

Biological Control of *Aspergillus flavus* Using Saprophytic Yeasts

Sui Sheng T. Hua
USDA-ARS, Western Regional Research Center
Albany, CA

Introduction

The project is to apply certain strains of saprophytic yeast to almond orchard for reducing the population of *Aspergillus flavus*. The major aflatoxin-producing fungus, *A. flavus* has a broad ecological niche and can reproduce copiously. Attempts to implement any control strategy necessitate a better understanding of the fungal populations in these orchard environments, because pathogen populations evolve in response to changes in their environment. It is essential to characterize the fungal pathogen populations in orchards in order to identify the sources of fungal infection, to determine the appropriate control strategies, and eventually to evaluate the efficacy of control strategies implemented in the orchards.

Several hundreds of yeasts have been screened by a visual bioassay developed in my laboratory. A few species of yeasts have been shown to be effective in inhibiting both the growth of *A. flavus* and aflatoxin production. The screening is a continuing process in order to find suitable biocontrol agent effective for various geological and environmental conditions as well as for a variety of almonds.

Experiments on isolation of *Aspergillus spp.*

Plant materials such as flowers, leaves and almond fruits and defective almonds (almond

fruits defectively developed) were collected from the orchard and placed on selective media for the presence of *A. flavus* and, *A. ochroceus*. The fungi were isolated in pure cultures for further characterization. These two fungi were detected in 6% of the samples for *A. flavus* and 8% of the samples for *A. Ochroceus*. Insect damaged nuts had a very high percentage of *A. flavus*. 58% of the nuts had *A. flavus* on them.

Experiments on biocontrol of *Aspergillus flavus* by yeast on almond leaves.

The interactions of one strain of effective yeast and *A. flavus* were further investigated. Cultural filtrate of this yeast delayed spore germination and inhibited the growth of hyphae. The effect of this yeast on the growth of *A. flavus* on almond leaves sterilized by autoclave was evacuated. The yeast grew and persisted on the plant materials. Spore production of *A. flavus* was reduced by 60-90% in the presence of the yeast in several independent experiments. The number of viable spores was determined by colony forming unit (CFU) on nutrient agar plates.

Production of yeast for application in almond trees

Scientists from AgraQuest were contacted to grow sufficient yeasts for field application. It is in the planning stage.

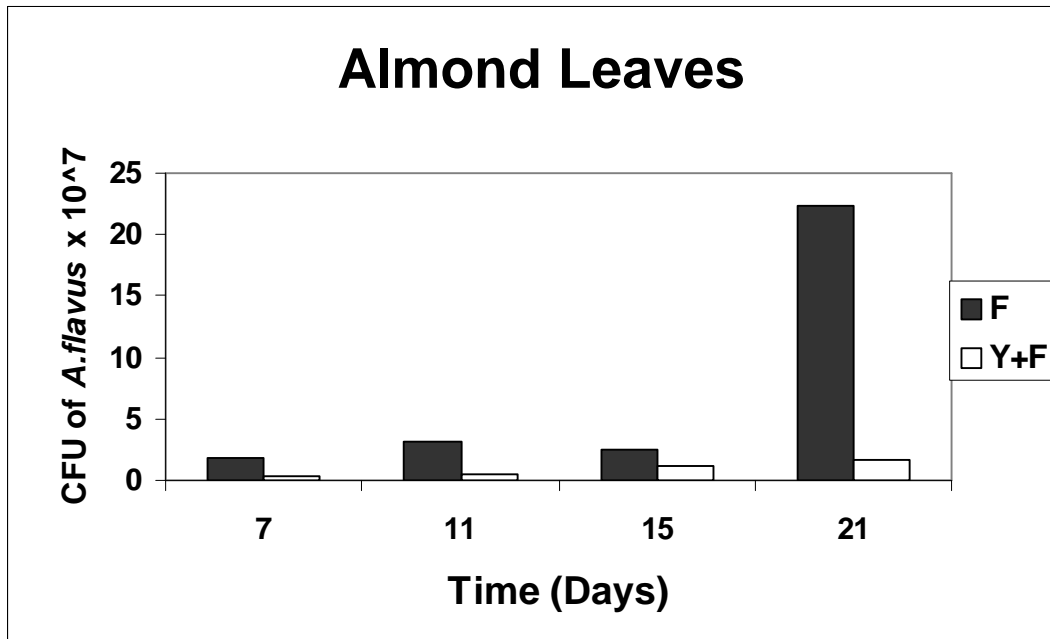


Figure 1. Reduction of viable spores on almond leaves by yeast

The solid black bar represents the number of spores produced by *A. flavus* when inoculated on sterilized almond leaves. The white bar represents the number of spores produced by *A. flavus* when yeast was applied to the leaves. F: only *A. flavus* was inoculated on the leaves. Y+F: both *A. flavus* and a strain of effective yeast were inoculated on the leaves.