OPMC

Ontario Pest Management Conference 2017

15th Annual

Evolution of IPM: Influences of Climate Change, Regulations and Technology

November 2, 2017

Victoria Park East Golf Course
1096 Victoria Road South
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OPMC Organizing Committee

Kristen Obeid, Chair - OPMC, Ontario Ministry of Agriculture, Food and Rural Affairs
Denise Beaton, Ontario Ministry of Agriculture, Food and Rural Affairs
Mike Celetti, Ontario Ministry of Agriculture, Food and Rural Affairs
Melanie Filotas, Ontario Ministry of Agriculture, Food and Rural Affairs
Robert Nurse, Agriculture and Agri-Food Canada, Harrow
Ian Scott, Agriculture and Agri-Food Canada, London
Cynthia Scott-Dupree, School of Environmental Sciences, University of Guelph
Harold Wright, Syngenta Canada

AGENDA

8:30 a.m – 9:00 a.m **Registration and Coffee**
Poster Set Up

MORNING SESSION

Morning Session Chair: Dr. Julia Mlynarek, Agriculture and Agri-Food Canada

9:00 am **Welcome: Kristen Obeid**, Chair, Ontario Pest Management Conference
Opening Remarks and Introduction of Student Poster Presenters

9:15 am Evaluation of disease forecasting models and cultivar susceptibility to manage leaf curl (*Colletotrichum fioriniae*) of celery in Ontario **Stephen Reynolds,** M. Celetti, K. Jordan and M.R. McDonald. (Student Competition)

9:30 am Control of glyphosate-resistant waterhemp (*Amaranthus tuberculatus* var. *rudis*) in Ontario with the Roundup Ready 2 Xtend Crop System. **Brittany Hedges,** D. Hooker, D. Robinson and P. Sikkema. (Student Competition)

9:45 am Pepper weevil and its cultivated and wild hosts in southern Ontario: Implications for an IPM program. **D. Catalina Fernández,** S. VanLaerhoven and R. Labbe. (Student Competition)

10:00 am Group 1 herbicide resistance in large crabgrass: Development of a quick diagnostic test. **Robert Nurse,** Agriculture and Agri-Food Canada. (Invited Speaker)

10:15 am – 10:45 am **Coffee Break and Poster Viewing**

10:45 am **Plenary Speaker:**

Dr. Mary Ruth McDonald
Research Program Director – Plant Production Systems
Professor, Department of Plant Agriculture
University of Guelph

"The evolution of IPM and the future of plant protection"

11:30 am Conquering pigweed resistance in carrots: Herbicides as part of integrated weed management. **Tessa de Boer** and C. Swanton. (Student Competition)

11:45 am Assessing dimethoate as a toxic standard for use in semi-field pesticide toxicity studies with *Bombus impatiens* (Cresson). **Tara Celetti,** A. Gradish, C. Cutler, P. Sibley and C. Scott-Dupree. (Student Competition)

12:00 pm - 1:00 pm **Lunch and Poster Viewing**

AFTERNOON SESSION

Afternoon Session Chair: Dennis Van Dyk, Ontario Ministry of Agriculture, Food and Rural Affairs

1:00 pm **Plenary Speaker:**

Dr. Evan DeLucia
Professor of Integrative Biology
Director, Institute for Sustainability, Energy and Environment
University of Illinois at Urbana-Champaign

"Is increasing carbon dioxide in the atmosphere reshaping plant-insect interactions?"

1:45 pm The development of pheromone-based action thresholds for management of swede midge, *Contarinia nasturtii* Kieffer (Diptera: Cecidomyiidae), in canola. **Matthew Muzzatti** and R. Hallett (Student Competition)

2:00 pm Roundup Ready Xtend Crop System – 2017 Update. **Adam Pfeffer**, Monsanto Canada Inc. (Industry Speaker)

2:15 pm Integrated management of the pepper weevil. **Roselyne Labbe**, Agriculture and Agri-Food Canada. (Invited Speaker)

2:30 pm-3:00 pm **Coffee Break and Poster Viewing**

3:00 pm **Plenary Speaker:**

Dr. Maria Trainer
Managing Director of Science and Regulatory Affairs, Chemistry
CropLife Canada

"From lab to label"

3:45 pm Clubroot in Ontario canola: How do we prevent a disaster? **Meghan Moran**, Ontario Ministry of Agriculture, Food and Rural Affairs. (Invited Speaker)

4:00 pm **Presentation of Student Competition Award Winners – Harold Wright**, CropLife Canada

Closing Remarks and Adjourn

PLENARY SPEAKER BIOGRAPHIES

Dr. Mary Ruth McDonald - Research Program Director, Plant Production Systems and Professor, Department of Plant Agriculture, University of Guelph

Dr. Mary Ruth McDonald is a professor in the Department of Plant Agriculture, University of Guelph. Her research focuses on plant diseases and integrated pest management of several vegetable crops, including onions, carrots, leafy greens and Brassica crops. She is also a member of a national research group studying the biology and management of clubroot of canola. The emphasis of her research program is forecasting and management of diseases and insect pests, screening for resistance, biological control, and crop nutrients in relation to plant disease. Mary Ruth teaches a graduate course on plant disease epidemiology and management and is the Research Program Coordinator for the Plant Production Systems theme of the OMAFRA/Univ. of Guelph partnership. She has published over 75 papers in scientific journals and has received national and international awards for excellence in plant disease management and integrated pest management. Recently she was the keynote speaker for the Swedish Plant Protection Conference, in Uppsala, Sweden.

Evan H. DeLucia – Professor of Integrative Biology and Director, Institute for Sustainability, Energy and Environment, University of Illinois at Urbana-Champaign

Evan H. DeLucia is the G. William Arends Professor of Biology and Baum Family Director at the University of Illinois at Urbana-Champaign; he was the founding Director of the Program in Ecology and Evolutionary Biology, served as the Head of the Department of Plant Biology, and as the director of the School of Integrative Biology. He was named Director for the new Institute for Sustainability, Energy and Environment in 2013. After completing his B.A. at Bennington College and working as a teaching fellow at Phillips Andover Academy, DeLucia completed a M.F.S. (1982) in forest ecology at Yale University and a Ph.D. (1986) in plant ecology and physiology at Duke University. He joined the faculty at Illinois in 1986, where he was recognized as a University Scholar in 1997. In 1994, DeLucia was a Bullard Fellow at Harvard University and in 2002 he was a Fulbright Fellow at Landcare Research in New Zealand. DeLucia became a fellow of the American Association for the Advancement of Science in 2005 and of the Ecological Society of America in 2015. He is a member of the American Association of Plant Physiologists, the International Union of Forest Research Organizations, the Ecological Society of America, the American Geophysical Union and the American Association for the Advancement of Science. He currently provides editorial services for several prominent journals, including *Ecology* and *Oecologia*. How the use and management of land affects the climate system, and the responses of forest and agro-ecosystems to elevated carbon dioxide and other elements of global change are at the center of DeLucia's research interests. Using ecological, physiological and genomic approaches, DeLucia seeks to understand how global change affects the carbon cycle and the trophic dynamics between plants and insects. He has served in an advisory capacity to members of the US congress and the National Academy of Sciences.

Dr. Maria Trainer – Managing Director of Science and Regulatory Affairs, Chemistry, CropLife Canada

Dr. Maria Trainer is the Managing Director of Science and Regulatory Affairs, Chemistry for CropLife Canada. She holds a PhD in Bacterial Molecular Genetics from the University of Waterloo; an MSc in Biochemistry from Washington State University; and BSc degrees in Microbiology and Molecular Biology & Biochemistry from the University of Idaho. Maria joined CropLife Canada in April 2012 and provides technical expertise on a broad range of science and regulatory priorities related to pesticides, including pollinators. Prior to joining CropLife, Maria worked as a scientific evaluator with the New Substances Assessment Bureau of Health Canada conducting human health risk assessments for biotechnological products. Maria also worked as Program Director with the Council of Canadian Academies where she had the lead responsibility for the Expert Panel on the Integrated Testing of Pesticide, evaluating the applicability of emerging toxicological approaches for the regulatory assessment of pesticides. Maria is passionate about environmental issues and sustainable agricultural development. She is a strong advocate for science-based regulation and science communication. She particularly enjoys explaining the importance of using a science-based approach to navigate hot-button science issues and was recently named as a Scientific Advisor to the American Council on Science and Health.

INVITED SPEAKER BIOGRAPHIES

Dr. Robert Nurse, Research Scientist - Weed Management, Harrow Research and Development Centre, Agriculture and Agri-Food Canada

Robert Nurse is a Research Scientist in Weed Management at Agriculture and Agri-Food Canada's Harrow Research and Development Centre. His current work focuses on the study of herbicide resistant weeds. His research aims at providing a better understanding of their mechanisms of resistance, and overall reproductive fitness. It is hoped that this research will lead to more efficient ways to identify herbicide resistance in the field and will improve management methods. Another area of research that he is actively involved in is herbicide evaluations for both field and horticultural crops. Further to this he is currently the Test Site Manager for the minor use pesticide program at Harrow. Robert holds a BSc Hons. degree in Ecology and Evolution from Western University, an MSc degree in Weed Ecology from the University of Guelph and a PhD in Weed Ecology from Cornell University. He has served as the Editor-in-Chief of the Canadian Journal of Plant Science and is currently an Associate Editor for the journal Weed Technology. Since 2010, Dr. Nurse has also served as an Adjunct Professor in the Department of Biology at Western University and as a Special Graduate Faculty member at the University of Guelph in the Department of Plant Agriculture.

Roselyne Labbe, Research Scientist – Greenhouse Entomology, Harrow Research and Development Centre, Agriculture and Agri-Food Canada

Roselyne Labbe is a Research Scientist in Greenhouse Entomology at Agriculture and Agri-Food Canada's Harrow Research and Development Centre. Her current work focuses on the study of greenhouse arthropods including developing novel biological control agents to suppress established and invasive crop pests. She also currently examines how manipulation of the greenhouse light environment can alter arthropods under year-round crop production cycles. Roselyne holds PhD and HBSc degrees in insect biology from Western University, as well as an MSc degree in greenhouse entomology and biological control from Laval University. She has previously studied population dynamics and intra-guild interactions of greenhouse crop pests and beneficials, as well as mechanisms of insecticide resistance. She has served as a contributing member to Canada's Biocontrol Network and is currently an Adjunct Professor in Biology at the University of Windsor.

Meghan Moran, Canola and Edible Bean Specialist, Ontario Ministry of Agriculture, Food and Rural Affairs, Stratford

Meghan Moran is the Canola and Edible Bean Specialist with the Ministry of Agriculture, Food and Rural Affairs, working out of the Stratford office. Moran has a BSc in Biochemistry and an MSc in Plant Agriculture from the University of Guelph. Her role is focused on agricultural extension; sharing research and crop production information with farmers and agronomists to support on farm decision making in the production of canola and dry edible beans. Moran is currently involved in projects focused on swede midge and clubroot in Ontario canola, and reduced tillage practices in edible beans.

–CROPLIFE STUDENT COMPETITION–

Student Oral Presentations:

OP-1 Evaluation of disease forecasting models and cultivar susceptibility to manage leaf curl (*Colletotrichum fioriniae*) of celery in Ontario **Stephen Reynolds,** M. Celetti, K. Jordan and M.R. McDonald.

OP-2 Control of glyphosate-resistant waterhemp (*Amaranthus tuberculatus* var. *rudis*) in Ontario with the Roundup Ready 2 Xtend Crop System. **Brittany Hedges,** D. Hooker, D. Robinson and P. Sikkema. (Student Competition)

OP-3 Pepper weevil and its cultivated and wild hosts in southern Ontario: Implications for an IPM program. **D. Catalina Fernández,** S. VanLaerhoven and R. Labbe.

OP-4 Conquering pigweed resistance in carrots: Herbicides as part of integrated weed management. **Tessa de Boer** and C. Swanton.

OP-5 Assessing dimethoate as a toxic standard for use in semi-field pesticide toxicity studies with *Bombus impatiens* (Cresson). **Tara Celetti,** A. Gradish, C. Cutler, P. Sibley and C. Scott-Dupree.

OP-6 The development of pheromone-based action thresholds for management of swede midge, *Contarinia nasturtii* Kieffer (Diptera: Cecidomyiidae), in canola. **Matthew Muzzatti** and R. Hallett (Student Competition)

Judges: Denise Beaton - OMAFRA (Judging Supervisor)

1. Jason Deveau – OMAFRA
2. John Purdy – Abacus Consulting Services Limited
3. Hannah Fraser – OMAFRA
4. Scott Hodgins – BASF

-Student Poster Presentations-

GP-1 Assessment of dry beans (*Phaseolus vulgaris* L.) tolerance to soybean cyst nematode (*Heterodera glycines* Inchinohe) and the effects of biological and chemical controls in a controlled environment. **Kaiqi Zhang,** K Pauls, K. Jordan and C. Gillard. **(Time of judging 9:15-9:30 am**)

GP-2 Dose responses to a range of pesticides by the alfalfa leafcutting bee, *Megachile rotundata*, a potential representative solitary bee for risk assessment. **Graham Ansell**, A. Frewin, A. Gradis and C. Scott-Dupree. **(Time of judging 11:30-11:45 am)**

GP-3 In search of chemicals for the control of stem and bulb nematode (*Ditylenchus dipsaci*) in the Canadian garlic industry. **Lilieth Ives**, M. Celetti, K. Jordan and M.R. McDonald. **(Time of judging 10:00-10:15 am)**

GP-4 Effects of Solarization, Anaerobic Soil Disinfestation and Mustard biofumigation on Ginseng Replant Disease. **Amy Fang Shi**, P. Goodwin and S. Westerveld. **(Time of judging 2:00-2:15 pm)**

GP-5 Electrochemical Advanced Oxidation Process (EAOP) system efficacy in managing greenhouse pathogens *Fusarium oxysporum* and *Rhizoctonia solani*. **Serge Lévesque**, T. Graham, D. Bejan, P. Zhang, J. Lawson and M. Dixon. **(Time of judging 9:45-10:00 am)**

GP-6 **T**he life and times of *Contarinia nasturtii* (Kieffer) in Ontario. **Jenny Liu**, B. Mori, O. Olfert, J. Newman and R. Hallett. **(Time of judging 11:45 am–12:00 pm)**

UP-1 Brown marmorated stink bug distribution and phenology in Ontario. **Kevin Scaife**, A. Frewin, H. Fraser and C. Scott-Dupree. (UNDERGRADUATE) **(Time of judging 1:45-2:00 pm)**

UP-2 Insecticides, seed treatments, and parasitic nematodes for the control of onion maggot. **Brittany Lacasse** and M.R. McDonald. (UNDERGRADUATE) **(Time of judging 9:30-9:45 am)**

**** Judging time - Students should be present at their poster at the time indicated.***

Judges: Denise Beaton – OMAFRA (Judging Supervisor)

1. Travis Cranmer - OMAFRA
2. Ashley Dickson – Syngenta Canada
3. Asifa Munawar – University of Guelph
4. Lyndsey Goudis – BASF

-REGULAR POSTER PRESENTATIONS-

RP-1 Efficacy of insecticides for management of brown marmorated stink bug (*Halyomorpha halys* Stål) in Ontario. **Angela Gradish**, K. Scaife, H. Fraser, T. Gariepy and C. Scott-Dupree.

RP-2 Clubroot (Plasmodiophora brassicae) identified on canola in northern Ontario. M.A. Nunes, **Fadi Al-Daoud**, M. Moran, B. Gossen and M.R. McDonald.

RP-3 Survey of late season and postharvest pests of specialty crops in Ontario. **Samuel Wilson**, E. Elford, J. Todd, S. Westerveld, M. Filotas and K. Jordan.

RP-4 *Megachile rotundata*: a potential model for non-*Apis* bee risk assessment. **Andrew Frewin**, A. Gradish, G. Ansell and C. Scott-Dupree.

RP-5 An update on the Muck Crops Research Station IPM Program, 2017**. Zachariah Telfer,** K. Vander Kooi and M.R. McDonald.

ORAL PRESENTATION ABSTRACTS
MORNING SESSION

CROPLIFE STUDENT COMPETITION (OP-1):

Evaluation of disease forecasting models and cultivar susceptibility to manage leaf curl (*Colletotrichum fioriniae*) of celery in Ontario.

Stephen Reynolds[1], M. Celetti[2], K. Jordan[1] and M. R. McDonald[1]
[1]Department of Plant Agriculture, University of Guelph, Guelph, ON
[2]Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON

Leaf curl on celery, caused by the fungal pathogen *Colletotrichum fioriniae* ((Marcelino & Gouli) R.G. Shivas & Y.P. Tan), is characterized by lesions on the petioles and crown rot, both which reduce the marketable yield of celery. The objectives were to improve the management of celery leaf curl by: identifying effective disease forecasting models for timing fungicide applications, and screening for cultivar resistance. Field experiments were conducted in 2016 and 2017 at the Holland Marsh. Disease forecasting models evaluated were: TOMCAST with a threshold of 15 DSV (disease severity value), TOMCAST 25 DSV, the strawberry anthracnose model (SAM) with a threshold of *INF* (predicted proportion of fruit) 0.15<, and BOTCAST at a cumulative disease severity index (DSI) of 21. A calendar spray and a no-spray control were included. The fungicide Quadris Flowable (azoxystrobin 25%) was alternated with Switch 62.5WG (cyprodinil 37.5% and fludioxonil 25.0%) was applied when the models indicated. Disease pressure was high in 2016 and TOMCAST was effective as the calendar spray program, but with fewer sprays. In 2017, disease pressure was lower. TOMCAST and SAM were both effective, while BOTCAST was not suitable for predicting disease risk. Twelve cultivars were evaluated for their resistance to *C. fioriniae*. Cultivars 'Geronimo', 'Merengo', 'TZ 6010' and 'Hadrian' remained among the least susceptible, while cultivars 'TZ 9779', 'Stetham' and 'Kelvin' were the most susceptible. Leaf curl can be managed effectively using a TOMCAST disease forecasting model, and selecting cultivars that are the least susceptible to infection.

CROPLIFE STUDENT COMPETITION (OP-2):

Control of glyphosate-resistant waterhemp (*Amaranthus tuberculatus* var. *rudis*) in Ontario with the Roundup Ready 2 Xtend crop system

Brittany Hedges, D. Hooker, D. Robinson and P. Sikkema
Department of Plant Agriculture, University of Guelph-Ridgetown, Ridgetown, ON

Waterhemp (Amaranthus tuberculatus var. rudis) is a small-seeded broadleaf weed, which emerges throughout the growing season. Glyphosate resistant (GR) waterhemp was discovered in Ontario in 2014. If left uncontrolled, yield decreases of up to 73% have been observed. Dicamba and glyphosate-resistant soybean (Roundup Ready 2 Xtend soybean) allow for dicamba to be applied pre-plant, pre-emergent (PRE) and/ or post-emergent (POST). The objective of this study was to determine the control of GR waterhemp in dicamba-resistant soybean with more than one herbicide mode of action applied PRE or in a two-pass system (PRE fb POST), with glyphosate/ dicamba (Roundup Xtend) applied POST. At 56 days after application (DAA), glyphosate/ dicamba, pyroxasulfone, s-metolachlor/ metribuzin, pyroxasulfone/ sulfentrazone and flumioxazin/ pyroxasulfone controlled GR waterhemp 35, 66, 83, 87 and 95%, respectively. The addition of glyphosate/ dicamba to pyroxasulfone, s-metolachlor/ metribuzin, pyroxasulfone/ sulfentrazone and flumioxazin/ pyroxasulfone PRE controlled GR waterhemp 76, 89, 89 and 95%, respectively. In a two-

pass program, pyroxasulfone, s-metolachlor/ metribuzin, pyroxasulfone/ sulfentrazone and flumioxazin/ pyroxasulfone PRE controlled GR waterhemp 44, 67, 62 and 70%, respectively. The same PRE herbicides, followed by glyphosate/ dicamba POST, improved control of GR waterhemp to 86, 97, 97 and 99%, respectively. In conclusion, the addition of glyphosate/ dicamba pyroxasulfone, s-metolachlor/ metribuzin and pyroxasulfone/ sulfentrazone applied PRE, resulted in a small increase in GR waterhemp control. Additionally, a two-pass program of an effective soil applied herbicide followed by glyphosate/ dicamba POST controlled GR waterhemp >85%.

CROPLIFE STUDENT COMPETITION (OP-3):

Pepper weevil and its cultivated and wild hosts in southern Ontario: Implications for an IPM program

D. Catalina Fernández[1, 2], S. VanLaerhoven[1], R. Labbe[2]
[1]University of Windsor, Department of Biological Sciences, Windsor, ON
[2]Agriculture and Agri-Food Canada, Harrow Research and Development Centre, Harrow, ON

The pepper weevil, *Anthonomus eugenii* Cano is a major pest of cultivated pepper plants (*Capsicum* spp.). The weevil is thought to be native of Mexico but it is present in Central America, United States, and some Caribbean Islands with recent outbreaks in Ontario, Canada. Although the weevil develops in cultivated *Capsicum* plants, prevalence in infestation varies among cultivars, and it is occasionally found in wild *Solanum* species -commonly known as nightshades- when pepper plants are not available. In Ontario, climbing nightshade (*S. dulcamara*), eastern black nightshade (*S. ptycanthum*), and hairy nightshade (*S. sarrachoides*) are commonly found in agricultural lands, and may contribute to the establishment and maintenance of *A. eugenii* in the field. We tested the preference in oviposition of pepper weevil in three pepper varieties (chili, hot cherry, and habanero) using choice experiments, and the suitability for insect development in three alternate hosts species present in southern Ontario. Our results showed that pepper weevil oviposited in all hosts tested, however, females oviposited more in chili and hot cherry varieties compared to habanero. In addition, pepper weevil females were able to oviposit and develop in all alternate hosts species tested suggesting that these species may have the potential to maintain pepper weevil populations in the field. Although additional experiments are required to test the importance of alternate hosts in the dynamics of *A. eugenii* in the field, our findings provide information that can serve to develop a pest management program for this species.

INVITED ORAL PRESENTATION:

Group 1 herbicide resistance in large crabgrass: Development of a quick diagnostic test

Robert Nurse
Agriculture and Agri-Food Canada Harrow Research and Development Centre, Harrow, ON

Growers have to cope with increasing cases of herbicide resistant weeds. The development of genetic tests is helping the identification of resistance for specific species and is leveraging years of research to identify causal mutations reported in the literature. Whereas most of these studies describe target site mutations, an unknown number of cases exist in nature where this molecular mechanism is not involved. The molecular descriptions of these cases are likely under-reported due to analytic challenges. A crabgrass biotype (*Digitaria sanguinalis*) from Southern Ontario tested positive for resistance to Acetyl-CoA Carboxylase (ACCase) inhibitors (WSSA group 1) herbicides (up to 4x the labelled rate) although none of the target site mutations previously known to confer resistance were detected. Our goal was to evaluate, using RNASeq, if any gene showed differential expression that could explain herbicide resistance. Both RNASeq results and confirmation by Reverse-Transcriptase Quantitative PCR (QRT-PCR) indicated an increase in the level of expression

of the target gene involved in the production of ACCase. The number of transcripts was 3.4 to 9.3 times higher in the resistant biotype compared to the susceptible population. The high variability of ACCase transcript levels in the resistant plants could be indicative of a genomic architecture promoting higher expression. The QRT-PCR assay developed could serve as a diagnostic tool when ACCase inhibitor resistance is suspected.

PLENARY PRESENTATION:

"The evolution of IPM and the future of plant protection"

Dr. Mary Ruth McDonald

Research Program Director – Plant Production Systems and Professor, Department of Plant Agriculture, University of Guelph, Guelph, ON

The evolution of the science and the application of integrated pest management (IPM) is driven by advances in pest biology and technology, and also by political and social forces. Advances in science will always be important, but advances in technology will change the speed and manner in which these are applied in the field. Molecular methods for identification and quantification of insects, pathogens and weeds will allow for rapid detection ofpests as they enter a field, or a country. Rapid assessments of pesticide resistance and virulence genes will allow for selection of the appropriate crop protection material or resistant cultivar. Weather forecasts will be more accurate and monitoring microclimates will be easier. Biological controls will be more reliable when they can be selected for a site-specific situation. Robot technology could mean many small machines working in a field, day and night, to monitor and control pests. Treatments will be applied to a specific plant or leaf, and there will be more mechanical control of weeds and insects. There is even the question of whether crop protection materials will become obsolete. Precision plant breeding, using CRISPR/Cas 9, could mean the end to crop protection materials (and biocontrols) because it will be possible to engineer plants with resistance to diseases and insect pests, and even improve competitive ability against weeds. One important evolutionary principle that must be considered with every change to IPM is the role of selection pressure. Pests are ingenious in evolving ways to circumvent control measures.

CROPLIFE STUDENT COMPETITION (OP-4):

Conquering pigweed resistance in carrots: Herbicides as part of integrated weed management

Tessa de Boer and C. Swanton

University of Guelph, Department of Plant Agriculture, Guelph, ON

The increasing prevalence of linuron resistant pigweed (Amaranth sp.) has had a major impact on carrot production throughout Ontario by significantly reducing yields. Herbicides have created a resistance problem for carrot growers, but as a tool of integrated weed management, herbicides can also be utilized to manage and avoid resistance in the future. Currently, there are only a handful of herbicides registered for use on carrots and linuron is most heavily relied upon for weed control. A greater variety of herbicide options need to become available to carrot growers in order to make tank mixes and rotations of various modes of action to manage resistance. The goal of our research was to test the effectiveness of products that are not currently registered for use on carrots for the control of weeds during the critical weed-free period and to assess crop safety. In our research, these products were applied at the biologically effective dose, meaning the rate was low enough to provide crop safety, but still able to provide control of linuron resistant pigweed. Over the past two years of field research many of the treatments tested were safe on carrots and provided excellent weed control. The results of the study confirm the potential for registration of these products for use as part of integrated weed management.

CROPLIFE STUDENT COMPETITION (OP-5):

Assessing dimethoate as a toxic standard for use in semi-field pesticide toxicity studies with *Bombus impatiens* (Cresson)*

Tara Celetti[1], A. Gradish[1], C. Cutler[2], P. Sibley[1], and C. Scott-Dupree[1]
[1] School of Environmental Sciences, University of Guelph, Guelph, ON
[2]Department of Plant, Food and Environmental Sciences, Dalhousie University, Truro, NS

Data from tiered risk assessments on bumble bees are currently not required by regulatory agencies for pesticide registration and re-registration, yet both managed and unmanaged bumble bees may be exposed to pesticides while foraging. Regulatory agencies soon will require agro-chemical companies to provide toxicity data on bumble bees for pesticide registration and re-registration, and thus risk assessment protocols for bumble bees are needed. The purpose of this experiment was to determine the suitability of dimethoate as a toxic reference standard for use in regulatory pesticide risk assessments with *B. impatiens*. Forty screened tents (10 per treatment, plus 10 controls) were placed in a field of flowering buckwheat. One *B. impatiens* colony was placed inside each tent when the plants were at 20% bloom. When the plants were at 95% bloom, colonies were removed, and plots were sprayed with dimethoate at 40 g a.i./h, 80 g a.i./h, or 200 g a.i./h. Controls were sprayed with water. Colonies were then placed back inside the tents where they continued to forage on the treated buckwheat. Colonies remained inside the tents for 2 weeks, during which foraging activity and colony weight were assessed two to three times per week. Colonies were then maintained in the lab for another 8 weeks. Colonies were then dissected, and the number of new queens, males, workers, pupae, larvae and honey pots were recorded. Results of forager assessments and development endpoints will be presented and discussed.

AFTERNOON SESSION

PLENARY PRESENTATION:

"Is increasing carbon dioxide in the atmosphere reshaping plant-insect interactions?"

Dr. Evan DeLucia
Professor of Integrative Biology
Director, Institute for Sustainability, Energy and Environment
University of Illinois at Urbana-Champaign

Human activities, most notably the combustion of fossil fuels, is driving a dramatic increase in the concentration of carbon dioxide in the atmosphere. Elevated carbon dioxide stimulates photosynthesis causing an increase in leaf carbohydrates and a dilution of leaf nitrogen. This increase in carbohydrate/nitrogen stimulates feeding by folivorous insects. More insidious than the change in food quality, elevated carbon dioxide also interferes directly with the ability of plants to mount an effective defense against insects. While plant and insect responses to elevated carbon dioxide are highly idiosyncratic, I will propose a novel mechanism linking the change in atmospheric carbon dioxide to changes in defense signaling that may be universal.

CROPLIFE STUDENT COMPETITION (OP-6):

The development of pheromone-based action thresholds for management of swede midge, *Contarinia nasturtii* Kieffer (Diptera: Cecidomyiidae), in canola

Matthew Muzzatti and R. Hallett
Department of Environmental Sciences, University of Guelph, Guelph, ON

The current action thresholds used for control of the swede midge (*Contarinia nasturtii* Kieffer) (Diptera: Cecidomyiidae) in canola (*Brassica napus* L.) are the recommended thresholds for swede midge in cole crops: an initial threshold of a cumulative trap capture of 20 midges across all traps, and then a subsequent threshold of ≥5 midges/trap/day. However, our research team hypothesizes that these are too conservative for use in canola. My research objective is to determine density effects of swede midge on canola growth and yield in a field-realistic situation. Canola at the 7 leaf, primary bud, and secondary bud growth stages will exposed to different densities of swede midge representing various levels of infestation in a randomized complete block design. All plots will be sprayed with □-cyhalothrin weekly until one week prior to swede midge introduction. Cages will be placed over the canola and various densities of adult swede midge will be inserted into the cages. Damage ratings will occur twice per week until canola reaches maturity, and this data will be used in combination with pheromone trapping and field damage data to develop the action threshold. It is critical to determine when swede midge populations warrant pest management efforts to minimize both insecticide costs and yield losses, and this project will provide valuable information towards the development of a comprehensive integrated pest management program within Canada for swede midge in canola.

INDUSTRY PRESENTATION:

Roundup Ready Xtend crop system – 2017 update

Adam Pfeffer
Monsanto Canada Inc.

The author will provide an update on the Roundup Ready Xtend Crop System, including experiences from 2017 in US and Canada and how the technology is being positioned moving forward.

INVITED SPEAKER:

Integrated management of the pepper weevil

Roselyne Labbe
Agriculture and Agri-Food Canada Harrow Research and Development Centre, Harrow, ON

The pepper weevil, *Anthonomus eugenii* Cano (Coleoptera: Curculionidae), is the most important pest of pepper crops in North America where it now poses a serious risk to the cultivation of peppers in Canada. Currently, growers here lack validated options for the management of the pepper weevil on greenhouse and field pepper crops. To address the urgent need for effective management tools, we have initiated a research program to first compare multiple conventional chemical and reduced risk microbial agents for their efficacy in killing adult pepper weevils. In 2016, we have also initiated surveys, in southern Ontario, for natural enemies of the pepper weevil which may target the immature life stages that are typically protected within the pepper fruit. From this work, parasitoids belonging to three hymenopteran families including Pteromalidae (Jaliscoa hunteri Crawford, Pteromalus anthonomi Ashmead), Eupelmidae (Eupelmus pulchriceps Cameron) and Braconidae (Nealiolus spp., Bracon spp.) were reared from infested field-collected pepper fruits. Together with ongoing product screening trials, these new natural enemy records will provide important information and new tools for

the integrated management of the pepper weevil in Canada.

PLENARY PRESENTATION:

"From lab to label"

Dr. Maria Trainer
Managing Director of Science and Regulatory Affairs, Chemistry
CropLife Canada

Crop protection products are one of the most highly regulated substances in commerce. This presentation explains how a pesticide makes it from the research phase to registration for use in Canada. This can be a complex topic to explain to consumers but we can help by providing you with a look at how a pesticide goes from being discovered in the lab to becoming a registered product in Canada, and why Canadians can feel confident in the safety of these products.

INVITED SPEAKER:

Clubroot in Ontario canola: How do we prevent a disaster?

Meghan Moran
Ontario Ministry of Agriculture, Food and Rural Affairs, Stratford, ON

Clubroot is a disease of Brassica crops caused by *Plasmodiophora brassicae*. Historically, clubroot has been present in Ontario cole crops such as cauliflower and cabbage for many years. Clubroot was first found in Ontario canola at one farm in 2016. A preliminary survey was conducted in 2016 and 2017 across canola growing regions in the province to determine the distribution of clubroot in Ontario. Of approximately 125 fields surveyed, clubroot was detected in soils from 11 fields. In the 2017 growing season multiple reports of clubroot symptoms and subsequent yield loss have been reported from various regions in the province. Clubroot cannot be eradicated, but it can be managed and canola can successfully be grown in clubroot-positive fields. Efforts are underway to determine the clubroot pathotype on Ontario farms. It is now, when clubroot spore loads across the province are likely low, that farmers must be made aware of the presence and significance of the disease and begin to manage for clubroot before there is significant disease pressure and yield loss. Through collaboration with the research team lead by Dr. Mary Ruth McDonald at the University of Guelph, and utilizing knowledge and farmer experience with the disease in western Canada, work is being done to better understand clubroot in Ontario canola and support on-farm disease management.

POSTER PRESENTATION ABSTRACTS

STUDENT POSTER COMPETITION

GP-1:

Assessment of dry beans (*Phaseolus vulgaris* L.) tolerance to soybean cyst nematode (*Heterodera glycines* Inchinohe) and the effects of biological and chemical controls in a controlled environment

Kaiqi Zhang, K. Pauls, K. Jordan and C. Gillard
Department of Plant Agriculture, University of Guelph, Guelph, ON

Soybean cyst nematode (*Heterodera glycines* Ichinohe; SCN) is a major pest of soybean (Glycine max (L.)) production worldwide. SCN also impacts dry bean (*Phaseolus vulgaris* L), an important plant source of protein in worldwide. One Andean (kidney bean) and one Mesoamerican (black bean) cultivar were evaluated for SCN tolerance with and without treatment with biological nematicides *Pasturia nishizawae* and *Bacillus firmus*, as well as the chemical nematicide fluopyram, at various concentrations. These treatments, along with resistance and susceptible soybean cultivars were planting in autoclaved sand in a controlled environment for 30 days. The female index (FI=the average number of females on the test plant / the average number of female number on Lee 74 x100) of SCN and the dry weights of above ground plants were measured. Kidney bean was more susceptible with a higher FI than black bean. Only seed treatment *B.firmus* + fluopyram reduced the FI of kidney bean, but there was no response was measured in black bean.

GP-2:

Dose responses to a range of pesticides by the alfalfa leaf cutting bee, *Megachile rotundata*, a potential representative solitary bee for risk assessment

Graham Ansell, A. Frewin, A. Gradish and C. Scott-Dupree
University of Guelph, Department of Environmental Sciences, Guelph, ON

Concerns about the potential role of pesticides in native bee declines cannot be fully addressed with the current pesticide risk assessment paradigm. These practices focus solely on the European honey bee (*Apis mellifera* Linnaeus) and do not account for the range of physiological and life-history differences across bee species. Therefore, data need to be collected on a broader range of bees to better inform pesticide policy decisions. Solitary bees comprise the majority of bee species, yet are poorly represented in the ecotoxicology literature. The alfalfa leafcutting bee (*Megachile rotundata* Fabricius) is one of the most well-studied, commercially available bee species. With further toxicological research and method development, this species is a viable candidate for future pesticide risk assessment programs. We aim to generate important baseline pesticide toxicity data for *M. rotundata* by determining the topical and oral LD_{50} of dimethoate, imidacloprid, permethrin, chlorantraniliprole, and captan for adult females. We will also generate comparative topical and oral toxicity data for honey bees to determine differences in susceptibility between these two species.

GP-3:

In search of chemicals for the control of stem and bulb nematode (*Ditylenchus dipsaci*) in the Canadian garlic industry

Lilieth Ives[1], M. Celetti[2], K. Jordan[1] and M. R. McDonald[1]
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[2]Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON

The stem and bulb nematode, *Ditylenchus dipsaci*, is one of the most destructive nematodes of garlic worldwide and is a problem in Ontario. This nematode can cause total yield loss and decrease the availability of seed cloves for successive planting. There are no garlic cultivars with resistance to *D. dipsaci* and no nematicides are registered for use on garlic seed cloves in Canada. Field trials were conducted on two different soils, mineral soil (2% organic matter) and muck soil (80% organic matter), to evaluate products to control the nematode. The treatments were: abamectin, flufensulfone, fluopyram, thyme oil and a seed fumigant, phosphine. The seed cloves were infested with an average of 832 nematodes $gram^{-1}$. Abamectin, flufensulfone, fluopyram and thyme oil were applied to cloves by soaking for four hours and as a drench over the cloves at seeding, while phosphine was applied as a seed fumigant prior to seeding. An untreated check and a check of clean seed were also included. The most effective product was fluopyram applied as a drench. Marketable yield for the treated plots were 1003 g and 871 g per plot on muck and mineral soil, respectively, as compared to 55 g and no marketable yield on the untreated infested check, and 400 g and 55 g of the garlic grown from non-infested seed. Fluopyram applied as a soak was also effective in reducing disease incidence and increasing marketable yield. There was no advantage to combining an in-furrow drench and seed soak of fluopyram.

GP-4:

Effects of solarization, anaerobic soil disinfestation and mustard biofumigation on ginseng replant disease

Amy Fang Shi[1,2], P. Goodwin[1] and S. Westerveld[3]
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[2]Ontario Ginseng Growers Association, Smcoe ON
[3]Ontario Ministry of Agriculture, Food and Rural Affairs, Simcoe ON

Ginseng replant disease threatens the survival of the industry. As a result, ginseng cannot be grown on the same land twice without considerable crop losses. To assess the effects of various soil treatments on replant disease, a research trial was established in 2016 at St. Williams, Ontario. The site was seeded eight years after a previous ginseng crop had been harvested. The trial was arranged in a split-plot design with fumigant (metam-sodium) as the main-plot and treatment as the sub-plot with four replications. The treatments included clear plastic tarp alone, tarp + orchard grass, tarp + molasses, tarp + orchard grass + molasses, tarp + mustard seed meal (*Brassica juncea* + *Sinapis alba*) (6.7 ton/ha), tarp + Brassica seed meal (3.35 ton/ha), tarp + mustard cover crop (*Brassica juncea* + *Sinapis alba*) and untarped control. Plant stand was recorded three times in 2017. A seedling harvest was conducted in August 2017. All treatments plus fumigation showed significantly higher total and marketable yield and lower percent of roots with Cylindrocarpon root rot. Marketable yield of unfumigated mustard cover crop and unfumigated orchard grass showed no significance compared to all the fumigated treatments. The results suggest that fumigation does have a positive impact on ginseng replant disease. Without fumigation, higher yield and less disease were observed in the plots treated with tarp (solarization), tarping + molasses/orchard grass (anaerobic soil

disinfestation) and mustard cover crop. This trial will be monitored for two more years to see the efficacy of these treatments at final harvest.

GP-5:

Electrochemical advanced oxidation process (EAOP) system efficacy in managing greenhouse pathogens *Fusarium oxysporum* and *Rhizoctonia solani*

Serge Lévesque[1], T. Graham[1], D. Bejan[2], P. Zhang[1], J. Lawson[1] and M. Dixon[1]
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[2]9654151 Canada Corporation, Oakville, ON

Capturing and reusing irrigation runoff water in Ontario greenhouses is an important consideration for effective nutrient and water management plans. Simply capturing and reapplying runoff water, although efficient from a resource utilization perspective, can contribute to the distribution and proliferation of disease causing microorganisms. In order for capture and reuse strategies to effectively reduce water consumption while maintaining crop yields, the reclaimed water must be treated. Contaminated water can carry pathogens and potentially phytotoxic chemical contaminants throughout the production system. Advanced oxidation processes (AOP's) are system's that address these concerns by producing highly reactive hydroxyl free radicals that degrade both biotic and abiotic contaminants. Although effective, these systems can be technically challenging to operate and expensive to install. Electrochemical advanced oxidation is an alternative AOP (EAOP) mechanism that produces hydroxyl radicals directly at the surface of an electrode without the need to combine multiple treatment technologies. Using the appropriate electrodes and supporting electrolyte, one can also generate additional sanitizing agents that further improve the efficacy of the system. The current research project is evaluating and comparing EAOP and AOP systems for efficacy against pathogens such as *Fusarium oxysporum*, *Rhizoctonia solani*, herbicides (glyphosate), and growth regulators (paclobutrazol). Successful demonstration of this emerging technology will provide greenhouse growers with an additional water management tool that will further enable the safe capture and reuse of irrigation runoff water. Enabling the safe use/reuse of irrigation runoff water also helps reduce the negative effects of waste water discharge to the local environment.

GP-6:

The life and times of *Contarinia nasturtii* (Kieffer) in Ontario

Jenny Liu[1], B. Mori[2], O. Olfert[2], J. Newman[3] and R. Hallett[1]
[1]School of Environmental Sciences, University of Guelph, Guelph, ON
[2]Agriculture and Agri-Food Canada, Saskatoon, SK
[3]Department of Integrative Biology, University of Guelph, Guelph, ON

The swede midge (*Contarinia nasturtii* (Kieffer)) is an exotic insect originating from Eurasia, whose feeding has caused a decline of over 60% of total canola acreage in Ontario, Canada since 2011. Management action must be undertaken to protect Canada's $26.7 billion canola industry, beginning with the development of a reliable forecasting model for swede midge emergence. The objectives of this project are to i) determine temperature-dependent development and mortality information for Ontario swede midge populations; ii) develop an accurate swede midge population dynamics model by incorporating this new information; and iii) use the model to determine environmental conditions for swede midge outbreak. The model's forecasting abilities will aid in limiting swede midge spread into Canada's crucial canola-producing regions, and will be an important stepping stone to developing an effective integrated pest management strategy for the swede midge.

UP-1 (UNDERGRADUATE):

Brown marmorated stink bug distribution and phenology in Ontario

Kevin Scaife[1], A. Frewin[1], H. Fraser[2] and C. Scott-Dupree[1]
[1]School of Environmental Sciences, University of Guelph, Guelph, ON
[2] Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph, ON

The brown marmorated stink bug (BMSB) (*Halyomorpha halys* (Stål)) is an invasive insect pest from East Asia that was first detected in North America in Pennsylvania in 2001. Since then this adept hitchhiker has been detected in 43 states and established in the provinces of Ontario, Quebec and British Columbia. BMSB's mobility and highly polyphagous nature make it capable of causing significant economic damage to fruit, vegetable and field crops, as well as ornamental trees and shrubs through the growing season. Survey programs for BMSB have been on-going in Ontario since 2013 –with approximately 160 sites surveyed annually. As of 2016, BMSB has been detected in 19 counties in Ontario, with established breeding populations in Hamilton, London, Newboro, St. Catharines, Windsor, St. David's and Toronto. In 2017, the number of sites surveyed using Trecé pheromone lures was reduced to focus on high risk crops such as grapes, apples and peaches in the Niagara Region. In 2017, nymphs and adults have been found in pheromone traps in close proximity to at risk fruit crops elevating the level of concern amongst growers substantially. In previous years it has appeared that there may be 2 generations of BMSB in Ontario. In an effort to verify this, field collected females were assessed for reproductive status using a 5-stage ranking system based on ovary development created by Nielson et al. (2017). Results from 2016 indicate that there is not a 2nd generation of BMSB in Ontario. Data from 2017 is still being analyzed.

UP-2 (UNDERGRADUATE):

Insecticides, seed treatments, and parasitic nematodes for the control of onion maggot

Brittany Lacasse and M. R. McDonald
Department of Plant Agriculture, University of Guelph, Guelph, ON

Onion maggot (*Delia antiqua*) is a destructive insect pest that feeds on *Allium* species, specifically onions. Three field trials were established at the Muck Crop Research Station to evaluate various treatments to control onion maggot damage. A seed treatment trial assessed seed treatments: Sepresto (imidacloprid + clothianidin), Regard + Cruiser (spinosad + thiamethoxam), Regard (spinosad), Trigard (cyromazine), Sepresto + EverGol Prime (imidacloprid and clothianidin plus penflufen), and Regard (spinosad) and Capture (bifenthrin) in-furrow. All seed was treated with fungicides (Pro Gro + F300: carboxin, thiram, mefanoxam, fludioxonil, and azoxystrobin) except Regard. In addition, all treatments except one with Regard alone, had Dithane DG (mancozeb) in-furrow. A second trial at two sites was established to evaluate the use of parasitic nematodes NEMASYS (*Steinernema foliate)* compared to Lorsban (chlorpyrifos). A third trial evaluated the efficacy of insecticide drench treatments Lorsban (chlorpyrifos), Verimark (cyantraniliprole), Delegate (spinetoram + kaolin + titanium dioxide) and seed treatment Sepresto (imidacloprid + clothianidin), Governor (cyromazine). Onions were assessed for damage throughout the summer, at three different times relative to the *D. antiqua* generational cycles. The trial evaluating parasitic nematodes showed that LORSBAN (15.7 kg/ha) was more effective (6% damage) than NEMASYS at 705 million nematodes/ha (40% damage). In the seed treatment trial, the Regard treatment had 57% losses compared to Sepresto at 1%. However, Sepresto was not different from the untreated check. There were no differences when insecticides were applied to onion transplants as a tray drench, but maggot damage was low (< 4%) in this trial.

REGULAR POSTERS

RP-1:

Efficacy of insecticides for management of brown marmorated stink bug (*Halyomorpha halys* Stål) in Ontario

Angela Gradish[1], K. Scaife[1], H. Fraser[2], T. Gariepy[3] and C. Scott-Dupree[1]
[1]School of Environmental Sciences, University of Guelph, Guelph, ON
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[3]Agriculture and Agri-Food Canada, London Research and Development Centre, London, ON

Brown marmorated stink bug (BMSB), *Halyomorpha halys* Stål, is an invasive pest native to East Asia. It was first detected in Ontario in 2010 and has since spread across 17 counties, with confirmed breeding populations in multiple urban centres. BMSB is highly polyphagous and feeds on many economically-important fruit, vegetables, row crops, and ornamentals grown in Ontario. High populations of BMSB in Ontario urban centres are at risk of spilling over into agricultural areas, and some fruit damage in nearby orchards has been observed. Therefore, effective pest management options for BMSB must be identified to prevent crop damage and significant economic loss for Ontario growers. Research indicates that insecticides are most effective for BMSB management; however additional studies are warranted as many novel formulations have yet to be tested for their efficacy against BMSB and limited research has focussed on immature life stages. We evaluated the efficacy of some insecticides for BMSB management in Ontario by determining their residual contact toxicity to BMSB nymphs. Ten insecticides, including products currently registered for BMSB, novel formulations, and mixes were tested at recommended rate, and half and double that rate, using leaf-dip bioassays. BMSB 4th and 5th instar nymphs were confined to dried, treated leaves for 48 h and morality was assessed. Recommendations for BMSB management in Ontario based on our results will be discussed.

RP-2:

Clubroot (*Plasmodiophora brassicae*) identified on canola in northern Ontario

Fadi Al-Daoud[1], M. Moran[2], B. Gossen[3] and M.R. McDonald[1]
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[3]Agriculture and Agri-Food Canada, Saskatoon Research and Development Centre, Saskatoon, SK

Clubroot, caused by *Plasmodiophora brassicae* Woronin, is endemic on Brassica vegetables in many regions of Ontario, but has not previously been reported in northern Ontario. It has not been a major concern to canola (*Brassica napus* L.) growers because the most common pathotype in Ontario (pathotype 6, Williams' system) is not highly aggressive on most commercial canola cultivars. In 2016, clubroot was found on canola in a field near Verner, Ontario and identified as pathotype 2. A subsequent survey found DNA of *P. brassicae* in soil of 11 of 95 fields that had been planted with canola in 2016, including 7 fields in northern Ontario. Pathotype 2 was identified on rutabaga in Ontario in the 1970s and occurs on canola in Quebec, but not on canola in western Canada. This is the first report of clubroot on canola in Ontario.

RP-3:

Survey of late season and postharvest pests of specialty crops in Ontario

Samuel Wilson[1], E. Elford[1], J. Todd[1], S. Westerveld[1] M. Filotas[1], and K. Jordan[2]
[1]Ontario Ministry of Agriculture, Food and Rural Affairs, Simcoe ON
[2]Department of Plant Agriculture, University of Guelph, Guelph, ON

Specialty crops, which include non-traditional fruits and vegetables, herbs and industrial crops, are increasingly grown in Ontario to supply a diversifying customer base. The insect and disease pests of many of these crops have not been well documented, especially late in the season and after harvest. Several specialty crops including pepino, pawpaw, tiger nut, euphorbia, hazelnut and sweetpotatoes were monitored on a weekly basis in the field, at harvest, and after storage for insect pests, diseases and disorders with the goal of improving educational resources for Ontario growers of these crops. Previously undiagnosed pests identified in this survey for Ontario included aphids, whiteflies, tarnished plant bug, mites and leafhoppers on pepino, Fusarium and Pythium root rots of euphorbia, and several harvest disorders of pawpaw. The extent and frequency of other known pests were also tracked. The knowledge gained in this project will be used to update or create new crop profiles for OMAFRA's Specialty Cropportunities Online Resource.

RP-4:

Megachile rotundata: A potential model for non-*Apis* bee risk assessment.

Andrew Frewin, A. Gradish, G. Ansell, C. Scott-Dupree
School of Environmental Sciences, University of Guelph, Guelph, ON

In recent years, public and scientific concern has grown regarding the negative impacts pesticides may have on non-*Apis* bee species, partially because current pesticide risk assessments for bees are conducted exclusively on the European honey bee (*Apis mellifera*). Due to fundamental differences in their biology and life-history, it is debatable whether honey bees are an appropriate surrogate species for estimating the risk pesticides pose to solitary bees. To address these concerns, we have started developing semi-field risk assessment methods for use with the alfalfa leafcutting bee (*Megachile rotundata*). The alfalfa leafcutting bee is managed in North America as a pollinator, primarily for alfalfa and canola seed production. As such, its biology is relatively well understood, it is commercial available in North America, and relatively more ecotoxicology data for this species exists compared to other solitary bees. These attributes make the alfalfa leafcutting bee an ideal candidate to serve as the surrogate species for North American solitary bee risk assessments. Our research has involved examining the nesting biology, behaviour, and reproduction of the alfalfa leafcutting bee in small field enclosures and has focused on determining appropriate surrogate crops and release rate combinations for semi-field studies. In addition, we are attempting to determine application rates of toxic reference standards for use as positive controls within this semi-field experimental system. In this presentation, we will discuss method development and describe our experience working with the alfalfa leafcutting bee in the context of semi-field experiments.

RP-5:

An update on the Muck Crops Research Station IPM program, 2017

Zachariah Telfer, K. Vander Kooi and M. R. McDonald
[1]Department of Plant Agriculture, University of Guelph, Muck Crops Research Station, King, ON

For the past 12 years, an IPM program for predominately carrots and onions has been run through the University of Guelph – Muck Crops Research Station located in the Holland Marsh. Over 20 local growers participated in 2017 with over 700 acres scouted for pests and diseases. The program relies on trained scouts examining fields twice a week over the growing season in addition to disease forecasting models. This year, heavy rainfall early in the season delayed most crops and resulted in several fields to be reseeded. In onions, insect pressure was low this year with minimal thrip activity and some onion maggot activity. Diseases in onions have been severe with the cool, wet season. Stemphylium has been active since late June and downy mildew started in early July before the DOWNCAST forecasting model predicted sporulation periods. Both diseases have spread throughout the marsh and have been major production issues. Onion smut has also been a problem in some fields. The most prominent insect problem in carrots has been the carrot weevil, with carrot rust fly and aster leafhoppers very low this year. Carrot leaf blights appeared in mid to late June and are quite common throughout the marsh. Despite the challenging year, onion crops have generally grown well, although carrots are small and exhibiting excessive forking.

NOTES

Post Event Evaluation – Ontario Pest Management Conference

Background

Profession: (Please circle) Research Government Grower Consultant Industry Rep

Input Supplier (retail/distribution) Student Other_____

Overall Feedback

1. How would you rate the following aspects of the conference? (circle the most appropriate number)

	Poor	Fair	Average	Good	Excellent
The content of the sessions	1	2	3	4	5
The speakers	1	2	3	4	5
The length of the sessions	1	2	3	4	5
The media used by the speakers	1	2	3	4	5
Practical information on pest management	1	2	3	4	5
The poster session	1	2	3	4	5

2. What session did you like the best/find most effective (and why)?

3. What sessions did you find the least helpful (and why)?

DETACH AT DASHED LINE TO ENTER DRAW.

4. Please suggest changes we could make that would significantly improve the conference.

5. Please indicate the extent to which you agree or disagree with the following statements concerning the conference:

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Topics were current.	1	2	3	4	5
It improved my understanding of new directions in pest management.	1	2	3	4	5
The information will influence my planning/work within the next two years.	1	2	3	4	5
In the end, I got what I needed from the conference.	1	2	3	4	5
The registration process was convenient and easy to use.	1	2	3	4	5

6. Overall, how satisfied were you with the conference?

Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
1	2	3	4	5

Thank you very much for taking the time to complete this survey. Your feedback will help us in organizing future events. If you would like to be included in a draw to thank you for completing the survey, please fill out your name and contact information below, then detach it from this form and place it in the container provided.

OPMC
Ontario Pest Management Conference

OPMC Survey Draw

NAME **EMAIL/PHONE NUMBER**