

Wireworm and Neonicotinoid Treated Seed in Row Crops

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Pest description & lifecycle

Wireworm (Family *Elateridae*, several species) is an early season pest in Vermont that can damage corn and other field crops. Wireworms directly feed on the seed germ, hollowing out the seed, or on young seedlings, by tunnelling into underground portions of the root or stem. Damage due to wireworms results in reduced plant stands and can decrease crop yield. Corn and soybean seed are commonly treated with neonicotinoids, a type of insecticide, to prevent damage from wireworm and other early season pests. Degree of damage varies with year, weather, and site conditions, but scouting and monitoring your fields for wireworms can help inform whether neonicotinoid seed treatments (NSTs) would be beneficial.



Image 1. Wireworm larvae (Frank Peairs, Colorado State University, Bugwood.org).

There are several species of wireworms that damage agricultural crops. Wireworms are slender, wire-like larvae that vary in color, from pale white to shiny yellow or brown (Image 1). They are between 0.5-1.5" in length. Adult wireworms, or click beetles, lay their eggs in the soil usually near the roots of grasses in the spring. Wireworms may live in the larval stage for several years, so while feeding in their first year may be minor, severe damage may occur in subsequent crop years from either continual damage or from increased pest populations.

High risk conditions

Many species of wireworms prefer grasses as host plants, so wireworm pressure is typically greater in fields following pasture, sod, or small grains. Depending on the species of wireworm, they may be more concentrated in low, poorly drained areas of the field or in well-drained, upland soils.

Wireworm damage occurs primarily in the spring during cool, moist weather. Slower seed germination in these conditions will prolong exposure of the seeds to wireworms, increasing their susceptibility to wireworm feeding.

Since wireworms may exist in the field for several years before reaching maturity, historical wireworm damage can be indicative of potential damage in the upcoming season. Fields with previous wireworm damage should be considered high risk.

Scouting

Monitoring your fields for pest pressure and damage is important to inform management options. Wireworm populations typically are not uniformly distributed, and infestations will appear as hot spots in the field.

Pre-season assessments of wireworm pressure. Farmers can set up **bait traps** in the previous fall or in the spring, 2-3 weeks prior to planting (Diagram 1). To set-up a bait trap randomly select an area in the field, dig a hole 2-3" deep and 6-9" wide. Next bury a handful of untreated corn/wheat seed or pieces of potato and mound soil in a dome over the bait. Cover the site with a piece of black plastic to heat up the soil. Make sure to mark each site with a flag. After two to three weeks, dig up the bait and check for presence of wireworms (or damage). It is recommended to set up one bait station for every 3-5 acres. An economic threshold of 1 wireworm per bait station can inform the need for NSTs.

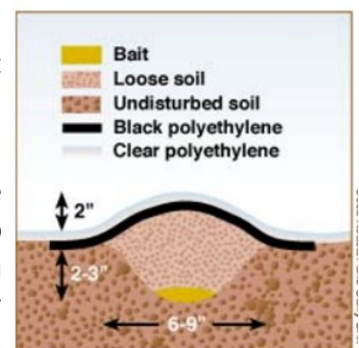


Diagram 1. Cross section of a solar bait station for detecting presence of wireworms (Scott Keaster and Garry Brix).

Scouting



Image 3. Wireworm in corn seedling (J. Obermeyer, Purdue).

Early season assessment of pest damage. Evaluating the extent of damage from wireworms and other early season pests (including seedcorn maggot) is important to decide whether reseeding is economically beneficial. Scouting should occur when seedlings are between the growth stages of V1-V3. Measuring **stand counts** is a good tool to assess the plant population. In randomly selected areas of the field, measure out 10-ft of row. Count the number of plants that have emerged. *Destructive sampling, or otherwise digging up or removing plants*, in areas where plants did not emerge, or where seedlings appear wilted or damaged will inform if the aboveground damage is due to early season pests. To determine if the source of damage is from belowground pests:

1) Dig a smaller area (2' long x 1' wide x 6" deep). 2) Remove soil and place soil on top of a sheet of black plastic or cloth. 3) Sort through the soil for live wireworms. 4) Examine seeds and seedlings for wireworm damage, including injury to ungerminated seeds and bored holes at the base of seedlings (Images 3 and 4). Rank the severity of above- and below-ground damage. If seedcorn maggot pest damage is severe and if growing conditions are good, it may be advantageous to replant.



Image 4. Wireworm created hole at base of seedling (R. Ahlers, Iowa State University).

Management

In the case of wireworm and other early season pest damage, no rescue treatments are currently available. Therefore, preventative measures to minimize the potential for wireworm damage are essential.

- *Scouting* in previous seasons can determine the prevalence of wireworms in each field and the degree of risk. This can inform the use of preventative insecticides for select fields.
- *Neonicotinoid seed treatments or insecticides* are commonly used preventative measures. For high-risk fields, NSTs are advantageous to protect seeds and emerging seedlings from wireworms and other early season pests. When using pesticides, be sure to select products approved for your state, follow label instructions and take precautions to minimize risk to human and environmental health.
- *Delayed planting* is a cultural practice to help avoid time periods when wireworms will be most active in the upper layers of the soil. As soil temperatures warm, wireworms will move deeper in the soil profile.
- *Replanting* in areas of severe pest damage may be economically advantageous. Consider the current population density, potential yield increase, replanting date, hybrid maturity, machinery/labor costs, and weather forecast when making this decision. If replanting into damaged field areas and wireworms are still present, using a soil insecticide or seed treatment is recommended.

References & additional resources:

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