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IOBC-NRS NEWSLETTER

INSIDE THIS ISSUE:

Post-release monitoring of introduced biological control agents

Post-release monitoring of exotic natural enemies introduced as biocontrol agents is an essential part of any biological control program. Data generated enable validation of host range hypotheses made during pre-release screening and estimation of impact on the target species by the introduced agent. These data may also provide insight into host-natural enemy dynamics in the target system.

Fig. 1. Leek moth larvae feeding on leek (Photo by A.M. Brauner, Agriculture and Agri-Food Canada)

Leek moth, *Acrolepiopsis assectella* Zeller (Lepidoptera: Acrolepiidae), is an invasive alien pest from Europe that

(Post-release cont. on p. 3)

The trouble with whiteflies

The whitefly *Bemisia tabaci* is an important pest of both greenhouse and field crops globally. It is now widely accepted that *Bemisia tabaci* is in fact a cryptic species complex consisting of as many as 24 species across its range. Although morphologically indistinguishable, members of this complex differ in their life history traits such as reproductive rate, and their tolerance to insecticides.

Photo credit https://commons.wikimedia.org/wiki/File:Bemisia_tabaci_from_USDA_1.jpg
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Interestingly, in some crops *Bemisia tabaci* will occur in mixed species infestations, and in Ontario, Canada, such infestations are often observed in greenhouse poinsettia. In this case the cryptic-species present are known as *Mediterranean* and

(Whiteflies cont. on p. 5)

Message From the President:

Ecosystems to protect and serve (us)

Don Weber

USDA-ARS, Beltsville

IOBC-NRS President

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Natural and managed ecosystems provide services... a rich diversity of them. Our IOBC NRS Symposium this year, "Insect-Mediated Ecosystem Services: Enhancing Interactions with our Beneficial Partners," addresses a few of the most important ecosystem services, those delivered by insects: biological control of plant pests, pollination of crops and other plants, and also suppression of human disease. Other symposia and presentations at this year's ESA meeting (logo left) convened with Tri-Societies (American Society of Agronomy, Soil Science Society of America, and Crop Science Society of America) address some of the many other ecosystem services. These include biological control of weeds and plant pathogens, decomposition and recycling of nutrients by detrital food webs, erosion and nutrient loss mitigation, water purification, flood control, groundwater recharge, carbon fixation, climate mitigation, pollution abatement, and I am sure several others. Let's not forget psychological and cultural benefits. Yes, recent well-controlled studies have shown that living landscapes promote psychological well-being and better learning.

We as scientists and educators need to recognize the synergy in these ecosystem services -- and of course the potential conflicts. Does a pollinator planting promote parasitoids and predators -- or pests of plants and plants that are pests? These nuts and bolts are critical to sustainability of agroecosystems and many other benefits from nature. Without ecosystem services, we have no food. Food from a Petri dish? Not sustainable. Sustainable food and other benefits from ecosystems? Only if we manage them properly, protecting and augmenting the still only partly known beneficial organisms which provide the rich and diverse portfolio of ecosystem services here on Earth.

IOBC NRS Meeting, Symposium and Mixer all on Tuesday afternoon

This year we have a new format for the annual IOBC events at the ESA meeting in Minneapolis. Starting Tuesday November 17 at noon, we'll meet (in Convention Center Room 211D) for our IOBC annual membership meeting and awards presentations, then continue with a wonderful line-up of speakers in the IOBC and Section Symposium" Insect-Mediated Ecosystem Services: Enhancing Interactions with our Beneficial Partners" organized by Governing Board members Cesar Rodriguez-Saona and Mary Gardiner. It's a great lineup mixing in some pollination, urban and rural landscapes, with an emphasis on what else but biological control! Following the symposium, just stretch and stroll over for some hors d'oeuvres and cash bar at the IOBC Mixer! See the details on the IOBC "Biocontrol Cheat Sheet" on the last page. Hope to see you ALL there for all three parts !

(Post-release cont. from p. 1)

feeds on leek, *Allium porrum* L., garlic, *Allium sativum* L. and onion *Allium cepa* L. (Liliaceae) (Fiig.1). It is present in northeastern North America, with three generations each year, and is highly destructive in organic farming operations. In some years it can destroy entire crops. Leek moth is expanding its range, in 2015 occurring in Ontario, Quebec, New York and Vermont. The exotic pupal parasitoid *Diadromus pulchellus* Wesmael (Hymenoptera: Ichneumonidae) (Fig. 2) was approved by the Canadian Food Inspection Agency and releases in Canada began in 2010. Progeny of overwintered females have been recovered in every year since 2011. However, in the 2nd generation, we have observed an increase in the numbers of the facultative hyperparasitoid, *Conura albifrons* (Walsh) (Hymenoptera: Chalcididae) (Fig. 3) and a concurrent decrease in the numbers of *D. pulchellus* recovered. We wondered if *C. albifrons* was parasitizing *D. pulchellus*, thus interfering with its establishment.

Fig. 2. *Diadromus pulchellus* parasitizing leek moth pupa (Photos by A.M. Brauner, Agriculture and Agri-Food Canada)

Fig. 3. *Conura albifrons* on leek moth pupa

We conducted laboratory experiments to examine the potential impact of *C. albifrons* on leek moth and *D. pulchellus*. In no-choice experiments we found that *C. albifrons* can develop in newly formed leek moth pupae, leek moth pupae containing 1st instar *D. pulchellus*, and in fully developed *D. pulchellus* pupae. Compared to unexposed controls, significantly fewer leek moth and *D. pulchellus* emerged when exposed to *C. albifrons.* Choice trials demonstrated that prior host experience significantly influenced host choice by *C. albifrons*. These results suggest that competition and intraguild predation by *C. albifrons* could negatively affect the establishment of *D. pulchellus*. Furthermore, the impact by *C. albifrons* has the potential to change as the relative frequency of leek moth and *D. pulchellus* shifts in field populations.

Peter Mason
Agriculture and Agri-Food Canada

Miall, J.H., Abram, P.K., Cappuccino, N., and Mason, P.G. 2014. Potential impact of the native hyperparasitoid *Conura albifrons* (Hymenoptera: Chalcididae) on the exotic biological control agent *Diadromus pulchellus* (Hymenoptera: Ichneumonidae). *Biocontrol Science and Technology* 24: 611–624.

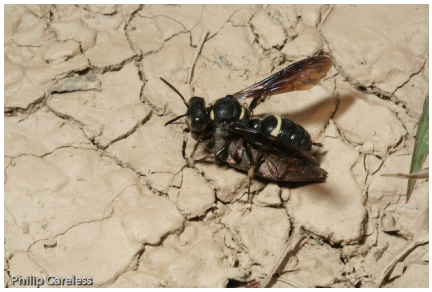
(Wasps cont. on p. 5)

Native wasps may point the way to new emerald ash borer finds

ST. PAUL, Minn. – Wasps native to Minnesota may help researchers in the fight against emerald ash borer (EAB). The Minnesota Department of Agriculture (MDA) and University of Minnesota Extension are collaborating on the Wasp Watchers program, which uses volunteers to look for and monitor the smoky winged beetle bandits (*Cerceris fumipennis*).

The beetle bandits are ground nesting wasps that are docile and do not sting humans. Female wasps collect wood boring beetles, including EAB, to feed their young.

"Early detection of emerald ash borer is difficult," said Jonathan Osthus, EAB Biocontrol Coordinator at the MDA. "By monitoring the wasps and collecting beetles they may have gathered, we can locate new EAB finds and gather more information to guide EAB management."



Wasp with prey. Photo by P. Careless

The beetle bandits like hard-packed, sandy soil near human activity. That makes Minnesota's baseball fields ideal conditions for their nests. Over 100 volunteers, called Wasp Watchers, have adopted and are monitoring beetle bandit colonies in baseball fields across the state. But more volunteers are needed.

Press release July 20, 2015 4:00 pm

Musings—Movable Ecosytem Services

George Heimpel
University of Minnesota

Biological control ecosystem services are primarily discussed in the context of naturally occurring biological control. Such ecosystem services feature biotic interactions that lead to the suppression of populations of native or introduced species that would otherwise reach the status or pests or weeds. Calculations of biological control ecosystem services (also called 'biocontrol services') have so far focused exclusively on natural or conservation biological control as far as I am aware. The practice of conservation biological control can then be seen as tactics taking advantage of and amplifying these ecosystem services. But what of classical biological control? Does the introduction of a species as a biological control agent into a new area constitute an ecosystem service? Not at first glance, since the idea of an ecosystem service is rooted in the idea that the interactions result naturally as emergent properties of ecosystems. Classical biological control does not easily fit into this framework because of the human intervention that is involved. However, when looked through the lens of the enemy release hypothesis, classical biological control is nothing more than an exported ecosystem service. Under this hypothesis, invasive pests do not reach damaging levels in their native range due to biotic interactions, and if it involves specialized natural enemies, classical biological control takes advantage of the situation. Thus, I think it is appropriate to consider classical biological control a biological control ecosystem that is moved from the native to the introduced range of a pest or weed species.

Costanza R, d'Arge R, de Groot R, et al. (1997) The value of the world's ecosystem services and natural capital. Nature 387: 253-260.
Gardiner MM, Landis DA, Gratton C, et al. (2009) Landscape diversity enhances biological control of an introduced crop pest in the north-central USA. Ecological Applications 19: 143-154.
Losey JE & Vaughan M (2006) The economic value of ecological services provided by insects. BioScience 56: 311-323.

(Whiteflies cont. from p. 1)

Middle East-Asia Minor 1 (MEAM1), named after their respective presumed place of origin. However some may recognize these as *Bemisia tabaci* biotype 'Q' and biotype 'B', respectively.

It has been established that the *Mediterranean*-species is more tolerant to insecticides than its relative MEAM1. In mixed laboratory populations, MEAM1 will displace *Mediterranean;* however, perhaps not surprisingly, following insecticide application, the opposite trend may be observed. Although these demographic trends had been observed at a small scale (i.e., in the lab), it was unclear if similar trends would be observed in commercial greenhouses over the course of a single growing session. Therefore we implemented a season- long survey of commercial poinsettia growers using either insecticide- or biological control-based pest management programs in their greenhouses.

In the lab, we used DNA barcoding and another molecular method to differentiate MEAM1 and Mediterranean *Bemisia* and thereby estimates the composition of the population that individuals were sampled from. While we detected many mixed species infestations at the beginning of the growing season, after a few weeks the *Mediterranean*-species dominated infestations in the insecticide managed greenhouses, while MEAM1 dominated infestations in the biological control-managed greenhouses.

As an ornamental plant, poinsettia must be virtually pest free to be sold to consumers. To accomplish this, many growers in Ontario use biological control to manage *Bemisia* for the majority of the season, and then in the fall, a single application of insecticides may be used to ensure the crop is clean prior to shipment. Unfortunately this technique is likely to be ineffective if infestations consist of insecticide tolerant *Mediterranean*-species. Fortunately, our findings support this management strategy, as we found no evidence that mixed species infestations persisted under biological control based management. Instead these infestations were comprised of the insecticide susceptible MEAN1. Our findings also highlight the importance of determining the identity of *Bemisia* infestations to help inform management decisions.

Andrew Frewin
University of Guelph

Field guide to the Syrphidae

Originally planned as a traditional printed book, times have changed and the authors (including Maryland Entomological Society member Chris Thompson) have decided instead to publish the *Field Guide to the Syrphidae of Northeastern North America* online. Syrphids are dipterans commonly known as flower flies or hover flies.

The *Field Guide to the Syrphidae of Northeastern North America* can be accessed at: http://www.canacoll.org/Diptera/Staff/Skevington/Syrphidae/Syrphidae.htm.

The companion *Key to the Genera of Nearctic Syrphidae* can be accessed at: http://www.biology.ualberta.ca/bsc/ejournal/mylmst_23/mylmst_23.html.

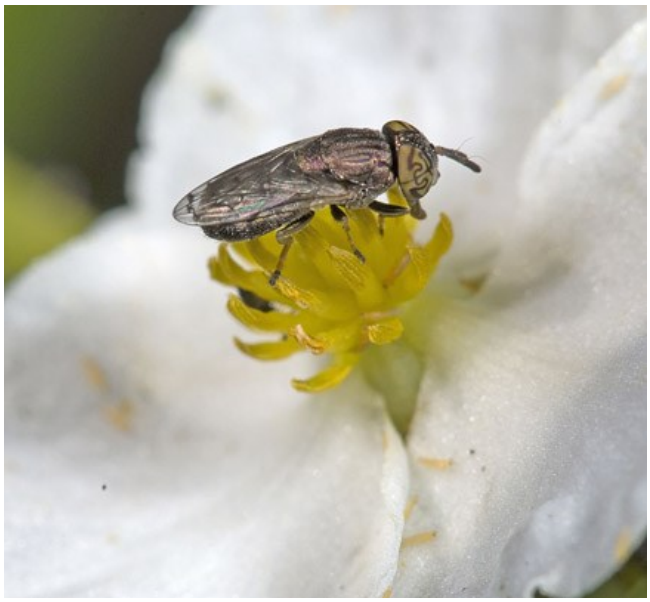


Photo from online guide, pages maintained by Canadian National Collection of Insects, Arachnids and Nematodes

2015 ESA Meeting, IOBC Biocontrol 'Cheat Sheet' - a sampling of symposia and presentations related to biological control

Sunday, November 15

8am-Noon in 205B; Symposium: Synergy and Partnerships in Biological Control: Honoring the Career of Roy Van Driesche

8am-Noon in 200D; Symposium: What Are The Costs and Benefits for Neonicotinoid Seed Treatments in Field Crops?

8am-Noon in 208D; Symposium: Greenhouse Insect Management – Critical Questions Answered with Collaborative Research

2pm-3:30pm Greenway B (Hyatt Regency);International Organization for Biological Control (IOBC-NRS) Governing Board Meeting
All current members are welcome.

Monday, November 16

8am-6:30pm Exhibit Hall BC; Graduate Poster Competition: P-IE - Biological Control (posters 3118-3129)

7:55am-12:30pm in 205B; Graduate Ten-Minute Paper Competition: P-IE - Biocontrol (papers 0552-0572)

10:15am-11:30am in M100E; Joint Symposium: Managing Research Centers for Wildlife and Beneficial Insects

12:30pm-2pm in 208C and 208D (two separate sessions); Student Three-Minute Presentation Competitions A & B (includes several biocontrol titles)

1pm-4:15pm in L100A; Joint Symposium: Insect Ecology in Organic Crop Management Systems

Tuesday, November 17

8am-6:30pm Exhibit Hall BC; P-IE Section Poster Session A (Posters on biocontrol include numbers D3291-D3306)

8am-Noon in 200H; Ten-Minute Papers, P-IE Section: Applied Ecol.

8am-Noon in 208AB; Symposium: Effects of Global Climate Change on Species Interactions and Biological Control

9:25am-Noon in 101H ; Joint Symposium: Agroecosystems Research: Integrated Cropping Syst. That Promote Ecosystem Services

Noon to 2pm: IOBC NRS Annual Meeting in 211D

12:00: IOBC/NRS Member & Business Meeting

12:30: Presentation of Professional and Graduate Student Awards

12:45: Distinguished Scientist Awardee Presentation, ""Mopping up the Invasion: The Janitorial Role of Classical Biological Control" by Mark Hoddle, Dept. of Entomology, University of California Riverside

1:15: Outstanding PhD Student Awardee Presentation: "The invasive brown marmorated stink bug as an evolutionary trap for indigenous egg parasitoids: implications for biological control", by Paul K. Abram, Institut de Recherche en Biologie Végétale, Université de Montréal

1:45: Concluding Remarks and then ...

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2:00-5:30pm: IOBC-NRS Symposium in same room (211D)
Insect-Mediated Ecosystem Services: Enhancing Interactions with our Beneficial Partners
Organizers: Cesar Rodriguez-Saona and Mary M. Gardiner

2:00 Welcoming Remarks

2:05 (1228) Conserving and enhancing wild bees for crop pollination: The importance of species identity and community composition. Daniel Cariveau and Rachael Winfree, Rutgers University

2:25 (1229) Arthropod biodiversity and ecosystem services are decoupled across New York City green spaces. Amy Savage, Elsa Youngsteadt, Rob R. Dunn, and Steven Frank, North Carolina State University

2:45 (1230) How important are microbes in the bee diet? (Withdrawn)(we'll fill in here! – TBA!)

3:05 (1231) Designing vacant land to enhance biodiversity and ecosystem services in Cleveland, Ohio. Mary Gardiner, Ohio State University

3:25 (1232) Implications of small and large scale land conversion for bee communities and pollination. Rufus Isaacs, Michigan State University

3:45 Break

4:00 (1233) Dynamic resource landscapes: How landscape-scale spatial and temporal variation in resource availability affects predatory insects and biocontrol. Claudio Gratton, Tania Kim, and Brian Spiesman, University of Wisconsin

4:20 (1234) Managing agricultural landscapes for insect-mediated ecosystem services. Douglas A. Landis, Michigan State University

4:40 (1235) Decoding carnivore roles in crop protection. Shawn Steffan, USDA-ARS, Madison, WI.

5:00 (1236) Insect biodiversity and the suppression of human pathogens. William E. Snyder, Matthew Jones, and Amanda Jean Meadows, Washington State University

5:20 Concluding Remarks and then ...

5:30-7:30: same room (211D) IOBC Mixer (open to all *current* members)

Wednesday, November 18

8am-4:30pm (note earlier closing time) in Exhibit Hall BC
P-IE Section Poster Session B (some of the posters numbered D3445 throuh D3527)

8am-Noon in 200E; Symposium: Landscape Simplification: Effects on Arthropod Mediated Ecosystem Services and Agricultural Production

8am-Noon in 211D; Symposium: Arthropod Mediated Associational Effects Among Native and Non-Native Plants

8am-Noon in 212AB; Symposium: Vegetation Management for Beneficial Insect Conservation in Agroecosystems

11am-2:30pm in 101-J ; Joint Symposium: Linking Soil Macrofaunal and Microbial Communities with Crop Dynamics Including Diseases