STINK BUGS IN COTTON: FEEDING AND INJURY OBSERVATIONS

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Abstract

A preliminary study was conducted to observe the stink bug feeding preferences and injury to cotton. There were three aspects to this study. The feeding preference and damage studies used cone shaped Fibe Air breathable plant sleeves to either cage or exclude stink bugs on cotton branches with three fruiting positions. In one aspect, sample branches were collected and bolls observed for visible damage symptoms, and spots and warts inside boll walls. In the other aspect, cages were left for yield at harvest. Damaged locks, retention, and lint weight per position were recorded. In the third aspect of this study, bolls were pulled at random from both treated and untreated fields and examined for damage symptoms. It was concluded that in the random samples data tend to show that bolls had received the most stink bug damage by day 15. The data from the cage studies reinforced this tendency showing that stink bugs prefer bolls less than 12 days old.

Introduction

The use of cotton insecticides in Georgia has changed due to the successful boll weevil eradication program and the increase in acres planted to transgenic Bt cotton varieties. Stink bugs, once considered a secondary pest, were controlled incidentally by sprays targeting other pests such as bollworms. In the absence of multiple broad spectrum sprays, stink bugs have become an annual mid-late season problem requiring pest management. It is apparent stink bugs are damaging cotton but timing and the extent of damage is still not fully understood. The objective of this study was to observe the feeding preferences and injury to cotton bolls by stink bugs.

Materials and Methods

Two fields of Bt cotton, DPL 33B and PM1220BG/RR, were used in this study. Cone shaped Fibe Air breathable plant sleeves (24 inches in length, 24 and 8 inches in width) were used to cage or exclude stink bugs on cotton branches with three fruiting sites. Feeding damage and damage symptoms were observed. Stink bugs used in these studies were captured using sweep nets in podding soybean fields and maintained on fresh green beans in seven gallon plastic buckets until needed. Two species of stink bugs were used; southern green stink bug, *Nezara viridula*, and green stink bug, *Acrosternum hilare.* Both adult and late instar stink bugs were utilized. Starting on July 14, cages were tied over cotton branches with three boll positions on twelve dates. Boll ages ranged from 12-15 days at first positions, 6-9 days at second positions, and 0-3 days at third positions. Cages were infested with stink bugs and left for three to six days. Cages were also placed on branches to exclude insects. Branches with cages were removed and stink bug damage ascertained in this destructive sample. Bolls were examined for the number of visible external damage sites and the presence or absence of puncture spots or warts on the inner surface of the boll wall. The numbers of aborted positions were also counted. A total of 125 infested cages and 57 control cages were used.

Cages were also placed on branches as above on three dates beginning July 24 to observe the impact of stink bug feeding on lint yield. A total of 82 infested cages and 62 control cages were used. Stink bugs were removed from cages after three to six days and the cages were replaced until harvest. Bolls were examined by position for damage and hand harvested for yield. The number of tight locks per boll, percent retention, and lint weight per boll and position were recorded. Observations were combined for each date and analyzed with a standard ANOVA. Means were separated using Duncan's Multiple range Test.

In another aspect of the study, 50 bolls were pulled at random from both insecticide treated and untreated fields on 30 dates. Boll ages were recorded and data was taken similar to the destructive samples. Data were analyzed using PROC MIXED procedures (SAS, 1989). The model used included treatment, farm within treatment, and linear and quadratic relationship of boll age with the data for each treatment.

Results and Discussion

In the destructive sample cage study, the data was corrected by subtracting the damage in the control cages from the damage in the infested cages. The number of visible damage sites per boll was significantly less at the third position, 0.74 sites per boll, and numerically less at the first position 2.49, which was not significantly different from the second position 2.79 sites/boll (Table 1). The percent of bolls with spots on the inside boll wall was significantly lower at the third position. The second position was numerically higher than the first position. The percent of bolls with warts on the inside boll wall was similar with the third position having significantly fewer warts. The second position had the numerically higher warts but not significantly more than the first.

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In the cage study for yield, the data was again corrected by finding the difference between infested cages and the controls. The number of damaged locks per boll, was numerically higher at the second position 1.76 and lowest at the first (Table 2). There was no significant difference between the three positions. The percent retention was 90% in the infested and 92% in the check at the first position. At the second position it was 67% in the infested and 86% in the check, the highest difference numerically. At the third position it was 36% and 39% respectively . Yields were recorded as lint per boll and lint per position. There was no significant difference between positions looking at lint per boll. The greatest numerical difference was again at the second position (Table 3). The lint per position was significantly different at the third position. Again the numeric differences were greater at the second position.

Table 1: External and internal stink bug damage by fruiting position in infested and control cages.

	External Damage Sites	Percent Spots	Percent Warts
1st Position			
Infested	4.21	63	53
Control	1.72	32	23
Difference	**2.49a**	**31ab**	**31a**
2nd Position			
Infested	3.6	52	45
Control	0.81	12	7
Difference	**2.79a**	**40ab**	**38a**
3rd position			
Infested	1.05	18	10
Control	0.31	0	0
Difference	**0.74b**	**18b**	**10b**

Corrected means (difference) in a column followed by the same letter are not significantly different (DMRTp=0.10)

In the random sample study, the relationship between boll age and the various data variables showed that significant quadratic fits occurred more consistently in samples from untreated fields than treated fields. As boll age increased the number of external damage sites also increased until day 13.42 (pr>|t|=0.0001) in the untreated samples and day 10.40 (pr>|t|=0.0001) in the treated samples. Greater damage was observed in the untreated compared with the treated fields (Figure 1). Spots on the inside boll walls are reported as the percent of bolls with spots verses day of boll age. The percent of bolls with puncture spots on the inner boll wall increased as boll age increased. Maximum damage in the treated was 18.1% on day 12.41 (pr>|t|=0.2391) and 30.9% on day 14.34 (pr>|t|=0.0647) in the untreated (Figure 2). Warts on the inside boll walls are reported as the percent of bolls with warts verses day of boll age, treated and untreated. Data were similar with the treated samples maximizing at 16.46% bolls with warts on day 11.15 (pr>|t|=0.1180). The samples from untreated fields peaked at day 12.81 (pr>|t|=0.0245) with 27% bolls with warts (Figure 3). Based on this preliminary study it appears bolls less than 15 days of age are most susceptible to stink bug feeding.

Conclusions

This preliminary one year study showed that the tendency in the samples pulled at random from treated and untreated fields, was that bolls had received the most stink bug damage by day 15. The data from the cage study reinforced this tendency and showed that stink bugs tended to prefer the bolls less than 12 days old.

Table 2: Damaged locks and percent retention by fruiting position , infested and control

Position	Damaged Locks	Percent Retention
1st Position		
Infested	2.02	90
Control	1.06	92
Difference	**0.96a**	**1.59a**
2nd Position		
Infested	2.77	67
Control	1.01	86
Difference	**1.76a**	**18.84a**
3rd Position		
Infested	2.19	36
Control	0.9	39
Difference	**1.28a**	**3.76a**

Corrected means (difference) in a column followed by same letter are not significantly different (DMRT p=.10)

Table 3: Yield per boll and yield per position by fruiting position infested and control

Position	Lint/gram Boll	Lint/ Position
1st Position		
Infested	1.42	1.27
Control	1.87	1.71
Difference	**0.45a**	**0.43a**
2nd Position		
Infested	1.02	0.69
Control	1.54	1.33
Difference	**0.52a**	**0.63a**
3rd Position		
Infested	0.86	0.32
Control	1.08	0.44
Difference	**0.21a**	**0.12b**

Corrected means (difference) in a column followed by same letter are not significantly different (DMRT p=.10)

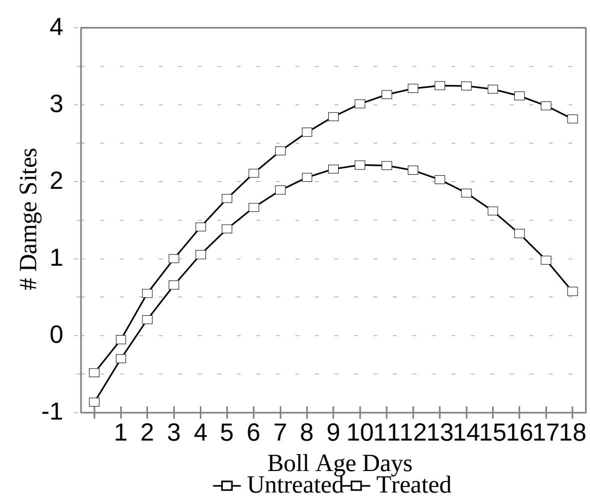

Figure 1. The number of external damage sites by boll age, treated and untreated.

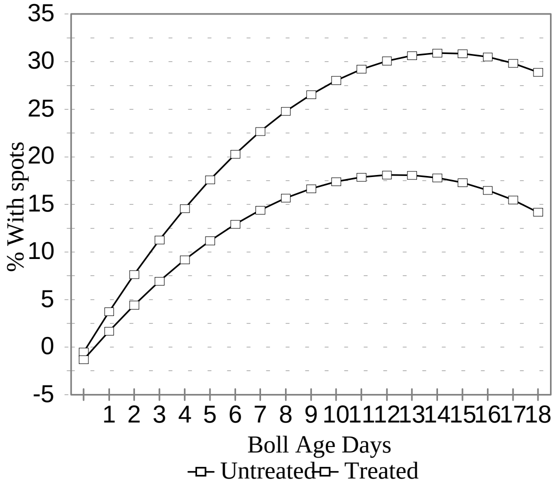

Figure 2. Percent of bolls with spots on internal wall by boll age, treated and untreated.

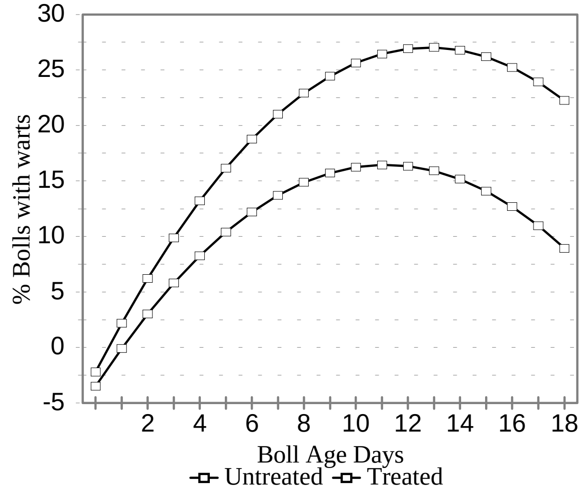

Figure 3. Percent of bolls with warts on inside boll wall by boll age, treated and untreated.