

Balancing pest suppression and pollinator conservation in pumpkin and squash fields

A USDA-funded research collaboration of The Ohio State University, Purdue University, and Michigan State University

Summer 2017

Pesticides help control damaging pests, but may harm beneficial insects, such as pollinators. In pumpkins and other cucurbits, pollinators are essential for fruit production. Thus, applying more pesticides than are needed to control crop pests may lead to a decrease in crop yields. Thus far, there has been little research to determine how best to apply pesticides to achieve adequate pest control while avoiding unintended harm to pollinators (and other beneficial organisms in and around farms).

This study was designed with the goal of determining when, and how much, to apply pesticides to maximize pest control while minimizing harm to pollinators. To do so, we will collect the following data for analysis:

- Which pesticides (if any) are being applied, at what timing, and under what circumstances.
- The level of pesticides present in the soil, in crop leaves (to measure defense against pests), and in crop flowers (to measure harmful exposure to pollinators).
- The level to which pests damage crop plants.
- The level of pollination services provided by pollinators.
- The diversity and abundance of pollinators and other beneficial organisms (such as spiders and other predators) in and around the farm.
- The average seed production of crop plants (to measure how successfully plants are pollinated by pollinators at the farm).

To collect these data, we will visit each farm once every 1-2 weeks. We will walk through the fields to observe insect pests, pest damage to leaves, and pollinator visits to flowers, taking care not to damage any crop plants. We will contact you regularly to update you on our field visit schedule and to request information on any pesticide treatments you have applied during the growing season. Below is an approximate schedule of field visits for the 2017 research season.

Visit 1 (June 1 – June 10)

- Meet with grower to discuss project. Answer any questions, and collect information on pesticide management practices and history of cucurbit field.
- Collect soil samples for pesticide residue analysis.
- Survey pollinators and other beneficial organisms in natural habitats surroundings cucurbit field.

Visits 2-4 (June 10 – July 5)

- Measure pest activity and pest damage on cucurbit crop plants.
- Survey pollinators and other beneficial organisms in surrounding natural habitats.
- Collect cucurbit crop leaves (1 leaf from each of 5 randomly selected plants) for pesticide residue analysis.

Visits 5-7 (July 5 – August 25)

- Measure activity, diversity, and abundance of pollinators servicing cucurbit crop flowers.
- Measure pest activity and pest damage on cucurbit crop plants.
- Survey pollinators and other beneficial organisms in surrounding natural habitats.
- Collect cucurbit crop leaves (1 leaf from each of 5 randomly selected plants) for pesticide residue analysis.
- Collect male flowers (1 flower from each of 20 randomly selected plants) for pesticide residue analysis.
- Assess health of managed honey bee colonies, if present.

Visit 8 (September 1 – September 15)

- Measure pest activity and pest damage on cucurbit crop plants.
- Survey pollinators and other beneficial organisms in surrounding natural habitats.
- Collect cucurbit crop leaves (1 leaf from each of 5 randomly selected plants) for pesticide residue analysis.

Visit 9 (October 1 – October 15)

- Collect soil samples for pesticide residue analysis.
- Collect data on cucurbit crop yields