Pollinators and Pollination

Thursday morning 9:00 am

Where: Grand Gallery (main level) Room A & B
MI Recertification credits: 1 (COMM CORE, PRIV CORE)
CCA Credits: CM(2.0)
Moderator: Ben Phillips, Vegetable Extension Educator, MSU Extension, Saginaw, MI

9:00 am	Neonicotinoid Effects on Pollinators in Vine Crops • Rick Foster, Entomology Dept., Purdue Univ.
9:30 am	Integrated Crop Pollination of Great Lakes Fruit Crops • Julianna Wilson, Tree Fruit IPM Outreach Specialist, Entomology Dept., MSU
10:00 am	How Greenhouses and Nurseries Can Grow and Market Annuals, Perennials and Woody Ornamentals for Pollinators in the Yard and Garden • Dave Smitley, Entomology Dept., MSU
10:30 am	Michigan Pollinator Protection Plan (MP3) Progress • Meghan Milbrath, Entomology Dept., MSU
11:00 am	Session Ends

Neonicotinoid Effects on Pollinators in Vine Crops

Rick Foster and Kira Nixon, Department of Entomology, Purdue University

Vine crops are affected by a variety of insect pests. For melon and cucumber growers, the most important pest is the striped cucumber beetle, which is a vector of the bacterium, *Erwinia tracheilphila*, which causes the disease, bacterial wilt of cucurbits. The only way to protect crop from this disease is to prevent the beetles from feeding on the crop long enough for transmission to occur. The primary method used to accomplish this goal is with insecticides. For many years, foliar insecticides such as carbaryl (Sevin) and the pyrethroids were effectively used. Both types of insecticides are toxic to pollinators if applied when they are actively foraging in the crop. In more recent years, many growers have begun using one or more of the neonicotinoid insecticides for striped cucumber beetle control, largely because of their systemic activity and action against other pests such as aphids.

Although neonicotinoids are effective insecticides against the target pests, they are innately extremely toxic to honey bees and other pollinators. In addition, their systemic activity means that it is possible that the insecticide will be translocated to the pollen and nectar, resulting in pollinators receiving potentially lethal doses when pollinating melons or cucumbers.

Growers can apply neonicotinoid insecticides to melons in several ways: seed treatments, treating seedlings in their trays in the greenhouse, in transplant water at the time of planting, through trickle irrigation, and by foliar applications. In 2013 and 2014, we measured the amount of insecticide residues that occurred in the flowers of muskmelon plants with different neonicotinoid insecticides applied in several different ways. Our conclusions were:

1. Application of Admire Pro to either the bedding trays or in the transplant water resulted in residues of imidacloprid in the pollen that may potentially cause harm to pollinators.
2. Application of Platinum in transplant water resulted in residues of thiamethoxam or its breakdown product, clothianidin, in the pollen that may potentially cause harm to pollinators.
3. Use of FarMore treated seeds did not result in damaging residues of thiamethoxam in the pollen, but may cause harm to pollinators from the residues of the breakdown product, clothianidin.
4. Foliar application of Actara resulted in residues of thiamethoxam that are well above the levels needed to cause harm to pollinators.
5. Foliar applications of Assail did not result in residues of acetamiprid in the pollen that could cause harm to pollinators, because acetamiprid is much less toxic to pollinators than other neonicotinoids.

In 2015 and 2016, we conducted studies looking at developing best management practices that would allow the effective control of striped cucumber beetles and bacterial wilt with the least possible potential effects on pollinators. We were seeking to answer four questions and here are the preliminary answers to those questions. More definitive answers will be forthcoming in the next year as we analyze the data more completely.

1. Do FarMore treated seeds provide protection from SCB feeding? Maybe a little, but it is unlikely to be worth the cost and the potential harm to pollinators.
2. Do soil applications of Platinum at planting provide protection from beetle feeding? Yes, but they also have the potential for harm to pollinators.

3. Does the high rate of Platinum provide greater protection from beetle feeding than the low rate? No, the low rate is just as effective as the high rate, and has less potential for harming pollinators, and costs less.
4. Do foliar sprays of Warrior (and other pyrethroids) provide protection from beetle feeding? Yes, using a spray threshold of 1 beetle/plant resulted in excellent control with only a few applications. There is some potential for harm to pollinators, but this can be mitigated by spraying in late afternoon and evening after the flowers have closed and/or the bees have left the field.

Purdue University, Michigan State University, and Ohio State University recently received a large Specialty Crops Research Initiative grant entitled "*Navigating the Trade-Off between Pest Management and Pollinator Conservation in Cucurbits.*" In this 5 year study, we will continue these types of studies in commercial fields rather than in small plots. Growers who are interested in participating should contact me one of the other investigators.

Michigan Pollinator Protection Plan Progress

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The purpose of Michigan's Managed Pollinator Protection Plan (MP3) is to improve and protect the health of pollinators in Michigan, while simultaneously protecting our crops, property, and human health. The MP3 is designed to be flexible, and will improve as we receive input from stakeholders, and new strategies become available.

In response to the 2014 presidential memorandum issued by the president, the EPA was charged with developing a method to assess the effect of pesticides on pollinator health, engage states and tribes in the development of managed pollinator protection plans, as well as carry out actions to enhance the environment to support more pollinator friendly habitat. Numerous other states began to address the issues surrounding managed pollinators prior to the presidential memorandum, engaging stakeholders and developing MP3 plans. Recognizing that all states differ, it is crucial to tailor Michigan's MP3 to fit individual situations and to encourage best management practices (BMPs) that are most applicable to our particular situation. There will be a system in place that will periodically review the efficacy of the MP3 and provide an outlet to amend it as necessary.

This plan will focus on new label requirements for pesticides, and will work to improve communication strategies between growers and beekeepers.

More information on Michigan's Managed Pollinator Protection Plan, including links, ways to submit input, and drafts of other plans are available on our website.

https://pollinators.msu.edu/protection-plan/

The importance and value of pollinators

Pollinators, such as honey bees, native bees, other insects, and mammals, are vital to the production of fruits, vegetables, nuts, and other foods in the United States. Honey bee pollination alone adds more than $15 billion in value to the country's crops. Worldwide, pollinators contribute to the production of about 90 crops. Pollinators pay a key part of agriculture and food system sustainability in the United States and contribute greatly to the economy of the country's agricultural sector. A strong pollinator community overall helps ensure a better environment.

Timeline

The Decline of Pollinators and Its Causes in the United States

U.S. beekeepers began reporting widespread losses of the honey bee (Apis mellifera) in 2006. TheBee Informed Partnership (BIP) (1), a collaborative group consisting of researchers and universities from all across the country, started monitoring yearly colony losses beginning in 2006. According to their results, total colony losses have been higher than the acceptable (2) every year since 2006. In 2012, the United States Department of Agriculture issued its Report on the National Stakeholders Conference on Honey Bee Health (3). The report identified multiple stressors that contribute to pollinator loss, including parasites and pathogens, poor nutrition due to the loss of forage lands, and exposure to pesticides.

Addressing the Pesticide-Related Decline of Pollinators

In 2013, the U.S. Environmental Protection Agency (EPA), along with Health Canada's Pest Management Regulatory Agency and the California Department of Pesticide Regulation, developed a harmonized risk assessment framework for quantifying the risk of pesticide exposure to bees (4). EPA accepted this process and made it a part of its pesticide registration and registration review processes.

Also in 2013, EPA developed new label language (5) for certain neonicotinoid pesticides that were identified as particularly hazardous to managed bees. These label changes were designed to reduce exposure to bees in areas where these chemicals are used. Shortly thereafter in 2013, EPA announced its intention to amend the labels of pesticides that were applied to foliar surfaces of plants that were acutely pesticides to bees upon contact. In 2015, EPA proposed to limit the use of pesticides that are detrimental to bees, including neonicotinoids, when crops are in bloom and bees are under contract for pollination services (6). In early 2016, the EPA released the first of four preliminary reports on pesticides potentially harmful to pollinators. The risk assessment looked at the neonicotinoid insecticide imidacloprid, a pesticide that poses a threat to hives when the pesticide comes in contact with certain crops that attract pollinators. The risk assessments for the other three neonicotinoids, clothianidin, thiamethoxam, and dinotefuran, will be released for public comment in December 2016.

In June 2014, President Obama issued the Presidential Memorandum (7). Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators. The Memorandum recognized the serious, ongoing loss of pollinators, including honey bees, native bees, birds, bats and butterflies and its potential impact on food production systems, agriculture, and the environment. It established the Pollinator Health Task Force (8), named as co-chairs the Secretary of Agriculture and the Administrator of the Environmental Protection Agency, and identified multiple federal agencies as members. The Task Force was directed to develop a National Pollinator Health Strategy to increase and improve pollinator habitat. and for the EPA in particular.

National Strategy to Promote the Health of Honey Bees and Other Pollinators (9)

In May 2015, the Pollinator Health Task Force identified three primary goals for federal departments and agencies, in collaboration with public and private partners:

1. Reduce honey bee colony losses during winter (overwintering mortality) to no more that 15% within 10 years.
2. Increase the Eastern population of the monarch butterfly to 225 million butterflies occurring in an area of approximately 15 acres in its overwintering grounds in Mexico through domestic/international actions and public-private partnerships by 2020.
3. Restore or enhance 7 million acres of land for pollinators over the next five years through federal actions and public-private partnerships.

The EPA has a large role in the National Strategy including its use of the harmonized risk assessment guidance; development and implementation of toxicity testing guidelines for honey bees; reevaluation of the risk, and development of a new use policies for certain neonicotinoid pesticides; and conducting risk assessments on new active ingredients and on selected registered active ingredients.

EPA will implement risk management measures by

- Working with state and tribal partners to develop managed pollinator protection plans aimed at mitigating pesticide exposure.
- Improving pesticide labeling and restriction of pesticides that are acutely toxic to bees when applied to foliage.

- Reducing the exposure of bees to pesticide dusts generated during the planting of pesticide-treated seed.
- Expedited review of new Varroa mite control pesticides.
- Encouraging and enhancing pollinator protection and habitat activities.
- Evaluation and mitigation of pesticide impacts on monarch butterflies.

The State FIFRA Issues Research and Evaluation Group (SFIREG), with input from the EPA, published a guidance document to aid in the development and implementation of state Managed Pollinator Protection Plans (MP3). The purpose of the document was to advise state lead pesticide regulatory agencies, (State Lead Agencies or SLAs) on the critical and recommended aspects to include for developing a successful MP3.

The critical and recommended elements suggested by SFIREG are as follows:

Critical Elements of a State Managed Pollinator Protection Plan (MP3)

1. Public stakeholder participation process

- Direct discussion between beekeepers, farmers, pesticide appliers, and other stakeholders
- Must represent input from a balanced (representative) cross-section of stakeholders when plans are being developed and prior to it being finalized

2. A method for growers/ applicators to know if there are managed pollinators near a treatment site

- Ability of appliers to contact beekeepers to alert them to planned applications
    - Needs to be timely
- Should define the distance from the application site in which an applicator should contact a beekeeper (pollinator awareness zone)
    - Typically a ~1 to 2 mile radius
- Should define the method or means by which an applicator can identify the location and owner of managed apiaries nearby.
    - Mandatory/ voluntary hive or apiary registration that identify geographically where hives are located
    - Other strategies to visually identify the location of hives (bee flags)
    - Some registrations very specific (GPS points), other list a township, section, or area and beekeeper has to be contacted directly to learn exact location

3. A method for growers/ applicators to identify and contact beekeepers prior to application

- Need to be able to contact beekeepers and give them adequate time to manage hives and prepare for application
- Plan needs to identify minimum time prior to pesticide application to contact beekeeper within defined action zone
    - Minimum timeframe used by several other states is 48 hours prior to scheduled application
- Clearly describe how to obtain beekeeper contact information. Other plans have included:
- Web- based apiary databases or self-registry websites in which applicators can quickly and easily obtain contact information for hives in a given location
- Prominently display beekeeper contact information via signage on the colony location

4. Recommendations on how to minimize risk of pesticides to bees

- Mitigate risk of pesticides to bees while managing pests

- Best Management Practices (BMP's)
    - Managing flowering weeds in crops
    - Making applications when bees are less active (dawn or dusk)
    - Using more targeted application (drip irrigation)
    - Using products less toxic to bees when possible
    - Minimizing or reducing pesticide drift
    - Utilizing Integrative Pest Management (IPM)

5. A clear defined plan for public outreach

- Only be successful if there is a vast and robust adoption of the plan
- Adequate outreach to publicize the plan and its recommendations
- Meetings with organized stakeholder groups and beekeeper organizations
- Posting plans on website for easy access by the public

6. Mechanisms to measure the efficacy and effectiveness of the MP3 and a process to periodically review and modify each plan

- Goal is reduced exposure to bees through enhanced communication and collaboration among stakeholders
- Include measure to determine if goals are being met
    - Communication / collaboration has increased
    - Pesticide exposure has decreased
- Requirement for periodic review that is no longer than 3 years between reviews and submission to EPA for acceptance

Optional/ Recommended Elements of State MP3's

1. Strategy to deal with hives without identified owners

- Options will depend on individual state laws and regulatory authorities
- Seek stakeholder input on reasonable approaches and actions for when unidentified colonies are found

2. Communication with crop advisors and agricultural extension services

- Engaging with technical experts who make management and best practice recommendations
- Often aware of local pest pressures and crop production needs of the area and able to make a realistic and specific recommendations

3. Clear information as to the applicability of the MP3

- States may want to develop separate or modified MP3's for specific cropping systems
- Crop-specific approaches if needed
- Clearly defining cropping/ beekeeping systems to which MP3s apply

4. Addressing urban beekeeping and pesticide use in non- agricultural settings

- Depends if state has significant urban beekeeping or managed bees in/ near urban or residential areas
- Some states may want to address non-agricultural pesticide use patterns

5. Recommendations for more formalized agreements between beekeepers, crop producers, and property owners, especially in situations with a financial agreement

- Exchange of contact information
- Agreements for capture responsibilities, notification requirements, expectations, etc

Internet References

1. https://beeinformed.org/
2. https://beeinformed.org/results-categories/winter-loss/
3. http://www.usda.gov/documents/ReportHoneyBeeHealth.pdf
4. https://www.epa.gov/pollinator-protection/how-we-assess-risks-pollinators
5. https://www.epa.gov/pollinator-protection/new-labeling-neonicotinoid-pesticides
6. https://www.epa.gov/pesticides/epa-releases-first-four-preliminary-risk-assessments-insecticides-potentially-harmful
7. https://www.whitehouse.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b
8. https://www.epa.gov/pollinator-protection/federal-pollinator-health-task-force-epas-role
9. https://www.whitehouse.gov/sites/default/files/microsites/ostp/Pollinator%20Health%20Strategy%202015.pdf