

Seed mixtures and insurance pest management: Future norm in the Corn Belt?

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As the use of biotechnology increases and more companies move forward with the U.S. Environmental Protection Agency's approval to begin full-scale commercialization of seed mixtures in transgenic insecticidal corn, many researchers believe pest monitoring will become even more difficult.

"Seed mixtures may make insect resistance management (IRM) risky because of larval behavior and greater adoption of insecticidal corn," said David Onstad, professor in the Department of Crop Sciences at the University of Illinois and lead author in a recent article published in the *Journal of Economic Entomology*.

On the other hand, Onstad said block refuges present a different suite of risks because of adult pest behavior and the lower compliance with IRM rules expected from farmers.

"It's likely that secondary pests not targeted by the insecticidal corn, as well as natural enemies, will respond differently to block refuges and seed mixtures," Onstad said.

The risk management approach to corn pest management has provided tangible benefits to producers in corn-producing regions where target pests were once abundant. For example, Bt corn hybrids have helped to greatly reduce the number of European corn borers, the authors said.

"However, the risk management approach tends to ignore many aspects

of IPM, such as monitoring pest levels and concentrating treatments when or where appropriate, because there is an assumption that most pests are controlled throughout the season, regardless of pressure levels," he said. "Although field corn has never been considered an IPM-intensive [cropping system](#), there is less impetus than ever for growers or crop consultants to enter fields."

Onstad said that growers will also have fewer choices in what hybrids they grow in their fields. Experts in [integrated pest management](#) are concerned that some seed companies will provide fewer options for regional needs, secondary pests, disease control and refuge plantings.

Onstad and the collaborating authors also questioned whether pyramided toxins would actually increase mortality in targeted pests.

"Without this increase in mortality through independent activity of each toxin, the pyramid has much less value for IRM," he said. "EPA recently acknowledged that a corn hybrid pyramided with two toxins active against corn rootworms does not significantly increase larval mortality."

Mike Gray, U of I Extension entomologist, said this research is important for stakeholders to consider as the industry transitions to the new paradigm of 95 to 5 seed blends across the Corn Belt.

"A significant consequence of the seed mixture infrastructure emerging within the corn insect protection arena is increasing pressure on the long-term sustainability of the soil insecticide market," Gray said. "As the number of refuges configured as blocks, strips, or separate fields declines, soil insecticide use should also be reduced. Ultimately, loss of soil insecticide products will result in reduced flexibility of producers to effectively manage economic infestations of white grubs, wireworms, and other soil insects."

In addition, if resistance develops to Bt hybrids and becomes widespread, growers will need to have some remaining tools to manage insect pests of [corn](#), Gray added.

"It remains to be seen whether some groups within the agribusiness sector will maintain their investments in this competitive arena just in case resistance develops or to offer products targeted against secondary soil insect pests," Gray said.

More information: Onstad's research, "Seeds of change: Corn seed mixtures for resistance management and integrated pest management," was published in the Journal of Economic Entomology.

Provided by University of Illinois at Urbana-Champaign

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