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Brighter Side of Genetically Modified Crops?

The debate about the environmental impacts of genetically modified crops continues to be highly controversial. While growing evidence highlight that introduction of genetically modified crops could have negative impact on the wildlife, a recent literature review suggests that such crops could improve soil management techniques without threatening biodiversity.

Ten years after genetically modified (GM) crops were first cultivated for commercial purposes, the public debate on the use of GM organisms in seeds, crops, and food continues to be highly polarised. Several studies suggest that natural genetic diversity of crop species could be harmed by the introduction and commercial cultivation of GM crops. But other studies suggest that GM crops such as those developed to allow better targeting or lower usage and inputs of agrochemicals may have potential benefits for wildlife, particularly if their use results in less intensive and more sustainable agricultural practices in general.

In a recent review, a Swiss researcher has summarised the methods and the conclusions of several studies focused on the impact of the introduction of GM crops on soil management practices and biodiversity.

The author beings with a review of case studies concerning the consequences of GM crop introduction on soil tillage. Soil tillage is a technique widely used for the control of weeds. Unfortunately, soil tillage can lead to soil degradation and harm biodiversity. The study pointed out that the use of herbicides and the development of herbicide-resistant GM crops can limit farmer dependence on soil tillage. Recent polls have also suggested that the introduction of cotton and soybean GM crops in North America contributed to reduce tillage and to improve soil fertility.

Other reported studies suggested that the use of GM crops that produce bacterial toxins could enable a more specific management of weeds and insect pests, and thus limit detrimental effects on non targeted species. In particular, no significant impact on species diversity or community structure was detected in GM corn, cotton, and potato fields, in contrast to fields sprayed with conventional chemicals.

A controversy has emerged on the potential toxicity of GM corn crops expressing a toxin called “Bt” on the Monarch butterfly larvae. Despite previous contradictory results, the author points out that the most recent studies did not indicate any toxic effects of the toxin on the Monarch larvae.

The last reported case is the Farm Scale Experiments (FSE), a three-year-long study on three genetically modified herbicide-tolerant (GMHT) crops in the United Kingdom. This study revealed that biodiversity equilibrium was modified in GMHT beet and canola fields. However, the author underlines that this observation has not been reproduced in GMHT maize fields. He also highlights that all the FSE data were not available and that improvements of soil management techniques were not all applied in this study.

On the whole, the author concludes that the use of GM crops, combined with appropriate field management techniques, could enable the gain of new traits in traditional crops without threatening biodiversity. However, it should be noted that the scientific community is not yet in a position to give a definitive answer as to the dangers of GM crops because of a lack of long-term experience. In this context, the decision making related to this issue should be based on effective scientific assessments of the health and the environmental impacts of each genetically modified organism released in the environment.

Source: Ammann K. (2005) “Effects of biotechnology on biodiversity: herbicide-tolerant and insect-resistant GM crops”, Trends Biotechnology 23(8): 388-394.
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