

Corn growers look for new options to handle their ever-changing pest problems and this is affecting variety choices.



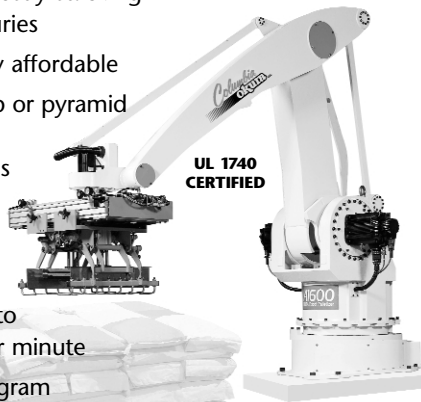
Pest Pressures

By Kelly Green

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FARMERS HAVE BEEN QUICK to adopt insect-resistant traits; however, the changes in pest pressures in corn may mean changes to the market share of some traits and varieties. Jack Bernens, Business Unit Head of Agrisure Traits at Syngenta, says “Farmers understand the levels of yield they can achieve in a near-perfect environment, so they are always looking for tools to reduce their risks and get as close to the perfect yield as possible. That’s why the uptake of in-crop insect traits has been so rapid.” It may be the shifts in use of those traits are just as rapid, particularly as seed companies use new technologies and trait stacks to evolve their offerings.

European Corn Borer

“European corn borer, a pest that in the past wreaked havoc on growers throughout the Corn Belt, has been greatly reduced due to the introduction of transgenic corn hybrids that include an in-crop corn borer trait such as YieldGard and Herculex,” says Marlin Rice, Professor of Entomology at Iowa State University. “Little do they know that their objective of finding a home in the corn field is really a suicidal mission for the female and the hatching larvae. So in areas of infestation, even if half of the corn fields are planted to a corn borer-resistant variety, there will be continued downward pressure on the corn borer population.”

Corn Rootworm

While the European corn borer remains an economically damaging pest, several other pests are big concerns for corn



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growers as well. "Corn rootworm was probably the number one pest in 2006," says Clint Pilcher, Corn Technical Development Manager with Monsanto. According to Ben Kaehler, Traits and Germplasm Licensing Leader with Dow AgroSciences, "it continues to infect more acres each and every year." First generation rootworm products are found in Dow AgroScience's Herculex RW, Monsanto's YieldGard RW, and Agrisure RW from Syngenta.

While a crop rotation of corn-soybeans is a farmer's most common defense against the insect, new variants are reducing the effectiveness of this management practice. The northern corn rootworm variant has an extended diapause, so the eggs lay dormant in the soil for two or possibly even three years, waiting for the field to be reseeded to corn. As a result, corn growers are investing more into field scouting, insecticides, seed treatments, and resistant corn varieties.

The western corn rootworm is also throwing a curve ball as it develops what Rice calls "behavioral resistance". The insect typically lays eggs in a corn field, so in the past crop rotation was highly effective in controlling the pest. But the western variant is laying eggs in soybean fields, so once again crop rotation is losing its effectiveness. A transgenic hybrid with resistance is a solution; however, Rice cautions that he has seen instances where the rootworm trait has not performed as well as expected. "This could be due to several factors, including the number of insects are so high that they simply overwhelm the crop, or the rootworm protein is not maintained at a high level throughout the entire growing season, resulting in a vulnerable period for the crop," he says.

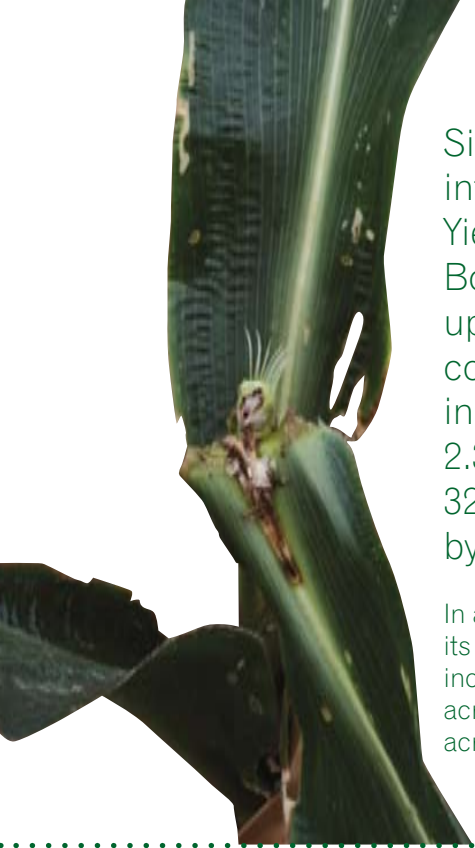
Western Bean Cutworm

Since 2000, western bean cutworm, once isolated to a small area in Nebraska, has spread across Iowa into parts of Illinois, Wisconsin, and to a lesser degree Missouri, Michigan, Ohio, Indiana, and Minnesota. The insect has been known to reduce yields by up to 11% in highly infected fields. "Herculex is the only in-crop trait to control western bean cutworm effectively," says Kaehler.

A Focus on New Technologies

Companies are now focusing on the next generation of in-crop traits, intended to give more consistent efficacy and also a broader spectrum of insect control by stacking resistance traits along with herbicide tolerance. Herculex XTRA gives above and below-ground control of corn borer and rootworm as well as black cutworm and western bean cutworm. Agrisure has several new products, including Agrisure GT/RW which is available for 2007 planting, and two additional launches are anticipated for 2008.

"Insects will continue to adapt so we need to keep developing new products to address these adaptations," says Pilcher. As a result, some companies are working on new technologies that will hopefully increase the speed at which new products can be delivered to the marketplace. Monsanto's YieldGard VT or vector-stack transformation technology is designed to provide more consistent insect control. The VT technology allows for multiple traits to be inserted into the chromosome of one plant – avoiding the need to crossbreed two parents to produce a stacked-trait hybrid. As a result, the stacked-trait hybrid provides



Since Monsanto introduced its YieldGard Corn Borer trait in 1997, uptake by U.S. corn growers has increased from 2.3 million acres to 32.3 million acres by 2006.

In addition, adoption of its rootworm trait has increased from 400,000 acres in 2003 to 10 million acres in 2006.

more consistent protection. Monsanto's first VT product will be available for rootworm protection in 2007.


Syngenta recently received approval for its Agrisure RW with and without glyphosate tolerance. The company expects to receive regulatory approval for Agrisure CB/LL/RW in the next few months, and approval for Agrisure GT/CB/LL/RW for the 2008 planting season.

Secondary Pests

As farmers find solutions to controlling primary pests, the yield losses from secondary pests such as wireworm, black cutworm, and fall armyworm become more evident, so companies are working on a broader spectrum of control to manage these pests as well. While some products such as Herculex XTRA control black cutworm and western bean cutworm, future products are intended to provide control of a broader spectrum of insects such as a lepidoptera product by Syngenta and Monsanto's YieldGard VT Pro.

Farmer's Economic Choice

Kevin Steffey, Extension Entomologist with the University of Illinois, sums it up well. "A corn grower's planting decision rests on economics and agronomics. First and foremost, the farmer is looking for a hybrid that will be a high performer agronomically." Pilcher adds, "After addressing this issue, the farmer may select value-added in-crop traits that will help maximize that yield potential." Much of the latter decision depends on regional occurrences of insect pests, and convenience of the in-crop trait versus applying insecticides, while considering the additional costs of purchasing insect-resistant seed.

"It's all about the level of risk a grower is willing to take, and while more growers are moving towards single, double, and even triple-stacked traits, in part because some of the best hybrids are only available with these traits, the limitations may be paying for something they may not need or use," says Steffey. 

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