



Mississippi Corn Promotion Board 2012 Progress Report

Project Title: Impact of Corn Earworm Infestations on Transgenic and Conventional Field Corn Yield and Grain Quality

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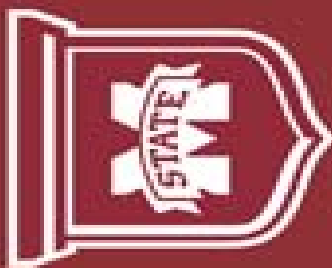
Project Summary (Issue/Response)

The first generation *Bacillus thuringiensis* (Bt) traits in field corn (ex. Monsanto's Yield-Gard Corn Borer and Dow AgroSciences' Herculex I) demonstrated minimal activity against corn earworm feeding on grain in ears. However, the newer transgenic Bt corn hybrids express traits with significant efficacy against corn earworm and fall armyworm infesting corn ears. These technologies have been promoted to provide yield improvement over the previous technologies and non-transgenic corn through reductions in insect damage to corn ears including corn earworm damage. Preliminary evaluations have demonstrated that these traits are effective at reducing ear damage from corn earworm and fall armyworm. However, corresponding increases in corn yield have not been consistently observed. Studies as part of a Masters' of Science in entomology project were initiated to determine the value of Bt corn technologies with respect to corn earworm control and the impact of corn earworm on corn yield. These studies included the Herculex, VT3, and VT Triple Pro Bt technologies due to their range of activity against corn earworm infesting corn ears. Within each technology two treatments were initiated. One with supplemental insecticide applications to minimize corn earworm damage as much as possible, this was to serve as a comparison for the Bt technology treatment without any additional control measures for corn earworm. The use of no supplemental control for corn earworm represents the scenario in which these technologies would be placed on commercial farms. Comparisons were made within each technology to eliminate differences in genetic potential among hybrids.

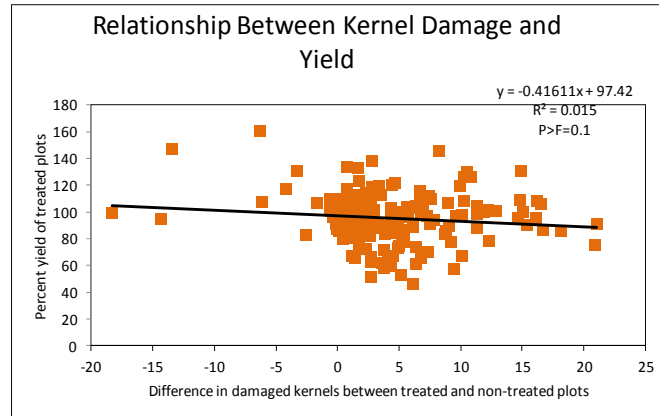
Project Results/Outcomes

Results from 2011 and preliminary results from 2012 demonstrated that supplemental insecticide applications did result in significant differences in kernel damage between the treated and non-treated plots within each technology. During 2011 this differences in damaged kernels did not translate into significant differences in yield. Preliminary results from 2012 indicate that differences in kernel damage did translate into yield differences for the Herculex and VT3 technologies. However, all of the data for 2012 has not been compiled and analysis of the entire data set is not complete. Across all technologies, regression analysis of the 2011 data combined the preliminary data from 2012 indicates that within the range of damage observed within these studies there is not a significant relationship between kernel damage and corn yield. Data from a simulated injury study conducted during 2012 indicates that there is a significant relationship between kernel damage and yield. However, kernel damage levels were higher in the simulated damage study than in the studies utilizing natural corn earworm infestations. Results from 2011 also indicate that reductions in corn earworm damage did not translate into differences in aflatoxin contamination.

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Project Results



Project Impacts/Benefits

We feel that the level of damaged kernels observed in these studies represents the level that would normally be observed in a commercial setting. Under these conditions corn earworm does not significantly reduce corn yield. Also, in many circumstances reducing corn earworm damage to corn ears does not provide protection against aflatoxin contamination. Within the range of the data in these studies, there was no relationship between corn earworm damaged kernels and corn yield. In these situations the corn earworm control provided by newer Bt technologies does not provide a benefit to growers. The Bt technologies do provide an economic benefit with regard to corn borer control and the newer Bt technologies that express multiple Bt proteins do serve as an important resistance management tool for corn borers and fall armyworm.

Project Deliverables

D. Cook, J. Bibb, A. Catchot, F. Musser, S. Stewart, B. R. Leonard, and D. Buntin. 2011. Impact of corn earworm on field corn yield. Pioneer Academic Forum, Reno, NV. November 11-12, 2011.

D. Cook, J. Bibb, A. Catchot, F. Musser, S. Stewart, B. R. Leonard, and D. Buntin. 2011. Impact of corn earworm populations on field corn yield. Mississippi Row Crop Short Course, Starkville, MS. December 5-7, 2011.

D. Cook, J. Bibb, A. Catchot, F. Musser, S. Stewart, B. R. Leonard, and D. Buntin. 2012. Early Season Insect Management and Impact of Corn Earworm on Field Corn Yield. Arkansas Crop Management Conference, Little Rock, AR. January 17-20, 2012.

D. Cook, J. Bibb, A. Catchot, F. Musser, S. Stewart, B. R. Leonard, and D. Buntin. 2012. Early Season Insect Management and Impact of Corn Earworm on Field Corn Yield. Mississippi Agricultural Consultants Association Annual Conference, Starkville, MS. February 14-15, 2012.

J. Bibb, A. L. Catchot, D. Cook, F. Musser, S. Stewart, B. R. Leonard, and G. D. Buntin. 2012. Impact of corn earworm (*Helicoverpa zea*) on field corn yield. 2012 Annual Meeting of the Southeastern Branch of the Entomological Society of America, Little Rock, AR. March 4-7, 2012.

J. Bibb, A. Catchot, D. Cook, F. Musser, S. Stewart, B. R. Leonard, and D. Buntin. 2012. Impact of corn earworm on field corn grain quality. Corn Utilization and Technology Conference. June 4-6, 2012. Indianapolis, IN.

D. Cook. 2012. Insect management in field corn and soybeans. 2012 R.R. Foil Plant Science Research Center Field Day. Starkville, MS. July 19, 2012.

D. Cook. 2012. Insect management in field corn and soybeans. 2012 Delta Research and Extension Center Field Day. Stoneville, MS. July 19, 2012.

J. Bibb, A. Catchot, D. Cook, F. Musser, S. Stewart, B. R. Leonard, D. Buntin, and T. Allen. 2012. Impact of corn earworm on yield and grain quality in field corn. Pioneer Academic Forum, Knoxville, TN. November 10, 2012

J. Bibb, A. Catchot, D. Cook, F. Musser, S. Stewart, B. R. Leonard, D. Buntin, and T. Allen. 2012. Impact of corn earworm on yield and grain quality in field corn. 2012 Annual Meeting of the Entomological Society of America, Knoxville, TN. November 11-14, 2012.

D. Cook, B. Adams, J. Bibb, A. Catchot, F. Musser, S. Stewart, B. R. Leonard, and D. Buntin. 2012. Insect management in corn and soybeans. Delta Crop Summit, Stoneville, MS. November 13, 2012.

