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DO PHOSPHATE-BASED INSECTICIDES INFLUENCE COTTON GROWTH AND YIELD?

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 (Bryant *et al*., 1998; Lege *et al*., 2001; ReJesus *et al*., 1997). 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 (Edge *et al*., 2001), 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 between an organophosphate and pyrethroid insecticide regime. Therefore, a two-year study was conducted to investigate selected physiological parameters, yield, and fiber quality of genetically modified and conventional cotton as influenced by organophosphate insecticide and foliar phosphorus applications. A four replication split-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 (ST4892B/R, 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 organophosphate insecticide group, which served as the phosphate-based insecticide application. In the second regime, a non-phosphate insecticide application utilized the pyrethroid group of insecticides, and served as a control. The third regime consisted of a non-phosphate pyrethroid insecticide plus foliar phosphorus as 12-48-08. The foliar phosphorus was applied at an equivalent P_2O_5 weight as the concurrent organophosphate 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 pyrethroid 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 General Linear Model in SAS and means were separated using Fisher's Protected LSD at α=0.05 significance level. In both years, ST4892B/R had greater lint yield than ST474. The insecticide regime effect on lint yield in 2001 showed no statistical differences although numerical differences were apparent. A trend for numerically higher lint yield was observed for the non-phosphate insecticide plus foliar phosphorus regime compared to the other two insecticide regimes. In 2002, the non-phosphate insecticide plus foliar phosphorus regime had significantly higher lint yield than the other two insecticide applications. However, a significant variety by insecticide interaction was observed. Plotting mean lint yield against insecticide regime with individual lines for variety showed that ST4892B/R and ST474 had similar responses to the insecticide regime, while that of ST4793R differed. Considering both years, the effect of the insecticide regime on lint yield was inconclusive. Data for both years exhibit no differences in growth parameters and fiber quality characteristics for variety and insecticide effects. Variable response to the non-phosphate insecticide plus foliar phosphorus regime was not significantly different from that of the organophosphate insecticide regime. Phosphate-based insecticides influenced only a limited number of the variables studied. This two-year study does not provide sufficient evidence to conclude that phosphate-based insecticides influence growth, yield, or fiber quality characteristics of these cotton cultivars.

References

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