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Preventing mycotoxin contamination of corn through biological control and transgenic insect protection

Corn is a global food and feed staple, totaling over 1 billion metric tons annually and the crop in the United States alone was valued at over $50 billion US dollars. This commodity can be infected with fungal plant pathogens in storage or while growing in the field. Such fungal contamination is a serious threat because some fungi may contaminate the grain with mycotoxins. The mycotoxin of greatest concern in corn production is aflatoxin, a secondary metabolite of some strains of *Aspergillus flavus* and other *Aspergillus spp*. Fumonisin, produced by *Fusarium verticillioides*, is another mycotoxin that is important in certain environments. These secondary metabolites may lead to the grain being rejected and add expense to grain processing and marketing. A number of field studies, particularly in the Southern U.S., have validated the use of biocontrol fungi to prevent aflatoxin contamination. For example, a three-year, fourteen site experiments demonstrated a $200 per hectare increase in net returns by using a product for the biocontrol of aflatoxin. Other studies have examined the transgenic insect protection, such as Bt corn, to prevent fumonisin contamination, by reducing damage from Lepidopteran insects and subsequent opportunistic fungal infections. More recently, improved transgenic corn hybrids have greater than 90% reduction in earworm (*Helicoverpa zea*) damage and a 60% reduction in fumonisin compared to isogenic hybrids without insect protection. The threat of mycotoxin contamination is highly variable and difficult to predict, but it may be possible to use biological control with transgenic insect protection to provide broad and robust protection from mycotoxin contamination in corn.

Biography

Mark A Weaver has published research papers on cover crops, microbial herbicide metabolism in soils and wetlands, and biological control of weeds. His work includes development of biocontrol strains of *Aspergillus flavus* and the post-release tracking of biocontrol agents. Presently he is developing molecular tools for landscape-scale monitoring of *A. flavus*.

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