



Mississippi Corn Promotion Board 2013 Progress Report

Project Title: Aflatoxin management in corn with Afla-Guard and the effects of fungicides and Afla-Guard on aflatoxin contamination

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Project Summary (Issue/Response)

Application of biological control strains of *Aspergillus flavus*, such as Afla-Guard are presently the most effective management practice to reduce aflatoxin contamination of corn. Because this is a new product, with a unique mode of action that is sensitive to several environmental factors, the timing and rate should be evaluated over several seasons in different corn production systems (e.g., dryland, irrigated).

Several foliar fungicides are marketed to promote plant health at the reproductive and maturation stage, but are ineffective at reducing aflatoxin contamination in corn. Furthermore, the compatibility of fungicides with Afla-Guard is unknown. While *Aspergillus flavus* is thought to be tolerant of many fungicides, the level of compatibility is unknown.

The 2013 research program included field and laboratory experiments to address the following issues:

Optimal rate and timing of Afla-Guard application.

Compatibility of Afla-Guard and similar products with fungicides labeled for application in corn.

Four field trials were included in 2013. Fields included irrigated and non-irrigated management practices, Bt and non-Bt genotypes and had planting dates ranging from March 7 to April 18.

Project Results/Outcomes

After cold, wet conditions delayed planting and early corn establishment, the 2013 growing season allowed excellent corn production throughout Mississippi in 2013. Most importantly, the near total absence of heat stress and mostly favorable rainfall greatly limited the amount of aflatoxin observed this year. We observed very little aflatoxin in our research plots and communication with area growers and elevators affirmed the historically low levels of aflatoxin in Mississippi corn in 2013.

Despite the overall unfavorable conditions to observe successful Afla-Guard performance in 2013, one field, near Yazoo City, had appreciable aflatoxin contamination and a measurable reduction in aflatoxin from Afla-Guard treatments. As indicated in **Figure 1**, Untreated plots had an average of 15 ppb aflatoxin, but all biocontrol treated plots averaged less than 1 ppb aflatoxin.

Figure 2 includes a summary of fourteen field trials over the last three years. While there was great variation, several treatments appeared effective in reducing aflatoxin contamination.

Nearly zero aflatoxin was detected in field trials examining the effect of Proline fungicide alone and in combination with Afla-Guard, so no conclusions can be made regarding the effectiveness of that program.

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Project Results

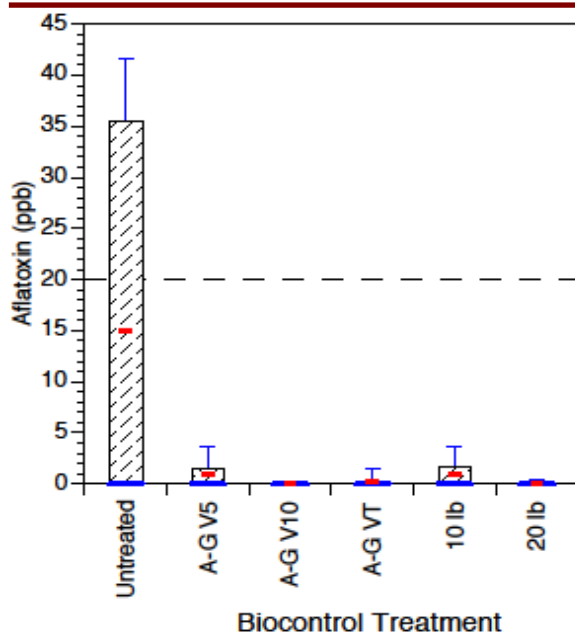


Figure 1. Biocontrol efficacy in 2013. Red bars indicate treatment mean, blue lines are the outliers and the hashed boxes span the 25th to 75th percentile observations. Dashed line is the 20 ppb regulatory limit.

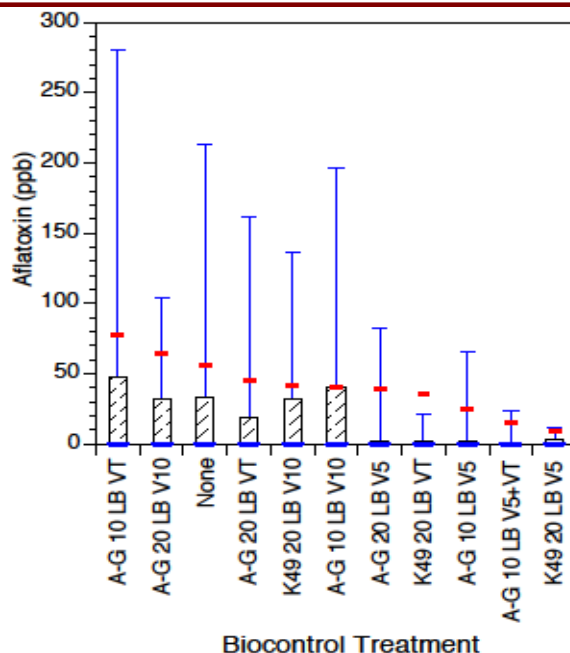


Figure 2. Biocontrol efficacy in 2011-2013. Data includes 14 field trials. Red bars indicate treatment mean, blue lines are the outliers and the hashed boxes span the 25th to 75th percentile observations. Application rate 10lb and 20lb indicate 10 and 20 pounds per acre of biocontrol product. All applications were with Afla-Guard (A-G) except where indicated by K49

Project Impacts/Benefits

Three out of four field sites in 2013 had little or no aflatoxin even in untreated plots. In the one field with significant aflatoxin the Afla-Guard treatments were effective in reducing the aflatoxin concentration. There was no difference between the application rates or application timing in 2013, but when considering observations over the last three years, several of the V5 applications were most effective. Twenty pounds per acre was not consistently more effective than the ten pounds per acre rate.

Field testing of fungicide / Afla-Guard interaction was inconclusive in 2013 due to weather conditions that were not conducive to aflatoxin, but in previous years no interaction has been detected.

Project Deliverables

H. K. Abbas, R. M. Zablutowicz, M. A. Weaver, W.T. Shier, H. A. Bruns, N. Bellaloui; C. Accinelli ; and C. A. Abel Implications of Bt traits on mycotoxin contamination in corn: overview and recent experimental results. In press Journal of Agricultural and Food Chemistry

H. K. Abbas, M. A. Weaver, W. T. Shier, R. M. Zablutowicz , and J. D. Plasencia. Aflatoxin and fumonisin contamination in corn smut (*Ustilago maydis*) galls in the field and in the grocery store. Presented at annual meeting of the American Phytopathological Society, Austin, TX, Aug 11, 2013

M.A. Weaver, H.K. Abbas, G.L. Sciumbato, H.C. Pringle, and T. W. Allen. Aflatoxin management in corn with Afla-Guard.

Presented at annual meeting of the American Phytopathological Society, Austin, TX, Aug 11, 2013

H. K. Abbas, R. M. Zablutowicz, B.J. Johnson, M.A. Weaver, C.A. Abel, H.A. Bruns. Association of aflatoxin and fumonisin with infection of corn (*Zea mays*) by common smut (*Ustilago maydis*). Submitted 10-26-2012

