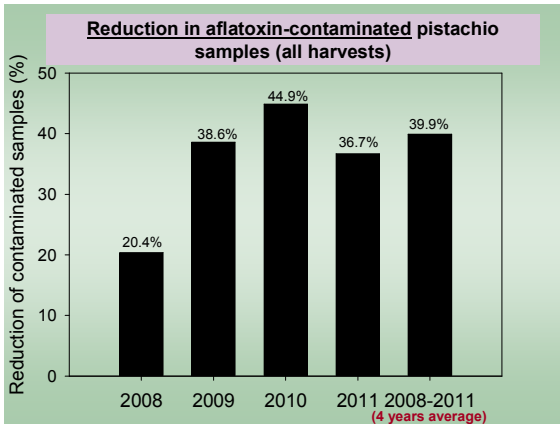


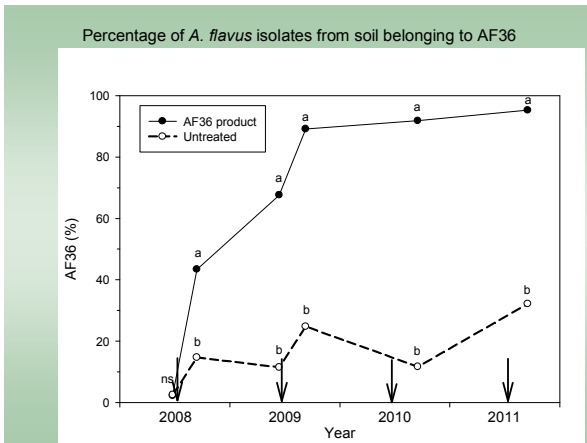
## How Do We Know That AF36 Works?

Extensive field testing on 3,000 acres of pistachios in 2008 through 2011 conclusively demonstrated:

1. AF36 was effective in displacing other strains of fungus that produce aflatoxin.
2. AF36 tends to build up in orchard soils with annual applications.
3. AF36 applications do not result in increased levels of kernel decay.
4. Nuts from AF36 treated orchards are less likely to be contaminated with aflatoxin than those from untreated orchards.



Reduction in aflatoxin contamination in pistachios following treatment with AF36.



Build up of AF36 in soil over time following annual treatments 2008 through 2011.

## What Results and Benefits Can I Expect?

AF36 does not directly reduce aflatoxin; it competitively displaces other fungi (*A. flavus* strains) that do produce aflatoxin. As a result, use of AF36 acts to change the community profile of fungi associated with the treated crop so that the atoxigenic strain (AF36) becomes very common and the incidence of aflatoxin producers is greatly reduced. It has been observed that influences of AF36 treatments extend beyond the treated crop. AF36 treatments may provide beneficial displacement even in orchards adjacent to those treated and over multiple years. Cumulative effects may thereby result especially in areas undergoing an area wide aflatoxin management program. Because background aflatoxin levels vary greatly from year to year, best results are achieved where single applications of AF36 are made annually, according to the label.

## For More Information Contact:

Arizona Cotton Research and Protection Council (Manufacturer)  
602-438-0059 [WWW.AZCOTTON.ORG](http://WWW.AZCOTTON.ORG)



Arizona Cotton Research and Protection Council

# UTILIZING AF36 TO MANAGE AFLATOXINS IN PISTACHIOS





## Aflatoxins: Costly Contaminants in Pistachios

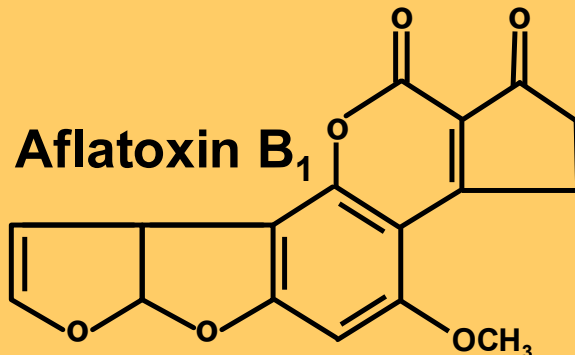


Aflatoxins are toxic chemicals produced by various strains of the common fungi *Aspergillus flavus* and *Aspergillus parasiticus*. Aflatoxins cause cancer in certain experimental animals at very low concentrations (1 part per billion). Aflatoxins are also associated with human liver cancer.



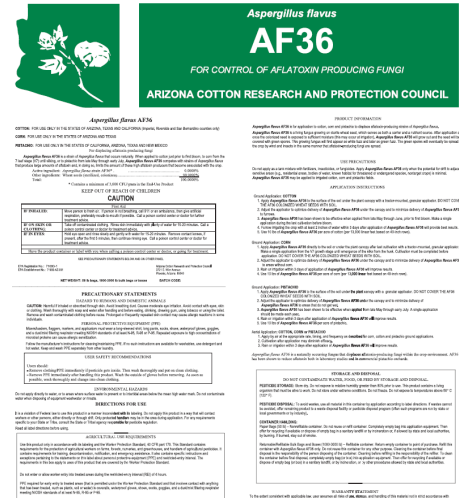
Governments around the world regulate the quantity of aflatoxins allowed in foods and feeds. In the U.S. the aflatoxin content of food must be below 20 ppb (parts per billion). Crops such as pistachios with normally low but detectable levels of aflatoxin may have a trading disadvantage in competitive markets worldwide. Higher toxin levels result in deep domestic discounts or may even render the crop unmarketable.

ppb (parts per billion) means 1 part per billion (or microgram per liter) and corresponds to 1 second in 32 years, 1 penny in \$10 million, 1 inch in 16-thousand miles, 1 pinch of salt in 10-tons of potato chips or 1 bad apple in 2-million barrels.

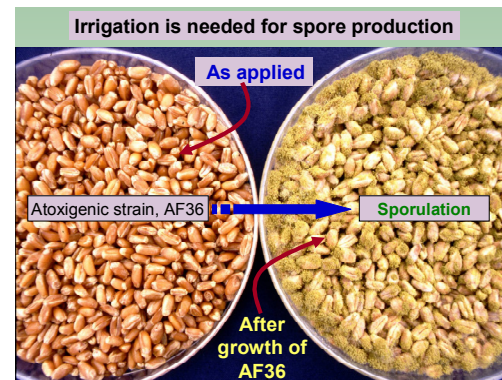


## What is *Aspergillus flavus* (AF36)?

AF36 is a strain of *Aspergillus flavus* that occurs naturally but does not produce aflatoxin. When AF36 is applied to pistachio orchards at the appropriate time, it actually competes with other strains of *Aspergillus flavus* that do produce large amounts of aflatoxin and, in doing so limits or reduces the amount of these high aflatoxin producers that become associated with the crop. Because AF36 is a living biological control agent, it functions best under moist sheltered conditions out of full direct sunlight.



### How AF36 acts in the orchards



AF36 is a fungus grown on sterilized wheat seed (or sorghum) which serves as both a carrier and a nutrient source for fungal growth.

After application and once the colonized seed is exposed to sufficient moisture (i.e. irrigation, rainfall, etc.), AF36 will grow out and the carrier seed will be covered with green spores. The growing fungus will first appear as white fuzz and later as green fuzz. The green spores will eventually be spread to the crop by wind and insects in the same manner that aflatoxin producing fungi are spread. Once in place AF36 acts to competitively displace aflatoxin producing strains.

### How is AF36 best applied?

AF36 is best applied by ground in the tree line wet zone where either drip lines or micro sprinklers are placed. ATV's equipped with adapted ant bait spreaders have proven to be an effective and inexpensive means of application. An application rate of 10 lbs. of AF36 per planted acre is recommended.

