

Rootworms may fall victim to greater crop rotation

April 3 2014, by Amy Mayer



These adult beetles in a lab at ISU helped researchers confirm the western corn rootworm can adapt to Bt corn. Credit: Amy Mayer/IPR

(Phys.org) —After a long battle with corn rootworm, Midwest farmers thought they'd found relief in genetically modified seeds with engineered-in toxins to beat back the pest. But recent research confirms what farmers have been noticing for several years: the western corn rootworm has been evolving to outwit the technology.

When Aaron Gassmann, a bug researcher at Iowa State University, started answering calls to come look at some cornfields, he went out and quickly had a hunch. Now, his research proves his fear.

"These insects can adapt rapidly to this Bt technology," Gassmann said. "So it highlights the potential vulnerability of the technology and the need to not set up scenarios where this type of adaptation occurs."

Gassmann recently published a study showing that after about three and a half years the poison no longer works. That's because when corn varieties with the same toxic traits are planted in consecutive years, the worms with some natural resistance survive. Then, natural selection makes those bugs the winners. And farmers the losers. Their corn suffers devastating root damage, complicating harvest and lowering yields.

"Farmers could use Bt corn, but they should also be using other things like crop rotation," Gassmann said, "so these patterns don't arise then, where the rootworm population gets selected year after year on this same Bt trait."

Alternating soybeans or some other crop on the field limits the root worm's food source and creates a fresh start for the following year's new corn crop. Although the certainty that the worms evolve to survive the toxins in Bt corn is new, the damage from the rootworm and the advice on crop rotation are not.

They're topics Erin Hodgson, another ISU entomologist, addressed during a field day last summer at the ISU Northern Research Farm in Kanawah, Iowa.

"I hear a lot of reasons for growing [continuous corn](#)," she said, though she advises against it. "My recommendation to you guys would be to throw a confusion at the larvae. Mix up your traits so that you're not

planting the same trait year after year after year."

Crop rotation once was the norm, with fields growing corn, alfalfa, oats, soybeans... perhaps other crops as well, to maximize soil health and diminish pest problems. Gradually, as current agricultural trends took hold, many farms dropped to just corn and soybeans and, in some cases, corn alone.

Mostly, it comes down to dollars and cents. Farmers wanted to capitalize on the high price of corn. Despite the risk of rootworm, farmer Doug Adams of Humboldt, Iowa says farmers with landlords to pay can feel beholden to market forces.

"You have to make decisions based on the markets for that year," Adams said, "and typically your cash rent's year to year as well and that's kind of what forces you into a shorter-term outlook."

Adams says he recognizes the importance of [crop rotation](#) and uses it on most of his fields. But not all of his acres.

"I've got a few acres where I do corn on corn," he said. On those, he tries to use a variety of the available Bt traits to limit the rootworm's ability to adapt.

The USDA is already predicting farmers will plant fewer acres of corn this year, partly thanks to lower prices. And analysts are expecting a record-high for soybean acres. That could help quell the rootworm's ability to develop resistance. But scientists and [farmers](#) both know that pests are likely to continue adapting. Seed companies will keep trying to stay a step ahead.

Next up: some evidence shows rootworm larvae can survive in soybean fields, so one year off [corn](#) may not be enough.

Provided by Iowa State University

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