

MANAGE RESISTANCE *Now*

Protect your land, one field at a time

CASE STUDY

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Climate change and pest migration expected to increase insecticide resistance

While Canadian growers aren't dealing with insecticide resistance to the same extent as those in the Corn Belt in the midwestern United States (U.S.), Tracey Baute predicts insecticide resistance is going to increase in the future, so we need to proactively manage it now.

As the Field Crops Entomologist for the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), Baute works with growers of every major field crop in the province, such as soybean, corn, alfalfa, dry bean, canola and cereals, and has dealt with just about every pest affecting those crops. Some of the pests are native and have expanded their range, and others are invasives from other areas. For both, proactive management strategies need to be found.

"In Ontario we have a three-crop rotation so we can avoid some mechanisms of resistance just by using cultural methods. At the same time, new pests come (i.e., western bean cutworm) that require foliar pesticides," says Baute. "In field crops, there's a perception that resistance isn't an issue, because growers can usually only afford to apply once annually."

Even though there is a perception that insecticide resistance isn't an issue, Baute says she is seeing evidence of it. One factor contributing to resistance development is that although insecticides are generally only applied once per year on field crops, some growers tend to spray the same active ingredient year after year. Adding to this repeated exposure of insects to the same active ingredient, the changing climate is allowing pests to expand their geographical ranges. For example, corn earworm, a major pest of corn and cotton in the U.S., blows into Ontario annually from the southern U.S. and is already resistant to active ingredients used in Canada, like pyrethroids.

In addition, in the U.S., the corn earworm is building resistance to *Bacillus thuringiensis* (Bt) genes, both the seed trait and a foliar spray, so the pest has already been exposed to all of the tools available to Canadians. Corn earworm can't yet overwinter in Ontario, but with climate change bringing warmer winter temperatures it may be able to soon. This would allow pests to survive from one season to the next, encouraging resistance development since they were already exposed to control methods used during the previous season.

Monitoring foliar insecticide resistance a challenge

Tracey says resistance to Bt corn has posed the biggest insect resistance problem in Ontario. “OMAFRA is keeping an eye on the different traits that control corn insect populations to see if they’re still susceptible to the traits. There are some instances of resistance emerging.”

Corn earworm blows in annually from the southern U.S. and is already resistant to active ingredients like pyrethroids because they are used in areas the insect came from.

It’s more challenging to monitor resistance to foliar applied insecticides than transgenic¹ traits like Bt. “Some things could be mistaken for resistance developing: insecticide application issues, spray mechanisms or a rate used that didn’t target the pest properly. There are lots of unknowns that can’t be followed up on, especially if growers don’t find out until months after application that they didn’t get the control they wanted,” says Baute.

Western bean cutworm and corn earworm both show resistance to Bt traits, which indicates that they have the potential to also develop resistance to foliar sprays. Therefore, foliar insecticides need to be rotated too.

Based on her work with growers around the province, Baute says that while they are probably less concerned about insect than weed resistance, they do recognize that it’s important in scenarios where there are not enough effective insecticide groups to rotate.

Spider mites are one example – since there is only one active ingredient currently registered for spider mites on soybeans, there is no way of rotating products. This makes preventing resistance that much more crucial.

Use multiple strategies to preserve effective tools

There are several best management practices that Baute recommends to growers: scout early and often, apply insecticides only when the pest is both present and has reached thresholds, use cultural practices like crop rotation, and rotate insecticide groups. “If possible, switch up chemicals annually even if it costs a bit more. It will cost more in the long run if we lose the tools in the toolbox.”

Baute also encourages growers not to solely rely on insecticides but to use biological controls when possible. “In soybeans, growers have become very aware of how much natural enemies can do for them, and are willing to hold off on spraying for them to work.”

“Eventually we may need to bring in new technologies like using pathogens or viruses instead of just using synthetic pesticides if we’re going to overcome resistance. It may take more time and effort and it will not always be 100 per cent effective, but it will extend the time these tools are effective.”

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For more information, visit ManageResistanceNow.ca

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¹ Transgenic plants contain a gene or genes from another organism inserted into the host plant. Bt corn varieties, for example, contain a gene from a bacterium (*Bacillus thuringiensis*) found in the soil that causes the transgenic corn to produce an insecticidal protein.