RESERVOIR STRIP PLANTINGS IN TARNISHED PLANT BUG RESEARCH

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Abstract

Strip plantings of mustard, pigweed, and corn were used to increase tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), populations in cotton for insecticide efficacy, COTMAN validation, and cultivar resistance traits research. Strip plantings were arranged as three rows of corn followed by one row of pigweed one row of mustard and three rows of corn. This eight-row pattern was followed by eight rows of cotton and repeated across the field. Approximately 20 acres were planted in this pattern on the experiment station. Strip plantings were sampled in June to determine population densities. High numbers of tarnished plant bugs developed on mustard and pigweed in June. Samples in July showed heavy infestations developed in cotton. The reservoir strip planting technique proved to be an effective aid for producing natural field populations of tarnished plant bugs for research purposes.

Introduction

Small-plot replicated experiments have often been conducted on the Delta Branch Experiment Station, Stoneville, MS to study various aspects of tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), management and control in cotton. Some experiments, such as an insecticide efficacy trial conducted in 1997 (Harris et al. 1997), have had lower than desired infestation levels or inopportune timing of infestation occurrences. Other experiments have been unproductive and unreported because of plant bug infestations too low for effective measurements. A reliable method has been needed to augment natural infestations of tarnished plant bug in cotton research plots.

Cultivated mustard greens (*Brassica* sp.) are early season hosts of tarnished plant bug (Young 1986). Mustard greens have been effectively used to augment tarnished plant bugs in cotton test plots by interplanting in strips with cotton and "cutting the mustard" at a desired time to flush bugs into the cotton (Meredith et al. 1974). A limitation of mustard is that its attractiveness to tarnished plant bug is greatest during flowering in mid to late spring. Pigweed (*Amaranthus* spp.) is also a host of tarnished plant bug in Mississippi (Young 1986, Snodgrass et al. 1984). Pigweed germinates later than mustard and normally begins flowering and becomes attractive to tarnished plant bugs after mustard has passed its peak period of attractiveness. Pigweed continues to flower all summer and has potential to be a near season-long good tarnished plant bug host plant. Therefore, mustard and pigweed were chosen as plant species to plant in strips for the purpose of producing tarnished plant bugs that would infest the adjacent cotton, i.e. to serve as reservoirs of tarnished plant bugs.

Methods

A twenty-acre field on the experiment station in 1998 was planted in an alternating pattern of cotton, *Gossypium hirsutum* L., (8 rows) and reservoir strips (8 rows) across the field. Most of the cotton was Deltapine 5409. Some experiments contained NuCotn 33B, NuCotn 32B, and other varieties. The eight rows of each reservoir strip contained three rows of corn, *Zea mays* L., on each side, adjacent to the bordering cotton plots, and two rows in the center-one planted to mustard (Florida broadleaf variety) and one planted to pigweed, *Amaranthus hybridus* L. Corn variety was Pioneer 3223. Mustard and corn were planted on March 27; cotton and pigweed were planted on May 6.

Corn and cotton were planted with a John Deere® model 7300 vacuum planter (4-row) set to place four seed per row foot. Three planter units were used when planting corn; the fourth unit was an outside row planter with an empty hopper used to mark the rows to be planted in pigweed and mustard. Mustard and pigweed were planted with a Planet Jr.®, one row planter equipped with vegetable seed plates and modified for three-point hitch mounting on a tractor. Tiny pigweed seed (1 part) were diluted with corn grits (1 part) and corn meal (5 parts) to aid in calibrating the planter to deliver a sufficiently low seeding rate. Specific seed rate for mustard and pigweed was not determined.

Corn rows were intended to serve as a spray drift barrier to protect tarnished plant bugs on mustard and pigweed when insecticide treatments were applied to adjacent cotton plots. Eight different experiments were located in the field. However, this report deals only with an appraisal of the effectiveness of the reservoir strip-planting tactic for infesting cotton research plots with wild tarnished plant bugs.

Mustard, pigweed, corn, and cotton (untreated plots only) were sampled with a Weed Eater® blower/vacuum model no. BV1650 fitted with an organdy cloth sample bag. Vacuum sampling was done on 3 dates: June 11, 18, and 25. Each sample consisted of vacuuming 40 row ft of each plant species, and was repeated 4 times (four different locations) on each sampling date. All sampling was done between 1:00 and 3:00 p.m. Each vacuum sample of adult and nymph tarnished plant bugs was kept in an individual labeled organdy cloth sample bag; frozen and stored in a freezer; then sorted and counted on a later date in the laboratory.

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Cotton plots in all experiments were sampled by various methods – visual observations of terminals, sweep net samples, and drop cloth samples. Data from drop-cloth samples in the untreated check cotton plots of one experiment on four observation dates are used to provide an example of the effectiveness of the reservoir strip plantings.

Results

Vacuum sample data for the four plant species are summarized as adult and nymph tarnished plant bugs per acre in Table 1. These data show relatively high numbers of tarnished plant bug in mustard from mid- to late-June. Tarnished plant bug numbers, especially nymphs, quickly became very high by late June. The vacuum samples detected relatively low numbers in corn and cotton compared to mustard and pigweed, and there was an unexpected detection of nymphs in corn samples on June 25. The vacuum sampler was inefficient in cotton when compared to drop-cloth samples (Fig. 1) on June 25. Drop-cloth samples in untreated cotton on June 25 and 29, and July 2 and 9 show rapid development of a very high level of tarnished plant bug infestation (Fig. 1).

Conclusion

The results of these evaluations of mustard and pigweed, bordered by corn, in reservoir strip plantings show that tarnished plant bug populations develop high numbers in the mustard and pigweed and apparently move into adjacent cotton. The tactic was effective in producing natural populations of tarnished plant bugs for field research in cotton.

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Table 1: Tarnished plant bug populations per acre on four species of plants on three observation dates.

	6/11		6/18		6/25	
Crop	Adults	Nymphs	Adults	Nymphs	Adults	Nymphs
Mustard	10,346	11,435	24,503	17,969	53,906	23,414
Pigweed	545	10,890	25,047	9,257	3,812	143,748
Corn	545	0	1,634	0	0	1,089
Cotton	545	0	3,267	0	1,089	545

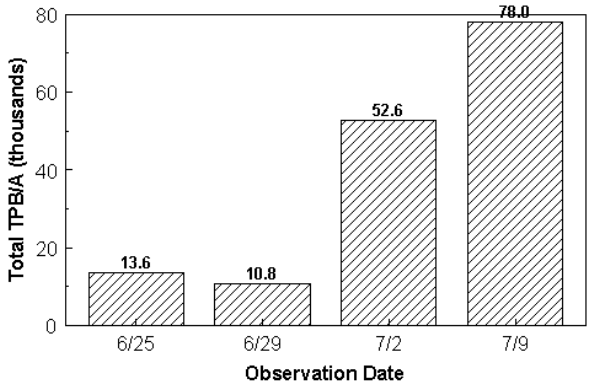

Figure 1. Tarnished plant bug per acre estimates (nymphs + adults) based on drop-cloth samples in untreated cotton plots adjacent to reservoir strip plantings.