NATURAL RESERVOIRS OF *ASPERGILLUS FLAVUS* IN THE SONORAN DESERT: POTENTIAL IMPLICATIONS FOR AGRICULTURAL AREAS

María L. Boyd and Peter J. Cotty
Southern Regional Research Center, ARS-USDA
New Orleans, LA

Abstract

The distribution of *Aspergillus* section Flavi within the Sonoran desert of Arizona was characterized. Colony forming units (CFU) were determined for soil, plant debris and dung samples and *Aspergillus* section Flavi was characterized by species and strain. *Aspergillus* section Flavi was present in 83% of 391 samples at an average of 3,313 CFU/g. Two species were detected, *A. flavus* (S and L strains) and *A. tamarii*. CFU of section Flavi, *A. tamarii*, and *A. flavus* differed (p=0.05) among substrates. *Aspergillus flavus* quantities were ten times higher in plant debris and dung than on soil. Quantities of *A. tamarii* were higher on plant debris than on dung and soil. Quantities of *A. flavus* in surface soils were weakly correlated, in most plots, with presence of vegetation. Results suggest a "fertile island" distribution of *Aspergillus* section Flavi in the Sonoran desert with "hot spots" containing high propagule counts in a background of soil with low numbers of propagules. Desert isolates of *A. flavus* like isolates from agricultural fields of Arizona produce only B aflatoxins, but the average aflatoxin-producing potential of communities in natural areas is lower due to a reduced incidence of the highly toxigenic S strain.

Throughout this study, *Aspergillus* section Flavi was frequently associated with desert tree legumes. Eighty-seven percent of 270 samples of debris and fruits of mesquite, ironwood, acacia and palo verde were positive for *Aspergillus* section Flavi, with the same two species present (*A. flavus*, S and L strains, and *A. tamarii*). *Aspergillus flavus* was the most common member of section Flavi in legume debris with an incidence of 87% among 3763 isolates examined. Quantities of *A. flavus* were highest on mesquite pods with an average of 2.3×10^6 CFU/g. In vitro, most desert legumes allow significant growth, reproduction and aflatoxin production by *A. flavus*, with mesquite pods supporting production of 1×10^{10} propagules/g and 5,000µg/kg of aflatoxin B_1. Twenty percent of legume pods collected in the desert contained measurable quantities of aflatoxin ranging from 1 to >2500 µg/kg. The highest incidence (33%) and average aflatoxin accumulation (891 µg/Kg) was found on mesquite pods. Insect damaged mesquite pods had significantly higher aflatoxin than undamaged pods. Legume debris may be an important reservoir of aflatoxin-producing fungi and pods a significant source of aflatoxin exposure in native Sonoran desert habitats. Plant debris (especially that of tree legumes) and dung serve both as reproductive centers and reservoirs of *A. flavus* propagules in desert habitats. Because these reservoirs contain high densities of *A. flavus* with aflatoxin-producing ability, they could impact current biological control strategies using atoxigenic *A. flavus* strains for the management of aflatoxin contamination in agricultural crops.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 1:153-154 (2001)
National Cotton Council, Memphis TN