

In 2001, Bt Corn Technology Will Provide Rootworm Control At Root Zone

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LANDISVILLE (Lancaster Co.) — Beginning in 2001, about 1 percent of the corn acreage in the U.S. will be comprised of Bt corn that fights corn rootworm where it matters most — at the roots.

The Bt variety, marketed under unspecified variety names by a major seed producer, will be another transgenic corn tool to fight destructive crop pests. But producers need to keep in mind that transgenic corn coming out may not protect against black cutworm and other pests, according to Dennis Calvin, Penn State entomologist.

Calvin spoke to about two dozen crop management experts and industry representatives in mid-December at the first of a Penn State-sponsored two-day Capitol Region Crop Insect and Disease Management School at the Penn State Extension Southeast Regional Laboratory near Landisville.

If corn producers are to use the new Bt varieties, it's possible they'll need other insect-type controls using standard chemical treatments or in combination with an overall industry approved integrated pest management (IPM) program.

Today's varieties of Bt corn do not control black cutworm and provide little control of stalk borer, fall armyworm, or corn earworm.

The new corn rootworm Bt "stacked" varieties, noted Calvin, would be expressed at the larvae stage of the corn rootworm.

Penn State tested a variety of corn rootworm Bt this past year. Unfortunately the drought wiped out the rootworm population, though "what we did have looked good," said Calvin. The control was the same as other standard soil insecticide programs, though using the Bt type controls could push costs slightly higher. It's not clear yet what the premium costs could be. More work is necessary, he noted, at the Penn State Rockspring research farm and at a private farm where testing is under way.

Calvin and other crop management experts provided an introduction to the philosophy of pest management through IPM at the school.

The use of Bt corn as part of a program has raised some concerns over the Monarch butterfly controversy. Lab studies indicated that it is possible the pollen from Bt corn can kill Monarch butterflies, and industry and academia has been under heavy criticism from the public.

Calvin said he spent time at two conferences this fall, including two days in Chicago, reviewing the Bt and Monarch butterfly controversy. Apparently, the Bt 176 type can have a 10-fold expression in the corn pollen, yet only 1-2 percent of the Bt corn planted uses this type. The Bt 176 type only expresses up to eight yards from the edge of a field. More field studies of the effects of the Bt corn on the butterflies may be needed.

Favorite pollen-feeding plant species for the Monarchs are milkweed and dogbane. In Iowa and Illinois, milkweed grows on the roadways. A milkweed variety in Kansas, Blue Vine, is a really good host for the butterflies.

Much of the information about the potential toxicity of Bt to the butterflies has been "taken out of context to stir something up," Calvin noted. But the controversy has allowed the industry to step back and reexamine other, more "holistic" ways, friendly to the environment, to control pests.

Calvin referred to the programs outlined in the Penn State-issued Field Crop IPM Guide, available for \$75 from the Capitol Region Extension Agronomy Team. More detail about the program is available by contacting Del Voight at the Lebanon extension office at (717) 270-4391.

For now, growers have



Several crop insect and disease management experts spoke to about two dozen crop management experts and industry representatives in mid-December at the first of a Penn State-sponsored two-day Capitol Region Crop Insect and Disease Management School at the Penn State Extension Southeast Regional Laboratory near Landisville. From left, looking over a predator beetle model, John Ayers, Del Voight, and Dennis Calvin.

embraced the Bt corn, which uses a natural biological control embedded in corn genes, to control the European corn borer. The industry has "made a lot of strides in the genetic method of pest management," said Calvin. But with those advances have come new strategies to ensure its long-term effectiveness and viability.

IPM emphasizes taking a look at the crop grown, the rotation, the cultural practices, the soil and environment types, consistent scouting, and understanding effective timing and application of pesticides. Producers must look at the economics of the use of different technologies to see if they'll be useful.

Finding that "economic threshold," Calvin noted, is key. The issue is, "when do I treat to get the most effective control?" Fact is, the economic thresholds are "not based on as much science as we think," Calvin noted.

For example, for the corn leaf aphid, the threshold is 25 aphids per foot of row in the fall, or 100 aphids per foot of row in the spring.

To find those thresholds, a computer spreadsheet program was shown at the school.

In the past, to control the corn borer, no economic treatments were available in the region. Only a small percentage of growers could justify using standard treatments. But with Bt corn, the borer became an economic concern, now that technology has arisen to treat it, according to Calvin.

"This changed the economics of managing the pest, because we have a tool that does a much better job," noted the Penn State entomologist. Bt corn offers almost complete control of the pest under good growing conditions.

Calvin noted several resources for producers. If there is one book that offers a complete index of information from iden-

tification to insect biology, he recommended the reference, "Handbook of Corn Insects," available from the Entomological Society of America (Landham, Md., 1999, 174 pp., \$35, ISBN 0-938522-76-0, 301-731-4535). For corn reference, if there was one book to identify insect pests, "this would be it," he said.

For soybeans, Calvin recommended the "Handbook of Soybean Pest Insects," available from the society (1994, 142 pp., \$25, ISBN 0-938522-29-9).

Penn State has its own IPM Website at www.fra.cas.psu.edu/

Calvin also recommends the "Penn State Agronomy Guide," also available on the Web at <http://agguide.agronomy.psu.edu/>

Del Voight, crop team member and Lebanon extension agent, and John Ayers, Penn State plant pathologist, reviewed ways to diagnose dis-

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