Science Societies

Wireworms: Resurgence in the pacific northwest

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Wireworm Trapping

Wireworms were once a thing of the past in the Pacific Northwest but that changed in 2006 when the USEPA decided not to renew the registration of Lindane, an insecticide seed treatment that had virtually eliminated crop losses to wireworms. Picking up the mantle on wireworm research has been a learning curve, but new research is arming farmers and their CCAs to better manage the pest with new tools and cultural practices.

Wireworms were once a thing of the past in the Pacific Northwest. For more than a few decades, crop researchers and entomologists gave little concern to wireworms

infesting wheat fields and other grass crops that the click beetle found as ideal hosts for its larvae.

All that changed in 2006 when the USEPA decided not to renew the registration of Lindane, an insecticide seed treatment that had virtually eliminated crop losses to wireworms. Since then, wireworms have returned with a vengeance.

“They re one of the primary pests, especially insect pests. Almost every acre now is treated for wireworm control with seed-applied insecticide,” says Aaron Esser, Washington State University extension agronomist who began researching wireworms in 2008.

The wireworm is the larvae of the click beetle, which prefers to lay its eggs in grasses, Esser explains. Fields planted to native grasses as part of the Conservation Reserve Program (CRP) are also attractive to the click beetle for laying eggs that hatch and turn into wireworms that feed on plant roots and seeds.



*Wireworm larvae in soil. Source: Blake Wilson/LSU AgCenter (**https://bit.ly/37HsnKf**).*

David Crowder, associate professor of entomology at Washington State University, says that early in the last century, wireworms were a common nuisance that plagued farmers wheat fields.

“Wireworms have been a pest going back to the beginning of the 20th century,” Crowder says. “From about the 1950s to the early 2000s, we think they were effectively controlled with broad spectrum insecticide. Then, some of the compounds that growers were able to use got taken off the market, and that caused a resurgence

of wireworms. The unfortunate thing was these pesticides had been so effective that there had been a lack of research on wireworms for about 50 to 60 years. So when they started to resurge, growers didn't have a lot of effective tools to really understand how to manage them because their basic biology was poorly understood."

Picking up the mantle on wireworm research has been a learning curve, but new research is arming farmers and their CCAs to better manage the pest with new tools and cultural practices.

Scouting fields on foot in search of evidence of wireworms remains integral to managing wireworm populations, Esser stresses.

Wireworms can remain in the larval stage in the soil from 2 to 10 years, Esser points out, depending on which species has infested the field. Esser and other WSU researchers have identified at least 17 species of wireworms in fields across the inland Pacific Northwest region with three species, in particular, causing yield losses in grass crops, particularly wheat.

"In some instances, wheat is our only crop," Esser notes. "A common rotation around here is winter wheat–summer fallow or summer fallow–winter wheat–spring wheat. It's almost exclusively wheat. We've done some canola and chickpeas, but it's by no means dominating the cropping sequence."

The longevity of the pest living in the soil and the diversity of species, Esser adds, requires a keen eye and persistence in management. Effective management, he says, begins with first identifying wireworm infestations and which type of wireworm has infested the field.

Scouting and Trapping



Scouting fields on foot in search of evidence of wireworms remains integral to managing wireworm populations. Source: Adobe Stock/banedeki1.

When wireworms made their comeback following the delabeling of Lindane in wheat, farmers and crop scouts at first struggled with identifying the problem, Esser says, with the poor stands caused by wireworm infestations commonly misidentified as weed problems.

“In 2008, farmers who had crop damage from wireworms mistook it for poor weed control and soil-borne disease,” Esser explains. “Farmers couldn’t control the downy brome in their winter wheat and couldn’t control the wild oats in their spring wheat. And they were also having big issues with Russian thistle.”

If the wireworms that are feeding on the seeds and roots below the soil surface don’t kill the plant, Esser says thin wheat stands will be noticeable above ground with the plant having fewer-than-normal tillers.

Wireworm infestations can also be identified by the patterns of damage left in the field, adds Crowder.

“Once you get wireworms in your field, they move in a linear fashion from plant to plant,” Crowder points out. “That’s characteristic of areas where you have wireworms as opposed to a pathogen. If it’s a problem with certain seeds that didn’t germinate, that usually doesn’t happen in a very linear or uniform pattern. That’s more random.”

Crops with wireworm infestations also typically do not have damage visible throughout the field, but rather in patches, Crowder notes.

“You typically don’t have a wireworm problem in your entire field because they don’t move very far,” he says. “So if you really want to manage wireworms effectively, there’s no better strategy than just walking around your field and trying to understand where they are and that you may only have to manage them in certain parts of the field.”



Click beetle. Source: Flickr/Judy Gallagher.

Farmers and CCAs also need to know what a wireworm looks like, Crowder stresses. If a wireworm infestation is suspected, pulling the plant up by the roots will reveal worms clustered around the plant’s root zone, he says.

Setting traps in the field can also help monitor an infestation, he says, adding that farmers should place at least 10 traps per field (see wireworm trapping video at **https://youtu.be/LMKDqdvOXmo**).

“We use a modified tiller bait trap, which is wheat, corn, and a pair of panty hose,” Esser explains. “Soak it in water and then bury it in the ground. Dig it up in a week or two, and find out what it looks like.”

Wireworms will be caught in the mesh of the trap as they try to feed on the seeds and sprouted roots. If there are more than four wireworms caught per trap, that’s an

indication of a very heavy infestation, Esser points out.

Wireworm Species and Treatment

After a wireworm infestation has been confirmed, Crowder says farmers and CCAs should then identify the species. Of the many wireworm species confirmed in the Pacific Northwest region, three species are of particular concern: The Western field wireworm, the sugarbeet wireworm, and the Great Basin wireworm.

“Prior to 2010, wireworms were kind of treated as one big group and as all the same. But there are actually a lot of different species of wireworms that we've been able to catalog, and only some of them are pests,” Crowder explains. “So we recommend to producers that they do some sampling, and our lab at WSU will identify the wireworms. If you know the species of wireworms that you have in your field, you can target your management more effectively to that particular species.”



Multiple stages of the wireworm life cycle. Source: Art Cushman, USDA Systematics Entomology Laboratory, Bugwood.org

The Western field wireworm (*Limonius infuscatus*), which comprises about 40% of all wireworms and is found mostly in southeastern Washington, feeds most heavily in April and May on seeds and roots and then move deeper in the soil at the end of May to feed on other organic matter, Crowder notes. Seed treatments are very effective on the Western field wireworm even at low rates because the species is actively feeding on seedlings right after planting.

The sugarbeet wireworm (*Limonius californicus*), which makes up about 30% of wireworms, feeds much later in June or

July, he says. With the sugarbeet wireworm feeding two to three months after planting, pesticide applications are less effective with the seed treatment having degraded over that period. To manage the sugarbeet wireworm, Crowder advises using higher rates of seed treatments and delaying planting as late as possible in the planting window.

The Great Basin wireworm (*Selatosomus pruininus*), meanwhile, comprises about 20% of the wireworm population but is confined mostly to dry growing regions. Crowder notes that less is known about the Great Basin wireworm and that research is ongoing to help growers manage these populations.

Neonicotinoid insecticide seed treatments have had varying success on controlling wireworm populations.

“We're looking at the neonics as a seed-applied insecticide,” Esser says. “The problem with neonics is that they work more as a repellant and the mortality rate for wireworms is really low and is different for each species. That further complicates the whole picture.”

The three groups of neonicotinoid seed treatments farmers can use for wireworm control are thiamethoxam, imidacloprid, and clothianidin, Esser says, noting that higher application rates have helped improve stand establishment in wheat by keeping wireworms off the seed and away from the crowns longer until the crop is established.

Better wireworm control can also be achieved by including different crops into rotations, Crowder adds.

“Wireworms don't like barley as much as wheat, and they don't like oats at all,” he says. “You can also go with a broadleaf crop. If mama click beetle is looking for a place to lay her eggs, she's going to prefer to go to a grassy crop such as spring wheat, winter wheat, or CRP. She probably won't want to lay eggs in a canola crop or in a pea crop.

That's not their ideal host."

Incorporating a fallow year in the rotation will also decrease the wireworm population by about 50%, he adds.

The most important ingredient in wireworm control, Crowder stresses, is good management.

"It's important that growers understand there isn't a silver bullet for wireworms," Crowder says. "The growers that really understand the biology and are doing the sampling that we suggest are the ones that can tailor their strategy most effectively and save money, whether that be using a lower rate of a pesticide or only applying a pesticide in certain parts of your field, or adapting a more effective rotation in areas that maybe more problematic. It boils down to good management."

More information

- Wireworms in Wheat and Small Grains: **http://smallgrains.wsu.edu/insect-resources/pest-insects/wireworms/**
- Wireworm Scouting and Action Controls: **http://smallgrains.wsu.edu/wp-content/uploads/2013/10/Wireworm-Scouting-FS059E2.pdf**
- Identifying Wireworms in Cereal Crops: **http://smallgrains.wsu.edu/wp-content/uploads/2013/03/Identifying-Wireworms.pdf**

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