

BT COTTON: IMPACT OF SUPPLEMENTAL SPRAYS

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Abstract

Approximately 37 percent of Georgia's cotton acreage was planted to Bt (Bollgard) varieties in 1997. The primary insect pests of Bt cotton in Georgia included bollworm, fall armyworm, and stink bugs. The impact of two applications of PennCap-M, Tracer, and Karate in late July and early August on insect pest populations and yield were evaluated.

Introduction

Bollworm and tobacco budworm have accounted for a large percentage of insect control costs and losses since the successful elimination of the boll weevil from Georgia. Eliminating or reducing the need to treat these two primary pests have made transgenic Bt cottons attractive to Georgia growers. Approximately 37 percent of Georgia's cotton acreage was planted to Bt (Bollgard) varieties in 1997 compared with about 30 percent in 1996. Bt cotton provides excellent control of tobacco budworm. However, experiences in Georgia and other cotton producing states have demonstrated that supplemental insecticide applications may be needed to control bollworm and other non-target pests such as boll weevil, fall armyworm, plant bugs, stink bugs, etc. (Lambert, 1997, Layton, 1997, and Smith 1997). In Georgia, the primary insect pests of Bt cotton include bollworm, fall armyworm, and stink bugs. Bollworm and fall armyworm infest Georgia cotton during mid-late July, typically coinciding with the dry down of field corn. Stink bugs are generally considered a late season pest, reaching economic levels in late July and August.

The objective of this study was to evaluate the impact of three insecticide treatments on insect pest populations and yields of Bt cotton. Selected treatments included PennCap-M, Tracer, and Karate. PennCap-M has activity on stink bugs, Tracer has activity on caterpillar pests, and Karate has activity on both stink bugs and caterpillar pests. Two applications of each treatment were made on 10 day intervals. The first application was scheduled based on historical movement of bollworms to cotton, i.e. corn dry down.

Methods

Single replicate large plot (10-15 acres) strip trials were established in Dodge and Worth Counties, GA. Treatments

included an untreated check, PennCap-M at 1 qt./acre, Tracer at 2 ozs./acre, and Karate at 4 ozs./acre. Applications were made using cooperating grower's equipment on July 23 or 24 and August 6. Plots were scouted weekly for the remainder of the season. Scouting procedures included examination of the top 1/3 of the plant, one bloom, one boll with a stuck bloom tag, and another boll lower in the plant for bollworm and fall armyworm (Roberts, 1997). A drop cloth was used to monitor plant bug and stink bug populations. Fifty bolls approximately 20 days after white bloom were also collected from each plot and examined for internal stink bug damage. Bolls were considered damaged if discoloration was present on the lint or if warty growths or puncture wounds were observed on the inner surface of the boll wall. Plots were machine harvested at both locations.

Results and Discussion

Stink Bugs / Plant Bugs were sampled on six dates after insecticide sprays were initiated. Average number of stink bugs and plant bugs were greatest in the untreated and Tracer plots (Table 1). The recommended threshold for stink bugs in Georgia is one per six row feet (Roberts, 1996). Threshold populations of stink bugs were observed at the Worth County location in the untreated and Tracer plots in early September but not in Dodge County. Bolls were collected on four dates and examined for internal feeding damage from bug pests. As expected, percent damaged bolls were also greater in the untreated and Tracer plots. The majority of this injury is believed to be caused by stink bugs, although tarnished plant bug may have accounted for a percentage of this damage. Preliminary studies in South Carolina suggested that 20 percent internal boll injury may be expected when stink bugs number one per six row feet (Greene et al., 1997). However, in these trials boll damage exceeded 20 percent in the untreated and Tracer plots but stink bug populations remained below one per six row feet for most of the season.

Bollworm and Fall Armyworm were sampled on four dates after insecticide sprays were initiated. The mean number of bollworm escapes was lowest in the Karate treatment. The majority of escaped bollworms were found feeding low in the plant canopy, often feeding in the tips of bolls under stuck bloom tags. Fall armyworm populations were least in the Tracer treatment. Fall armyworm is a difficult pest to control with insecticides. Timing of applications is critical for success.

Yields were greatest in the Karate treatment at both locations, an average of 180 lbs. lint per acre compared with the untreated. Average yields of the Tracer and PennCap-M treatments also were numerically higher compared with the untreated plot, 75 and 50 lbs. lint per acre respectively.

Summary

Bt cotton is a valuable tool for use in insect pest management programs. Elimination of tobacco budworm sprays has a significant impact on other pest species, especially in boll weevil free areas. More research is needed on population monitoring, thresholds, and management of stink bugs, late season plant bugs, bollworms, and fall armyworms in Bt cotton.

These preliminary trials were not replicated and conclusions cannot be drawn. However, yield differences among treatments do raise several questions which need more research.

References

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Table 1. Average number of stink bugs and tarnished plant bugs per six row feet and percent internal boll injury from bug pests during August and early September in Bt cotton treated with selected insecticides during late July and early August, Dodge and Worth Counties GA-1997.

Treatment	Number per 6 Row Feet		% Internal Boll Damage
	Stink Bugs	Tarnished Plant Bugs	
Untreated	0.4	0.5	35
	0.3	0.2	12
Pennacap-M 1 qt./acre			
Tracer 2 ozs./acre	0.3	0.5	27
Karate 4 ozs./acre	0.1	0.2	9

Table 2. Average number of bollworms and fall armyworm per 100 plants during August and yield of Bt cotton treated with selected insecticides during late July and early August, Dodge and Worth Counties GA-1997.

Treatment	Number per 100 Plants		Yield (lbs lint/acre)
	Bollworm (>1/4 inch)	Fall Armyworm	
Untreated	4.1	6.4	951
Pennacap-M 1 qt./acre	2.4	6.0	1003
Tracer 2 ozs./acre	2.3	1.5	1025
Karate 4 ozs./acre	1.4	4.0	1134