Biocontrol of Aflatoxin

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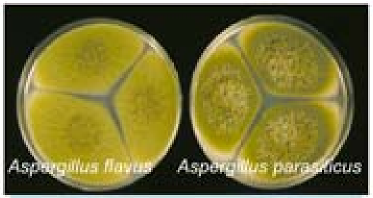

Molds that can produce aflatoxin in nut crops in California

INTRODUCTION

Aflatoxins, produced by *Aspergillus flavus* and *A. parasiticus*, are the most potent liver carcinogens and are widely regulated by governments who have set very low tolerances for aflatoxins in food and feed. The almond industry has taken extensive successful measures to control aflatoxin. The focus of this research is to provide background for obtaining an Experimental Use Permit (EUP) and ultimately an almond registration for the atoxigenic *Aspergillus flavus* strain AF36 to use as a biocontrol agent to reduce aflatoxin potential in the orchard. AF36 is currently registered and being used successfully in other crops.

AF36 product needs irrigation to produce spores

PROCEDURES

The research procedures are described very briefly in the legends of the poster's Figures.

CONCLUSIONS

1. The atoxigenic strain AF36 became the dominant strain in the soil where the AF36 product was applied.
2. The atoxigenic strain AF36 persisted well in the soil for 2 years after application.
3. No increase in nut decay was observed after application of the AF36 product.
4. The sorghum-AF36 product shows promise as an alternative to the wheat-AF36 product.
5. New VCGs (vegetative compatibility groups) of atoxigenic *A. flavus* are potential resources to register biocontrol mixtures.

AF36 in a Research Almond Orchard

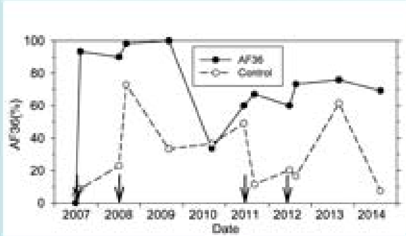

Figure 1. Percentage of *Aspergillus flavus* isolates belonging to the atoxigenic strain AF36 for isolates from soil collected from areas treated with the wheat-AF36 product or from untreated areas. Arrows indicate dates for application of the AF36 product.

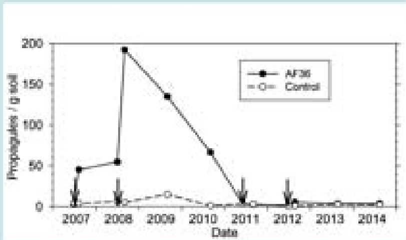

Figure 2. Density of *Aspergillus flavus* in soil collected from areas treated with the wheat-AF36 product or from untreated areas. Arrows indicate dates for application of the AF36 product.

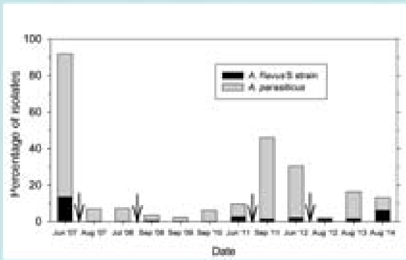

Figure 3. Percentage of *Aspergillus flavus/A. parasiticus* isolates that are the aflatoxin-producers *A. parasiticus* and *A. flavus* S strain for isolates from soil from areas treated with the AF36 product. Arrows indicate dates for application of the AF36 product.

Use of Sorghum for AF36 and new strains

Sorghum-AF36 product

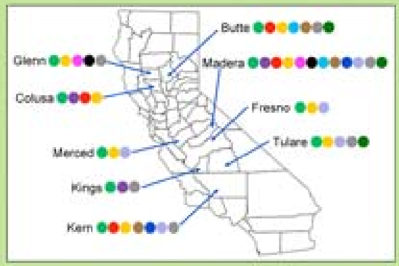

Figure 4. Occurrence of *A. flavus* atoxigenic vegetative compatibility groups (VCGs) in almond-growing counties of California. Each circle represents a VCG. The most common VCG, AF36, was detected in all examined counties. These VCGs are potential resources to register a biocontrol mixture for almond aflatoxin mitigation across California.

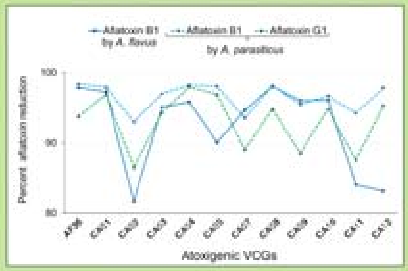

Figure 5. Aflatoxin reduction ability of isolates belonging to atoxigenic VCGs endemic to California when co-inoculated with highly toxigenic isolates of *A. flavus* and *A. parasiticus* on viable almond kernels under laboratory conditions. In all cases, well over an 80% reduction in aflatoxin accumulation was observed in comparison to aflatoxin accumulated in almond kernels inoculated with a toxigenic isolate alone.