

# Bugs May Be Resistant to Genetically Modified Corn

RICK CALLAHAN, Associated Press



One of the nation's most widely planted crops — a genetically engineered corn plant that makes its own insecticide — may be losing its effectiveness because a major pest appears to be developing resistance more quickly than scientists expected.

The U.S. food supply is not in any immediate danger because the problem remains isolated. But scientists fear potentially risky farming practices could be blunting the hybrid's sophisticated weaponry.

When it was introduced in 2003, so-called Bt corn seemed like the answer to farmers' dreams: It would allow growers to bring in bountiful harvests using fewer chemicals because the corn naturally produces a toxin that poisons western corn rootworms. The hybrid was such a swift success that it and similar varieties now account for 65 percent of all U.S. corn acres — grain that ends up in thousands of everyday foods such as cereal, sweeteners and cooking oil.

But over the last few summers, rootworms have feasted on the roots of Bt corn in parts of four Midwestern states, suggesting that some of the insects are becoming resistant to the crop's pest-fighting powers.

Scientists say the problem could be partly the result of farmers who've planted Bt corn year after year in the same fields.

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Most farmers rotate corn with other crops in a practice long used to curb the spread of pests, but some have abandoned rotation because they need extra grain for livestock or because they have grain contracts with ethanol producers. Other farmers have eschewed the practice to cash in on high corn prices, which hit a record in June.

"Right now, quite frankly, it's very profitable to grow corn," said Michael Gray, a University of Illinois crop sciences professor who's tracking Bt corn damage in that state.

A scientist recently sounded an alarm throughout the biotech industry when he published findings concluding that rootworms in a handful of Bt cornfields in Iowa had evolved an ability to survive the corn's formidable defenses.

Similar crop damage has been seen in parts of Illinois, Minnesota and Nebraska, but researchers are still investigating whether rootworms capable of surviving the Bt toxin were the cause.

University of Minnesota entomologist Kenneth Ostlie said the severity of rootworm damage to Bt fields in Minnesota has eased since the problem surfaced in 2009. Yet reports of damage have become more widespread, and he fears resistance could be spreading undetected because the damage rootworms inflict often isn't apparent.

Without strong winds, wet soil or both, plants can be damaged at the roots but remain upright, concealing the problem. He said the damage he observed in Minnesota came to light only because storms in 2009 toppled corn plants with damaged roots.

"The analogy I often use with growers is that we're looking at an iceberg and all we see is the tip of the problem," Ostlie said. "And it's a little bit like looking at an iceberg through fog because the only time we know we have a problem is when we get the right weather conditions."

Seed maker Monsanto Co. created the Bt strain by splicing a gene from a common soil organism called *Bacillus thuringiensis* into the plant. The natural insecticide it makes is considered harmless to people and livestock.

Scientists always expected rootworms to develop some resistance to the toxin produced by that gene. But the worrisome signs of possible resistance have emerged sooner than many expected.

The Environmental Protection Agency recently chided Monsanto, declaring in a Nov. 22 report that it wasn't doing enough to monitor suspected resistance among rootworm populations. The report urged a tougher approach, including expanding monitoring efforts to a total of seven states, including Colorado, South Dakota and Wisconsin. The agency also wanted to ensure farmers in areas of concern begin using insecticides and other methods to combat possible resistance.

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Monsanto insists there's no conclusive proof that rootworms have become immune to the crop, but the company said it regards the situation seriously and has been taking steps that are "directly in line" with federal recommendations.

Some scientists fear it could already be too late to prevent the rise of resistance, in large part because of the way some farmers have been planting the crop.

They point to two factors: farmers who have abandoned crop rotation and others have neglected to plant non-Bt corn within Bt fields or in surrounding fields as a way to create a "refuge" for non-resistant rootworms in the hope they will mate with resistant rootworms and dilute their genes.

Experts worry that the actions of a few farmers could jeopardize an innovation that has significantly reduced pesticide use and saved growers billions of dollars in lost yields and chemical-control costs.

"This is a public good that should be protected for future generations and not squandered too quickly," said Gregory Jaffe, biotechnology director at the Center for Science and Public Policy.

Iowa State University entomologist Aaron Gassmann published research in July concluding that resistance had arisen among rootworms he collected in four Iowa fields. Those fields had been planted for three to six straight years with Bt corn — a practice that ensured any resistant rootworms could lay their eggs in an area that would offer plenty of food for the next generation.

For now, the rootworm resistance in Iowa appears isolated, but Gassmann said that could change if farmers don't quickly take action. For one, the rootworm larvae grow into adult beetles that can fly, meaning resistant beetles could easily spread to new areas.

"I think this provides an important early warning," Gassmann said.

Besides rotating crops, farmers can also fight resistance by switching between Bt corn varieties, which produce different toxins, or planting newer varieties with multiple toxins. They can also treat damaged fields with insecticides to kill any resistant rootworms — or employ a combination of all those approaches.

The EPA requires growers to devote 20 percent of their fields to non-Bt corn. After the crop was released in 2003, nine out of 10 farmers met that standard. Now it's only seven or eight, Jaffe said.

Seed companies are supposed to cut off farmers with a record of violating the planting rules, which are specified in seed-purchasing contracts. To improve compliance, companies are now introducing blends that have ordinary seed premixed with Bt seed.

Brian Schaumburg, who farms 1,400 acres near the north-central Illinois town of Chenoa, plants as much Bt corn as he can every spring.

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But Schaumburg said he shifts his planting strategies every year — varying which Bt corn hybrids he plants and using pesticides when needed — to reduce the chances rootworm resistance might emerge in his fields.

Schaumburg said he always plants the required refuge fields and believes very few farmers defy the rule. Those who do put the valuable crop at risk, he said.

"If we don't do it right, we could lose these good tools," Schaumberg said.

If rootworms do become resistant to Bt corn, it "could become the most economically damaging example of insect resistance to a genetically modified crop in the U.S.," said Bruce Tabashnik, an entomologist at the University of Arizona. "It's a pest of great economic significance — a billion-dollar pest."

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