

Management of European Corn Borer / Anthracnose Stalk Rot Pest Complex with Transgenic Bt Corn Hybrids for Silage Production

Gary C. Bergstrom¹, J. Keith Waldron², and Elson J. Shields³
Departments of Plant Pathology¹ and Entomology³, and IPM Support Group², Cornell University

Abstract

Recent advancements in biotechnology have lead to the development of transgenic corn hybrids which express insecticidal toxins from *Bacillus thuringiensis* (Bt). Bt hybrids are an attractive pest management tool due to their pest specificity, environmental and mammalian safety, and potential for season long control. This research tested feasibility of deploying transgenic (insect resistant) corn hybrids in New York for management of European corn borer, *Ostrinia nubilalis*, and associated damage by anthracnose stalk rot (ASR). Field plots of transgenic and near-isogenic (nontransformed) corn hybrids exposed to naturally occurring populations of European corn borer (ECB). A portion of each plot was inoculated with the anthracnose causal agent, *Colletotrichum graminicola*. Insect and disease development, standability, and silage yield were monitored.

Early evaluations detected no significant differences among hybrids in plant populations and leaf feeding from natural populations of cutworm. Significant differences among hybrids were detected for the following ECB evaluations (percentage of plants with ECB foliar damage, percentage of plants with ECB stalk damage; and silage yields). First generation ECB infestation levels were light at both locations with less than 20% of the plants at the Aurora site, and less than 9% at the Freeville site of the plants having detectable feeding injury. On all sampling dates, detectable ECB feeding injury was near 0 for all Bt hybrids (Bt vs. non-Bt).

Fungus inoculated subplots did not differ significantly from noninoculated subplots for any ECB or anthracnose stalk rot evaluation ($P \geq 0.1$) and no hybrid by treatment interactions were detected ($P \geq 0.29$). Anthracnose leaf blight was apparent, but at low severity in fungus inoculated subplots. However, the anthracnose stalk rot phase was likely limited by the relatively low ECB populations early in the season

Bt hybrids had numerically fewer corn plants infected with anthracnose stalk rot, although this was not statistically significant. Bt hybrids had 3.3 fold fewer plants with stalk symptoms compared with their non-Bt counterparts. The majority (72%) of those plants exhibiting anthracnose stalk symptoms also had stems wounded by ECB.

Silage yields of both Bt hybrids had numerically higher yields than their non-Bt counterpart (+1.3 and + 0.57 T/A for Pioneer 35N05, +0.55 and +0.95 T/A for Northrup King 4640 grown at Freeville and Aurora, respectively). Highest overall yield, at both locations, were obtained from Pioneer 3525, a standard non-Bt hybrid. Overall yields were similar among most hybrids regardless of Bt(+/-) status.

Results indicate Bt hybrids will enhance management of the ECB/ anthracnose stalk rot pest complex. Further research should clarify the efficacy of Bt hybrids in reducing losses from ECB and *C. graminicola* attack at corn vegetative stages. The larger question that now needs to be addressed is whether and where there is sufficient pressure from European corn borer populations in New York to justify economically the added seed cost of transgenic Bt hybrids.

This research was featured at the Musgrave Farm Field Day on field days on 11 July. There were 120 participants. Data from this study will be further shared with farmers, extension educators, and agribusiness personnel.

For a printed copy of the entire report, please contact the NYS IPM office at:

IPM House
630 W. North St.
New York State Agricultural Experiment Station
Geneva NY 14456
315-878-2353