

**Comments on Recent Reports Involving Plants Engineered to
Protect Them from Insect Attack**

Congressional Testimony

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In Shakespeare's *Henry IV Part Two*, the play begins with a character called Rumor. Rumor announces that at the battle of Shrewsbury, Hotspur has triumphed, but the audience soon learns that this is only a false rumor because, in fact, Hotspur was not only defeated but killed. The rest of the play describes a chaotic series of events resulting from this false rumor. While we might find such dramatic themes entertaining in literature, rumors can have profound consequences in the real world of science and public policy.

Recent articles on plants engineered to express proteins of *Bacillus thuringiensis* (Bt) for insect control have created a modern drama of sorts. A recent short correspondence in *Nature*¹ about a laboratory study in which pollen from Bt-transgenic corn was fed to Monarch butterflies has attracted considerable coverage in the popular press and led to dramatic shifts in policies including possible trade restrictions by Japan, freezes on the approval process for Bt-transgenic corn by the European Commission (Brussels), and calls for a moratorium on further planting of Bt-corn in the United States.² Was this reaction justified based on what can only be considered a preliminary laboratory study? Absolutely not!

Serious questions have been raised about this study,²⁻⁵ but once it was published it became a rallying cry against Bt plants. It seems no one paid any attention to subsequent statements by the author, such as, "Our study was conducted in the laboratory, and it would be inappropriate to draw any conclusions about the risk to Monarch populations in the field based on these initial results."⁴ Once this story hit the press, however, the "bell could not be unring," and we are now at risk of losing a technology that many of us believe is a safer and more environmentally responsible method of managing insects.

Bt corn is designed to manage insect pests like the European corn borer, which annually costs US growers >\$1 billion. Larvae of this pest bore into the stalk or ear of the plant, and it is extremely difficult to control the insect with conventional sprays. However, when a corn plant has been modified to express proteins of Bt, proteins that have been used for > than 40 years as an "organic insecticide," the insect is controlled very effectively. Bt corn can help farmers produce up to 15% more grain and significantly lower the likelihood of mycotoxin contamination.^{6,7} Additionally, parasites and predators are conserved, and there is essentially no risk to farmworkers.

But what about the Monarch? The only field study to date⁸ indicates that Bt pollen is not dispersed widely and that Monarch larvae probably don't encounter such high concentrations of Bt pollen as were used in the laboratory study. Furthermore, milkweed is considered a weed, which occurs most commonly in pastures and old fields, not in corn fields. I think it is safe to say that scientists believe that Monarch populations are not at serious risk because of Bt corn pollen. And besides, if Bt pollen is shown to be a problem, then borders of non-Bt-corn can be planted around the field to reduce the movement of Bt pollen. This planting strategy would also be in line with an EPA mandate for an insecticide resistance management program, and thus be a win-win situation. But these arguments have not garnered the headlines that the preliminary laboratory study on Monarchs has, and Shakespeare's Rumor continues to have a field day.

Another short research note recently appeared in the journal *Nature*,⁹ but this time the insect was the pink bollworm, a major pest of cotton in the southwest US. This insect is difficult to control with conventional technology, but it is effectively controlled by Bt cotton. Much to the chagrin of the authors, the media pounced on this study and turned it into another claim that Bt plants are inappropriate and doomed. The authors of this paper have not been pleased with this distorted view of their paper.

Not everyone in the scientific community thinks that these papers, only preliminary in nature, should have been published without further studies, and I think that there is strong consensus that the media has distorted the truth. In a recent op-ed piece in the *Washington Times* entitled "Butterflies Bearing Grenades,"⁹ John Foster from the University of Nebraska states that both the Monarch study and the pink bollworm study were "hyped by activists and exploited for headline values, and both left the erroneous impression that science had overlooked something important in the potential risks of biotechnology."

Many of us entomologists, including those of us who were so strongly influenced by Rachel Carson's *Silent Spring*, see this technology as an advantage over conventional methods and think that we can use it wisely. As scientists and policy makers, we should not be so easily swayed by preliminary laboratory reports and the media. We can not afford to be an ignorant society on these important new technologies and fall victim to false Rumor.

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