

NCERA 220 Accomplishments Report 2019

Project/Activity Number: NCERA 220

Project/Activity Title: Biological control of arthropods

Period Covered: 10/01/2018 to 09/30/2019

Date of Report: 05/17/2019

Annual Meeting Dates: 03/17/2019

Participants:

Luis Canas (canas.4@osu.edu) – Ohio State University

Marianna Szucs (szucsmar@msu.edu) – Michigan State University

John Ruberson (jruberson2@unl.edu) – University of Nebraska (Advisor)

Brian McCornack (mccornac@ksu.edu) – Kansas State University

Jennifer White (jenawhite@uky.edu) – University of Kentucky

Jeff Bradshaw for Julie Peterson (jbradshaw2@unl.edu) – University of Nebraska

Bob Wright (rwright2@unl.edu) – University of Nebraska

George Heimpel (heimp001@umn.edu) – University of Minnesota

Jason Harmon (jason.harmon@ndsu.edu) – North Dakota State University

Impact Nugget:

- Project participants have advanced the knowledge of biological control against various pests.
- Webinar series stimulated discussion of projects and served to educate students in multiple states.

Brief Summary of Minutes of Annual Meeting:

- Welcome, introductions, agenda review: the meeting started with a general welcome to the group as well as reviewing the agenda. Introductions were done with the whole group.
- Administrative Update: next NCB-ESA meeting will be March 15-18, 2020, Oklahoma City, OK, The Skirvin Hilton Oklahoma City. As before we can do our meeting the first day of the NCB meeting. During that meeting we need to start the process of re-writing our project.
- State report highlights:
 - Michigan: Sterile codling moth releases in apple orchards - Larry Gut, Chris Adams.
 - Biological control of nematodes - Marisol Quantanilla Tornel
 - Biological control of Emerald ash borer - Toby Petrice, Therese Poland, Leah Bauer, F. W. Ravlin.
 - How future bioenergy crops may alter biodiversity and ecosystem services – Douglas Landis.
 - Ohio: Use of resistant soybean varieties has implications for biological control and IPM of the soybean aphid – Andy Michael, Luis Canas.
 - North Dakota: NCERA220 organized a special symposium and Webinar series – Jason Harmon and Matthew O’Neal.
 - Kentucky: A diversity of natural enemies may be needed to control even a single pest species, due to variation in prey defenses – Jen White.
 - Nebraska: Work on spider predation – Julie Peterson.
 - Minnesota: Soybean aphid biological control – George Heimpel.
 - Kansas: Sugar cane aphid biological control – JP Michaud.
- Project review: next meeting we will start the process of re-writing our project.
- North Central Branch Entomological Society of America Symposium: Jason Harmon and Matt O’Neal organized a symposium titled “Pollinators and Biological Control: Overlap and Reciprocal Insights” that took place during the NCB-ESA meeting on March 2019. There were 8 invited presentations and it was well received (see presentations).
- Webinar series: a webinar series that runs over the academic year was organized and it was

very well received. The group decided to continue with the series as it allows for exchange of ideas between the different states throughout the year (see presentations). For Spring 2019, there were 5 webinars scheduled during April and May 2019 (see presentations).

Accomplishments: NCERA220 organized a special symposium and Webinar series. Both activities were very well received and will continue.

Short-term Outcomes: Engaging multiple labs in webinar presentations and discussion.

Outputs: Multiple campuses and audiences were reached:

- **NCERA220 organized a special symposium:** Jason Harmon, North Dakota State Univ., Fargo, ND and Matthew O'Neal, Iowa State Univ., Ames, IA. "Pollinators and Biological Control: Overlap and Reciprocal Insights." North Central Branch Entomological Society of America, Hyatt Regency Cincinnati, OH. March 19, 2019.
- **Webinar series:** There were a total of 5 presentations scheduled for Spring 2019.
 - C. Scott Clem, University of Illinois. April 25, 2019. Assessing hoverfly (Syrphidae) winter survival strategies in a Midwestern agricultural landscape and implications for pollination and biological control.
 - George Heimpel, University of Minnesota. May 2, 2019. Linking parasitoid nectar feeding and dispersal in conservation biological control.
 - Shawn Steffan, USDA-ARS, Madison WI. May 9, 2019. Trophic omnivory among pollinators and bio-control agents: Bees and nematodes eat "microbial meat".
 - Kayla Perry, Ohio State University. May 16, 2019. Mechanisms of ground-dwelling beetle community assembly in an urban ecosystem.
 - Amanda Skidmore, Purdue University. May 23, 2019. Ecosystem service bundling: Integrating predator and pollinator responses to insecticides in Midwestern cropping systems.

Activities:

- Webinar series and discussion.
- Symposium at North Central Branch Entomological Society of America.

Milestones:

- In Year 2 (2017-18) of this 5-year project, implementation and dissemination efforts continue on the eB4CAST tool to benchmark community-programming efforts and their effectiveness in change and sustainability, the revised Behavioral Environmental Perceptions Survey will be administered, and the Behavioral Environmental Perceptions-Community Survey will be developed.

Impacts:

- Discussion between labs at multiple states related to biological control projects (webinar series).
- Advanced knowledge of biological control of different pest species (see publications).

Publications:

- Diego F. Rincón, Eduardo M. Espitia, and Casey W. Hoy. 2018. El control biológico en el contexto de un manejo integrado estratégico de insectos plaga. (Biological control in the context of strategic integrated insect pest management). Pp. 826-847. In (A. M. Cotes, ed.) Control biológico de fitopatógenos, insectos y ácaros. Agrosavia, Mosquera. 1078 pp.
- Duan, Jian; Bauer, Leah; Van Driesche, Roy; Gould, Juli. 2018. Progress and challenges of protecting North American ash trees from the emerald ash borer using biological control. *Forests*. 9(3): 142; doi:10.3390/f9030142.
- Esquivel, C. J., C. M. Ranger, P. L. Phelan, E. J. Martinez, W. H. Hendrix, L. A. Canas, and A. P. Michel. 2019. Weekly Survivorship Curves of Soybean Aphid Biotypes 1 and 4 on Insecticidal Seed-Treated Soybean. *Journal of Economic Entomology* 112: 712-719.

- Grez, A.A., Zaviezo T. Gardiner, M.M. and Alaniz A. Urbanization filters coccinellids composition and functional trait distribution in greenspaces across greater Santiago, Chile. *Urban Forestry and Urban Greening*. (In Press).
- Haan, N, DA Landis. 2019. Grassland disturbance increases monarch butterfly oviposition and decreases arthropod predator abundance. *Biol. Conservation*. 233: 185-192.
- Heimpel, G. 2018. Shifting paradigms in the history of classical biological control. *BioControl* 63: 27-37.
- Jarrett B. J. M., J. Pote, E. Talamas, L. Gut and M. Szucs. 2019. The discovery of *Trissolcus japonicus* (Hymenoptera: Scelionidae) in Michigan. Submitted to *The Great Lakes Entomologist* (Accepted for publication with minor revisions).
- Karp, Daniel S., Rebecca Chaplin-Kramer, Timothy D Meehan, et al. 2018. Crop pests and predators exhibit inconsistent responses to surrounding landscape composition. *PNAS*. published ahead of print August 2, 2018. <https://doi.org/10.1073/pnas.1800042115>
- Kautz A.R., and M.M. Gardiner. Agricultural intensification may create an attractive sink for Dolichopodidae, a ubiquitous but understudied predatory fly family. *Journal of Insect Conservation*. (In Press).
- Kim, TN, S Bartel, BD. Wills, DA. Landis, and C Gratton. 2018. Disturbance differentially affects alpha and beta diversity of ants in tallgrass prairies. *Ecosphere*. <https://doi.org/10.1002/ecs2.2399>
- Landis, DA., C. Gratton, RD Jackson, KL Gross, DS Duncan, C Liang, TD Meehan, BA Robertson, TM Schmidt, KA Stahlheber, JM Tiedje, BP Werling. 2018. Biomass crop effects on biodiversity and ecosystem services in the North Central US. *Biomass and Bioenergy*. 114: 18-29. <https://doi.org/10.1016/j.biombioe.2017.02.003>
- Lenhart, P.A., K. A. Jackson, and J.A. White. 2018. Intraspecific variation in prey defence provides refuge for subdominant predators. *Proceedings of the Royal Society B, Biological Sciences* 285: 20180523
- Myers, A, CA Bahlai and DA Landis. 2019. Habitat type influences *Danaus plexippus* (Lepidoptera: Nymphalidae) oviposition and egg survival on *Asclepias syriaca* (Gentianales: Apocynaceae). *Environmental Entomology*. In Press.
- Noriega, JA, J. Hortal, F.M. Francisco M. Azcárate, M.P. Berg, N. Bonada, M.J.I. Briones, I. Del Toro, D. Goulson, S. Ibanez, D.A. Landis, M. Moretti, S.G. Potts, E. Slade, J.C. Stout, M.D. Ulyshen, F.L. Wackers, B.A. Woodcock, and A.M.C. Santos. 2018. Research trend in ecosystem services provided by insects. *Basic and Applied Ecology* 26: 8-23. doi.org/10.1016/j.baae.2017.09.006
- Rowe, L, D Gibson, D Landis, J Gibbs, R Isaacs 2018. A Comparison of Drought-Tolerant Prairie Plants to Support Managed and Wild Bees in Conservation Programs. *Environmental Entomology* 47: 1128-42. <https://doi.org/10.1093/ee/nvy091>
- Wills, B.D., D.A. Landis. 2018. The role of ants in north temperate grasslands: A review. *Oecologia*, 186(2) 323-338. [10.1007/s00442-017-4007-0](https://doi.org/10.1007/s00442-017-4007-0)

Research and Extension Presentations:

- Amanda Skidmore, Jacob Pecenka, Ivan Grijalva, Christian Krupke, Laura Ingwell, Rick Foster, Steve Yaninek and Ian Kaplan. 2019. Ecosystem service bundling: Integrating predator and pollinator responses to insecticides in midwestern cropping systems. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- C. Scott Clem and Alexandra Harmon-Threatt. 2019. Assessing hover fly (Syrphidae) winter survival strategies in a midwestern agricultural landscape and implications for pollination and biological control. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- Carlos Esquivel, Bill Hendrix, Andy Michel and Luis Canas. 2018. Effects of insecticides on lady beetles and insidious pirate bugs. 2018 ESA, ESC and ESBC Joint Annual Meeting, Vancouver, Canada.
- Ge Zhang, Ashley St. Clair, Adam Dolezal, Caroline Murray, Lisa Schulte Moore, Amy Toth and Matthew O'Neal. 2019. Honeybees (*Apis mellifera* [Hymenoptera: Apidae]) in prairie strips integrated

- into cropland can obtain improved forage in agricultural landscape. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- George Heimpel and Jana Lee. 2019. Linking parasitoid nectar feeding and dispersal in conservation biological control. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- George Heimpel. 2018. Shifting paradigms in the history of classical biological control. NCERA220 webinar series, February 8, 2018.
- Jason Harmon and Katherine Kral. 2019. Choices and consequences: Comparing the foraging behaviors of generalist predators and pollinators. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- Jeff Bradshaw. 2018. Incorporation of biological control into western bean cutworm IPM. NCERA220 webinar series, September 10, 2018.
- Jen White. 2018. Eco-evolutionary feedbacks between prey defenses and the enemy community. NCERA220 webinar series, September 13, 2018.
- Kayla Perry, Nicole C. Hoekstra, Yvan Delgado de la Flor and Mary Gardiner. 2019. Mechanisms of ground-dwelling beetle community assembly in an urban ecosystem. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- Kelsey Graham, Jason Gibbs and Rufus Isaacs. 2019. Monitoring changes in native bee communities in Michigan, with a focus on agricultural landscapes. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- Luis Canas. 2018. Improving whitefly biological control on vegetables. NCERA220 webinar series, April 12, 2018.
- Shawn Steffan. 2019. Trophic omnivory among pollinators and bio-control agents: Bees and nematodes eat 'microbial meat'. NCERA220 special symposium, North Central Branch of the Entomological Society of America Annual Meeting in Cincinnati Ohio in March, 2019.
- Szűcs M, P. Salerno, U. Schaffner, B. Teller, J. Littlefield, and R. A. Hufbauer. 2018. The effects of agent hybridization on the efficacy of biological control in the field. Joint ESA, ESC, and ESBC meeting. 11-14 Nov Vancouver, BC, Canada. (Invited to section symposia).
- Szűcs M, U. Schaffner, B. Teller, J. Littlefield, and R. A. Hufbauer. 2018. Contrasting rapid evolutionary processes in a classical weed biological control system. Joint ESA, ESC, and ESBC meeting. 11-14 Nov Vancouver, BC, Canada (Invited to member symposia).
- Szűcs M. 2018. Getting ready to fight brown marmorated stink bugs: Discovery of the Samurai wasp in Michigan. Poster, Great Lakes Expo. Dec 4-6, Grand Rapids, MI.
- Szűcs M. 2018. Initiating biological control of invasive swallow-worts in Michigan. June Oakland CISMA (Cooperative Weed Management Area).
- Szűcs M. 2018. The effects of agent hybridization on effectiveness and safety of biological control. University of Rhode Island, Invited by Dr. Richard Cassagrande. May 13, 2018.
- Szűcs M. 2018. The role of agent hybridization in biological control, University of Wisconsin, Invited by Dr. Christelle Gaudout. Sept 14, 2018.
- White, J. A. 2018. Eco-evolutionary feedbacks between prey defenses and the enemy community. NCERA220 webinar series.
- White, J. A. 2018. Symposium keynote address. Eco-evolutionary feedbacks between prey defenses and the enemy community. First International Congress of Biological Control, Beijing, China.
- White, J.A. 2019. Look a little closer – even bugs have bugs. University of Kentucky's "Everything is Science" outreach series, "Does Size Matter? The Science of Big and Small" session.