Florida, USA) & Guy Sutton (Rhodes University, South Africa); Session 13: Joan van Baaren (University Rennes, France) & Colmenarez Yelitza (CABI c/o UNESP, Brazil); Session 14: Kim Weaver (Rhodes University, South Africa), Grant Martin (Rhodes University, South Africa), Lorena Barra Bucarei (Instituto de Investigaciones Agropecuarias, Chile) & Malvika Chaudhary (CABI, India); Session 15: Kelley Leung (University of Groningen, The Netherlands) & Leo W. Beukeboom (University of Groningen, The Netherlands); Session 16: Feng Zhang (CABI, China) & Oliver Bach (Sustainable Agricultural Network, Costa Rica); Session 17: Modesto Olanya (USDA-ARS, ERRC, Pennsylvania, USA) & Adelumula Oladeinde (US National Poultry Research Center, Georgia, USA); Session 18: Ivan Rwomushana (CABI, Kenya) & Frank Chidawanyika (ICEPE, Kenya); Session 19: Marc Bardin (INRAE, France); Session 20: Lorena Barra Bucarei (Instituto de

Investigaciones Agropecuarias, Chile), Yelitza Colmenarez (CABI c/o UNESP, Brazil), Daohong Jiang (Institute of Plant Protection, Chinese Academy of Agricultural Sciences, China) & Jiatao Xie (Huazhong Agricultural University, China); Session 21: George Heimpel (University of Minnesota, USA); Session 22: Justice Tambo (CABI, Switzerland) & Beatrice Muriithi (ICEPE, Kenya); Session 23: Matthew Tinsley (Stirling University, United Kingdom) & Yelitza Colmenarez (CABI c/o UNESP, Brazil); Plenary Session 1: Martin Hill (Rhodes University, South Africa); Plenary Session 2 & 3: Ulli Kuhlmann (CABI, Switzerland), Plenary Session 4: George Heimpel (University of Minnesota, USA) and Plenary Session 5: Andy Sheppard (CSIRO, Australia), Martin Hill (Rhodes University, South Africa) & Raghu Sathyamurthy (CSIRO, Australia)

Scientific Programme & Abstract Booklet & Congress Design:

Gitta Grosskopf-Lachat (CABI, Switzerland), Sarah Hilliar and Tom Swindley (CABI, United Kingdom)

Sponsorships:

We acknowledge the financial support of IOBC and CABI to support the organization and implementation of ICBC3 in Costa Rica. Furthermore, IOBC and CABI provided additional and restricted funds to support travel grants for young scientists and to significantly reduce the registration fees for scientists from the LATAM region. We would like also to acknowledge the in-kind contributions from IICA for supporting the entire visa process and organizing technical field trips; the Ministry of Agriculture and Livestock of Costa Rica for making key personnel available and for supporting the organization of technical field trips; and the University of Costa Rica for ensuring the availability of technical assistants to support the local implementation of ICBC3.

Organizing Institutions

IOBC is affiliated with the International Council of Scientific Unions (ICSU) as the Section of Biological Control of the International Union of Biological Sciences (IUBS).

The International organisation for Biological Control (IOBC) was established in 1955 as a global organisation affiliated to the International Council of Scientific Unions (ICSU). IOBC promotes environmentally safe methods of pest and disease control. It is a voluntary organisation of biological-control workers.

Membership in IOBC gives individuals and organisations the opportunity to participate in biological control activities beyond their specific jobs and workplaces, to step outside their bureaucracies, and to contribute to the promotion of biological control worldwide.

- IOBC promotes the development of biological control and its application in integrated pest management programs, and international cooperation to these ends.
- IOBC collects, evaluates and disseminates information about biological control, and promotes national and international action concerning research, training of personnel, coordination of large-scale application and public awareness of the economic and social importance of biological control.
- IOBC arranges conferences, meetings and symposia, and takes other action to implement the general objectives of the organisation.
- As an independent professional organisation, IOBC can be an effective advocate for biological control, and can influence policy makers and Governments.
- IOBC assists in the communication among biological-control workers, through dissemination of the IOBC Newsletter.
- IOBC publishes a journal for basic and applied research on biological control of invertebrate, vertebrate and weed pests, and plant diseases. This journal is BioControl, published by Springer. Information about BioControl can be found at **https://www.springer.com/life+sci/entomology/journal/10526**

CABI is an international, intergovernmental, not-for-profit organization that improves people's lives by providing information and applying scientific expertise to solve problems in agriculture and the environment. The majority of CABI's development work is thus in the application of scientific knowledge, rather than in pure research programmes. However, CABI's implementation projects are supported by a core programme of research into invertebrate pests, plant diseases and weeds, and the use of climate-smart pest management methods including nature-based plant protection inputs which can control them. The principal beneficiaries of CABI's scientific research programmes are farmers (women, men and youth) gaining access to sufficient safe and nutritious food, as well as improved livelihoods from better market access, through sustainable, climate resilient agriculture in healthy ecosystems.

Climate change and gender and social inclusion are two overarching drivers for CABI's current Science Strategy, which is considered in all CABI's research. CABI's Science Strategy has identified the following Priority Research Areas:

- **Priority Research Area 1**: The impact of pests. Quantifying the impact of pests (invertebrate pests, plant diseases and weeds) on livelihoods, yield, biodiversity, and ecosystem functioning as affected by climate change
- **Priority Research Area 2**: Management of invasive alien species. Developing, validating and evaluating climate-smart ecosystem management approaches for invasive species to tackle emerging pests that threaten crops and livelihoods on the one hand and protect and restore biodiversity on the other
- **Priority Research Area 3**: Improved and safer food systems. Evaluating the advocacy of safe and effective biological control-based plant protection systems by advisory services, their use by farmers and its impact on production, quality and safety in plant health systems
- **Priority Research Area 4**: Advisory services and communications tools. Designing, validating and evaluating new extension approaches and communication tools to meet female and male farmers' needs

Complementing CABI's Priority Research Areas, we anticipate several cross-cutting research approaches which will underpin and add value to the Priority Research Areas: modelling and data science, molecular biology and microbiology, and monitoring and evaluation.

The Inter-American Institute for Cooperation on Agriculture (IICA) is the specialized agency for agriculture of the Inter-American System that supports the efforts of Member States to achieve agricultural development and rural well-being.

The Institute provides cooperation services through close and permanent work with its 34 Member States, addressing their needs in a timely manner. Without a doubt, IICA's most valuable asset is the close relationship it maintains with the beneficiaries of its work. IICA has broad experience in areas such as technology and innovation for agriculture, agricultural health, food safety and quality, international agricultural trade, family farming, rural development, natural resource management and the bioeconomy.The four strategic objectives organize and systematize the countries' development strategies and, consequently, IICA's technical cooperation actions.

Our roadmap is based on seven hemispheric programs, which lend uniqueness to IICA's vision; channel the Institute's programmatic actions toward the identification of cooperation actions through the design and implementation of projects; and provide technical advice and assistance to governments and other social and economic stakeholders involved in agricultural and rural life in the Americas. Within the seven hemispheric programs there is one focussing on Innovation & Bioeconomy.

Within the strategies of the bioeconomy, the development and use of bioinputs is a key topic on which the institute has focused significant efforts to promote these biological-based tools as nature-based solutions that can significantly contribute to the sustainability of agri-food systems, reduce the carbon footprint, minimize the environmental impacts generated by agricultural activities, help conserve biodiversity and local biological resources, and generate more job opportunities in rural areas of LAC. For this purpose, the Hemispheric Bioinputs Platform was created and launched, an international initiative that promotes multilateral cooperation and the exchange of experiences so that countries can strengthen the development and promotion of bioinputs in the region from scientific and technological, regulatory, and capacity-building perspectives.

MINISTERIO DE AGRICULTURA Y GANADERÍA | GOBIERNO DE COSTA RICA

The Ministry of Agriculture and Livestock of Costa Rica is the entity responsible for defining and guiding public policy for the development of the Costa Rican agricultural sector. In its management, it seeks to promote the dignity of rural families of small and medium-sized producers, promoting the development of their technical and management capabilities in productive systems and agricultural organizations, to improve agricultural activities' competitiveness, equity, social, economic, and environmental sustainability.

Through its Agricultural Extension services, distributed all over the country, it provides quality, timely, and effective services, focused on supporting the satisfaction of food and nutritional security needs of rural families and improving their quality of life.

The Agricultural and Livestock Sector is of great economic and social relevance; this is reflected in its share of the Gross Domestic Product (GDP), exports (currency source), as well as in its contribution to employment.

Within the framework of policies issued by the Ministry of Agriculture and the Costa Rican Agricultural Sector are:

1. The Public Policy for the Costa Rican Agricultural Sector 2023-2032, which aims to enhance economic, social, and environmental sustainability through the implementation of tools and mechanisms that contribute to the development and well-being of the population linked to the Costa Rican Agricultural Sector. It also establishes a close relationship with the Sustainable Development Goals, contributing to their fulfillment.
2. The State Policy for Territorial Rural Development (PEDRT) 2015-2030, whose general objective is to promote the inclusive development of rural territories, recognizing and respecting their own characteristics and cultural identity of their population, through a public-private articulation system, which reduces economic, social, cultural, environmental, and political-institutional inequalities and inequities, through capacity development and opportunities for their inhabitants.
3. The National Seed Policy 2017-2030 has the objective of developing the Costa Rican seed sector with an articulating approach to the interests and resources of its members, to improve the productive efficiency of the Agricultural Sector, in response to the challenges posed by food and nutritional security, conservation of biodiversity, climate change, globalization of markets, and quality assurance.

The University of Costa Rica (UCR) is a high education institution recognised throughout Latin America and a standard bearer of humanistic education, where generations of socially committed professionals have been trained. Since 12 March 2001 it has been designated as a meritorious Institution of Costa Rican Education and Culture.

According to the QS World University Rankings 2024, the UCR is ratified as the best university in Central America and one of the 19 best in Latin America. It has 76 research units, including institutes, centres, stations and experimental farms that allow the generation of knowledge in all areas of knowledge of the institution, Engineering, Sciences, Social Sciences, Health, Agro-food Sciences, Arts and Letters. Part of this knowledge is published in 50 academic journals. It also has a radio station, a television channel and a written newspaper to make its findings available to the public in a clear and simple way.

The UCR promotes research to ensure that the needs of Costa Rican society are met, so that decision-making and the well-being of citizens towards their personal, professional, social and economic development goals are achieved through science and knowledge. Thus, its guiding principles are:

1. Respect for diversity in research and forms of dissemination/dissemination.
2. Promotion of quality and excellence in research.
3. Promotion of multi/transdisciplinary research with the capacity to convene and dialogue with diverse social actors.

The University of Costa Rica is committed to environmental restoration, the generation of clean technologies, gender equity, innovation and entrepreneurship.

30% OFF

CABI

Third International Congress of Biological Control (ICBC3)

San José, Costa Rica

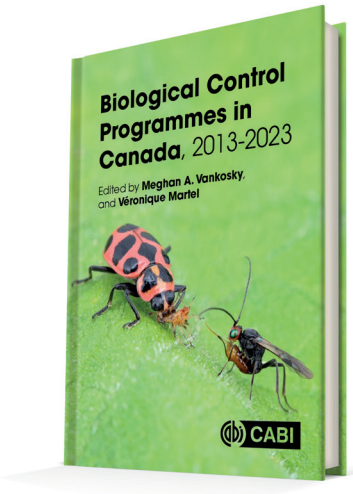
24-27 June 2024

30% discount on **all** books, e-books or individual book chapters through the **CABI Digital Library** until 31 July 2024 – **use the code CON30**

The CABI book publishing programme covers the life sciences and sustainable development. CABI books provide key resources for study, practice and professional development. Recent publications include:

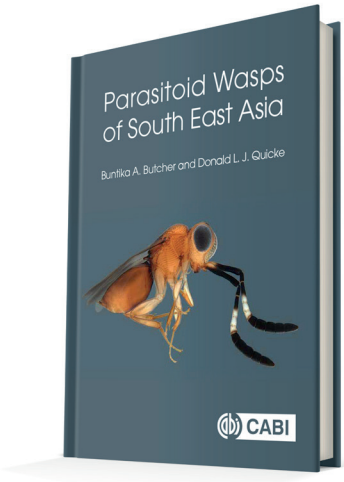
Biological control in Latin America and the Caribbean: its rich history and bright future

J. C. van Lenteren, V. H. P. Bueno, M. G. Luna, Y. C. Colmenarez



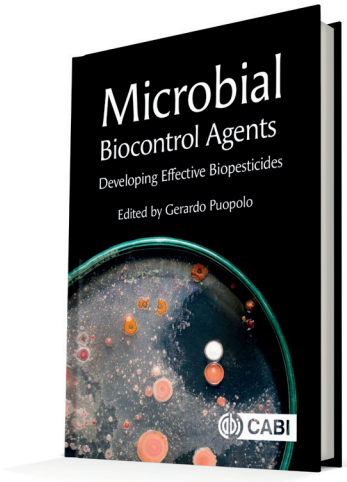
Biological Control Programmes in Canada, 2013-2023

Meghan A. Vankosky, Veronique Martel



Parasitoid Wasps of South East Asia

Buntika A Butcher, Donald Quicke



Microbial Biocontrol Agents: Developing Effective Biopesticides

Gerardo Puopolo

cabidigitallibrary.org/books

KNOWLEDGE FOR LIFE

Scientific Programme

Scientific Programme
3nd International Congress of Biological Control, Costa Rica

Time	Monday - 24 June 2024			
09:00	Registration - Foyer Greco		Poster presenters place posters on numbered boards - Room Greco	
10:00		IOBC General Assembly - Room Rivera-Velazquez		
11:00				
12:00				
13:00	Plenary - Room Greco **Opening Session - Room Greco (60 min)** Victor Carvajal, Minister, Ministry of Agiculture & Livestock of Costa Rica Manuel Otero Justo, Director General, Inter-American Institute for Cooperation on Agriculture (IICA) Maria del Milagro Granados, Professor, University of Costa Rica (UCR) Martin Hill, President, International Organization of Biological Control (IOBC) Ulli Kuhlmann, Executive Director - Global Operations, CAB International (CABI)			
14:00	Plenary - Room Greco			
	Plenary Session 1			
14:00	Moderation - Martin Hill			
14:05	Keynote Speaker - Nick Mills: Biological control for One Health (25 min + 20 min discussion)			
14:45	Moderation - Martin Hill			
14:50	Keynote Speaker - Raghu Sathyamurthy: A nod to the past and present, with an eye to the future: advances needed to sustain the next chapter(s) of biological control (25 min + 20 min discussion)			
15:30	Coffee/Tea (45 min) - Foyer Greco Room			
16:15	Plenary - Room Greco			
	Plenary Session 2			
	Moderation - Ulli Kuhlmann			
	What needs to be done to improve the uptake of biological control? A multi-stakeholder perspective - Panellists: Pedro Rocha, Inter-American Institute for Cooperation on Agriculture (IICA); Martin Wohlfarther, International Biocontrol Manufacturers Association (IBMA); Veronica Picado, Minor Use Foundation (MUF); José Campos, Sustainable Agriculutre Network (SAN); and Luis Diego Arroyo Rivera, National Association of Agricultural Organizations, Costa Rica			
18:00	Poster Session - Room Greco (90 min)			
19:30				
20:00	Welcome Reception (included in registration)			
21:30	End Day 1			

Time	Tuesday - 25 June 2024			
08:30	**Plenary - Room Greco**			
	Plenary Session 3			
08:30	Moderation - Ulli Kuhlmann			
08:35	**Keynote Speaker - Tara Gariepy: The use of molecular tools to unravel host-parasitoid associations in biological control of invasive insect pests (25 min + 20 min discussion)**			
09:15	Moderation - Ulli Kuhlmann			
09:20	**Keynote Speaker - Ted Turlings: Herbivore-induced plant volatiles and how they can be exploited for targeted biocontrol (25 min + 20 min discussion)**			
10:00	**Coffee/Tea (45 min) - Foyer Room Greco**			
10:45	**Track 1 - Room Rivera-Velazquez**	**Track 2 - Room Mediterranean-Bali**	**Track 3 - Room Pacific-Atlantic**	**Track 4 - Room Aquamarine**
	Session 1	**Session 2**	**Session 3**	**Session 4**
	Biological control of aquatic weed	**Slotting biological control into the agroecology toolkit**	**Advance of applied biological control in Latin America**	**Free themes**
	Julie Coetzee, Alejandro Sosa & Melissa Smith	Kris Wyckhuys & Lessando Gontijo	Yelitza Colmenarez & Lorena Barra Bucarei	Kent Daane & Belinda Luke
10:45	Moderation	Moderation	Moderation	Moderation
10:50	**Gianmarco Minuti:** Stick to your grubs: a flea beetle to combat the seedling recruitment of *Iris pseudacorus* (Iridaceae), an invasive wetland plant in the Southern Hemisphere	**Kris Wyckhuys**: Unveiling the architecture of biological control	**Joop C. van Lenteren**: 99.9% of the more than 1000 species of natural enemies used in biocontrol in Latin America are safe	**Jorge Jaramillo-Gonzalez**: Exploring the potential for biological control in industrial hemp crops
11:10	**Rodrigo Diaz**: Lessons on recovery: Contrasting the impact of biological control of giant salvinia (*Salvinia molesta*) in tropical and subtropical regions	**Pedro Togni**: Conservation biological control in tropical agroecological farms: the role of landscape and local features	**Tamara Takahashi:** Advances in the application of biological control in Brazil: challenges and opportunities	**Kent Daane**: Releases of the parasitoid *Pachycrepoideus vindemmiae* for augmentative biological control of spotted wing drosophila, *Drosophila suzukii*
11:30	**Megan Reid**: South Africa vs. south Florida: mass rearing and inundative releases of *Megamelus scutellari* s to manage waterhyacinth (*Pontederia crassipes*)	**Jason Schmidt**: Resolving effects of hedging practices on biocontrol communities and trophic interactions	**Pablo Benavides**: Classical biological control for *Hypothenemus hampei* (Coleoptera: Curculionidae) in Colombia using African parasitoids	**Carmelo Rapisarda**: Biological control of whiteflies on protected vegetable crops in Sicily (southern Italy): from illusions to reality
11:50	**Victoria Ayala**: BioControl meets AI: Implementation of real-time satellite monitoring for detection and management of giant salvinia (*Salvinia molesta*)	**Michael Brunner**: Combining an entomopathogenic fungus with crop diversification boosts its control efficacy against an important soil-dwelling pest	**Eduardo Donoso**: Meta-analysis on the consistency in the control efficacy of Bacillus spp. formulation against Alternaria alternata in tomato: results from Chile, Peru, Argentina, Brazil and Mexico	**Angelos Mouratidis**: Pirates to the rescue: expanding the use of *Orius* predators in floriculture
12:10		**Roselyne Labbe**: Stabilizing the agri-food web: The case for apex arthropod predators in the greenhouse	**Fernanda Cingolani**: Biological control programmes in Argentina: an overview	
12:30	**Lunch Break (1h 30 min)**			

	Track 1 - Room Rivera-Velazquez	Track 2 - Room Mediterranean-Bali	Track 3 - Room Pacific-Atlantic	Track 4 - Room Aquamarine
	Session 5	**Session 2**	**Session 3**	**Session 4**
14:00	**Risk assessment procedures for the safe import, quarantine rearing, and release of biocontrol agents against weeds and pests**	**continued**	**continued**	**continued**
	Laura Varone & M. Belen Aguirre			Giselher Grabenweger & Kate Constantine
14:00	Moderation	Moderation	Moderation	Moderation
14:05	**Iain Paterson**: Selecting the most damaging biocontrol agents for invasive alien Cactaceae in sub-Saharan Africa	**Samantha Willden**: Recruiting biocontrol agents to high tunnel tomato: companion plants vs. Weeds	**Francisco Gonzalez**: Parasitoids at work! An applied 6-years account of the use of *Spalangia endius* for the control of *Stomoxys calcitrans* in coffee wastewater management	**Anna Spescha**: When competitors join forces: using consortia of entomopathogenic *Pseudomonas bacteri* a, nematodes and fungi for pest control
14:25	**Dean Brookes**: Cogongrass (*Imperata cylindrica*) diversity and native range exploration for herbivores	**Helda Morales**: Promoting a preventive lens for biological control in agroecosystems	**Adriana Acevedo Alcalá**: First record of *Anagyrus tristis* (Hymenoptera: Encyrtidae) in Mexico and its potential for biological control of *Phenacoccus madeirensis* (Hemiptera: Pseudococcidae)	**Juliane Ferreira**: Biocontrol sweet spot: stepwise screening toward the identification of bacteria protecting strawberries from *Phytophthora cactorum* root and crown rot
14:45	**Greg Wheeler**: Biological control of the invasive grass cogongrass, *Imperata cylindrica*	**Arletys María Verdecia Mogena**: Maize direct response to entomopathogenic nematodes	**Alyssa Gooding**: Risk assessment status of a potential biological control agent of the Avian Vampire Fly in Galapagos	**Maria Zwyssig**: Insecticidal pseudomonads – interspecies interactions and adaptation to insect larvae
15:05	**Maria Belen Aguirre**: Exploring the safety of two parasitoid candidates for the biological control of the cactus mealybug *Hypogeococcus* sp. in Puerto Rico	**Lessando Gontijo**: Incentivizing biocontrol use in agroecological systems by extending the benefits beyond pest control	**Gerardo Arias-Robledo**: Controlling an emerging pest in Mexican horticulture: can we consider *Trissolcus basalis* for controlling the Mexican Stink Bug *Euschistus rugifer* ?	**Carolina Calderón Arroyo**: Predatory potential of the lacewing *Ceraeochrysa cornuta* on the spider mite *Tetranychus mexicanus*
15:25	**Laura Varone**: Assessing the potential of parasitoids as biocontrol agents for the Cactus Moth, *Cactoblastis cactorum* in Argentina and North America		**Saúl Aguirre**: Risk assessment of the parasitoid *Conura annulifera* as a biological control agent of *Philornis downsi* in the Galapagos Islands	**Lara Maistrello**: Side effects of cyantraniliprole and neem-based insecticides on *Myzus persicae* biocontrol agents
15:45	**Coffee/Tea (30 min) - Foyer Room Greco**			
	Track 1 - Room Rivera-Velazquez	**Track 2 - Room Mediterranean-Bali**	**Track 3 - Room Pacific-Atlantic**	**Track 4 - Room Aquamarine**
	Session 6	**Session 7**	**Session 8**	**Session 9**
16:15	**Molecular tools in biological control**	**Pre-emptive biological control: a novel approach to increase preparedness for potential biosecurity threats**	**Use and preservation of parasitoids in agriculture: challenges and potential**	**Biocontrol in a changing world! Develop and broadcast biocontrol strategies resilient to climate change and biodiversity loss**
	Tara Gariepy & Jason Schmidt	Gonzalo Avila & Jana Collatz	Matthew Tinsley & Yelitza C. Colmenarez	Michelle Fountain & Liam Harvey
16:15	Moderation	Moderation	Moderation	Moderation
16:20	**Mélodie Ollivier**: How ecological networks revealed by DNA metabarcoding may help in biological control programs? The case study of *Sonchus oleraceus* in Australia	**Gonzalo Avila**: Pre-emptive classical biocontrol risk assessment for high-risk biosecurity threats: paving the way for implementation	**Margot Gumbau**: Parasitoid wasps recruitment by flowering plants for natural regulation of Diaphania sp. in cucumber cropping systems in the Caribbean	**Giselher Grabenweger**: How to control a regulated invasive pest in a sustainable way? The case of *Popillia japonica* in continental Europe
16:40	**Stephanie Chen**: PhyloControl: a phylogeny visualisation interface for risk analysis in weed biological control	**Ricky Lara**: Challenges and opportunities: implementing pre-emptive biological control in California	**Alejandro Tena**: Can we manage honeydew to preserve parasitoids and increase their biological control services?	**Chris McGrannachan**: Biocontrol initiatives for invasive weeds in the Pacific
17:00	**Brandi Misiaszek**: Applying novel primers as a tool for determining the Ligustrum Weevil's (*Ochyromera ligustri*) impact on invasive Chinese privet	**Jana Collatz**: Assessing the feasibility of pre- emptive biocontrol against the emerald ash borer – a European case study	**Rodrigo Maciel**: Use and preservation of parasitoids in agriculture: challenges and potential	**Rebecca Boulton**: Can cryptic sex enhance the performance of an asexual aphid parasitoid?

17:20	**Jason Schmidt**: Molecular diagnostics reveal both landscape pattern effects and functional redundancy in whitefly- predator food webs	**Marc Kenis**: Classical biological control of the Japanese beetle, *Popillia japonica* , in Europe using the tachinid fly *Istocheta aldrichi*	**Gaylord Desurmont**: Use of *Diadegma semiclausum* as a biocontrol agent against diamondback moth in California: potential and challenges	**Norbertas Noreika**: Pesticide-induced food and macronutrient limitation in beneficial carabid beetles in agroecosystems
17:40	**Philippe Belliard**: Tillage effects on trophic interactions in carabid communities and their implications for biological control	**Marco Molfini**: Assessing the potential of native *Anastatus* spp. (Hymenoptera: Eupelmidae) parasitoids for proactive biological control of *Lycorma delicatula* in California	**Ángel Plata**: Unravelling the factors determining the efficacy of mealybug parasitoids	
18:00	**Venkatesan Thiruvengadam**: Potential RNA mediated control of global pest, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae)	**Mari West**: Is *Anastatus reduvii* (Hymenoptera: Eupelmidae) a potential natural enemy for proactive biological control of the spotted lanternfly in California?	**Jesica Pérez-Rodríguez**: Virome of the citrus mealybugs *Planococcus citri* , *Delottococcus aberiae* and their parasitoids: potential implications for biological control	
18:20		**Pablo Lopez Carretero**: Could biotic resistance contribute to future biological control efforts for brown marmorated stink bug (BMSB) in Aotearoa New Zealand?		
18:40	**End Day 2**			

Time	Wednesday - 26 June 2024			
08:30	**Plenary - Room Greco**			
	Plenary Session 4			
08:30	Moderation - George Heimpel			
08:25	**Keynote Speaker - Tania Zaviezo: Mind the gap: mechanisms in conservation biological control (25 min + 20 min discussion)**			
09:15	Moderation - George Heimpel			
09:20	**Keynote Speaker - Ralf-Udo Ehlers: Role of biocontrol for transformation of agricultural practice (25 min + 20 min discussion)**			
10:00	**Coffee/Tea (45 min) - Foyer Room Greco**			
10:45	**Track 1 - Room Rivera-Velazquez**	**Track 2 - Room Mediterranean-Bali**	**Track 3 - Room Pacific-Atlantic**	**Track 4 - Room Aquamarine**
	Session 10	**Session 11**	**Session 12**	**Session 4**
	Mechanism in conservation biological control	**Trajectory of commercial biological control in North America and Europe**	**Invasive alien grasses as targets for weed biological control**	**continued**
	Tania Zaviezo, Simone Mundstock Jahnke & Yelitza Colmenarez	Lynn M. LeBeck	Iain Paterson, Greg Wheeler & Guy Sutton	Alejandro Tena & George Heimpel
10:45	Moderation	Moderation	Moderation	Moderation
10:50	**Felix Wäckers**: *Pronematus ubiquitus* : a multitasking mite for pest and disease control	**Suzanne Lommen**: Genetics of pest control agents: to what extent do they matter?	**Brian Rector**: Biocontrol of annual grasses associated with Wildfire in North America	**Pablo Urbaneja Bernat**: Plant guttation a potential nutrient- rich food source for insects in peach
11:10	**Simone Mundstock Jahnke**: The IOBC-NTRS Conservation Biological Control working	**Norman Leppla**: Advancing commercial biological control in North America through advocacy and education	**Francecsa Marini**: Exploring the potential of eriophyid mites in biological control of annual grasses	**J.P. Michaud**: Conservation biological control under threat on the High Plains
11:30	**Bruno Jaloux**: Elicitor based Attract and Reward strategy against *Dysaphis plantaginea* in apple orchards	**Lynn LeBeck**: Current trends in commercial biological control in North America	**Chantal Probst**: Investigating the floral smut *Ustilago quitensis* as a potential biocontrol agent against pampas grass in New Zealand	**Matt Tinsley**: Impacts of biostimulant application on the efficacy of parasitoid-based biological control in tomato horticulture
11:50	**Tania Zaviezo**: Accessibility, availability and nutritional value of native flowers from central Chile to *Mastrus ridens* (Hymenoptera: Ichneumonidae), a natural enemy of codling moth	**Martin Wohlfarter**: Macrobial regulation within Europe - a comparison	**Colin Morrison**: Tri-trophic plant-herbivore- parasitoid assemblages and diet breadth across native and introduced grasses	**Enric Vila**: A unique combination of prey mites as supplementary food to boost the predators
12:10	**Betty Benrey**: Milpa farming: fostering biological control in a traditional Mesoamerican agricultural system	**Carol Glenister**: Developments in new commercial biological control products and delivery methods	**Guy Sutton**: Biological control of invasive African grasses: progress and prospects	

12:30	Lunch Break (1h 30 min)			
	Track 1 - Room Rivera-Velazquez	**Track 2 - Room Mediterranean-Bali**	**Track 3 - Room Pacific-Atlantic**	**Track 4 - Room Aquamarine**
	Session 10	**Session 11**	**Session 13**	**Session 4**
14:00	**continued**	**continued**	**Biocontrol and climate change: challenges and adaptation**	**continued**
			Joan van Baaren & Yelitza Colmenarez	Léna Durocher-Granger & Malvika Chaudhary
14:00	Moderation	Moderation	Moderation	Moderation
14:05	**Leonardo Fabio Rivera Pedroza**: Conservation strategies applied in Sugar Cane in Colombia: a successful case	**David Haviland**: Enhanced conservation biocontrol using commercial-scale hydrogel baiting strategies for sugar-feeding ants in California vineyards	**Paul Ode**: Climate change, plant defenses, and consequences for biological control	**Andreas Walzer**: The predation success of *Phytoseiulus persimilis* on its preferred prey, the spider mite *Tetranychus urticae*, is strongly reduced under extreme heat stress
14:25	**Elizabeth Lamb**: Encouraging the adoption of conservation biocontrol by farmers and the public using beneficial habitat plots	**Juliette Pijnakker**: Biological control of the tobacco thrips *Thrips parvispinus* (Karny)	**Gang Ma**: Biocontrol, climate change and population dynamics: Why is an increase of pest outbreaks and plant diseases transmitted by vectors expected following climate changes?	**Ikkei Shikano**: A novel formulation of entomopathogenic fungi that facilitates horizontal transfer of spores and improves long-term viability in bait stations
14:45	**Juan Antonio Sanchez**: Conservation of natural enemies provides satisfactory control of pear psyllids in Mediterranean pear orchards	**Sheng Qiang**: Development of *Bipolaris yamedae* into a potential bioherbicide against paddy weeds	**Honest Machekano**: Thermal performance drifts between egg-parasitoid and its host may threaten the efficacy of biological control of a global pest	**Nancy Chaves**: Bioprospecting of microorganisms for the management of the bacteria *Ralstonia solanacearum* Race 2, causal agent of Bacterial Wilt Disease (Moku) in banana
15:05	**Bruno Zachrisson**: Weeds associated with rice crop (*Oryza sativa* L.), as a refuge of *Telenomus podisi* for the reduction of the population of *Oebalus insularis* : a conservative control in a tropical agroecosystem	**Thomas V. M. Groot**: Biological control of invasive species using known natural enemies	**Adriana Najar-Rodriguez**: Effects of CO2 and heatwaves on trophic interactions mediating biological control systems	**Léna Durocher-Granger**: Modeling mortality factors and natural enemies of fall armyworm in Zambia
15:25		**Eduardo Donoso**: Biocontrol strategy for the complete cycle of Lasiodiplodia theobromae in avocado through Trichoderma spp formulation sprays on foliage and litter: results from Chile, Peru and Mexico	**Joan van Baaren**: Biological control systems and climate change	**Elena Romero**: Functional response and host stage preference of mealybug parasitoids of the genus *Anagyrus*
15:45	Coffee/Tea (30 min) - Foyer Room Greco			

16:15	Track 1 - Room Rivera-Velazquez	Track 2 - Room Mediterranean-Bali	Track 3 - Room Pacific-Atlantic	Track 4 - Room Aquamarine
	Session 14	**Session 15**	**Session 16**	**Session 17**
	Raising awareness for action: country perspectives on community engagement and what it means for those researchers	**Targeting biological control traits for improvement: challenges and future directions**	**Enhanced biodiversity at landscape level for sustainable management of crop pest**	**Progress on the biological control of foodborne and plant pathogens of agricultural commodities**
	Kim Weaver, Grant Martin, Lorena Barra Bucarei & Malvika Chaudhary	Kelley Leung & Leo W. Beukeboom	Feng Zhang & Oliver Bach	Modesto Olanya & Ade Oladeinde
16:15	Moderation	Moderation	Moderation	Moderation
16:20	**Tamara Takahashi:** Public-private initiatives to reinforce the research and increase the use of biological control in Brazil – SPARCBio case study	**Ryan Paul**: Applications of life history theory in biological control	**Amit Kumar**: First report of *Brachymeria* spp. (Hymenoptera: Chalcididae) as a Hyperparasitoid on *Charops bicolor* Szepligeti (Hymenoptera: Ichneumonidae) an larval parasitoid of *Spodoptera frugiperda*	**Ranajit Bandyopadhyay:** Bridging research to practice: Scaling aflatoxin biocontrol products through public private partnerships
16:40	**Kim Weaver**: Promoting biological control leads to improved implementation and long- term sustainability?	**Leo W Beukeboom**: Trait selection in biocontrol agents - a review	**Manuel Zumbado**: Multifunctional margins for enhancing biodiversity in agroecosystems	**Adelumola Oladeinde**: Application of probiotics as a biocontrol for Salmonella in chicken
17:00	**Yelitza Colmenarez**: Collaboration platforms and public-private initiatives favouring the uptake of biological control - case studies from Latin America	**Marianna Szucs**: Biological control potential of a laboratory selected generalist parasitoid versus a co-evolved specialist parasitoid against the invasive *Drosophila suzukii*	**Oliver Bach**: Practical considerations for the establishment of habitat islands for natural enemies – the case of oil palm in Malaysia	**O. Modesto Olanya**: Application of competitive microbes, predatory bacteria and antimicrobials for biocontrol and inactivation of foodborne pathogens
17:20	**Malvika Chaudhary**: Digital support tools: catalysing the uptake of bioprotection products through technological interventions	**Kelley Leung**: How hard is it to improve a biocontrol trait? A case of parasitoid host specificity	**Chengyun Li**: Agrobiodiversity for sustainability of crop pest management	**Daniel Mendoza Jiménez**: Organic tomato crop management by a bio-formulation based on PGPR: its effects on beneficial plant development and protection against vascular wilt disease
17:40	**Grant Martin**: Resolving conflict situations when using biological control against economically-useful invasive tree species	**Sara D Arco**: Molecular, taxonomic and behavioral characterization of house fly parasitoids in northern Italy	**Audrey Grez**: Landscape composition and heterogeneity affects the abundance and diversity of coccinellids, and biological control in alfalfa fields in Central Chile	**Ranajit Bandyopadhyay**: Regulatory approval of bioprotectants: lessons from registering multiple aflatoxin biocontrol products in Africa
18:00	**Lorena Barra-Bucarei**: Development and technological transfer model of bioinputs based on endophytic microorganisms	**Angela Saenz**: Classical biological control of the Emerald Ash Borer, an invasive forest pest of North America: challenges, management, and assessment of success		
18:20		**Michael Rostás**: Ecological functions and intraspecific variability of *Trichoderma sesquiterpenes* and other volatiles		
18:40	**End Day 3**			
20:00	**Congress Dinner (tickets to be booked during online registration process)**			

Time	Thursday - 27 June 2024			
	Track 1 - Room Rivera-Velazquez	**Track 2 - Room Mediterranean-Bali**	**Track 3 - Room Pacific-Atlantic**	**Track 4 - Room Aquamarine**
	Session 18	**Session 19**	**Session 20**	**Session 4**
8:30	**Recent advances in the classical biological control of alien invasive insects in sub-tropical Africa**	**Biocontrol of plant diseases: efficacy, durability and integration**	**Use of microbials as biological control agents in sustainable agriculture**	**continued**
	Ivan Rwomushana & Frank Chidawanyika	Marc Bardin	Lorena Barra Bucarei, Yelitza Colmenarez, Daohong Jiang & Jiatao Xie	Chandra Moffat & David Ensing
08:30	Moderation	Moderation	Moderation	Moderation
08:35	**Marc Kenis**: Importance of host specificity in classical biological control against insect pests threatening livelihoods	**Marc Bardin**: How to manage the complexity of deploying microbial biocontrol agents against plant diseases?	**Daohong Jiang**: Exploration of mycoviruses mediated hypovirulent strain as plant vaccine to control fungal diseases of field crops	**Chandra Moffat**: Post-introduction redistribution of biological control agents: best practices, risks and benefits
08:55	**Ivan Rwomushana**: Classical biological control for the sustainable management of papaya mealybug (*Paracoccus marginatus)* in East Africa	**Jürgen Köhl**: Challenges in using microbial antagonists on seeds to protect seedlings from diseases	**Matt Tinsley**: Selectivity of microbial biopesticides in crop protection	**David Ensing**: Incongruent range limits of invasive spotted knapweed (*Centaurea stoebe* ssp. *micranthos*) and key biological control agents results in high elevation refugia
09:15	**Khalid Khfif**: Investigation, identification and study of the effectiveness of the natural enemies against the leafhopper *Jacobiasca lybica* (Hemiptera: Cicadellidae) under laboratory conditions	**Magnus Karlsson**: Breeding for biocontrol: Exploring genetic variation in biocontrol interactions	**Jiatao Xie**: Plant modifies fungal non-self recognition to facilitate mycovirus transmission	**Martin Hill**: Agents sans frontiers: cross border aquatic weed biological control
09:35	**Frank Chidawanyika**: Controlling the fall armyworm using the push-pull strategy: trophic interactions and the potential for classical, and augmentative biocontrol for improved field efficac	**George Karaoglanidis**: Use of *Bacillus amyloliquefaciens* QST713 and *Clonostachys rosae* IK726 to control multidrug resistant strains of *Botrytis cinerea*	**Belinda Luke**: The use of *Metarhizium rileyi* to control fall armyworm in Zambia	**Javiera Ortiz-Campos**: Potential of endophytic *Beauveria* spp. for growth promotion in blueberries and protection against *Neofusicoccum parvum* disease
09:55	**Sahadatou Mama Sambo**: Management of *Phthorimaea absoluta* with introduced and native biocontrol agents	**Sharon Badilla Arias**: Enterobacter cloacae and a bacteriophage of the pathogen *Erwinia tracheiphila* as biocontrol agents of cucurbit bacterial wilt of muskmelon	**Beilei Wu**: Effects on the sporogenesis and biocontrol functions of *Trichoderma* spp. by the mycoviruses	**Pablo Garcia Palacios**: Arbuscular mycorrhizal fungi and soil organic carbon as tools to enhance crop yield
10:15	**Coffee/Tea (30 min) - Foyer Greco Room**			
	Track 1 - Room Rivera-Velazquez	**Track 2 - Room Mediterranean-Bali**	**Track 3 - Room Pacific-Atlantic**	**Track 4 - Room Aquamarine**
	Session 21	**Session 22**	**Session 20**	**Session 23**
10:45	**Modeling biological control interactions in support of agriculture and conservation**	**Socio-economics of biological control**	**continued**	**The importance of IPM adoption for biological control success**
	George Heimpel	Justice Tambo & Beatrice Muriithi		Matthew Tinsley & Yelitza C. Colmenarez
10:45	Moderation	Moderation	Moderation	Moderation
10:50	**Paul Ode**: Trait-based approaches to predicting biological control success: challenges and prospects	**Steven Naranjo**: Synthesis of the global economic impact of classical and conservation arthropod biological control	**Lorena Barra-Bucarei**: Collection of endophytic nematophagous strains and their potential in the control of phytoparasitic nematodes in tomato	**Rose Buitenhuis**: Old and new thrips species causing trouble: adjusting greenhouse biocontrol programs to manage multiple thrips species
11:10	**Saskya van Nouhuys**: Dynamic economic thresholds for insecticide applications against agricultural pests: Importance of pest and natural enemy migration	**Beatrice Wambui Muriithi**: Economic impact of a classical biological control program: application to *Diachasmimorpha longicaudata* against *Batrocera dorsalis* fruit fly in Kenya	**Edward LeBrun**: Biological control of tawny crazy ants with the microsporidian pathogen *Myrmecomorba nylanderia* e: the need for a Central American program	**Samantha Willden**: The intersection of weed management, biopesticides, and biological control to manage aphids on winter crops
11:30	**George Heimpel**: A new framework for benefit-risk analysis for biological control introductions	**Justice Tambo**: Adoption and impact of bioprotection products in Bangladesh	**Lucía Noboa-Jiménez**: Distribution of *Trichoderma rifaii* CT5 colonization in coffea arabica: insights into plant-endophyte dynamics	**Alessandra Marieli Vacari**: IPM and biological control in coffee

11:50	**Alberto Mele**: The joint action of *Trissolcus japonicus* and *Trissolcus mitsukurii* in biological control of *Halyomorpha halys* in Italy	**Kate Constantine**: Perceptions and willingness to use biological controls for fall armyworm in Zambia, a gendered perspective	**Patricia D. Navarro:** Use of entomopathogenic nematodes for management of cuculionids larvae cryptically located	**Marcel Tanner**: Multiple effects of baculoviruses and their use in IPM strategies
12:10	**Margarita Correa**: Modeling the interactions of *Pseudococcus* biological control agents on vineyards and its implications in virus spread	**Malvika Chaudhary**: Local biopesticide production hubs – insights on business models and evidence of women's empowerment from Bangladesh and India		**António Onofre Soares**: Ecological and economic feasibility of mass production of biological agents to control tomato moth, *Tuta absoluta* (Meyrick) (Lepidoptera, Gelechiidae) in protected culture
12:30				**Ruth Carter**: Coexistence and competition of two armyworms and implications for IPM
12:30	**Lunch Break (1h 30 min)**			

	Track 1 - Room Rivera-Velazquez	Plenary - Room Greco
14:00	**Session 4**	**Poster Session - Room Greco (75 min)**
	continued	
	Ulli Kuhlmann & Feng Zhang	
13:45	Moderation	
13:50	**Shanshan Li**: Develop synthetic biology-based platform for efficient biomanufacturing of natural product pesticides from *Streptomyces* species	
14:10	**Yuyan Li**: Mass rearing, storage and application of natural enemy insects	
14:30	**Yibo Zhang**: Evaluation of the potential biocontrol ablity of a native natural enemy, *Nesidiocoris poppiusi* , against *Tuta absoluta* in China	
14:50		
15:15	**Coffee/Tea (45 min) - Foyer Room Greco**	
16:00	**Plenary - Room Greco**	
	Plenary Session 5	
	Biological control in a national and international policy context	
16:00	Moderation - Andy Sheppard, Martin Hill & Raghu Sathyamurthy	
16:10	**Andy Sheppard**: Biological control is considered high risk by most governments around the world - how do we address this?	
16:30	**Hariet L. Hinz**: Classical biological control in Europe: regulatory constraints and how to move forward	
16:50	**Michelle Rafter**: Further integrating weed biological control into the Australian policy context – the development and implementation of a National Pipeline Strategy	
17:10	**Martin Hill:** Classical biological control in Africa: constraints and opportunities	
17:30	Discussion	
18:00	**Closing Address**	
18:15	**End Day 4**	

Poster Presentations

Poster #	Session Code	Author Name	Poster Title
1	01-P01	David Ensing	First report of native waterlily leaf beetle (*Galerucella nymphaeae* , Coleoptera: Chrysomelidae) feeding on invasive parrot's feather watermilfoil (*Myriophyllum aquaticum* , Haloragaceae) in Canada
2	02-P01	Fernanda Cingolani	Assessment of a tachinid fly and an egg parasitoid as biocontrol agents of *Edessa meditabunda* (Hemiptera: Pentatomidae)
3	02-P02	Daniel Cormier	Mixture of Btk and the granulovirus CpGV reduces codling moth control
4	02-P03	Arletys María Verdecia Mogena	Maize direct response to entomopathogenic nematodes
5	02-P04	Leslie Aviles	Evaluating biorational products effects on twospotted spider mite and predatory mites under high tunnels-simulated conditions
6	03-P01	Miguel Zapater	Insectarios SRL: the first biological control supplier in Argentina
7	03-P02	Karina Carrera	Evaluation of the antagonistic activity of *Trichoderma* spp. versus *M. roreri* in the Ecuadorian Amazon
8	03-P03	Segundo Valle Ramírez	Pathogenicity of four native isolates of *Beauveria bassiana* ((Balsamo) Vuillemin) against adults of *Metamasius hemipterus* L. in Pastaza, Ecuador
9	03-P04	Renato Gonçalves Santos Neto	Virulence of entomopathogenic fungi to *Disonycha glabrata* (Fabricius, 1775) (Chrysomelidae: Alticinae)
10	03-P05	Dunia Chávez Esponda	Study and identification of mitesof the Phytoseiidae family using computer applications
11	03-P06	Jesus E. Gomez	Has *Cephalonomia stephanoderis* , an introduced parasitoid of CBB, become very abundant almost 10 years after its release in Puerto Rico?
12	03-P07	Franceli Da Silva	*Lippia alba* hydrosol in the control of *Fusarium* spp. in papaya
13	03-P08	Franceli Da Silva	Hydrosol potential of *Mimosa verrucosa* benth leaves in the control of *Aspergillus welwitschiae*
14	04-P01	Jerome Grant	Lessons learned: successes, limitations, and opportunities for classical biological control in the southern U.S.A. (Tennessee)
15	04-P03	Angelos Mouratids	Evaluating predatory mites for the control of *Scirtothrips* in strawberry; from the lab to the field
16	04-P04	Jacques Brodeur	Oviposition determinants in *Istocheta aldrichi* (Diptera: Tachinidae), a parasitoid of the Japanese beetle
17	04-P05	Sara D Arco	Field monitoring of houseflies and their parasitoids in dairy farms in northern Italy
18	04-P06	Christopher Dunlap	Taxonomic and genomic diversity of a worldwide collection of entomopathogenic fungi
19	04-P07	Chandra Moffat	First detection of the broad-nosed knapweed seed head weevil, *Bangasternus fausti* (Coleoptera: Curculionidae) in Canada
20	04-P08	Juana Margarita Martínez De Jesús	Isolation of endophytic fungi in Cuernavaca, Morelos for the control of rust (*Hemileia vastatrix*) in coffee cultivation
21	06-P01	Tatiana Syrovets	Phytochemical composition of *Commiphora oleogum* Resins with insecticidal activities

22	07-P01	Xiaoqing Xian	Estimation of the global biocontrol potential of two native parasitoids *Chelonus insularis* and *Eiphosoma laphygmae* against the fall armyworm
23	08-P01	Weidson Sutil	Use of egg parasitoids in fall armyworm *Spodoptera frugiperda* augmentative biological control: challenges and opportunities
24	08-P02	Joao Gabriel Cancelliero	*Euschistus heros* egg parasitoids: effect of host egg age and collection site
25	08-P03	Alexandre Diniz	Rearing optimization of *Callosobruchus maculatus* , an alternative host for boll weevil parasitoids
26	08-P04	Feng Zhang	Is *Anastatus japonicus* an effective biological control agent against brown marmorated stink bug?
27	08-P05	Tamara Akemi Takahashi	Nonreproductive effects are more important than parasitism in *Trichogramma* spp.?
28	09-P01	Xing Ping Hu	A unique case of successful control of an invasive pest: self-introduced exotic parasitic wasps shifterd attempted classical biocontrol to conservation biocontrol
29	10-P01	Carolina Calderón Arroyo	Effect of the extrafloral nectar of Senna cernua Balb. H.S. Irwin & Barneby (Fabaceae) on the survival of the coffee leaf miner parasitoid *Proacrias coffeae* Ihering (Hymenoptera: Eulophidae)
30	10-P02	Benjamin Yguel	Does a conservation biological control strategy modify the density dependent relationship between aphids and hoverflies?
31	10-P03	Carlos Vásquez	Conservation practices for the enhance of predatory mites: opportunities and challenges
32	10-P04	Rozimar de Campos Pereira	Entomopathogenic fungi in eucalyptus plantation areas on the northern coast of Bahia, Brazil
33	14-P01	Dora Shimbwambwa	Farmer biopesticide for fall armyworm management in Zambia
34	14-P03	Alison Westwood	Inspiring interest in insects – discovery through play
35	15-P01	Elena Romero	Does parasitism in adult stages of female mealybugs prevent oviposition of the pest host? The case of citrus mealybug *Delottococcus aberiae* and its parasitoid *Anagyrus aberiae*
36	15-P02	Kelley Leung	Fine-scale mapping and comparative genomics link parasitoid *Nasonia host preference 1* to an odorant receptor-enriched region
37	15-P03	Lara Maistrello	Parasitization activity of *Spalangia cameroni* and *Muscidifurax zaraptor* (Hymenoptera, Pteromalidae), pupal parasitoids of *Musca domestica* (Diptera, Muscidae)
38	16-P01	Audrey Grez	Landscape composition and heterogeneity, at different spatial scales, filters functional traits and modulate coccinellid communities in alfalfa
39	16-P02	Juan Antonio Sanchez	Multivarieties and cover crops to increase sustainability of Mediterranean pear orchards
40	18-P01	Kate Constantine	Smallholder farmers' knowledge, attitudes and practices towards biological control of papaya mealybug in Kenya
41	18-P02	Mariana Campolino	Stability evaluation of formulations based on the entomopathogenic fungus *Beauveria bassiana*
42	19-P01	Juliane Ferreira	Biocontrol sweet spot: stepwise screenings toward the identification of bacterial strains protecting strawberries from *Phytophthora cactorum* root and crown rot
43	19-P03	Ángela María Mogollón-Ortiz	Actinobacteria, natural enemies of the root-knot nematode *Meloidogyne javanica*

44	20-P01	Luciana Vitorino	Potential of the extract obtained from *Aspergillus nomiae* for the biocontrol of *Spodoptera frugiperda*
45	20-P02	Reyes Alejandro Garnica-Zapata	Co-application of biochar and soil actinobacteria and its effect on the promotion of plant growth in tomato plants
46	20-P03	Layara Bessa	Potential of beneficial microorganisms present in biodiverse compounds based on Angiorperm and Gymnosperm for foliar protection of *Glycine max*
47	20-P05	Beilei Wu	Transcriptome dynamics underlying chlamydospore formation in *Trichoderma virens* GV29-8
48	23-P01	Weidson Sutil	Biological control as part of the soybean Integrated Pest Management (IPM): the success of a Brazilian programme
49	23-P02	Mª Ángeles Marcos García	IPM by essential oils: hard with aphids, soft with their predators
50	23-P03	Michael Brunner	Adopting mixed cropping systems to foster biocontrol and manage oviposition of a mayor belowground insect pest
51	23-P04	Alberto Mele	Evaluating sub-lethal behavioral effects of plant protection products on *Trissolcus* parasitoid
52	23-P05	Dahise Brilinger	Selectivity of hymenopterans in attractants and traps for monitoring fruit flies

Plenary Sessions

Plenary Session 1 - Keynote Speaker: Nick Mills

Nick Mills completed a BSc in Biological Sciences in 1975 and a PhD on the population ecology of a coccinellid predator of aphid in 1979, both from the University of East Anglia in the UK. After a four-year period as a Cook Junior Research Fellow at Lincoln College, Oxford University he joined CABI in 1982. Following an initial appointment as Head of Forest Entomology at the Swiss Centre, he became Director of the UK Centre in 1988. Soon after he accepted a professorship in entomology/ biological control at the University of California, Berkeley in 1990. He has served both as Chair of the Department of Environmental Science, Policy and Management and as Executive Associate Dean for Research and Extension in the Rausser College of Natural Resources at UC Berkeley, and is currently an Emeritus Professor of Entomology. His research interests bridge the gap between theory and practice in biological control with a focus on the ecology of arthropod predators and parasitoids, the dynamics of biological control systems, and the linkage between importation biological control and invasion biology. He has served in an editorial capacity for six different scientific journals and contributed to both national and international science review panels. During his career at UC Berkeley he received awards for undergraduate teaching and graduate mentorship, as well as for research excellence.

Biological control for One Health

Urs Schaffner[2], George Heimpel[3], Nicholas Mills[1], Beatrice Muriithi[4], Matthew Thomas[5], Yubak GC[6] & Kris Wyckhuys[7]

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Biological control is a biodiversity-driven ecosystem service that has been effectively exploited by mankind since 300 CE. By promoting the natural regulation of pests, weeds, and diseases, it produces societal benefits at the food-environment-health nexus. The concept of 'One Health' provides a uniquely useful paradigm for gauging the broader implications of environmental change while accounting for the interconnections between people, animals, plants, and their shared environment. Disciplinary silos and reductionist approaches hamper our understanding and eventual mitigation of complex issues while the One Health framework underlines how close cooperation between professionals in the human, animal, plant, and environmental health sciences can spawn unprecedented societal benefits. Evidence shows that biological control generates desirable outcomes across all One Health dimensions, mitigating global change issues such as chemical pollution, biocide resistance, biodiversity loss, and habitat destruction. Yet, its cross-disciplinary achievements remain unrecognized. Here we argue that a broader use of biological control can help address multiple One Health challenges with examples of how biological control contributes to each of the four interrelated One Health dimensions, i.e., environmental, plant, animal and human health. We emphasize that in addition to its direct benefits, such as reduced densities of crop pests or vectors of human diseases, there are underappreciated indirect benefits, including reduced environmental pollution, enhanced habitat conservation, and increased human and livestock health. We advocate a system-level, integrated approach to biological control research, policy, and practice. Framing biological control in a One Health context helps to unite medical and veterinary personnel, ecologists, conservationists and agricultural professionals in a joint quest for solutions to some of the most pressing issues in planetary health.

Plenary Session 1 - Keynote Speaker: Raghu Sathyamurthy

Raghu Sathyamurthy completed his bachelor's degree in Zoology (Madras, India; 1996) and his master's in environmental management (Griffith, Australia; 1998), and a PhD in Ecology & Entomology (Griffith, Australia; 2002). His graduate research focused on the ecology and evolution of plant-insect insect interactions where he focused on these dynamics from the insect's perspective. Since 2002 he has been working on the biological control of weeds, with a focus on plant-herbivore interactions principally from the plant's perspective. An empirical and quantitative ecologist, his research interests span invasion dynamics, plant-herbivore interactions, integrated population management, and biological control of invasive species. He endeavours to undertake all his research collaboratively, and in close partnership with end-users of science to ensure the research outputs have the best possible chance to be translated into practical outcomes and, eventually, longer-term impacts. He has served as Associate Editor for Environmental Entomology, Biological Control and BioControl. Raghu currently leads a national research program in Biosecurity within Australia's National Science Agency, CSIRO.

A nod to the past and present, with an eye to the future: advances needed to sustain the next chapter(s) of biological control

Raghu Sathyamurthy[1]

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The intersecting impacts of climate change, increased trade and travel, changing land use patterns, and significant international efforts to reduce the use of chemicals in agricultural and environmental interventions, necessitate sophisticated approaches to mitigating biosecurity risks. Biological control has been a valuable asset in the management of such risks (invasive pests (vertebrate and invertebrate), weeds and diseases) for over a century. While this historical legacy is assured (even if sometimes questioned), sustaining the discipline over the next century will require ongoing efforts to modernise all aspects of the discipline. In this talk, I will highlight some emerging trends and approaches spanning the spectrum of activities in biological control (i.e. target selection, agent selection, risk assessment, post release evaluation, integrated management, regulatory engagement, international conventions governing access and benefit sharing). Some of this will challenge the *modus operandi* in the discipline, but meeting this challenge will be essential to strengthen and advance the future of the discipline and share its benefits globally.

Plenary Session / Discussion 2 - Panellists: Martin Wohlfarter, José Campos Arce & Veronica Picado Pomar

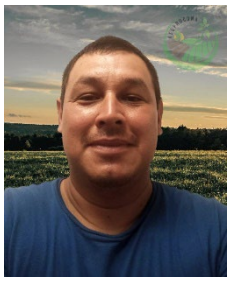
Martin Wohlfarter is a passionate agriculturist with fifteen years global experience in sustainable agricultural pest management. He completed his bachelor's degree in Agricultural Economics and Marketing at the University of Stellenbosch in 2004 and a Post Graduate Diploma in Rural Development and Agrarian Reform at the University of the Western Cape in 2015. Between 2008 and 2018, he worked in the fruit export sector, managed a Sterile Insect Release programme and was a Business Development Manager for the second largest plant protection products' distributer in South Africa. Between 2018 and 2020, he completed an MBA at the Graduate School of Business, University of Cape Town, South Africa. After further exchange studies on Change Management and European Policy, at the Copenhagen Business School, in Denmark, he briefly consulted to CTIFL in Southern France on insect rearing. Since end 2020, Martin is a Regulatory Affairs Specialist at the head office of Koppert B.V. in the Netherlands. He is responsible for global macro product registrations and actively engaged in policy matters, through various industry bodies. He is vice chair of the International Biocontrol Manufacturer Association (IBMA), Macro Professional Group, Rotating Chair of the IBMA Pollinators Group, and Chair of the Artemis Beneficials and Pollinator Group in the Netherlands. Martin will represent IBMA on the panel.

José J. Campos Arce has 40 years of international experience in academic and scientific organizations and technical cooperation, in forestry, agriculture and integrated landscape management. He was director general of Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE), and now serves as the Executive Director of the Sustainable Agriculture Network (SAN), a global impact network that works in the Americas, Africa, Europe, and Asia, orchestrating multistakeholder partnerships with the corporate, academic, and civil society sectors towards making agriculture regenerative. José has served in the boards of international organizations, including CIFOR, ICRAF, IUFRO and in sustainability task forces for The World Bank and the Inter-American Development Bank. José has a doctorate in forestry from the University of Oxford, a master in renewable natural resources management from CATIE/University of Costa Rica and a B.Sc. in forestry from the University of São Paulo, Brazil. He has published over 100 technical and scientific papers.

Veronica Picado Pomar Prior to joining the Minor Use Foundation (MUF), Veronica led the Laboratory for Analysis of Agrochemical Residues in Costa Rica's Office of Sanitary and Phytosanitary matters and oversaw the process of establishing its international accreditation (ISO 17025). She has also served as the Costa Rican delegate to the Codex Committee on Pesticide Residues, the body responsible for setting international pesticide residue standards under the joint hospices of the WHO and the FAO. A chemist by training, she has extensive experience managing studies related to the magnitude of pesticide residues. She now serves as the Foundation's Study Director for Central America and the Caribbean, as well as the Manager for Technical Operations. Veronica will represent MUF on the panel.

Plenary Session / Discussion 2 – Panellists (continued): Pedro Rocha & Luis Diego Arroyo Rivera

Pedro Rocha is a biologist from National University of Colombia, Ph.D. in plant biotechnology and molecular biology from University of East Anglia and John Innes Centre (Norwich, UK). Currently, he works as International Specialist and Coordinator in Biotechnology and Biosafety at the Inter-American Institute for Cooperation on Agriculture (IICA), based in Costa Rica. In this position, he provides technical support (policy generation, training, and communication) in biotechnology and biosafety to the ministries of agriculture of the 34 IICA member countries. His professional experience includes: Postdoctoral Research Scientist at The Sainsbury Laboratory in UK; in Colombia, Researcher at the Program for Agricultural Biotechnology Corpoica (now Agrosavia), Research Assistant at the International Center for Tropical Agriculture (CIAT), Senior Researcher and Director of the Division of Biotechnology at the National Oil Palm Research Center (Cenipalma), Consultant to the National Planning Department (DNP) in biodiversity and biotechnology, and specialist in technology and innovation (IICA). He has technically supported countries to develop regulations on bioinputs (Argentina, Paraguay, Dominican Republic, Guyana) and safety of biotechnology (GM and gene editing). His scientific experience was related to molecular characterization of germplasm, genetic modification of secondary metabolism, and molecular phytopathology. He has been director of 12 undergraduate and graduate works, author of over 160 technical articles, book chapters, technical reports, and press releases, and more than 380 international presentations, and organizer of more than 40 international events on biotech and biosafety.



Luis Diego Arroyo Rivera is an outstanding professional with more than two decades of experience in the agricultural sector. His passion for a healthy planet and his commitment to sustainability were manifested from his youth, when he completed his bachelor's degree in literature at the El Roble Environmental School in Alajuela, Costa Rica. Later, he expanded his academic training by obtaining a Middle Technical degree in Automotive Nautical at the Carlos Luis Fallas Sibaja Professional Technical College, acquiring technical skills that he would later apply in agricultural machinery. With 23 years of experience in agriculture, Luis Diego has specialized in the cultivation of agricultural products that are friendly to humans and the environment, such as tomatoes and sweet chili, crops which are important to Costa Rican restaurants. His innovative approach and refined practices have contributed significantly to improving the quality and yield of these crops, benefiting both producers and consumers. As a business partner of the National Association of Agricultural Organizations, Luis Diego has been a driver of change, promoting the participation of young farmers in agricultural activity. His leadership has inspired a new generation to adopt sustainable agricultural practices and perpetuate agricultural tradition with a modern and environmentally friendly approach. Luis Diego Arroyo Rivera not only grows food, but he actually is also sowing a legacy of innovation, sustainability and prosperity for its community and the country.

Plenary Session 3 - Keynote Speaker: Tara Gariepy

Tara Gariepy completed a BSc at Concordia University, Montreal, Canada, specializing in parasitology and entomology. This was followed by a Masters degree in Pest Management at Simon Fraser University, focusing on epidemiology and molecular diagnostics of plant pathogens. In 2002, she did an internship at CABI-Europe Switzerland on biocontrol of invasive insect pests, which led to her PhD research (2003 – 2007) on the use of molecular tools for non-target risk assessment in biological control (a collaboration between CABI, Agriculture and Agri-Food Canada, and University of Saskatchewan). From 2007 to 2009, she held a NSERC post-doctoral fellowship at University of Hawaii at Manoa, Kauai Agricultural Research Centre, where she conducted research on the use of molecular tools to assess competitive interactions between biocontrol agents of invasive aphids. This was followed by an Ontario Ministry of Research and Innovation post-doctoral award at the University of Guelph and Canadian Centre for DNA Barcoding, on DNA barcoding of parasites and insect vectors of disease. In 2011, she joined Agriculture and Agri-Food Canada as a Research Scientist at the London Research and Development Centre in Ontario. Her research focuses on importation biological control of invasive insects, and development of molecular tools to detect and evaluate trophic interactions between insect pests and their natural enemies.

The use of molecular tools to unravel host-parasitoid associations in biological control of invasive insect pests

Tara Gariepy[1]

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Trophic interactions between hosts and their parasitoids can be difficult to detect and identify using conventional methods, particularly when several closely-related and morphologically similar parasitoids co-exist in the same habitat or on the same host species. Molecular tools can help identify these interactions, which improves our understanding of food web ecology and provides valuable information to guide biological control decisions. Several examples will be presented on how these tools are applied at different stages in the discovery and use of parasitoids in biological control programmes for invasive insect pests.

Plenary Session 3 - Keynote Speaker: Ted Turlings

Ted Turlings did his studies at Leiden University, where he obtained a bachelors and masters degree in Biology, with a specialization in Ecology. In 1985 he moved to the University of Florida to conduct a PhD in Entomology/Chemical Ecology. During his PhD he discovered that insect-damaged plants emit specific volatile signals that attract parasitic wasps. The discovery of herbivore-induced volatiles has led to numerous follow-up studies by dozens of research groups, which resulted in thousands of publications on the topic. After a brief post-doctoral period in Florida, he moved to Switzerland in 1993. He first spent three years at the ETH-Zurich and in 1996 he obtained a prestigious START-fellowship, which he took the University of Neuchâtel to start his own research group. Eventually he was nominated full professor at the same university where he helped to establish the National Centre of Competence in Research *Plant Survival*, a swiss-wide research network that he directed for four years. Currently, he is head of the laboratory of Fundamental and Applied Research in Chemical Ecology (*FARCE*), which focuses on the use of plant-produced signals to improve crop protection. He has received several awards related to the field of chemical ecology and entomology. In 2023 he was elected president of the International Society of Chemical Ecology and was given the Marcel Benoist Prize, Switzerland's most prestigious science award.

Herbivore-induced plant volatiles and how they can be exploited for targeted biocontrol

Ted Turlings[1]

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Natural enemies of herbivorous pests often use plant-provided signals to locate plants that carry potential prey. Particularly intriguing are so-called herbivore-induced plant volatiles (HIPVs), which various plants release in large quantities only when they are attacked by insects (Turlings and Erb, 2018). Aboveground, HIPVs serve as foraging cues for predators and parasitoids, whereas belowground they are exploited by entomopathogenic nematodes. I will present results on our efforts to utilize these plant-produced signals to enhance the efficacy of biological agents. Belowground we have succeeded at making rootworm-damaged maize roots more attractive to entomopathogenic nematodes. Another focus is the use of odor sensors that can be placed on robotic rovers to detect HIPVs in real-time, allowing farmers to determine the presence of specific pests on crops before they do serious harm. The same rovers could then apply biocontrol agents to control these pests, but only when and where it is really necessary.

Turlings, T.C.J. and M. Erb (2018). Tritrophic interactions mediated by herbivore-induced plant volatiles: mechanisms, ecological relevance, and application potential. *Annual Review of Entomology* 63: 433-452

Plenary Session 4 - Keynote Speaker: Tania Zaviezo

Tania Zaviezo did her undergraduate studies at Universidad Catolica de Chile, where she obtained a bachelor's degree in Agricultural Sciences. In 1992 she moved to the University of California at Berkeley (USA) to conduct a PhD in Entomology/Biological Control. During her PhD she studied the evolution of clutch size in gregarious parasitoids and also looked at the interspecific relationships among parasitoids with different life-history traits. From then on, most of her research has explored the question of how biodiversity at different levels, from population genetics to landscapes, influences the outcome of biological control. Upon finishing her Ph.D she returned to Chile, to be an assistant professor at School of Agriculture and Natural Systems, Universidad Catolica de Chile, and in 2011 was nominated full professor at the same university. Here, she leads the laboratory of Fruit Crops Pest Management, which focuses on alternatives to pesticides, such as importation and conservation biological control and the use of pheromones. During her career she has secured funding from competitive national and international agencies, and has collaborated with researchers in many parts of the world. She has also served in many academic positions, such as head of department and vice-dean of undergraduate education, among others. Currently she serves as the secretary for the International Branch of the Entomological Society of America.

Mind the gap: mechanisms in conservation biological control

Tania Zaviezo[1]

[1] *Departamento de Fruticultura y Enología, Facultad de Agronomía y Sistemas Naturales, Pontificia Universidad Católica de Chile, Santiago, Chile*

Conservation biological control is an approach that encompasses a diverse set of practices that aim to preserve natural enemies and enhance their activity in order to improve their impact on the pest. It is probably the oldest form of biological control, but relatively new as an area of research. Conservation biological control practices aim to provide complementary or alternative trophic and non-trophic resources, that can be achieved through non-crop habitat/vegetation manipulation; within crop management practices; or direct provision of the resources. Additionally, careful pesticides use in conventional agriculture can be important for conserving natural enemies. Habitat or vegetation manipulation is probably the most studied and used tactic within conservation biological control, ranging in temporal and in spatial scale. Nevertheless, many gaps in knowledge must be addressed before habitat manipulation becomes an effective and more consistent practice, because mechanisms explaining the patterns and effects observed are rarely evaluated. In this talk we will present studies that provide evidence of the mechanisms by which conservation biological control practices increases natural enemies and/or biological control in crops. We will also highlight in which areas of conservation biological control there are the more studies on mechanisms and in which there are more gaps. Finally, we will give some suggestions on how to improve studies in order to move forward in making this strategy more transferable among cropping systems and locations.

Plenary Session 4 - Keynote Speaker: Ralf-Udo Ehlers

Ralf-Udo Ehlers finished his studies in Agriculture in 1985, received his PhD in 1989 and habilitation in 2003. His research focused on the development of liquid culture technology of entomopathogenic nematodes (EPN) at the Institute for Phytopathology of the University Kiel (Uni Kiel), Germany. In 1996, he founded the biotechnology company e-nema, which today is the largest producer of nematodes for biological control of insect pests. From 1988 until 2011, he was first subgroup convenor and then convenor of the IOBC/WPRS Working Group *Insect pathogens and entomoparasitic nematodes*. From 1992 until 2010, he was participating and serving as vice chairman and chairman of several EU COST Actions on EPN and *Bacillus thuringiensis*. Apart from his R&D in EPN he also worked on the use of microbial agents in biocontrol of insects and plant diseases. In 2006/2007, he coordinated the EU Specific Support to Policy Action REBECA: Regulation of biological control agents in Europe. Since 2004 he is guest professor at the University Gent, Belgium and became professor at Uni Kiel in 2009. In 2012, he left Uni Kiel to concentrate on the management of e-nema GmbH. From 2013 until 2018 he served as executive board member and treasurer of the International Biocontrol Manufacturers Association (IBMA) in Brussels lobbying for biological control. From 2014 until 2022, he was president of the European Society of Nematologists. He received the Escherich Award of the German Society for General and Applied Entomology in 2015 and the IBMA Bernard Blum Award for the best biocontrol product of the year 2020 (dianem® for control of the invasive corn pest Western Corn Rootworm). He is honorary member of IBMA. In 2023, he withdrew as shareholder from e-nema and is since working as consultant in biocontrol biotechnology.

Role of biocontrol for transformation of agricultural practice

Ralf-Udo Ehlers[1]

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The world is losing its diversity. In the last 25 years insect biomass has seriously declined. Main driver for insect decline is intensive agriculture (46.6%) followed by invasive species (16.4%), urbanization (10.7%) and deforestation (8.8%). Current agriculture practice heavily depends on synthetic pesticides but at the same time the tool-box of farmers is depleting, particularly with insecticides. Pests develop resistance, older actives are not re-registered, many active ingredients are banned, development of new actives is only possible at high costs and return of investment is declining why innovation is limited and new actives often have a narrow target spectrum. In the near future, agriculture will have to rely on biocontrol biodiversity. This transformation is hampered by a serious lack of knowledge. We know the antagonists but techniques how to promote their potential at farm level is less developed. R&D is needed to develop agro-ecosystem management strategies to enhance the potential of existing antagonists and to introduce and establish those agents, which are missing in the different habitats. Biocontrol industry can support the transition, however, the political environment prohibits the full exploitation of its potentials. Major hurdles are exaggerating data requirements for registration and xenophobic legislation when introduction of non-indigenous species/strains provide more benefits than risks. Externalisation of costs related to the use of synthetic actives would justify the support of biocontrol practice, however, such programmes are rare. Biocontrol industry made significant progress during the last two decades, contributing to a reduction of pesticide residues, substituting synthetic chemicals or filling gaps. How and in which sectors biocontrol industry can support transformation of agricultural practice with less or no insecticides will be demonstrated and discussed. The contribution of novel technologies will be reviewed.

Plenary Session 5 – Keynote Speaker: Andy Sheppard

Andy Sheppard is a Chief Research Scientist in CSIRO. He joined the organisation in France in 1986 having completed his PhD at Imperial College. He is based in Canberra, Australia working in biosecurity and invasive species management. He has been a CSIRO Research Director of three different national programs on plant, animal and environmental biosecurity and terrestrial biodiversity management. His current role is a secondment into the Australian Department Agriculture Fisheries and Forestry as Co-Executive Director of DAFF-CSIRO Catalysing Australia's Biosecurity Initiative after instigating this innovation catalyst as a partnership across both agencies. This $50-$100M Mission was launched in early 2024. He is also the non-residential Director of CSIRO's European Laboratory in Montpellier since 2002. He serves on a number of boards/advisory committees including the OECD Cooperative Research Programme Governing Board and the Scientific Advisory Body, the Federal Government National Biosecurity Committee, the Federal Government Threatened Species Scientific Committee and the CSIRO Centre of Australian National Biodiversity Research. He is also the IUCN Species Survival Commission Focal Person for the IUCN National Committee (NC) of Australia. His portfolio of research projects have included weed, pest and invasive species management based on Australia, South Africa and France. He is a Fellow of the Royal Entomological Society, Australian Academy of Technology & Engineering and an International Fellow of the Académie d'Agriculture de France. In 2023 he was awarded the "L'ordre du Mérite Agricole" by the French Government.

Biological control is considered high risk by most governments around the world - how do we address this?

Andy Sheppard[1]

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Despite more than 100 years of successful use and the generation of effective management of many exotic pests and invasive alien species, classical biological control is still considered high risk by most governments around the world. These are often landlocked countries, where the use of biological control is not common practice and there is little or a lack of policy approaches to regulate its use. This situation is despite the acceptance and promotion of classical biological control as an effective management approach of widespread invasive alien species by the International Plant Protection Convention and the Convention on Biological Diversity. Why is this? In the recent Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Invasive Alien Species Assessment report, the authors covered biological control as a management approach globally in some detail. Countries with no history of science-based and regulated use of classical biological control generally see this approach as encompassing the early and completely unregulated use; for example, the release of cats and mongoose onto islands and cane toads around the world to control pests. This still gives the discipline a bad name despite many studies on the lack on unexpected non-target impacts of biocontrol agent releases. That such governments seem unable to distinguish between such early opportunistic unregulated use and today's highly and regulated application of classical biological control using internationally accepted risk analysis and public consultation, tarnishes the whole modern discipline. The European Union is a good example of this regulator risk aversion despite the increasing use of classical biological control by some EU member countries. This talk analyses the relevant evidence from the IPBES assessment and proposes ways forward to address the current huge lack of global trust in what the science shows is a safe and effective invasive alien species management approach.

Plenary Session 5 – Keynote Speaker: Hariet Hinz

Hariet Hinz did her MSc in Applied Entomology at Imperial College in the UK and her PhD in Biology/Ecology at the University of Fribourg in Switzerland, focusing on plant-insect interactions in relation to classical biological weed control. In 1997, she was employed as a research scientist at CABI in Delémont, Switzerland, and became Head of the Biological Weed Control Programme in 2006. Since 2002, she is also Affiliate Professor at the University of Idaho, USA. She has thus over 30 years of experience in the risk assessment and impact quantification of weed biological control agents and related fields, such as the population biology of plants, invasion ecology and mechanisms underlying the host-finding and host-choice behaviour of insects. She published 65 papers in peer reviewed journals, was co-organizer of the XV International Symposium of Biological Control of Weeds, and co-editor of the most important resource in weed biocontrol 'A World Catalogue of Agents and their Target Weeds'. In 2015, Hariet was appointed Centre Director of the CABI operation in Switzerland, Regional Director in 2020, and Global Director Invasives in 2021. Currently, she is developing, together with colleagues, a new CABI-led programme using an Integrated Landscape Management approach.

Classical biological control in Europe: regulatory constraints and how to move forward

Hariet L. Hinz[1], Tim Haye[1], Marc Kenis[1] & Lukas Seehausen[1]

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Classical biological control (CBC) aims to reduce the density, vigour and spread of exotic invasive organisms (mainly plants and arthropods) by introducing specific natural enemies, so-called biological control agents, from the area of origin of these pests. CBC has been practiced since 100+ years and is characterized by high safety standards. The method has zero negative effects on human and animal health, and minimal to negligible impacts on non-target organisms. Releases of biocontrol agents against invasive plants are fully or partially successful in two out of three cases, leading to benefit:cost ratios of over 3000:1, while releases against invasive arthropod pests are successful in about 40% of cases. Despite the good safety record, and potential for successful control with minimal inputs, CBC, especially against invasive plants, is not commonly practiced in Europe. Many European countries lack regulations to allow the release CBC agents, while others have banned the introduction of exotic natural enemies to control invasive pests altogether. Efforts to try and harmonize regulations for CBC across Europe have failed so far. We will explore reasons for this lack of political will, despite the high demand for alternatives to synthetic pesticides in the face of the European Green Deal and the decrease in registered products. We will also discuss potential ways forward to ameliorate the current situation.

Plenary Session 5 – Keynote Speaker: Michelle Rafter

Michelle Rafter undertook her bachelors, honours and doctoral studies at the University of Queensland, where she obtained a PhD in Evolutionary Ecology in 2013. During her PhD she uncovered the existence of host-specific cryptic species within the taxon *Scirtothrips aurantii*, and that explained the paradox of the host-plant specificity of an adventive "generalist" thrips species to Kalanchoe succulents in Australia. After an intense post-doctoral period in stored product pest research on an India-Australia Grand Challenge Project, Michelle moved to CSIRO in 2016. At CSIRO she has continued to use evolutionary based approaches to develop and apply ecological theory to solving biosecurity problems involving plant-insect interactions. This has led to tangible advances in invasive species management in Australia and globally, through the development of nuanced and innovative approaches to the study of weeds and pest insects. She leads CSIRO's weed biocontrol program with insect candidate biocontrol agents, based in Brisbane, Australia. Michelle has extensive experience in delivering risk analysis under containment for biocontrol agents and weed targets in Australia. More recently, her responsibility has extended to liaising with various government agencies on behalf of CSIRO on weed management and biocontrol strategies. She is currently an Associate Editor for BioControl and Subject Editor for Environmental Entomology, former Associate Editor for Arthropod-Plant Interactions.

Further integrating weed biological control into the Australian policy context – the development and implementation of a National Pipeline Strategy

Michelle Rafter[1], Ben Gooden[2], Mariana Campos[3], Kumaran Nagalingam[1], Gavin Hunter[2], Andrew McConnachie[4], Pete Turner[4], Tony Pople[5], Kunjithapatham Dhileepan[5], Raelene Kwong[6], Jackie Steel[6], Greg Lefoe[5], Shauna Potter[7], Matt Sheehan[7], Peter Brenton[8] & Andreas Glanznig[9]

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[7]Wild Matters Pty Ltd, Castlemaine, Australia
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[9]The Centre for Invasive Species Solutions, Canberra, Australia

Classical weed biocontrol has been used successfully to control invasive weed species for over 120 years. Weed biocontrol is a proven valuable and effective approach to weed management in Australia with 39% of all programs considered to produce complete or near complete control, 30.5% partial control with an average benefit-cost ratio of 23:1 (Cullen et al. 2022). These successes can be attributed to the exitance of a well-established regulatory pathway and national risk assessment framework that enables biocontrol to be undertaken safely in Australia. But implementation of biocontrol in Australia is at risk due to diminishing agents coming through the research pipeline and variable research investment over time (Sheppard et al. 2023). Since 2014–15, the Australian Government has invested approximately $20 million in weed biocontrol projects, but most of these programs concluded in 2023. In response to this identified risk and to further embed biocontrol into national policy, a National Weed Biocontrol Pipeline Strategy was proposed (Rafter et al. 2022). The aim of this strategy was to ensure that available research investment is allocated to sustain the research pipeline of prioritising weed candidates for research, native range exploration, risk assessment, biocontrol agent release, impact monitoring and evaluation. The strategy was endorsed by the Commonwealth and State governments in 2023 and the initial phase of the strategy commenced in 2024. The development, implementation, and key deliverables of the National Pipeline Strategy will be discussed with the aspiration that the strategy undertaken in the Australian context may prove useful elsewhere.

Plenary Session 5 – Keynote Speaker: Martin Hill

Martin Hill did his undergraduate and postgraduate studies at Rhodes University in South Africa, where he obtained a PhD in entomology in 1995. In 1995 he joined the Plant Protection Research Institute of the Agricultural Research Council of South Africa, where he worked on the biological control of waterweeds, not only for South Africa, but initiated a number of projects throughout Africa. In 2002 Martin rejoined Rhodes University as the Professor of Entomology where he continued his work on waterweeds, but also started developing entomopathogenic fungi and viruses for the control of several crop pests, most notably in the citrus industry. In 2017 Martin established the Centre for Biological Control, which comprises a consortium of universities and research institutes in South Africa investigating the biological control of invasive alien weeds and several crops pests. Martin has served as the President of the Entomological Society of southern Africa, Secretary General of the Afro Tropical Sub Region of the International Organisation for Biological Control and is currently the President of the International Organization for Biological Control.

Classical biological control in Africa: constraints and opportunities

Martin Hill[1]

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The Convention on Biological Diversity (CBD) and the Nagoya Protocol (NP) establish the international legal framework for access and benefit sharing (ABS). The NP was initiated in October 2014 and has been ratified by many countries active in classical weed biological control. Whilst understanding the need for access and benefit sharing of biodiversity, the Nagoya Protocol was met with concern by the biological control community as many practitioners were skeptical of how efficiently it might be implemented in signatory states, and feared that it would significantly slow down the process of obtaining the necessary permissions to survey for, collect and export potential biological control agents (Prior Informed Consent (PIC) and Mutually Agreed Terms (MAT)). The International Organization for Biological Control (IOBC) Global established a Commission on Access and Benefit Sharing in 2021 that has resulted in a selection of papers including a special issue of BioControl (2023) that essentially sets out a best practice for implementing the Nagoya Protocol in classical biological control. In kind benefit sharing through support of laboratories, student support, infrastructure sharing of agents has historically been a philosophy of the international weed biological control community. The weed biological control community has prided itself in practicing a public good science. The intentions of the NP are noble as it seeks to reward countries for protecting their biodiversity. However, the unintended consequences of the NP could be that only resource rich countries will be able to afford to practice classical biological control and it will be unaffordable to resource poor counties.

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