2004 BELTWIDE COTTON CONFERENCES, SAN ANTONIO, TX – JANUARY 5-9

EVALUATION OF ORGANOPHOSPHATE INSECTICIDES ON PERFORMANCE OF TRANSGENIC AND CONVENTIONAL COTTON

Chris A. Hundley and J.T. Cothren
Texas A&M University
Department of Soil and Crop Sciences
College Station, TX
H.R. Smith
Biological Research Service, Inc.
College Station, TX

Abstract

Genetically modified cotton (*Gossypium hirsutum* L.) acreage has increased dramatically over the last six years. Reports of variable results in fiber quality and yield have arisen in these cultivars. Some changes in production practices have occurred coincident with the introduction of transgenic technology, such as reduced use of broad-spectrum insecticides including organophosphates and less cultivation that could potentially influence the growth and yield of cotton. One factor that might affect these parameters is the difference in the amount of foliar-applied phosphorus (P) between an organophosphate (OP) and non-phosphate (NP) insecticide regime. Therefore, a study was conducted to investigate selected growth characteristics, yield, and fiber quality of genetically modified and conventional cotton as influenced by OP and foliar phosphorus (FP) applications. A four replication strip-plot experimental design was utilized with variety serving as the whole plot and insecticide regime as the sub-plot. Three cotton varieties of the same isoline (ST4892BR, ST4793R, and ST474) were planted in 2001 and 2002 at uniform populations under irrigated conditions in Burleson County, near College Station, TX. The insecticide regime consisted of three unique application regimes. In the first regime, all insecticides consisted of the OP group, which served as the phosphate-based insecticide application. The second regime utilized applications of NP and served as a control. The third regime (NP+FP) consisted of NP plus additional FP applied as 12-48-08. The FP was applied at P_2O_5 weight equivalent to the P component in the concurrent OP application. Recommended insecticide rates were used for each application. Nine applications of this insecticide regime were made during the season at key phenological stages commencing with pinhead square through ten percent open bolls. Broadcast NP insecticide applications were made, outside of the insecticide regime, to all treatments as called for by scouting based on threshold levels for the conventional variety to minimize pest pressure. Data was subjected to the Mixed Models Procedure in SAS v8.01 and means were separated by Tukey's test at α=0.05 significance level, unless otherwise noted. ST4892BR had greater lint yield than ST4793R and ST474. This yield increase can be explained through plant mapping analysis which showed ST4892BR producing larger bolls and higher boll numbers. In addition, evaluation of fruiting distribution showed ST4892BR to contain more lint on sympodial branches 6-10. The insecticide regime effect on lint yield resulted in higher yield (p=.08) for the NP+FP regime. Leaf tissue sampling and analysis revealed increased levels of P for the OP and NP+FP over that of the NP insecticide regime. This indicates that plants do acquire P from OP insecticides. However, because there was no yield increase for the OP, it is concluded that the additional P did not result in yield increase. An explanation for the yield increase of the NP+FP could be plant response to the nitrogen (N) and potassium (K) in 12-48-8. However, this seems unlikely because of the small amount of N and K applied to the crop. Data for both years generally exhibit no differences in growth parameters and fiber quality characteristics for variety and insecticide effects. While conclusive evidence exists regarding varietal yield differences, this two-year study does not provide sufficient evidence to conclude that OP insecticides influence growth, yield, or fiber quality characteristics of these cotton cultivars.