STRATEGIES FOR MANAGING STINK BUGS IN TRANSGENIC B.T. COTTON

S. G. Turnipseed and J. K. Greene
Professor of Entomology and
Graduate Research Assistant
Clemson University
Edisto Research and Education Center
Blackville, SC

Abstract

Stink bugs (Nezara viridula, Acrosternum hilare, and Euschistus servus) caused economic damage in untreated transgenic B.t. cotton in South Carolina under most circumstances in 1995. B.t. cotton planted in May in three locations and treated 1 - 4 times during August and September with methyl parathion exhibited yields that were 20 to 40% higher than in untreated B.t. cotton. Yield losses from stink bugs were associated with the abundance of alternate hosts (corn, garden sites, untreated pecans, wild cherry, blackberries, etc.) near the study sites. Our suggestions for managing B.t. cotton to mini-mize losses from stink bugs include: 1. planting early to avoid higher num-bers of stink bugs moving into the crop from alternate hosts; 2. avoiding areas with abundant alternate hosts (wild or cultivated) or where problems with stink bugs have occurred in other crops such as soybean, corn, vegetables, etc.; 3. monitoring the crop for stink bugs as bolls begin to develop; and 4. treating when best available thresholds are reached. Until more effective thresholds are developed, for 1996 we suggest one bug per six feet of row.

Introduction

Stink bugs have not generally presented problems in the production of conventional non-B.t. cotton, because these potential pests were controlled by routine applications of organophosphates and pyrethroids for such major pests as the boll weevil, the budworm/bollworm complex, armyworms, etc. With the advent of transgenic B.t. cotton and its deployment in commercial cotton production in 1996, the fortuitous control of stink bugs will not be common particularly in areas where insecticides are not applied for boll weevil or plant bugs in early and mid-season.

Stink bugs (Nezara viridula, Acrosternum hilare and Euschistus servus) were the most important insects on B.t. cotton in South Carolina in 1994 (Turnip-seed et al. 1995). Evaluations during the 1995 season of the potential impact of this pest complex in conjunction with initial studies on development of economic thresholds (Greene and Turnipseed 1996) affirmed that stink bugs must be considered in management of transgenic B.t. cotton.

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Materials and Methods

Data were collected from cotton planted during May 8 - May 22 at three on-farm sites. At Sites 1 (Savannah Valley) and 3 (Pee Dee) field plots 24 rows by 80 ft. were used in a randomized block design with four replications. At least 12 rows of non-B.t. cotton bordered the sides of experimental plots and 40 ft. were planted at ends, all of which remained untreated. Since there were no differences among B.t. treatments of one, two or three applications of methyl parathion at 0.5 lb [AI]/acre, an average (B.t. Trt.) was used for each site. At Site 2 (Savannah Valley) treated and untreated B.t. cotton was com-pared in plots 32 rows by 80 ft. with three replications. Treated plots received four applications of methyl parathion at 0.5 lb[AI]/acre at weekly intervals from Aug. 31 - Sept. 21. Sampling was initiated in July to assess stink bug populations using dishpan or ground cloth methods as described by Green and Turnipseed (1996). Five beat cloth samples were taken from the center of each plot and continued through September. Non-B.t. cotton ('DP5415') was treated with lambda-cyhalothrin (Karate®1EC) at 0.033 lb [AI]/acre for the cotton bollworm, which controlled stink bugs (Greene and Turnipseed 1996). Lint was estimated at 37% of seed cotton yields after machine or hand picking of plots.

Results and Discussion

Growing conditions during 1995 were good at Sites 1 and 2 in the Savannah Valley, but dry at Site 3 in the Pee Dee. Pressure from the budworm/ bollworm complex was moderate, whereas stink bugs were numerous, particularly where wild or cultivated hosts were abundant. Untreated B.t. cotton gave good control of the budworm/bollworm complex (ca 90% H. zea during July and August) with no damaging numbers appearing in plots.

At Site 1 (Fig.1) B.t. cotton treated with one, two or three applications of methyl parathion (B.t. Trt) produced significantly higher yields than untreated B.t. cotton (B.t. Ck.). This yield difference was due to control of green and southern green stink bugs. No other pests reached damaging levels in untreated B.t. cotton. Pyrethroid use (8 applications) in treated non-B.t. plots (5415 Trt.) controlled both bollworms and stink bugs with yields being similar to treated B.t. cotton. Yields in untreated non-B.t. plots (5415 Ck.) were only 245 lb due to combined losses from bollworms and stink bugs. In a late-planted (May 28) field at Site 2 (Fig.2), B.t. cotton treated in late season was compared with untreated B.t. cotton under heavy stink bug pressure. Reproducing populations of both green and southern green stink bugs were present in late August, with adults migrating in earlier from untreated pecans, an abandoned garden, wild cherry and other hosts. Large plots treated four times with methyl parathion at weekly intervals from Aug. 30 - Sept. 21 produced 1280 lb compared with 796 lb from untreated plots.

At Site 3 (Fig. 3) cotton was planted late (May 22), growing conditions were dry, and pressure from stink bugs (green and brown) was moderate. Results were similar to those obtained at Site 1. The 'DP5415' variety treated four times with pyrethroids produced significantly more lint than untreated B.t. cotton and although differences were not significant, numerically more (80 lb) than B.t. cotton treated one or three times with methyl parathion. Again, lower yields (481 lb) in untreated B.t. cotton was directly related to damage by stink bugs, with lowest yields (146 lb) in untreated non-B.t. cotton due to combined damage of bollworm and stink bugs.

Our results indicate that, under relatively late-planted (May 8 - 28) conditions, untreated transgenic B.t. cotton was damaged extensively by stink bugs (Greene and Turnipseed 1996) and produced substantially less cotton (133-484 lb lint) compared with treated B.t. cotton.

We expect that stink bugs will damage B.t. cotton grown under similar conditions in any area of the cotton belt, particularly where problems have occurred in other crops and where the bugs are not controlled fortuitously by broad spectrum insecticides applied for other pests (i.e. boll weevil, plant bugs, armyworms, etc.).

Management options that should be considered to minimize losses from stink bugs in B.t. cotton include: 1. early planting and early crop maturation to avoid higher numbers of bugs that "build up" on alternate hosts and move into cotton as the season progresses; 2. avoiding areas with abundant alternate hosts or where stink bugs have caused problems in other crops such as vegetables, corn, soybeans, etc.; 3. monitoring for stink bugs when bolls begin to develop; and 4. treating when best available thresholds are reached. Until better thresholds are developed, for 1996 we suggest treating on the basis of one bug per six feet of row.

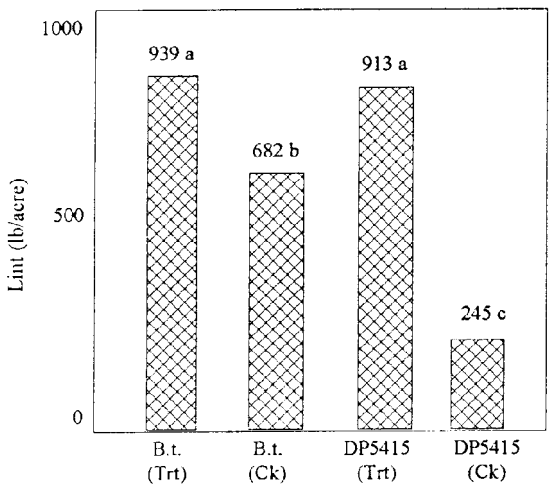

Figure 1. Effect of stink bugs on yield of treated and untreated B.t. and non-B.t. cotton (Site 1, Savannah Valley).

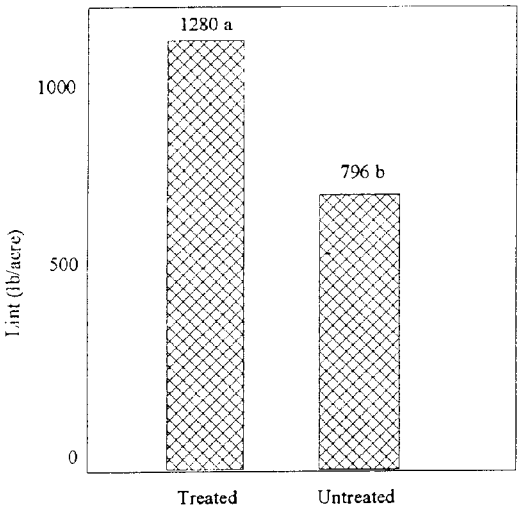

Figure 2. Effect of stink bugs on yield of treated and untreated B.t. cotton (Site 2, Savannah Valley).

References

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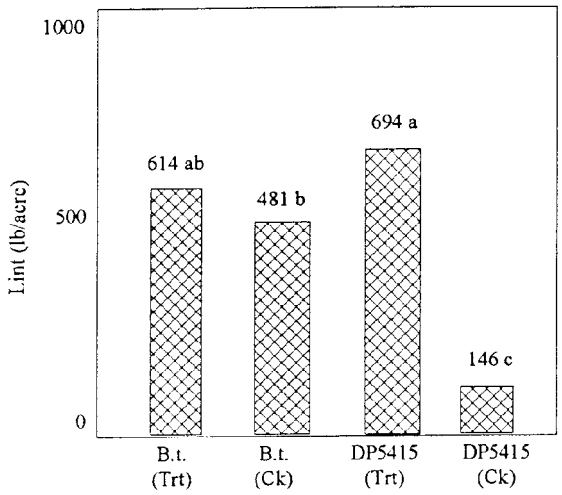

Figure 3. Effect of stink bugs on yield of treated and untreated B.t. and non-B.t. cotton (Site 3, Pee Dee).