Insect resistance to Bt crops can be predicted, monitored and managed

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Since 1996, crop plants genetically modified to produce bacterial proteins that are toxic to certain insects, yet safe for people, have been planted on more than 200 million hectares worldwide. The popularity of these Bt crops, named after the bacterium *Bacillus thuringiensis*, comes from their ability to kill some major pests, allowing farmers to save money and lessen environmental impacts by reducing insecticide sprays.

However, since insects can evolve resistance to toxins, strategies must be implemented to ensure that Bt crops remain effective. A new study published in the December issue of *Journal of Economic Entomology* entitled "Field-Evolved Insect Resistance to Bt Crops: Definition, Theory, and Data" (http://www.entsoc.org/btcrops.pdf) analyzes insect resistance data from five continents, as reported in 41 studies, and concludes that existing theories and strategies can be used to predict, monitor, and manage insect resistance to Bt crops.

According to lead author Dr. Bruce E. Tabashnik, "Resistance is not something to be afraid of, but something that we expect and can manage if we understand it. Dozens of studies monitoring how pests have responded to Bt crops have created a treasure trove of data showing that resistance has emerged in a few pest populations, but not in most others. By systematically analyzing the extensive data, we can learn what accelerates resistance and what delays it. With this knowledge, we can more effectively predict and thwart pest resistance."

Among the authors' conclusions are:

- The refuge strategy (growing non-Bt crops near the Bt crops) can slow the evolution of insect resistance by increasing the chances of resistant insects mating with non-resistant ones, resulting in non-resistant offspring.

- Crops that are "pyramided" to incorporate two or more Bt toxins are more effective at controlling insect resistance when they are used independently from crops that contain only one Bt toxin.

- Resistance monitoring can be especially effective when insects collected from the field include survivors from Bt crops.

- DNA screening can complement traditional methods for monitoring resistance, such as exposing insects to toxins in the lab.

- Despite a few documented cases of field-evolved resistance to the Bt toxins in transgenic crops, most insect pest populations are still susceptible.

With Bt crop acreage increasing worldwide, incorporating enhanced understanding of observed patterns of field-evolved resistance into future resistance management strategies can help to minimize the drawbacks and maximize the benefits of current and future generations of transgenic crops.

Source: Entomological Society of America (news : web)

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