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SEASONAL OCCURRENCE OF STINK BUGS AND TARNISHED PLANT BUGS IN MISSISSIPPI COTTON FIELDS

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Abstract

During the 2002 growing season weekly surveys were conducted in ten cotton fields located in South Mississippi and ten fields located in Central Mississippi to monitor the seasonal occurrence of stink bugs and tarnished plant bugs (TPB), *Lygus lineolaris*. Five of the fields in the Central Mississippi survey were located in the Hill region and five fields were in the Delta region. TPB numbers were extremely low in South Mississippi and in the Hill region of Central Mississippi, but TPB were more numerous in the Delta region, where an average of 3.4 insecticide treatments were applied to control TPB. Conversely, stink bug populations were higher in South Mississippi, where fields received an average of 0.6 stink bug sprays per field, while no stink bug treatments were applied in Central Mississippi. The southern green stink bug, *Nezara viridula*, was the most common stink bug species in South Mississippi, constituting 70.4% of all stink bugs captured. However, the green stink bug, *Acrosternum hilare*, was the most abundant stink bug species in Central Mississippi, followed by brown stink bugs, *Euschistus servus*, and southern green stink bug accounted for only 27.5% of all stink bugs captured in Central Mississippi.

Introduction

Stink bugs are important pests on numerous agronomic crops throughout the world and have been reported as an occasional pest of cotton since the beginning of the twentieth century (Bundy, McPherson, and Herzog 1998). However, until recently, stink bugs have not been considered to be a significant pest of cotton. This was because intensive insecticide use for control of other pests, especially boll weevils and the bollworm/tobacco budworm complex, coincidentally controlled stink bugs, making their presence in cotton uncommon. Widespread adoption of Bt-cotton and the success of the boll weevil eradication program have worked together to greatly reduce the number of foliar insecticide sprays applied to cotton, and this has allowed stink bugs to increase in prominence as pests of cotton.

In 2001 stink bugs, were ranked as the fourth most damaging pest in the Cotton Belt. Approximately 42% of the U.S. cotton acreage was infested with stink bugs, resulting in a 0.76% reduction in yield (Williams, 2002). In 2000 South Carolina cotton producers applied approximately 1.17 insecticide sprays specifically to control stink bugs (Williams, 2001), and Georgia growers applied an average of 0.8 sprays to control stink bugs in both 2000 and 2001. In 2001 stink bugs ranked as the second most damaging pest of Louisiana cotton, causing an estimated 1.5% yield reduction and requiring an average of 1.47 sprays per acre (Williams, 2001 & 2002). Although the average number of stink bug sprays applied to Mississippi cotton has yet to exceed 0.2 per acre, the incidence of stink bug infestation has increased in recent years. Mississippi is currently in the final phase of boll weevil eradication, and it is anticipated that stink bugs will continue to increase in prominence as pests of Mississippi cotton.

The most common plant-feeding stink bugs in Mississippi cotton are the southern green stink bug, *Nezara viridula* (L.), the green stink bug, *Acrosternum hilare* (Say), and the brown stink bug, *Euschistus servus* (Say). Stink bugs feed on developing seeds and lint, causing yellowing of lint, reduction in harvestable locks and shedding of young bolls (Bundy, McPherson, and Herzog 1999; Barbour, et. al., 1988). Although these surveys were initiated primarily to gain information on abundance and distribution of stink bugs, most of the sampling techniques used are also effective for TPB. Thus, information on TPB was also collected.

Tarnished plant bugs (TPB) *Lygus lineolaris* (Palisot de Beauvois) have historically been an important pest of Mississippi cotton, especially in the Delta region of the state (Layton, 2000). However, their importance has increased significantly in recent years and is expected to increase even more. This increase in the status of TPB is due to the same causes as discussed for stink bugs. However, TPB is by far the more important bug pest. In 2002 Mississippi cotton growers applied an average of 2.7 sprays to control TPB. In the Mississippi Delta the average number of TPB sprays was 3.5 (Williams, 2003).

Materials and Methods

In the 2002 growing season two surveys were conducted to monitor stink bug and tarnished plant bug populations throughout the season. The first survey involved ten cotton fields in George and Greene counties. These counties are located in the extreme southern part of the Mississippi and collectively include about 12,000 acres of cotton (Fig. 1). This is a unique cotton production area that is isolated from the rest of the Mississippi cotton. The second survey involved ten fields located along U.S. Highway 82 in central Mississippi. Five of these were located in a Hill environment and five were located in a Delta en-

vironment (Fig. 1). These fields were chosen with the help of local cotton producers and county extension personnel. Survey fields were visited weekly beginning June 6 and ending August 31.

In the southern survey the following sampling methods were used to monitor stink bug and tarnished plant bug populations: sweep net (25 sweeps of a 15 in. diameter sweep net per sample), ground cloth (6 row feet per sample), visual counts (25 plants per sample), and damaged boll counts (25 quarter-sized bolls per sample). The technique for making damaged boll counts was based on previous research conducted in South Carolina and Georgia (Bundy, et. al., 2000; Green, et. al., 2001; Green and Herzog, 1999; Green, et.al., 1997).

In addition to these sampling methods, beat net samples (10 beats into a 15 in. diameter sweep net per sample), and square retention counts (percent missing squares per 100 square sites) were taken in the central Mississippi survey. Also in the central Mississippi survey the time required to conduct the various sampling proceeding was recorded. The times, which were measured using a stop watch, included the time required to take the sample and make the necessary counts but did not include the time required to move to and from sampling sites.

Results and Discussion

Sampling Times

Average times required to complete the various sampling procedures in the Central MS survey are listed in Table 1. Because insect numbers were relatively low throughout the season, these should be viewed as minimum time requirements. Additional time would be required to complete insect counts when populations are high. The time for square retention counts represents an average across the five week time period when square retention counts were taken. The average time to complete a square retention count actually decreased each week as number of squares per plant increased, ranging from 5.11 minutes during the first week to 1.89 minutes per sample during the fifth week.

Insecticide Treatment Histories

Insecticide treatment information for the two surveys is shown in Table 2. Relatively few treatments were required in the South MS fields, (average of 1.1 sprays per field) compared to Central MS (3.3 sprays per field). Within the Central MS survey there was a large difference in the average number of insecticide sprays applied to the five Delta fields (6.2 total sprays per field) and the five Hill fields (0.4 total sprays/field). Fields in the Delta region were treated much more frequently for TPB (3.4) sprays) than were fields in the Hills (0.2 sprays) or in South MS fields (0 sprays). However, South MS fields received more sprays for stink bugs (0.6 sprays/field) than did Central MS fields (0 sprays/field).

Tarnished Plant Bugs

The average weekly number of TPB collected per 25 sweeps in South MS and Central MS are shown in Figures 2 and 3, with the Central MS data being shown for Hill and Delta regions. TPB numbers were extremely low in South MS throughout the season (Fig. 2), supporting the absence of TPB sprays in these fields.

TPB numbers were somewhat higher in Central MS (Fig. 3), but weekly averages were well below the economic threshold of two bugs per 25 sweeps during the first two weeks of squaring or four bugs per 25 sweeps during the remainder of the season (Layton, 2002). Delta fields had significantly higher populations of TPB than Hill fields on most sampling dates in July and August. The fact that TPB numbers in the Hills were slightly higher than those for the Delta fields through June and early July is attributed to the tendency of Delta growers tend to apply a number of “automatic” or “prophylactic”, and often unnecessary, TPB sprays during this time period.

Similar results were observed for the other TPB sampling methods (data not shown), and the square retention counts taken in the Central MS survey showed that square retention remained above 94% in both the Hills and the Delta, throughout June and early July. Collectively, the data show that TPB populations were considerably higher in the Delta than in the Hills. These data also suggest that a portion of the average 3.4 TPB sprays applied to Delta fields were unnecessary.

Stink Bugs

Southern green stink bugs, (*Nezara viridula* L.), were by far the dominant stink bug species encountered in the South MS survey, constituting over 70% of all stink bugs captured (Table 3). However, in Central MS southern green stink bugs were the least common of the three species. Green stink bugs (*Acrosternum hilare* Say), was the most commonly encountered species in Central MS, accounting for 42.5% of all stink bugs captured, followed by brown stink bugs, primarily (*Euschistus servus* Say), which comprised 30% of the total stink bugs captured. The greater abundance of southern green stink bug in South MS and the greater abundance of green stink bugs in Central MS is in agreement with previous surveys. Barbour, et. al. 1988 found green stink bugs followed by brown stink bugs to be the most common species in North Carolina cotton but, Bundy et. al. 1998 found that the southern green stink bug was the most common in south Georgia. Although the southern green stink bug occurs worldwide, it is primarily confined to tropical and subtropical regions (Panizzi, et. al., 2000).

Table 3 shows the average weekly number of stink bugs per six row feet in both surveys. Stink bug numbers were low throughout the season in Central MS, with the highest average number for any single field being only 0.50 bugs/6 row feet, for the week of August 21. Stink bug numbers were somewhat higher in South MS, especially during the last two weeks of August. But, the highest average number of stink bugs caught in any single field was only 0.75 bugs/6 row feet on the week of August 24, which is still below the current economic threshold of one bug per six row feet (Layton, 2002). Stink bug numbers were also low for the other sampling methods: sweep net, beat net, and visual counts (data not shown).

Considering the low numbers of stink bugs found in the South MS survey, the level of boll damage was surprisingly high (Fig. 4) and the stink bug treatments that were applied to the South MS fields (Table 2) were prompted more by boll damage counts than by stink bug counts. Given the near absence of TPB in South MS, it is assumed that the majority of the reported boll damage is attributable to stink bugs. These results suggest that checking for internal boll damage may be a more reliable method of scouting for stink bugs. In the Central MS survey an average of 4.09 minutes were required to check 25 bolls for boll damage (Table 1). Boll damage was lower in Central MS, and did not approach 15% until the end of the season (Fig. 5).

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Table 1. Average times required to complete indicated sampling procedures in the Central Mississippi survey.

Sample Method	Number	Avg. Time[1] (Min)	n
Sweep Net	25 Sweeps	1.09	640
Ground Cloth	6 Row Feet	0.73	472
Visual	25 Plants	5.89	152
Square Retention	100 Sq. Sites	3.21	222
Percent Bug Damaged Bolls	25 Bolls	4.09	146

[1] Includes time required to take sample and make counts, but does not include time required to move between sampling sites.

Table 2. Insecticide treatment history for fields in South MS (N=10) and Central MS (N=10), and in the Hill fields (N=5) and Delta fields (N=5) within the Central MS survey.[1]

	Bollworm Sprays	Plant Bug Sprays	Stink Bug Sprays	Other Sprays	Total Sprays	N
South MS	0.5	0	0.6	0	1.1	10
Central MS	1.2	1.8	0	0.3	3.3	10
Hills	0*	0.2*	0	0.2	0.4*	5
Delta	2.4*	3.4*	0	0.4	6.2*	5

[1] Means followed by an * indicate a significant difference (P = 0.1) between Hill and Delta fields. Statistical comparisons between South MS and Central MS were not appropriate.

Table 3. Species distribution of stink bugs captured in South MS and Central MS surveys.

	Percent of Total Stink Bugs Caught	
Stink bug Species	South MS[1]	Central MS[2]
Southern Green	70.4 %	27.5 %
Green	12.6 %	42.5 %
Brown	16.9 %	30.0 %

[1] Season long total of 71 stink bugs caught in all sampling methods combined.

[2] Season long total of 40 stink bugs caught in all sampling methods combined.

Table 4. Avg. number of stink bugs per 6 row ft in South MS and Central MS.

	Avg. # Stink Bugs per 6 row feet (All Species)	
Date	South MS (N=10)	Central MS (N=10)
6/27	-	0.000
7/01	0.000	0.000
7/08	0.025	0.000
7/17	0.093	0.017
7/22	0.025	0.000
7/29	0.025	0.000
8/06	0.050	0.080
8/12	0.013	0.000
8/19	0.025	0.050
8/24	0.150	-
8/31	0.175	-

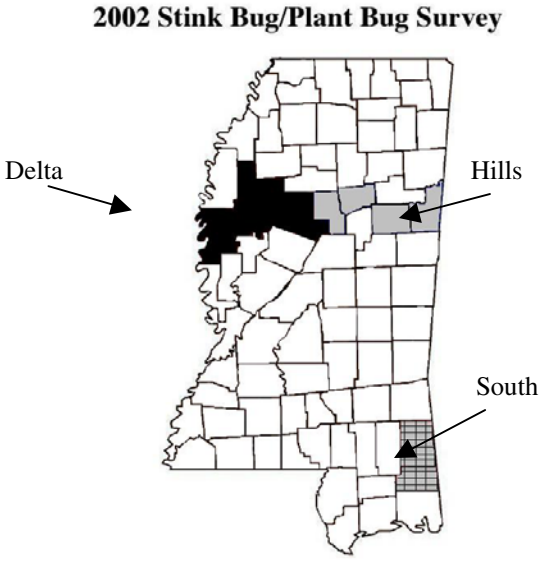

Figure 1. Location of counties involved in 2002 Stink bug/ Plant bug survey. South MS survey involved ten cotton fields. Central MS survey involved five fields in Hill region and five fields in Delta region.

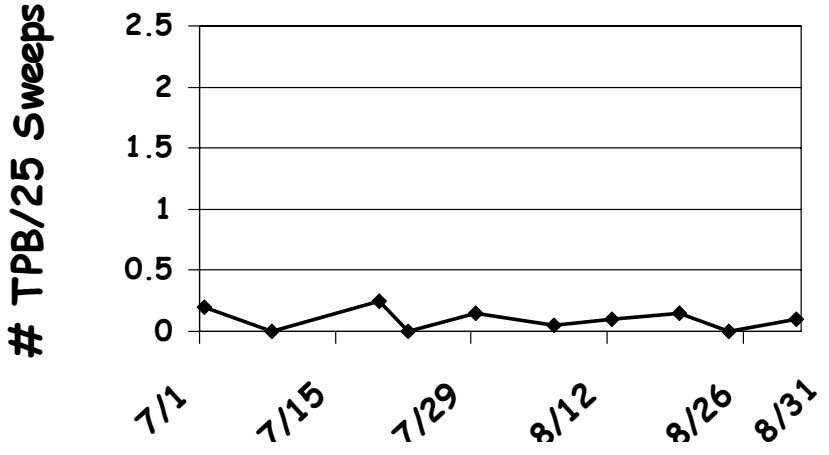

Figure 2. Average weekly number of Tarnished Plant Bugs per 25 sweeps in South MS, (n=10).

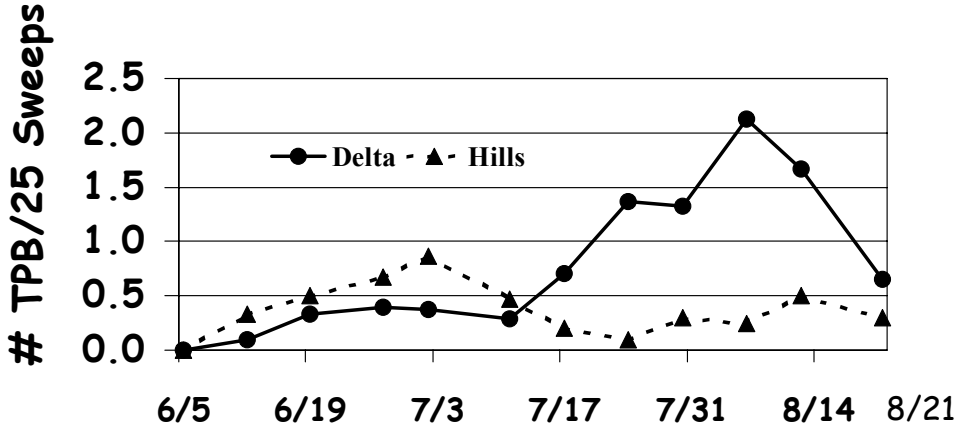

Figure 3. Average weekly number of Tarnished Plant Bugs per 25 sweeps in Central MS,Hills (n=5) vs Delta (n=5). Significant differences (P=0.1) were observed on the weeks of 7/3, 7/17, 7/24, 7/31, 8/6, and 8/14.

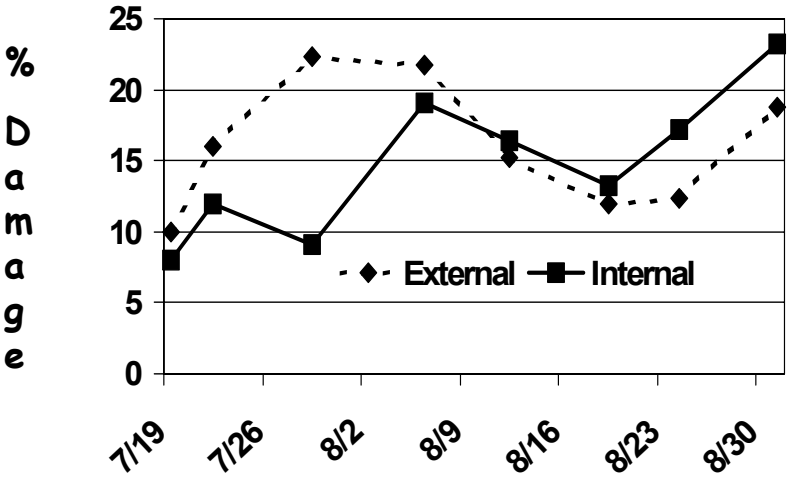

Figure 4. Average weekly percent bug damaged bolls, external and internal, for South MS survey (N=10).

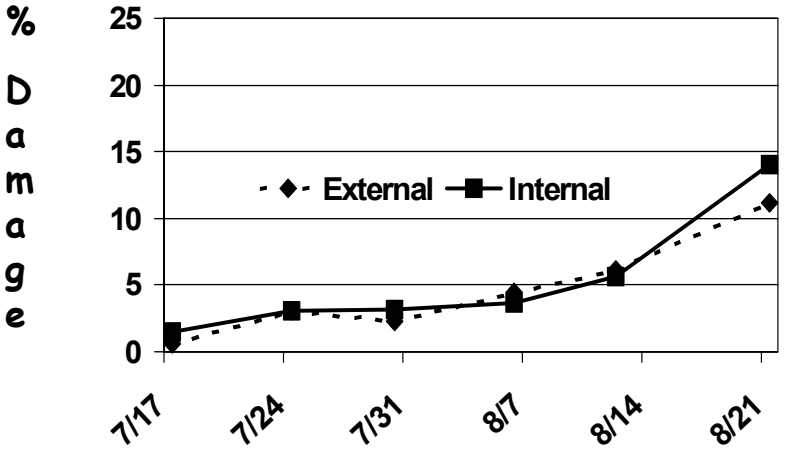

Figure 5. Average weekly percent bug damaged bolls, for Central MS survey (N=10).