

Title: Use of Atoxigenic Strains of *A. flavus* to Manage Aflatoxin in Texas

Principal Investigator: Peter J. Cotty, Research Plant Pathologist, Laboratory for Aflatoxin Reduction in Crops, Agricultural Research Service, USDA, Department of Plant Sciences, University of Arizona, Tucson, AZ 85721 Phone: 520-626-5049; FAX: 520-626-5944

This project seeks to evaluate the use of atoxigenic strains of *Aspergillus flavus* to manage aflatoxin contamination in Texas corn production and to develop use of these strains in Texas with the intent of providing tools for practical aflatoxin management and as resources for long-term elimination of aflatoxins as a production limiting problem. The project also seeks to determine *Aspergillus flavus* populations associated with the corn crop in Texas in regions where aflatoxin contamination is common and to determine the distribution of specific *A. flavus* with corn production in Texas in order to specifically identify both the most important causal agents of contamination and atoxigenic strains with superior adaptation to the various Texas production regions that experience contamination problems. The first objective of this work has been to develop sufficient experimental data to meet EPA's requirements for registration of the atoxigenic strain AF36 as a biopesticide for the management of aflatoxins in Texas corn and to assist the Texas Corn Producers and the Arizona Cotton Research and Protection Council with developing reports and filings to support full registration of AF36 for treatment of unlimited acreage in Texas. The data and filings generated were of sufficient quality to fulfill this objective and to meet EPA's requirements resulting in the granting of a full section 3 registration for AF36 use on corn in Texas on March 23, 2011. This registration allows unlimited use of AF36 in Texas and, as a result of this registration, significant commercial acreage was treated with AF36 in 2011 and the cost of both available atoxigenic-strain products was kept low. This may have saved farmers in Texas over \$1 million in aflatoxin management costs (just considering costs of atoxigenic strain material). This does not include the savings or increased income arising from lower levels of aflatoxins. An additional goal of the project is to determine *Aspergillus flavus* populations in Texas associated with the corn crop in regions where aflatoxin contamination is common. This continuing effort has included elevators and other collaborators in Grayson, Ellis, Medina, Bee, Victoria, Calhoun, Wharton, Williamson, Jackson, Bee, and Hidalgo counties. This is an important activity with the potential for long-term benefit and, as such, it has become a major activity of our laboratory. The goal of this aspect is to characterize the most important causative agents of contamination across the most severely affected regions of Texas and to determine factors associated with these agents. We also seek identification of atoxigenic strains of *A. flavus* of greatest value for managing aflatoxin contamination in Texas. In 2010, a total of 627 crop samples were obtained from nine elevators distributed from Grayson County in the north to Hidalgo County in the south. Initial isolation from these crop samples will continue into the spring of 2012. Genetic, morphological and physiological characterization of isolates from the 2008, 2009, and 2010 crops is expected to extend through 2013. During 2011 we initiated screening isolates of *A. flavus* from the 2008 Texas corn crop in order to identify additional atoxigenic strains of potential increased value to Texas. Based on these initial laboratory assays, sixteen atoxigenic strains native to Texas were selected for potential use as biological control agents. Selection criteria included both distribution on Texas corn crops and relative ability to inhibit aflatoxin contamination during competition with high aflatoxin producers on viable maize grain in laboratory tests. Field tests were initiated with these 16 atoxigenics in four commercial fields in Ellis and Grayson Counties. The harvested crops are

currently being subjected to analyses which will be completed during spring 2012. The best strains in the 2011 trials will be including in 2012 trials along with additional atoxigenics from the Texas crops selected in laboratory tests. The ultimate goal of this work is to develop formulations for aflatoxin management that will be composed of mixtures of 4 to 8 atoxigenics adapted to the target regions and with efficacy that provides benefit over multiple years. We hope to develop a strategy that, through annual use of small quantities (5 to 10 lb. per acre) of inexpensive atoxigenic strain material, commercially significant concentrations of aflatoxins can be prevented from forming in Texas corn.