EVALUATION OF MULTIPLE BUG SAMPLING TECHNIQUES FOR EFFECTIVENESS AND EFFICIENCY Jonathan W. Sharp and Ralph D. Bagwell LSU Agcenter Winnsboro, LA

Abstract

The results found in this experiment showed that the average time required for the sweep sampling method was 1:39 and the average number of tarnished plant bugs found was 1.16. When the drop sampling method was used the average time for a sample was 1:00 and the average number of tarnished plant bugs found was 0.37. The visual "whole plant" sampling method took the longest time to complete, but it also found the highest number of tarnished plant bugs. The average time taken to complete the visual sampling method was 9:18, with an average number of 1.29 tarnished plant bugs found. The average time taken to complete the square sampling method was 3:32. In this sampling method, external and internal damage was examined. The average number of tarnished plant bugs found was 0.19 and the average number of squares with external damage was 2.03; the average number with internal damage of 0.31 tarnished plant bugs, an average of 3.90 of the blooms were damaged and took an average time of 2:43 to complete. The last sampling method evaluated was bolls. The average amount of time required to complete a boll sample was 6:06 and the average number of bolls with external damage was 2.54 and the average number of bolls found with internal damage was 1.50.

The sampling method that took the least amount of time to complete was the drop method. The average time taken to complete a drop sample was 1:00. The sampling method that took the longest time to complete was the visual "whole plant" sampling method. The average time taken to complete it was 9:18. The boll sampling method took an average time of 6:06, and the sweep sampling method took an average time of 1:39 to complete. The square sampling method took an average time of 3:32 to complete, and the bloom sampling method took an average time of 2:43 to complete. The average time taken to complete all six of these sampling methods was 24:15.

The sweep sampling method found the highest number of tarnished plant bug adults. The drop sampling method found the highest number of tarnished plant bug nymphs. However, when the adults and nymphs are added together, the sweep method found 1.25 plant bugs per minute and the drop method found 1.54 plant bugs per minute. The difference between these two methods is only 0.29 plant bugs found per minute, but the sweep method still finds more plant bugs per minute. The drop sampling method also found the highest number of stinkbug adults and nymphs. Therefore, the drop sampling method proved to be more effective and efficient than any of the other sampling methods that were evaluated in this study.

Introduction

Multiple sampling methods to detect plant bug and stink bug infestations during bloom were compared. The effectiveness and efficiency of each sampling method was determined. Sampling methods evaluated included sweep net, drop cloth, visual sample, external square damage, internal square damage, bloom damage, external boll damage and internal boll damage. Sampling time for each method was recorded to evaluate sampling efficiency. Plant height and plant maturity (nodes above white flower) was determined at each sampling date. Samples were taken weekly at seven locations beginning at first bloom and continuing until cutout. Generally less time was required for the drop cloth sample than any other sample. The modified whole plant search of 25 plants required the most time.

Materials and Methods

An experiment was conducted during the 2005 growing season to determine the most efficient and effective sampling method for detecting bug pests in cotton. There were nine production cotton fields in Louisiana sampled several times for this experiment. Two fields were sampled in Rapides parish and one in Madison parish. In Franklin parish, four fields were sampled and in East Carroll parish two fields were sampled. There was a total of 144 samples recorded for this experiment.

Sampling methods included: sweep net, shake sheet, 10 ft. visual inspection, square inspection, bloom inspection, external and internal boll inspections. Each sampler timed the sampling method which he or she conducted. The data recorded included the field ID, date and time, crop variety, average plant height, average number of nodes, average number of nodes above the first position white flower, temperature, wind speed, presence of dew or any other type of moisture, insecticide treatment within the last two weeks and each samplers name.

The sampling methods were divided up among each sampler at every location. For example, one sampler would perform the sweep sampling method while another was performing the drop sampling method. Once all six of the sampling methods were completed, another location in the field would be examined. In every field sampled, all six sampling methods were evaluated at four different locations.

The data recorded at each sample point consisted of insect counts using a 15-inch diameter net (25 sweeps), a black 2.5 ft. Bayer Scout Smart Shake Sheet (5 row ft.), a visual inspection of 25 whole plants, specifically looking at the terminals, 2 medium-sized squares, one pink or white bloom and one thumb-sized boll. There was also an inspection of 25 squares and blooms in which the sampler looked for damage in addition to insects. The final sampling method evaluated was external and internal boll inspections of 25 thumb-sized bolls

Results and Discussion

The results found in this experiment showed that the average time required for the sweep sampling method was 1:39 and the average number of tarnished plant bugs found was 1.16. (Table 1.) When the drop sampling method was used the average time for a sample was 1:00 and the average number of tarnished plant bugs found was 0.37. The visual "whole plant" sampling method took the longest time to complete, but it also found the highest number of tarnished plant bugs. The average time taken to complete the visual sampling method was 9:18, with an average number of 1.29 tarnished plant bugs found. The average time taken to complete the square sampling method was 3:32. In this sampling method, external and internal damage was examined. The average number of tarnished plant bugs found was 0.19 and the average number of squares with external damage was 2.03; the average number with internal damage was 1.69. (Table 2.) The bloom sampling method, which also examined the blooms for damage, found an average of 0.31 tarnished plant bugs, an average of 3.90 of the blooms were damaged and took an average time of 2:43 to complete. The last sampling method evaluated was bolls. The average amount of time required to complete a boll sample was 6:06 and the average number of bolls found with internal damage was 1.50.

The sampling method that took the least amount of time to complete was the drop method. The average time taken to complete a drop sample was 1:00. The sampling method that took the longest time to complete was the visual "whole plant" sampling method. The average time taken to complete it was 9:18. The boll sampling method took an average time of 6:06, and the sweep sampling method took an average time of 1:39 to complete. The square sampling method took an average time of 3:32 to complete, and the bloom sampling method took an average time of 2:43 to complete. The average time taken to complete all six of these sampling methods was 24:15.

The sweep sampling method found the highest number of tarnished plant bug adults. The drop sampling method found the highest number of tarnished plant bug nymphs. However, when the adults and nymphs are added together, the sweep method found 1.25 plant bugs per minute and the drop method found 1.54 plant bugs per minute. (Table 3.) The difference between these two methods is only 0.29 plant bugs found per minute, but the sweep method still finds more plant bugs per minute. The drop sampling method also found the highest number of stinkbug adults and nymphs. Therefore, the drop sampling method proved to be more effective and efficient than any of the other sampling methods that were evaluated in this study.

	Table 1. Average Sample	Completion Time and Number of Insect Detected by Sample Type.
--	-------------------------	---

Sampling	Time	No. TPB	No. Stink Bug

Method	Required	Adults	Nymphs	Adults	Nymphs
Sweep Net	1:39	1.16	0.83	0.14	0.03
Drop Cloth	1:00	0.37	1.17	0.15	0.1
Whole Plant	9:18	1.29	1.18	0.03	0.06
Squares	3:32	0.19	0.33		
Blooms	2:43	0.31	0.76		

 Table 2. Average Damage Found per Individual Sample.

Sampling	External	Internal
Method	Damage	Damage
Squares	2.03	1.69
Blooms	3.90	
Bolls	2.54	1.50

Table 3. Average Number of Bug Pest Found per Minute.

Sampling	No. T	PB	No. Stin	k Bug
Method	Adults	Nymphs	Adults	Nymphs
Sweep Net	0.70	0.55	0.09	0.02
Drop Cloth	0.37	1.17	0.15	0.1
Whole Plant	0.14	0.13	0.003	0.006
Squares	0.05	0.09		
Blooms	0.11	0.28		

 Table 4.
 Average Damage Found per Minute.

Sampling	External	Internal
Method	Damage	Damage
Squares	0.57	0.48
Blooms	1.44	
Bolls	0.42	0.25