

# IOBC-NRS NEWSLETTER

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## Message from the President

Dr. Cesar Rodrigues-Saona retires after two years leading the Nearctic section of IOBC. Recently submitted and accepted, he created a live streamed Symposium for the next national ESA meeting, for early career professionals in biological control.

## California Department of Food & Agriculture's Biological Control Program Hires Two New Scientists

Two new Entomologists have recently joined CDFA's Biological Control Program. Drs. Chris Borkent and Ricky Lara will pick up the responsibilities of Charlie Pickett and Mike Pitcairn who will soon be retiring.

## Biological control of Dalmatian toadflax in southern California

Releases of a stem-boring weevil have caused the collapse of Dalmatian toadflax in a study site at the base of the San Joaquin Valley in California. Impact of this exploding beetle population on this weed can easily be seen in before and after photos of this invasive alien perennial forb.

## Award announcements

### IOBC NRC Annual Awards

Robert O'Neil Award for Outstanding Ph.D. Student in Biological Control – Jeremiah Foley IV

Early Career Outstanding Scientist Award – Dr. Ellen C. Lake

## Distinguished Scientist Award – Dr. Kent M. Daane

Each year IOBC recognizes a Ph.D. student, early career scientist, and late career scientist who have made exceptional contributions to the study and practice of biological control.

## 2019 ANBP Award of Excellence - Dr. Clive Stinson

ANBP represents producers of natural biocontrol agents and every year awards individuals who have made an extraordinary contribution to this industry. Dr. Clive Stinson of Beneficial Insectary is the most recent recipient of this award.

## 2020 Arthur T. Potts Award - Dr. John A. Goolsby

The Subtropical Agricultural and Environments Society of the Rio Grande Valley in southern Texas annually awards individuals that have made a major contribution to the agricultural industry in that region. Dr. John Goolsby, of the USDA ARS is this year's awardee, and has dedicated his career to biological control.

## Interesting Literature

Three recent publications with wide readership interest were reviewed. One is a 24 year study on the long-term impact of neonicotinoids on an Asian agroecosystem, the second reveals the mysteries of egg parasitism, or lack thereof, and the third describes how genomics can benefit biological control.

## Remembrances

## Governing Board and Websites for NRS IOBC

## Message from the President

This year marks the end of my two-year term as IOBC-NRS president. One of my main goals as president has been to promote the work of early-career biological control professionals. For this, we organized two back-to-back symposia at the ESA annual meeting where we invited young professionals to present their research on biological control. This year, we have organized a Section Symposium for the ESA annual meeting (see details below), which will be held virtually. We will also have our regular Business Meeting (virtual) at the ESA annual meeting. Our Business Meeting will feature a presentation by this year's Distinguished Scientist Award winner.

One of the challenges our organization has faced in past years is the decline in membership. We encourage scientists, students, practitioners, insectary workers, instructors, and regulators interested in biological control to join our organization. Besides promoting biological control and early career professionals, members can compete for the IOBC-NRS awards and join our business meeting and mixer at the ESA annual meeting. Our organization stimulates collaborations among members and establishes leadership roles by joining the Governing Board. IOBC-NRS also provides monetary support to individuals who wish to organize and present short courses on highly specialized topics in biological control. Please visit our website at <http://www.iobcnrs.org/> for more information.

Lastly, I would like to thank all members of the Governing Board for their time and efforts towards IOBC-NRS functions and activities. Special thanks go to: Paul Abram, Corresponding Secretary, for overseeing the IOBC-NRS website; Stefan Jaronski, Secretary/Treasurer, for managing our bank account and maintaining membership records; Sara Hermann, Members-At-Large, for her assistance co-organizing our 2020 Section Symposium; and Charlie Pickett, Members-At-Large, for overseeing the production of this Newsletter. We also welcome two new members: Ricky Lara (Secretary/Treasurer) and Sara Hermann (Members-At-Large), and the return of a former member: Jana Lee (Members-At-Large).

It has been a pleasure to serve the IOBC-NRS as president. I wish the best to Mark Hoddle (President-Elect) and will happily assist his efforts to lead the section during his term.

Cesar Rodriguez-Saona  
Rutgers University  
New Brunswick, NJ

### **ESA Section Symposium: Early career professionals promoting biological control in a changing world**

Details on the date and how to participate in this symposium are currently not available.

#### Organizers

Cesar Rodriguez-Saona, Rutgers University, New Brunswick, NJ  
Sara Hermann, Penn State University, University Park, PA

## Presentations

Coccinellid contribution to biological control in Brassica agroecosystems revealed by diet analysis.

**Hannah L. Gray**, Débora Pires Paula, and Dave A. Andow.

Next Generation Biocontrol: Using experimental evolution to increase the effectiveness of native parasitoids at attacking invasive pests. **Marianna Szucs** and Benjamin M. Jarrett.

Challenges and opportunities for enhancing biological control of cucumber beetles. **Anjel Helms**, John Grunseich, Allison Hay, Morgan Thompson, and Jared Ali.

Community-wide impacts of induced plant defenses in the tropical plant *Trichogoniopsis adenantha* (Asteraceae). **Mônica F. Kersch-Becker**, Guilherme P. Pinheiro, Thais Silveira, Martin Pareja, and Gustavo Q. Romero.

The African citrus psyllid honeydew as a carbohydrate and protein source for its specific parasitoid *Tamarixia dryi*. **Pablo Urbaneja-Bernat**, Joel González-Cabrera, Estrella Hernández-Suárez, Cesar Rodriguez-Saona, Alberto Urbaneja, and Alejandro Tena.

Argentine ant control precipitates collapse of populations of Asian citrus psyllid and other honeydew-producing hemipteran pest populations in citrus. **Kelsey McCalla** and Mark Hoddle.

Management through manipulation: Improving biological control while considering abiotic and biotic stressors. **Jessica Kansman** and Sara Hermann.

TBD. Outstanding Master's Award.

TBD. Robert O'Neil Award for Outstanding Ph.D. Student in Biological Control.

TBD. Early Career Outstanding Scientist Award.

# California Department of Food & Agriculture's Biological Control Program Hires Two New Scientists

The California Department of Food & Agriculture's Biological Control Program recently hired two new scientists to help fill upcoming retirements. Dr. Chris Borkent was hired summer 2018 and Dr. Ricky Lara began January 2020. They are both rapidly learning their duties and responsibilities despite all the impediments hitting us from the corona virus pandemic. We in CDFA are extremely pleased to have both of these outstanding individuals join our unit. Below is a brief overview of their past educational and work experience that landed them with a career path in Biological Control.

**Dr. Chris Borkent** joined the Biological Control Program at the California Department of Food and Agriculture (CDFA) in Sacramento as an Environmental Scientist in the summer of 2018. He hails from Canada originally, where he received a BSc with an honors thesis in population ecology from the University of Victoria in 2000, and his MSc in pollination ecology and evolution at the University of Calgary in 2003. He then worked for several years as an independent research scientist examining fly pollination behavior along the west coast of North America. He went on to complete a PhD in Diptera systematics at McGill University in 2012, after which he and his wife fled the great white north and moved to sunny Sacramento in order for Chris to pursue postdoctoral studies.



These were in Diptera systematics, principally on fungus gnats, spider flies, and tephritid fruit flies, while holding a joint appointment with CDFA's Plant Pest Diagnostics Laboratory and the University of California, Davis Department of Entomology and Nematology. Research for these projects allowed him to travel to more than 20 countries on six continents to collect insect specimens and pursue study questions. Chris has authored 20 peer reviewed publications and given many presentations at national and international conferences. He is currently treasurer of the North American Dipterists Society. He served as President and Past-President of the Pacific Coast Entomological Society (2014-2017) and was on the governing board of the Entomological Society of Canada (ESC) as the student affairs chair (2005-2008). He is on the organizing committee of the 10th International Congress of Dipterology (ICD X), and organized symposia at ICD 7, 8, and 9 and the 2006-2008 ESC meetings. He served as Diptera subject editor for four journals (Zootaxa, Zookeys, Pan-Pacific Entomologist, Proceedings of the Entomological Society of Washington) and is a Research Associate of the California State Collection of Arthropods. Since joining the CDFA Biological Control Program, Chris has been involved in monitoring, evaluating, and releasing a variety of natural enemies of several target pest taxa across California. This includes the brown marmorated stinkbug, bagrada bug, cereal leaf beetle, olive psyllid, olive fruit fly, and squash bug. He has also been helping with research into some of the noxious weeds of California and their natural enemies present in the state. He is excited about growing the program and discovering new challenges in California agriculture that can be addressed by biological control, particularly with the continued rise in organic farming acreage.



**Dr. Jesús R. (Ricky) Lara** came to us from the University of California, Riverside where he earned his doctorate in Entomology in 2014 under the guidance of Dr. Mark Hoddle. Dr. Lara's dissertation work (2008-2014) centered around pest management strategies for *Oligonychus perseae*, an invasive spider mite pest in California avocado orchards. He developed time saving sampling plans for this mite that incorporated the role of beneficial spider mite predators, i.e., phytoseiids. Additionally, he completed molecular studies to optimize the search for co-evolved natural enemies of *O. perseae* from Mexico that could be imported in the future to target this pest in California. During his postdoctoral appointment at UC Riverside (2014-2018), Dr. Lara began developing a classical biocontrol program for *Halyomorpha halys*, a major invasive pest threat to commercial fruit, vegetable,

and nut crop production in California. He completed quarantine host-specificity evaluations for *Trissolcus japonicus*, a key co-evolved egg-parasitoid of *H. halys* from Asia. With the support of numerous cooperators, Dr. Lara also coordinated area-wide *H. halys* surveys in urban and agricultural systems and found the first adventive field population of *T. japonicus* in California. This initial detection is significant as it will expedite government approval to field-release and permanently establish *T. japonicus* in California for cost-effective *H. halys* control in the southwestern U.S.

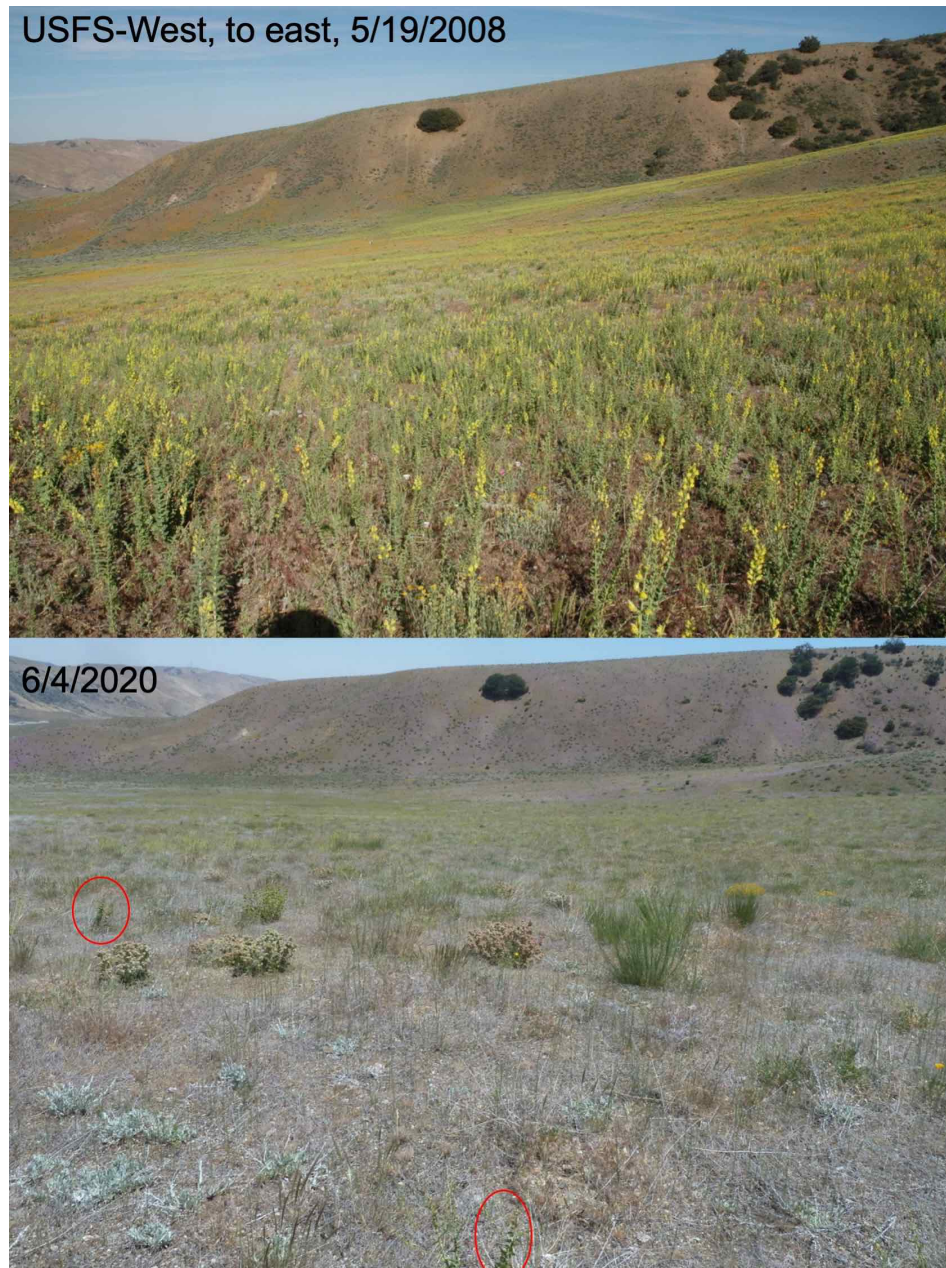
In 2019, Dr. Lara was promoted to Assistant Project Scientist at UC Riverside. He conducted foreign exploration for parasitoids of polyphagous shot hole borer in Taiwan that could be introduced for control of this invasive ambrosia beetle in California. He set up the field work logistics for this beetle project before starting a new position in 2020 as Senior Environmental Scientist, Specialist for the California Department of Food and Agriculture. In this new appointment, Dr. Lara is responsible for promoting classical biological control efforts statewide. His current mission is to continue field detection surveys for *T. japonicus* in California, track the spread of invasive wood-boring beetles, and initiate classical biological efforts against invasive Lepidoptera that threaten several specialty crops in California. Dr. Lara has identified funding sources and submitted research proposals to support these efforts.

## Biological control of Dalmatian toadflax in southern California

Dalmatian toadflax (*Linaria dalmatica*, Plantaginaceae) is an invasive alien perennial forb that has invaded grasslands in the western USA. In 2005 about 64 ha of the Hungry Valley State Vehicular Recreational Area, near Gorman, CA were found to be heavily infested, and a program to contain and reduce the perimeter of the infestation using herbicides was initiated. The stem-boring weevil, *Mecinus janthiniformis*, was released in the untreated core of the infestation in 2008 (1,400 adults divided among 3 sites), and again in 2014 (1,318 adults divided among 5 sites) following a wildfire that decimated the weevil population in May 2013. After both releases, the weevil population grew exponentially, attacking up to 100% of plants at release sites within 3 years. The



weevil also spread to nearby monitoring sites (> 200 meters) within 2-4 years. Dalmatian toadflax densities continued to increase during 2014 and 2015, but began to decrease in 2016. By 2019, toadflax was undetectable at all permanent line-intercept transects except one, at which toadflax coverage was 2%. This is the most southern release of *M. janthiniformis* in the USA. The elevation of the sites is at least 4,600 ft., but winters are mild ( $-5.6^{\circ}\text{C}$  mean annual minimum), and overwintering survival of adults was high (91%). As toadflax coverage declined from 2013 to 2019 annual grasses increased and other vegetation types did not change significantly.



Dalmatian toadflax at Hungry Valley State Vehicular Area before and after releases of *Mecinus janthiniformis* in 2008 and 2014. Red circles mark the few remaining toadflax plants.

by Lincoln Smith, Michael J. Pitcairn, Dale M. Woods, Patrick J. Moran, and Chris Hon

# Award announcements

## IOBC NRC Annual Awards

### Robert O'Neil Award for Outstanding Ph.D. Student in Biological Control – Jeremiah Foley IV



Jeremiah is a PhD candidate in Entomology at Virginia Tech University since 2017 under the supervision of Dr. Scott Salom. Jeremiah is working on the thermal requirements, aestivation survivorship, feeding, and establishment of *Laricobius* spp. (Coleoptera: Derodontidae), biological control agents released for the Hemlock Woolly Adelgid, *Adelges tsugae* (Hemiptera: Adelgidae). Jeremiah has been extremely productive in his short career. Before joining Virginia Tech, he simultaneously went to school for his B.S. and M.S. degrees while working at the USDA, ARS Invasive Plant Research Laboratory (IPRL) in Ft. Lauderdale, FL. During his formative years, Jeremiah played an incredibly important role in a number of biological control projects. His first project involved the release of the planthopper, *Megamelus scutellaris*, for control of water hyacinth. Jeremiah maintained the colonies of these insects and released 73,000 across Florida over a 3-yr period. Working with the same

plant, he then contributed to the evaluation of another agent, the mirid *Eccritotarsus eichhorniae*. Jeremiah also contributed to several papers focused on the biology and host-range of the plant hopper *Lepidolophus pistiae*, a biocontrol agent of water lettuce, *Pistia stratiotes*. In his time at the IPRL, Jeremiah served as co-author on 10 peer-reviewed papers, one of which he was the senior author. This was done while he was pursuing an M.S. from the University of Florida, where he studied the interaction of termites and nematodes. He was able to publish two papers from his M.S. program. Jeremiah has mentored several wage personnel and contributed critically to grants yielding over \$140,000, much of which is funding his Ph.D.

### Early Career Outstanding Scientist Award – Dr. Ellen C. Lake

Ellen completed her doctoral degree under the direction of Dr. Judith Hough-Goldstein in 2011 at the University of Delaware. Here, she conducted research on biocontrol of mile-a-minute weed, co-taught biocontrol, and participated in biocontrol outreach. She started working at the USDA ARS Invasive Plant Research Laboratory in Fort Lauderdale, Florida in 2012 and to date has conducted laboratory and field studies on multiple aspects of biocontrol targeting several species of invasive weeds. Ellen has 37 refereed publications associated with biocontrol and has given numerous talks on her research to scientific audiences, stakeholders, and the public, reaching more than 3,000 people. She has co-authored several US Forest Service publications, including the 2017 Field Guide for the Biological Control





of Weeds in Eastern North America, and was invited to co-author a chapter on Importation Biological Control for a CSIRO book: Biological Control: A Global Endeavour (in press). Ellen has directly contributed to the acquisition of \$4.37 million in new research funding since 2012.

### **Distinguished Scientist Award – Dr. Kent M. Daane**

Kent is a Cooperative Extension Specialist at the University of California, Berkeley. His research focuses on developing IPM programs in California's vineyard systems and tree crops (nuts and fruit). His research program is multifaceted utilizing various IPM tactics. When possible, he uses biological control as the cornerstone of these management programs. His most recent achievements were 1) establishment of the parasitoid *Psytalia lounsburyi* (Hymenoptera: Braconidae) in California for classical biological control of the Olive Fruit Fly, *Bactrocera oleae* (Diptera: Tephritidae); and 2) discovery, importation, and evaluation of three Asian-native larval hymenopteran parasitoids [*Asobara japonica* (Braconidae), *Ganaspis brasiliensis*, and *Leptopilina japonica* (both Figitidae)] for introduction against the Spotted-Wing Drosophila, *Drosophila suzukii* (Diptera: Tephritidae). Kent is one of a small number of entomologists who still attempt classical biological control introductions to manage invasive pest species in the USA. He has published 407 papers including 205 peer-reviewed journal articles, 39 book chapters/invitational review papers, and one book. According to Google Scholar (4 July 2020), his publications have been cited 8,591 times and his h-index and i10-index are 51 and 171, respectively. His co-authored study on the invasion biology of *Drosophila suzukii* has been cited >520 times. His review of management approaches for olive fly has been cited >255 times. Over his career, he and his colleagues have been awarded greater than \$30 million in research funding. For his specific work on biological control, Kent has received >\$16 million. His service to science includes his participation as Co-Chair (2000-Present) of the Center for Biological Control at UC Berkeley. He is on the Editorial Board of the journal Biological Control (2012-Present). He is an active member of the Western Regional Committee on Biological Control (W4185) in which he has participated for > 25 years. His achievements have been recognized by numerous organizations (Entomological Society of America, International IPM Symposium), institutions (UC Cooperative Extension, Cornell University), and agencies (CA Dept of Pesticide Regulation).





## 2019 ANBP Award of Excellence - Dr. Clive Stinson



Every year, ANBP recognizes an individual who has made, or is making, extraordinary contributions to the field of augmentation biological control and/or its use in integrated pest management. This year we could not have selected a more appropriate recipient for the award. Dr. Stinson has worked on an extraordinarily wide range of areas critical to the discovery and implementation of natural enemies (for both arthropod and weed biocontrol), all of which are important in IPM systems today.



Dr. Clive Stinson holds a B.S. degree in Ecology from the New University of Ulster in the UK, and a M.S. and Ph.D. degree in Applied Entomology from the University of London in the UK. An internationally recognized leader in his field, Clive has been conducting advanced entomological research and development for over 35 years, working in an array of commercial and industrial settings. From 1983 to 1988, Clive was Project Manager for CAB International in Delmont, Switzerland. He led the program for the biological control of spotted and diffuse knapweed. This entailed field surveys and collecting phytophagous insects attacking knapweed in their native habitats of Central and Eastern Europe (Yugoslavia, Bulgaria, Romania, Hungary, and Austria). As part of this

classical biocontrol program, he reared, in quarantine, collections of potential natural enemy species at CABI's biological control facility in Switzerland.

An essential step in classical biocontrol is host testing, so Clive also developed screening techniques to test host specificity against an exhaustive list of plant pests determined by the USDA and Ag Canada. He developed off-plant rearing techniques for late instar larvae prior to pupation which involved powdered Knapweed roots mixed with a range of nutrients and insect vitamins. As a result of Clive's work, one species, a curculionid beetle (*Cyphocleonus achates*) was approved for release in Canada and the US by the USDA and Agriculture Canada.

From 1988 to 2010, Clive was head of production at Syngenta Bioline in the UK. In this position, Clive performed an enormous amount of work to the benefit of crop protection in the UK, Europe and North America. Among his many other duties, he was responsible for research regarding the nutrition of host insects and mites used in the commercial production of beneficial insects and mites and the development of new products used in augmentative biological control. He also spearheaded numerous other R & D projects during this time. A bulleted summary of some key contributions include:

1. The development of a yeast-based diet for several species of astigmatid mites.
2. Field testing of predator mites in breeding sachets in commercial cucumbers in the UK and Holland.
3. Development of a dextrose-yeast diet for the production of stored fruit mite *Carpoglyphus lactis*.
4. Development of a new prey mite *Thyreophagus entomophagus* for the commercial production of a number of species of phytoseiid predator mites. For this it should be noted that Clive was recognized as an inventor by the European Patent Office, Munich (Title:

Method for rearing predatory mites”) and by the “World Intellectual Property Organization (Title: “Method for rearing predatory mites)

5. The development of a soft plant feed recipe to optimize the palatability and nutrient availability of plants used to breed insect and mite pests in commercial production of beneficial insects and mites on plants.
- 6.

From 2010 Clive has been head of production at Beneficial Insectary in Redding. Undoubtedly, his background has been a tremendous asset to the company. We heartily extend our congratulations to Clive for this award and will be adding him to the list of our past awardee’s below.



**Everett “Deke” Dietrick**  
Rincon-Vitova  
Insectaries Ventura,  
California USA



**Karel Bolckmans**  
New Business Dev.  
Director Special Fruit  
BELGIUM



**Jim McMurtry**  
Professor Emeritus Dept.  
of Entomology  
University of California  
Riverside, California USA



**Pierre Ramakers**  
Wageningen University  
& Research Centre THE  
NETHERLANDS



**Graeme Murphy**  
Ontario Ministry of  
Agriculture and Food  
(OMAFRA) CANADA



**Dave Gillespie**  
Agriculture & Agri-Food  
Canada Agassiz, B.C.  
CANADA



**Fred Legner**  
Professor Emeritus Dept.  
of Entomology  
University of California  
Riverside, California USA



**Joop C. van Lenteren**  
Professor Emeritus  
Wageningen University  
THE NETHERLANDS



**Glenn Scriven**  
Formerly Biotactics, INC.  
Romoland, California  
USA



**Dan Cahn**  
President Syngenta  
Bioline USA



**Don Elliott**  
Applied Bio-nomics  
Sidney, British Columbia  
CANADA



**Norman Leppla**  
Dept. of Entomology &  
Nematology University  
of Florida Gainesville,  
Florida USA



**Sinthya Penn**  
Beneficial Insectary, INC.  
Redding, California USA

## 2020 Arthur T. Potts Award - Dr. John A. Goolsby

Dr. John A. Goolsby, a research entomologist with the U.S. Department of Agriculture, Agricultural Research Service (USDA ARS) from McAllen, received the 2020 Arthur T. Potts Award from the Subtropical Agricultural and Environments Society for his “outstanding contributions and service to the agricultural industry of the Rio Grande Valley.” The award was presented Feb 7, 2020 at the 74th annual meeting of the Subtropical Agriculture and Environments Society held at South Texas College in Weslaco.

Dr. Goolsby joined the USDA in 1993, and has worked for both USDA APHIS and USDA ARS. With APHIS, he was co-project leader of the national biological control program for silverleaf whitefly, which produced significant benefits for vegetable and cotton crops in the Lower Rio Grande Valley and internationally. Upon joining ARS, Dr. Goolsby was posted overseas as Director of the Australian Biological Control Laboratory in Brisbane, Queensland, where he



led and conducted research on biological control of the Australian paperbark tree, and Old World climbing fern. Several biological control agents were discovered in Australia and Southeast Asia and released to control these invasive weeds in the Florida Everglades.

He returned to Weslaco in 2005 and led a program with Texas Agrilife and Frito Lay to develop an IPM program for zebra chip disease in potatoes in the Rio Grande Valley and throughout the Great Plains. To mitigate the effects of invasive weed, *Arundo donax* (giant reed) on water conservation and national security he conceived of and developed a biological control program for the Rio Grande Basin and received support from the U.S. Department of Homeland Security to accelerate the program. With his collaborators at the European Biological Control Laboratory, University of Texas – Rio Grande Valley, Texas Agrilife, and the Instituto Mexicano de Tecnología del Agua they accomplished the release of three biological control agents, which have reduced the biomass of *A. donax* by 32%, conserved 6000 acre-feet of irrigation water annually, increased visibility for the Border Patrol, and a subsequent reduction in cattle fever tick habitat.

Dr. Goolsby initiated a program to treat nilgai antelope which are exotic wildlife hosts of cattle fever ticks in South Texas. The team which included scientists at ARS, APHIS, Texas A&M Kingsville – Caesar Kleberg Wildlife Institute, and the University of Texas – Rio Grande Valley has determined that nilgai have a large home range thus capable of long range dispersal of fever ticks, evaluated native entomopathogenic nematodes to treat nilgai, and developed a novel, remotely activated sprayer for treatment of nilgai in infested pastures.

Dr. Goolsby has also led a global search for classical biological control agents of cattle fever ticks with on-going field work in their native range in Asia. Dr. Goolsby has more than 160 publications and has worked internationally in over 30 countries to develop research solutions which impact agriculture, homeland security, natural resources, livestock entomology in the Rio Grande Valley.



# Interesting Literature

## Impacts of neonicotinoids on aquatic systems

By Charlie Pickett

Science recently published two papers on the same topic: long term impact of neonicotinoids on aquatic systems. The first is a summary of the published study, highlighting its significance to understanding community level impacts by insecticides, and the second is a report on the study itself:

Jensen, O. P. 2019. Pesticide impacts through aquatic food webs, effects of neonicotinoid insecticides ricochet all the way to fisheries yields. [Science 366: 566-567](#).

Yamamuro, M., T. Komuro, H. Kamlya, T. Kato, H. Hasegawa, and Y. Kameda. 2019. Neonicotinoids disrupt aquatic food webs and decrease fish yields. [Science 366: 620-623](#).

The importance of this study to biological control is that it highlights the need to provide non-toxic alternatives to insecticides wherever possible. Neonicotinoids have been around since the early 1990's and are now the most commonly used insecticide worldwide. This study is unusual in that it provides a long term, 24 year study on the impact of neonicotinoids on fish in a lake in Japan. It presents 10 years of pre-use data on the zooplankton, followed by 12 more years of post-use of neonicotinoids. The abundance of these plankton plummets shortly following the introduction of these insecticides used for coating seeds used by the rice industry. The benthic invertebrates species in Lake Shinji are downstream from these rice fields. The same watershed feeding the lake was sampled for imidacloprid in 2018 and found at levels toxic to these organisms. Shortly after the introduction of imidacloprid, the fisheries industry reported steep declines in fish that depend on these invertebrates for food.

## Escaping egg parasitoids

By Chris Borkent

A recent article in the Proceedings of the Royal Society B will be of general interest to biological control researchers, as it reviews the distribution of egg parasitoids within the Hexapoda orders. The study provides a phylogenetic and ecological discussion of the prevalence and lack of egg parasitism in different lineages and guilds of insect. They provide a comprehensive overview of the types of egg protections that have evolved across the hexapods, both behavioral and physical, and discuss why some modes and adaptations are good protections from parasitoids whereas others are not. The paper serves as a good introduction to egg parasitoid diversity and biology for those entering the field, and a welcome refresher for those already familiar with parasitoids.

Fatouros NE, Cusumano A, Bin F, Polaszek A, van Lenteren JC. 2020 How to escape from insect egg parasitoids: a review of potential factors explaining parasitoid absence across the Insecta. Proceedings of the Royal Society B 287: 20200344. <http://dx.doi.org/10.1098/rspb.2020.0344>

## Population Genomics and Biological Control

By John Obrycki

A recent paper in the journal *Insects* reviews the current status of genomics and how it benefits classical biological control. The paper provides a review on the current technology and methods in population genomics and their applications to biological control and include basic guidelines to biological control researchers for implementing genomic technology and statistical modeling. Recent advances in genomic sequencing technology and model-based statistical methods to analyze population-scale genomic data can provide a much needed impetus for biological control programs to incorporate a consideration of evolutionary consequences. Population genomics provides insights into (1) long-term biological consequences of releases, (2) the ecological success and sustainability of this pest management tactic and (3) non-target effects on native species, populations and ecosystems.

Arun Sethuraman, Fredric J. Janzen, David W. Weisrock, and John J. Obrycki. 2020. Insights from Population Genomics to Enhance and Sustain Biological Control of Insect Pests. *Insects* 2020, 11: 462; [doi:10.3390/insects11080462](https://doi.org/10.3390/insects11080462).

## Remembrances

NEWARK DE— Dr. Bill Day, age 85, passed away peacefully on May 16, 2020. Bill was born in Wilmington, DE, the oldest of 3 children of F. Homer Day and Ann (Dangel) Day. He grew up with a strong interest in the outdoors, fishing, hunting and wildlife, encouraged by one of his uncles. Bill entered Cornell University Graduate School at age 20, researching the pests and beneficial insects on potato plants on eastern Long Island, providing effective substitutes for the chemicals to which the Colorado Potato Beetle and Green Peach Aphid, in turn, had become resistant. His graduate work was supervised by W.A. Rawlings, W.C. Kelly, C.E. Palm and M. Semel, and was interrupted by service as a 1st Lt. in the U.S. Army's Medical Service (1962-64) in San Antonio Texas. He met his wife, Char, while attending Cornell University and they married in 1959. They bought a 19' house trailer which he towed with his '50 Ford to Riverhead Long Island and back each summer & fall while doing research field work.

After returning to Cornell to complete his Ph.D., he began as a Research Entomologist at the USDA Beneficial Insects Research Lab at Moorestown, NJ in 1965. There Bill was part of a small research team that developed the classical biological control program for the Alfalfa Weevil that reduced this once major pest to minor status in most of eastern North America. In 1971, he became Research Leader of the Moorestown lab, and participated in the design of a new research & quarantine facility that would be built at the University of Delaware. After the lab was moved to Newark in 1973, Bill continued as Research leader, staffing the lab and initiating new research projects until 1978. After the alfalfa weevil work was completed, he developed a plan for reducing damage by the TPB (tarnished plant bug) and other mirid plant bugs to fruit, vegetable and seed crops by introducing *Peristenus digoneutis*, a European parasite of *Lygus* bugs into the NE US in cooperation with the (then) ARS European Parasite Laboratory. He also documented the resulting reduction of TPB numbers and led studies to determine the subsequent dispersion of this wasp into many NE states and Canadian provinces. His success in establishing *P. digoneutis* led to renewed interest in biocontrol of other *Lygus* species in the western U.S.

Bill retired in November 2004 after 39 years, but continued to work until January 2011 analyzing and publishing seven more publications with data from his research projects, and occasionally assisting with construction planning. He then produced a nearly 300-year "Day family history" book with 2 other relatives in 2014, and a second book in 2015 around the family production of regional "Oxy" cough medicine. Bill provided information and pictures for the Brewing in Delaware book that covered his grandfather's ownership of Diamond State Brewery. He enjoyed reading history books and visiting local historical sites.

He served on several committees of American Entomological Society including as President, followed by Chair of its Finance Committee for 26 (deficit-free) years. He was also a volunteer for many years at the Delaware Academy of Science, President of CHIPP 23yrs (1990-2013 establishing a local historic iron mine park) and a member of the Christina Conservancy Board for 21 years (ca. 1997-2018). He was a dedicated member of St. Paul's Lutheran church in Newark for 46 yrs.



# Governing Board and Websites for NRS IOBC

## **President**

Cesar Rodriguez-Saona  
Rutgers University

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