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Sneaky Yield Robbers

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While pest management can never be taken for granted, it certainly got easier with the advent of genetically engineered hybrids fortified with corn borer and rootworm resistance. But ironically, the technology may have helped a couple of other yield robbers become more of a threat. One, so far, is limited to northern areas of the U.S., and the other is present everywhere, just waiting for a chance to take a bite out of yield.

Corn Nematodes



Some entomologists believe that corn nematode populations are quietly increasing.

Nematodes are tiny nonsegmented worms. A few of the species that attack corn include corn needle nematode, lance nematode, lesion nematode and sting nematode. Most live in the soil and feed on corn roots from the outside, but some enter the roots and feed inside root tissue.



"Because nematodes exist in all soils, they are a potential problem wherever corn is grown," says University of Illinois plant pathologist Terry Niblack. "There are many species of nematodes, so various ones may become yield limiting in certain soils and localities."

Some species of corn nematodes cause no crop damage at all. Others cause a lot or only a little.

"In Kansas and Nebraska, sting and needle nematodes can wipe out every plant in some sections of a corn field," says Kansas State University nematologist Tim Todd. "Fortunately, those species occur only on our sandiest soils, and their damage is limited to patches.

"At the other end of the spectrum is the lesion nematode, which is found in every corn field regardless of soil type," Todd continues. "Their damage is in the form of chronic yield loss—a 5% loss is common across Kansas."

Inquiries about corn nematodes from farmers are increasing, Niblack says. A survey she conducted in northern Illinois revealed root lesion nematodes in every field, often in high enough numbers to damage yields.

Niblack, Todd and Michigan State University nematologist Fred Warner believe there are three reasons corn nematode populations could be climbing. First, because of genetically engineered corn hybrids, farmers are applying fewer soil insecticides. The older organophosphate and carbamate insecticides provided some nematode control. The newer pyrethroid insecticides do not. The other two reasons are more continuous corn and less tillage.

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Symptoms of nematode damage can be mistaken for nutrient deficiencies, disease or other problems. The only way to find out is to have your soil analyzed. Niblack, Todd and Warner recommend monitoring fields for nematodes just as you do for fertility.

Monitor your fields. Iowa State University plant pathologist Greg Tylka recommends taking 10 to 20 soil cores, 8" to 12" deep, from every 20 acres. "Some laboratories also request two or three root balls, including the soil around the roots," he says. "If possible, collect a soil and root sample from a nearby area in the field that appears to be free of nematode damage so nematode numbers can be compared. Samples must be stored in a moisture-proof bag. They must be kept cool, but not frozen, until delivered to a laboratory."

Tylka recommends sampling during the growing season when corn nematode numbers are likely to be highest. An exception is needle nematodes, which migrate down into the soil in midsummer. Sample for needle nematodes in the spring or fall, he advises.

Land-grant universities and many private labs analyze the samples. Threshold recommendations for treatment vary by state, area and soil type.

For now, the primary treatment option is to rotate to a nonhost crop for at least one year. "If you already are planning to apply Counter as a rootworm insecticide at planting, you may get some control of some species of nematodes," Warner says. "But I don't recommend applying the product just to control nematodes."

Syngenta's Avicta seed treatment nematicide was recently registered for use on corn. But a company spokesman says it will not be available to growers until the 2010 season.

Western Bean Cutworm

Until about 2000, damage from western bean cutworm (WBC) was found only in the western Corn Belt states and a few western states. Corn yield losses as high as 40% have been reported in Colorado when high populations of WBC were left untreated.

"For WBC, ground zero is northeastern Colorado and southwestern Nebraska," says University of Nebraska entomologist Gary Hein. "We see quite consistent populations here. Farmers deal with the pest on an annual basis by scouting and spraying or planting resistant hybrids." WBC also has long been reported in parts of Kansas, Wyoming, Idaho and Arizona.

But the pest has been on the move. In recent years, WBC has been found in Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, North Dakota, Ohio, South Dakota and Wisconsin.

How quickly is WBC expanding its range? "Western bean cutworm was first found in southwestern Minnesota in 1999 and in western Iowa in 2000," says Iowa State University plant pathologist Merlin Rice. "By 2004, they were all across Iowa and had moved into northeastern Missouri and western Illinois. In 2006, they were found in southern Michigan and western Ohio—a spread of 675 miles."

No one knows for sure why WBC is increasingly showing up in new areas. The Bt hybrids that resist corn borer may be eliminating the insect's competition while leaving WBC unharmed. And some hybrids that resist corn borer also suppress corn earworms that prey upon WBC.

In 2006 and 2007, there were reports of 10-bu. to 20-bu. yield reductions in areas of Iowa. But in 2008 in Iowa, the population crashed. No one knows why, but Rice believes weather probably played a key role.

"The potential for damage next year in Iowa is smaller because of fewer moths in 2008," Rice explains. "But it's impossible to predict the chance of economic damage in a given area. They will be back and cause damage sometime, somewhere."

WBC moths emerge from the soil in early July. If corn (or dry beans, WBC's other favorite host) are no longer growing in that field, "the female moths can fly at least 15 miles in one night to find a host crop," Rice says.

After mating, the moths lay eggs in masses of five to 200 on host plants such as field corn, sweet corn, popcorn and dry beans. With corn, the eggs are laid on the upper surface of the upper few plant leaves. The egg masses turn from white to tan to dark purple, and larvae hatch within five to seven days.

Newly hatched larvae are about ¼" long and are dark brown in color. They pass through a tan stage, with a darker, faint diamond-shaped pattern on their backs. Near maturity, they are pinkish-tan or pale brown and up to 1½" long.

The larvae feed on the flag leaf, tassel and other yellow tissue. As the plant tassels and silks, the larvae move to the ear. They feed on silks and then on the developing kernels. Studies have shown that one larva per plant can reduce yield by 3.7 bu. per acre. Severe feeding pressure can damage 50% to 60% of the kernels on an ear.

Control options. "If the larvae get into the ear, it's too late to treat," Rice says. To prevent that from happening, growers have two options. The first is to plant Herculex I or Herculex Xtra Bt hybrids, which are resistant to WBC.

The second option is to scout for WBC egg masses. Begin scouting based either on a period of 1,320 growing degree days (GDD) or on reports of moths caught in pheromone traps.

The pheromone trapping of moths will help you determine when to scout, especially in areas where you are not used to seeing WBC. For egg sampling on the plants, "check 20 consecutive plants at five locations," Rice says.

Continue scouting for seven to 10 days after the peak of the flight period, at 1,422 GDD, to detect eggs and larvae. Egg laying varies by plant growth stage, so if fields are planted to different-maturity hybrids, check each area separately. Remember to scout refuge areas of fields. "Late-maturing hybrids are usually hit the hardest," Rice says.

Thresholds. University of Nebraska entomologists, who have dealt with WBC longer than their colleagues farther east, recommend considering an insecticide treatment if 8% of the plants contain an egg mass or if young larvae are found in the tassel.

At Michigan State University, entomologist Chris DiFonzo has lowered the treatment threshold to 5%. That's because egg survival seems to be greater in Eastern states, perhaps because of more humid weather. "We catch fewer moths in our traps than they do in Nebraska," DiFonzo says. "But the egg survival rate is tremendous."

"Timing of the insecticide application is critical," Rice says. "Apply it when 90% to 95% of tassels have emerged. If the tassels have already emerged, spray when 70% to 90% of the larvae have hatched."

Before you spray, check the field for spider mite colonies. "Pyrethroid insecticides provide very effective control," Hein says. "But they can cause a flare-up of spider mites by killing their natural enemies. Because of the risk of spider mite problems, it's important to spray only fields where WBC exceeds the economic threshold levels."

Read the Web Extra.



Western bean cutworms have been moving east since 2000.

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