

Neonic Education & Research

Seed Corn Maggot & Wireworms



The University of Vermont

Background and Key Questions

1. What is the impact of neonic treated seed on plant stands?
 - Funded through the EPA (on-farm demonstrations)

Scope of Work: EPA Grant

- **Education**

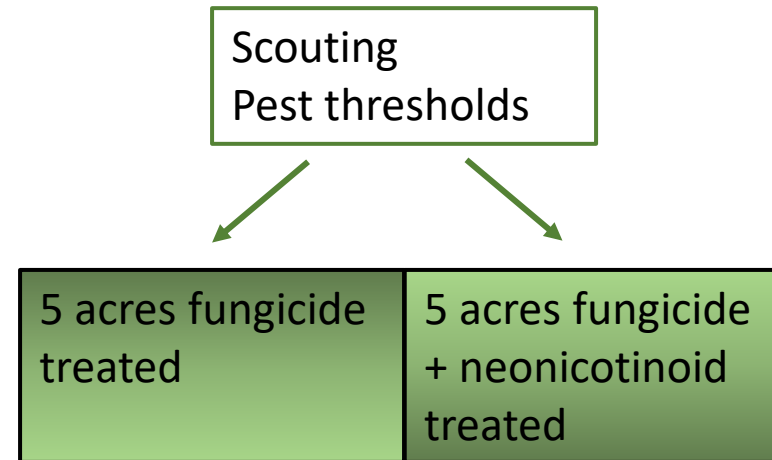
- Webinar series
- 5 on-farm field days
- Two crop specific field sheets (corn and soy)
- Four presentations
- 30 one-one consultations

- **Field Demonstration**

- 6 farms will participate in a field demonstrations where $\frac{1}{2}$ of the field is planted with fungicide treated seed and the other is planted with fungicide+ neonicotinoid treated seed

- **Affect**

- reaching over 1,000 farmers, technical service providers, and agricultural industry stakeholders
- 250 producers and stakeholders with hands-on education opportunities representing 25,000 acres of row crops
- 30 farmers will implement scouting, pest thresholds on over 1,500 acres

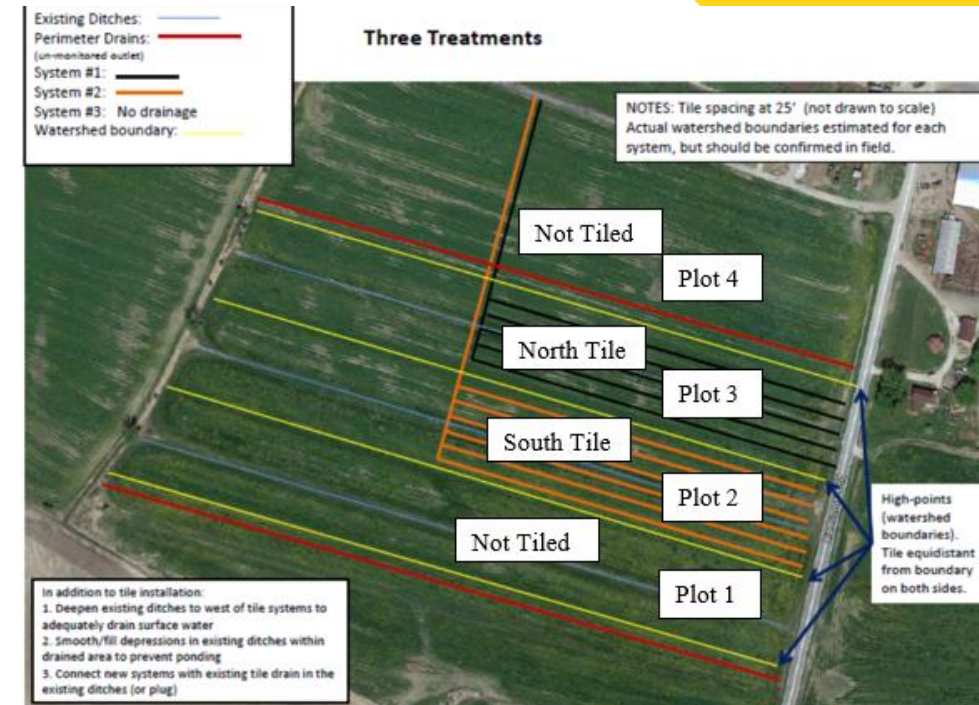


Background and Key Questions

1. What is the impact of neonic treated seed on plant stands?
 - Funded through the EPA (on-farm demonstrations)
2. How do neonics move through water?
 - Funded through the LCBP (Discovery Acres)

Scope of Work: LCBP

- **Discovery Acres**
 - Assess the impact of management methods on water quality (N&P)
 - Neonicotinoid movement in surface and subsurface water
 - 20 samples/year
 - Average 10 sample events/month?



Background and Key Questions

1. What is the impact of neonic treated seed on plant stands?
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2. How do neonics move through water?
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3. How are insect communities and plant damage impacted by treated seed?
 - AIB? (Discovery Acres & Borderview Research Farm)

Impact of Treated Seed on Plant Stands

- **Borderview Research Farm**
 - Replicated trial
 - Two treatments: treated and untreated
 - Up to six planting dates
 - 48 plots



Insect Scouting and Plant Damage Assessment

1. Pre-season: bait stations for wireworms
2. In-season (V1-V3): scouting for early season pest damage (wireworm & seedcorn maggot)
 - Stand counts: #plants per 1/1000th of an acre
 - Destructive sampling to assess pest damage:
 - Collect any insect pests
 - Evaluate severity above- and below-ground seedling injury
3. At harvest: Yield

Seeds showing feeding damage by seedcorn maggot larvae.



Image Number: 5434908. Photo credit: Mariusz Sobieski, Bugwood.org

Wireworm tunneling into corn seedling

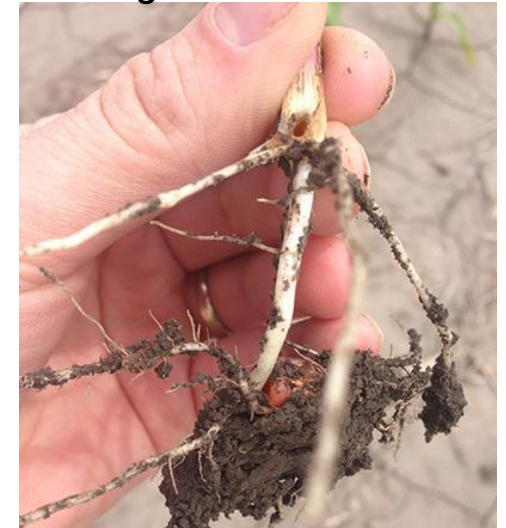
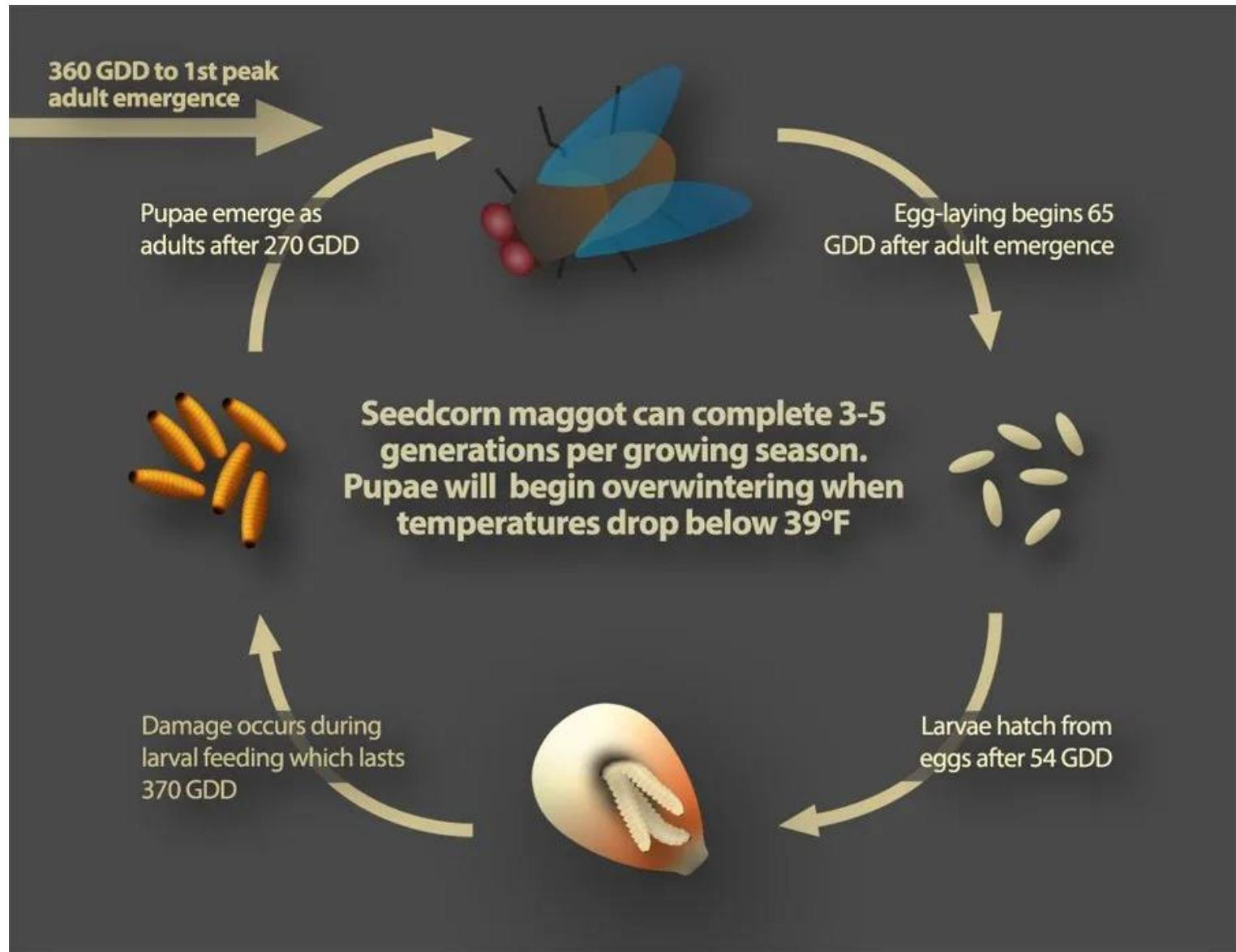


Photo taken: Rebecca Ahlers, Iowa State University

Soil Sampling

1. Discovery Acres: Neonic movement under different field management practices
 - Four microwatersheds
 - Two 'treatments' (different field management practices)
 - 1 replicate
 - All planted with treated seed on the same planting date
 - Grid sample
 - 4 composite samples per microwatershed
 - 16 samples per sampling event
2. Borderview Research Farm:
 - Treated seed plots + 1 edge of field
 - 4 replicates
 - 1 sampling date
 - 1 composite sample per plot
 - 6 composite samples per sampling event



Seed corn maggot

- Occurrence of this pest is not completely predictable but its
- More common under some soil management and cultural practices.
- Seedcorn maggot is mainly an early season pest
- Greater losses in fields with abundant decaying organic matter, such as manure and green plant residues
- Fields at highest risk of severe infestations include
 - heavily manured fields
 - old pastures and hay fields that have recently been plowed under,
 - fields with heavy-textured or wet soils, or fields with naturally high organic matter levels.
 - The incorporation of cover crops into soil may also increase the risk of seedcorn maggot infestation.



Delia platura

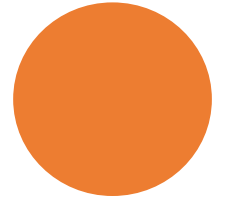


Seed corn maggot

- Larvae feed on germinating seeds or seedlings of corn and soybean
- Feeding can delay development or kill the plant.
- Plant injury is especially prevalent during cool and wet springs when plants are growing slowly.
- Infestations tend to be field-wide instead of in patches like for many other pests.



Delia platura





Cultural Controls

- There are no rescue treatments other than re-planting
- Cultural practices that speed germination and plant emergence will help reduce crop losses
- Delaying planting until soil is warm allows for rapid germination and early seedling growth
- Maggot flies are attracted to decaying vegetation
 - plowing in sod, green manures or animal manures at least two to three weeks in advance of planting is recommended
- Maggot populations are generally higher after a legume (e.g., beans) is incorporated into the soil than where a grass is incorporated.
- Conservation tillage can result in lower seedcorn maggot populations
 - plant residues occur mainly on the surface of the soil rather than being incorporated into the soil where decomposition occurs.

“Fly-Free” Period

- Plant the field during a “fly-free” period between fly generations.
- Peak fly emergence estimated by accumulating GDDs above 39F after January 1.
- Peak emergence of the overwintering generation in the spring occurs at 360 GDD after January 1.
- Peak emergence can be monitored using yellow sticky cards.
- A “fly-free” period occurs 450 GDD after this peak adult emergence.





Growing Degree Day Calculators

The screenshot shows a web browser window with the URL <https://newa.cornell.edu/degree-day-calculator/>. The page features the NEWA logo and a navigation menu with links for Home, Weather Tools, and Crop & IPM Tools. The main content area displays the results for Montpelier (VT Compost), VT, including the coordinates (Latitude: 44.27, Longitude: -72.56, Elevation: 983 ft) and the last download date (3/27/2023, 6:00 AM). A map titled "Station Selection Map" shows the location of Montpelier (VT Compost) in Vermont, with other nearby locations like Waterbury, East Montpelier, and Peacham also marked.

← → ↻ <https://newa.cornell.edu/degree-day-calculator/> ☆ 📌 ☰

NEWA
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Home Weather Tools Crop & IPM Tools

Results for Montpelier (VT Compost), VT
Latitude: 44.27
Longitude: -72.56
Elevation: 983 ft

Courtesy of NEWA in Vermont
Last download: 3/27/2023, 6:00 AM

Station Selection Map

Map showing locations: Milliston, Richmond, Waterbury, East Montpelier, Montpelier (VT Compost), Woodbury, Danville, Peacham, Barnet.

All Stations
● Montpelier (VT Compost), ... ▾

Start Date
01/01/2023

End Date
03/27/2023

Degree Day Type
Base 39°F ▾

Seed Corn Maggot

- There is no chemical rescue treatment
- Control options for seedcorn maggot are preventive.
- Seeds pre-treated with an insecticide.
- Planter box seed treatment
- Application of a broadcast soil insecticide treatment that is incorporated into the soil prior to planting



Wireworms

- Wireworms are the soil-dwelling larvae of click beetles
- Resemble mealworms and are slender, elongate, yellowish to brown with smooth, tough skin.
- Wireworms may remain in the soil as larvae from 1 to 3 or more years, depending upon the species and the food supply.



Wireworm Damage

- Wireworm damage to crops often is confined to certain areas of a field
- Stand losses can vary from zero to 75 or 80 percent.
- The two major species prefer grasses as host plants
- Greatest damage occurs in crops planted in fields that were in grass sod the previous year or two.
- Major crop losses are to corn small grains, and potatoes.



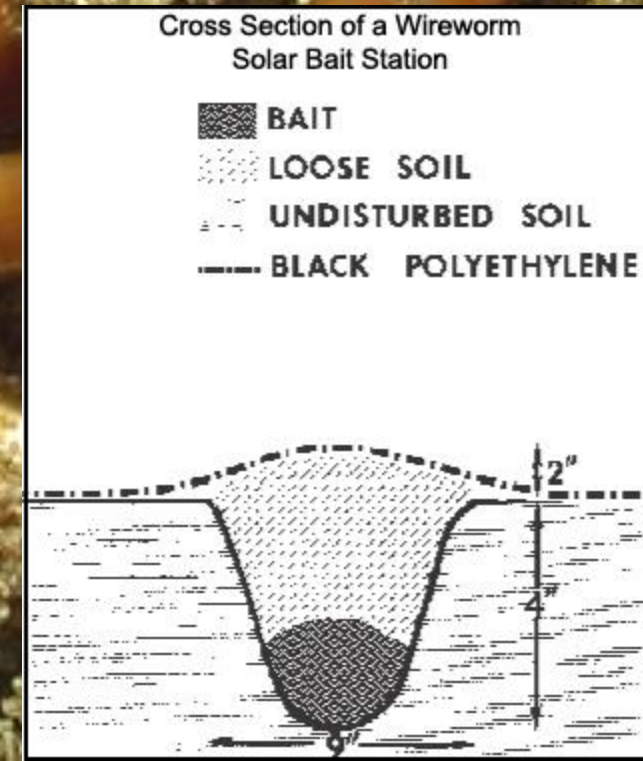
Wireworm Damage on Older Plants

- Slow development of wireworm larvae extends the time that crops planted into an infested field will be subjected to damage.
- Unless wireworms are controlled, moderate to heavy damage can be expected for 2 to 3 years.



Scouting/Monitoring for Wireworm

- Bait stations are a popular method for scouting
- 2 to 3 inch (5-8 cm) deep hole with one cup of untreated wheat or shelled corn in it.
- Cover the grain with soil and then a piece of black plastic to increase soil temperature and seed germination.
- Baits should be placed in grassy areas in the field or parts of the field with a wireworm history.
- Use 5-10 bait stations per 30 acre.
- The baits can be checked for wireworms after two weeks.
- The economic threshold is an average of 1 wireworm per bait station for the whole field.
- Ideally bait and scouting should be done in fall when temperature still above 45F.



Other Scouting

Using a shovel - dig down about 10 inches and lift the shovel of soil for examination.

Round the soil sample off to approximately 6 inches in diameter.

Sift through at least 20 shovels of soil from different locations in the field to check for wireworms.

An average of one wireworm per shovel of soil = 20,000 wireworms per acre.

Economic injury level for corn is an average of 2 or more wireworms per 10 shovels of soil.

