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Perspective

Genetically Modified Crop Technology for Improving Quality of Crop Production

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DESCRIPTION

Over the course of its decades-long use, Genetically Modified technology (GM) has been widely used on a variety of crops, with variable degrees of success. The incorporation of genes from the soil bacteria *Bacillus thuringiensis* (Bt) for defense against destructive insect pests is one of the more fruitful and commonly utilized uses of GM technology. Due to their toxicity to some insects, plants that have been genetically edited to produce the Bt crystalline (Cry) protein are resistant to insect infection and actively reduce pest populations. There are now around 70 major subgroups of Cry proteins. Only a small portion of the Cry proteins, nevertheless, have been included into Bt crops.

The cultivation of GM Bt maize would endanger traditional and organic farming as well as affect European biodiversity. Despite this, there is a chance that large-scale cultivation of Genetically Modified (GM) insect-resistant maize may occur in Europe since businesses are proposing new GM Bt maize types for EU approval. Toxic effects on beneficial and non-target creatures, such butterflies; long-term effects on the health of the soil and rivers; and effects on environmentally friendly farming methods are only a few possible consequences on the natural and agricultural ecosystems. The limited amount of GM Bt maize planted in Europe is already contaminating non-GM crops, making coexistence with non-GM crops untenable.

The term "Bt" refers to the ubiquitous soil bacterium *Bacillus thuringiensis* (Bt), so named because it was originally discovered in the German state of Thuringia. The cotton bollworm and Asian and European corn borers are two prevalent plant pests whose infestations have severe impacts on major crops. Bt releases a protein that paralyzes the larvae of these damaging insects. The Bt protein, when consumed by the larva of the target insect, activates in the alkaline conditions of the stomach and punctures the mid-gut, rendering the insect incapable of feeding. Within a few days, the bug passes away. Much work is being done to maximize the organism's agronomic usefulness because of its capacity to manufacture the insecticidal protein. More than 200 different forms of Bt proteins have been discovered so far, all of which can be harmful to different insects to differing degrees.

An essential step in the approval process is the assessment of any new technology's possible risks and drawbacks. Risk, which is a result of the likelihood and effects of a danger, may be used to weigh hazards. Due to the fact that this idea is generically applicable to practically any subject, risk assessment has been used as a tool by many technological domains, including agricultural genetic engineering. Before a new technology is widely used, it is essential to take into account any potential negative effects. The assessment of GM crops is similar. Bt crops that have been genetically engineered have been the focus of extensive scientific analysis employing risk assessment approaches. Since dietary exposure to Cry proteins in people and animals and the environmental effects of Cry proteins on non-target species are two of the main concerns surrounding Bt maize, risk assessment of these two issues will be the main topic of the discussion that follows.

The current analysis concentrates on Bt maize since it is the only GM crop now of economic consequence for Europe, it is the most frequently cultivated insect-resistant GM crop globally, it was among the first GM crops farmed commercially and has therefore been the subject of numerous scientific investigations. The evaluation includes non-target animal field data because, regardless of whether the underlying impacts are direct or indirect, expected or unexpected, a decline in populations of valuable creatures may cause environmental harm. In addition to the imported Bt proteins' potential toxicity, consequences of the Bt crops' absence of target species on the food web and modifications to plant physiology or crop management techniques may also have an impact.

The usage of GM crops has been increasing widely for about 20 years now. According to the growing trend, adopting one or more GM characteristics offers farmer's real benefits that help them offset increased seed costs. Many researches have examined the effects of switching to GM crop types on labor, costs, and

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yields. Particularly, it has been demonstrated that plant-incorporated defines employing Cry protein genes is successful at suppressing harmful insect populations, including many of those that threaten crops of economic importance in developing nations, such as maize and cotton. The deployment of GM crops would be postponed in nations without biosafety standards, nevertheless, in order to address the consequences of climate change and population pressures.