GRAIN SORGHUM AS A TRAP CROP FOR THE CORN EARWORM IN COTTON

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Abstract

The ability of a strip crop of sorghum to serve as a trap crop for the corn earworm in cotton was investigated in Mystic, GA in 2000. A strip of sorghum, 8 rows by 400 feet, was planted in the center of a 2.4 acre cotton plot which was located at one end of a cotton field. Corn earworm populations were monitored in the sorghum strip, in cotton adjacent to the sorghum, and in cotton in a control plot located at the other end of the cotton field. The mean number of corn earworm eggs/acre was higher in the grain sorghum than in the cotton. These results demonstrated that the corn earworm was more attracted to sorghum than cotton, and thus grain sorghum was an effective trap crop for the corn earworm in cotton. Total real mortality (r_x) of the corn earworm in sorghum was very high, and so the sorghum trapped the pest insect without becoming a source of the insect in cotton.

Introduction

Since *Bt* cotton can be susceptible to corn earworm, and corn earworms have developed resistance to pyrethroids in isolated locations in the southeast, the corn earworm can be a serious problem in cotton in Georgia. A trap crop which is highly attractive to a pest can be an effective control measure by becoming a sink for the pest. Stern et al. (1969) reported that strip-planting of alfalfa in cotton was a very effective means of keeping *Lygus* bugs out of cotton by trapping the insects in alfalfa. Grain sorghum is highly attractive to corn earworm moths, and planting a grain sorghum strip crop in cotton could provide a trap crop for the corn earworm. Trapping the corn earworm in a grain sorghum strip in cotton would be especially beneficial when corn is no longer available as a host for the corn earworm. Many natural enemies, particularly predators, are associated with grain sorghum, and these natural enemies should be able to control the corn earworm in the grain sorghum so that the trap crop does not become a source of this pest in cotton.

This study was designed to evaluate planting a strip crop of grain sorghum for trapping corn earworms in cotton. Specific objectives included: 1) ascertaining if a strip crop of grain sorghum served as a preferred ovipositional site for the corn earworm over cotton and 2) determining whether the sorghum would be a source for corn earworm moths in cotton.

Materials and Methods

Three treatments were evaluated in this study: 1) grain sorghum strip crop with an 8-row x 400 ft. strip of sorghum in the center of a 2.4 acre cotton plot at one end of a cotton field, 2) cotton control with 8 rows x 400 ft of cotton in the center of a 2.4 acre cotton plot at the other end of the same cotton field, and 3) cotton adjacent to sorghum trap (40 cotton rows on each side of trap). These treatments were replicated in 3 commercial cotton fields. 'DP 458 B/RR' cotton was planted on May 3, 2000, and DeKalb E57 plus grain sorghum was planted on June 1, 2000. Insect sampling techniques included whole plant counts and drop cloth samples. For parasitoid sampling, hosts were collected and held for emergence of insects. Plants were sampled every 2-3 days throughout the sorghum and cotton season.

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Data were analyzed to: 1) calculate percentage occurrence of corn earworm life stages on panicles in sorghum, 2) calculate percentage occurrence of sorghum panicle development stages, 3) ascertain the efficacy of the sorghum strip crop by comparing the mean number of corn earworm eggs/acre in the sorghum, the cotton control, and cotton adjacent to the sorghum using analysis of variance, and 4) determine if the sorghum trap served as a sink for the corn earworm by constructing a partial life table of corn earworms occurring on the panicles of sorghum using the graphical method.

Results and Discussion

The flowering stage of grain sorghum coincided with migration of the corn earworm from corn into cotton. Oviposition was most common during the flowering stage (Figs. 1 and 2). Medium and large larvae were present during the milk and soft dough stages. Very few corn earworms were present on sorghum in the hard dough stage. Length of attractiveness of sorghum to the corn earworm was around 20 days.

The mean number of corn earworm eggs/acre was significantly higher (F =12.58; df =2; $P < 0.001$) in the sorghum trap than in the cotton control and cotton adjacent to the sorghum trap (Table 1). Thus, the strip of sorghum was an effective trap for this insect pest in cotton. A statistical difference in the mean number of corn earworm eggs/acre was not detected between the control cotton and cotton adjacent to the sorghum trap. However, the number of eggs was numerically much lower in the cotton next to the trap than the control cotton at the other end of the cotton field indicating that the sorghum trap did not increase corn earworms in cotton. Indeed, the grain sorghum may have been preferred over the adjacent cotton.

Total real mortality (r_x) of the corn earworm in sorghum was very high (Table 2). Thus the sorghum trap crop served as a sink for this species in cotton. Most mortality occurred in the egg and first instar stage. *Trichogramma* spp. and *Orius insidiosus* were the two predominant beneficial insects in sorghum. *O. insidiosus* nymphs and adults were observed feeding on corn earworm eggs and first instars on sorghum heads. Low numbers of lady beetles (mainly *Hippodamia convergens*) also were present in sorghum. *Geocoris punctipes, O. insidiosus*, and *H. convergens* were the predominant species of beneficial insects in cotton.

In summary, strips of grain sorghum served as a trap crop for the corn earworm in cotton when corn earworms migrated from corn, and the grain sorghum trap crop was a sink for this pest insect relative to cotton.

Acknowledgments

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References

Stern, V. M., A. Mueller, V. Sevacherian, and M. Way. 1969. *Lygus* bug control in cotton through alfalfa interplanting. Calif. Agric. 23: 8-10.

Table 1. Estimated mean number of corn earworm eggs/acre in sorghum trap, control cotton, and cotton adjacent to strip of sorghum.

Treatment	Mean (±SE) no. eggs/acre[a]
Sorghum Trap	2,421,320 (± 679,275) a
Control Cotton	16,466 (± 2,151) b
Adjacent Cotton	7,509 (± 2,345) b

[a] Means followed by the same letter within a column are not different at P = 0.001 (LSD).

Table 2. Partial life table of corn earworm occurring on the panicles of sorghum.

Life Stage (x)	No. Entering stage/ha (l_x)	Real mortality (r_x)	Apparent mortality (q_x)
Egg	2,421,320	61.2	61.2
1st	938,496	32.4	83.7
2nd	153,047	1.2	18.9
3rd	124,170	4.3	83.7
4th	20,286	0.7	91.4
5th/6th	1,747	0.1	---
TOTAL		99.9	

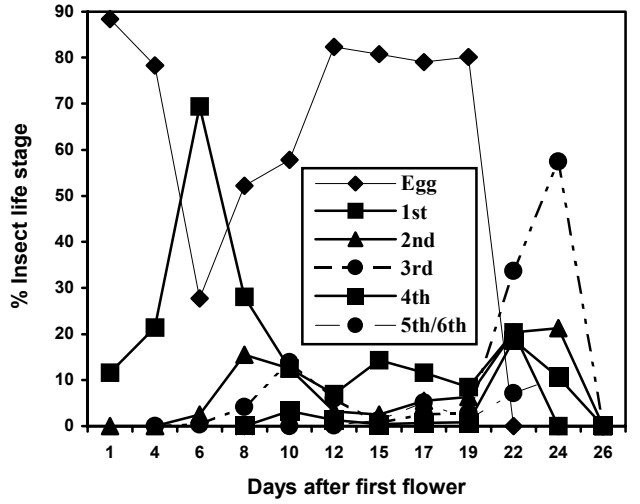

Figure 1. Percentage occurrence of corn earworm life stage on Sorghum (Date of first flower was July 20, 2000).

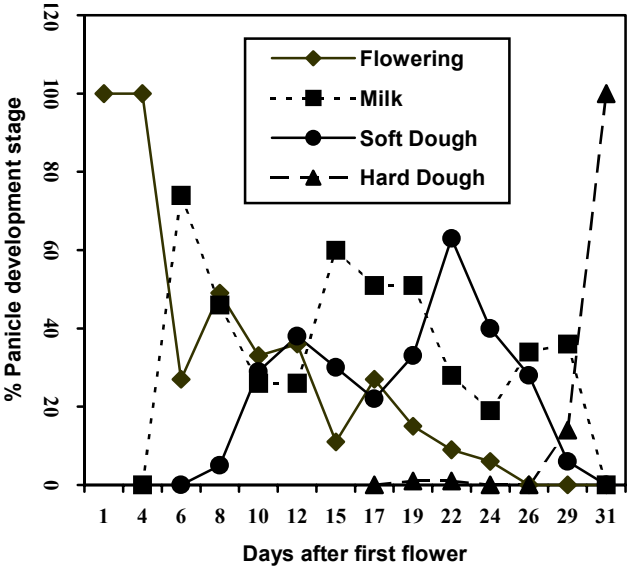

Figure 2. Percentage occurrence of sorghum panicle development stages.