Transgenic Cotton and Disease Resistance Genes

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Success in conventional breeding for resistance to mycotoxin-producing or other phytopathogenic fungi is dependent on the availability of resistance gene(s) in the germplasm. Even when it is available, breeding for disease-resistant crops is very time consuming, especially in perennial crops such as tree nut crops, and does not lend itself ready to combat the evolution of new virulent fungal races. While it is possible to identify a few genotypes of corn or peanuts that are naturally resistant to *Aspergillus* it is not known whether these antifungal factors are specific to *A. flavus*. In addition, the resistance is often a polygenic trait as in the case of corn. In crops such as cotton, there are no known naturally resistant varieties to *Aspergillus*. Availability of transgenic varieties with antifungal traits will be extremely valuable in cotton breeding. Disease resistant transgenic crops would not only control mycotoxin-producing organisms such as *Aspergillus* or *Fusarium* spp., but also several other microbial (fungal, bacterial, and viral) diseases which cause significant economic losses in crop production. Above all, transgenic crops resistant to aflatoxin producing fungi offer not only the promise of negating the adverse effects caused by the toxin on immuno-compromised humans and animals, but they also provide environmentally safe alternatives to the current practices of using chemicals and pesticides. With the current information available with respect to proteomics of host and genomics and field ecology of the fungus, novel strategies for aflatoxin contamination will emerge based on a clear understanding of the toxin biosynthesis and contamination processes, especially at the molecular level. Details will be given on available native, heterologous or synthetic genes that are effective against mycotoxigenic fungi and other plant microbial pathogens, especially in cotton where they are sorely needed. Recent advances in cotton biotechnology will be presented. In addition, control of preharvest aflatoxin contamination made through conventional breeding and genetic engineering in selected crops vulnerable for contamination will also be presented.