SPATIAL MAPPING OF STINK BUGS IN COTTON FIELDS USING THREE SCOUTING TECHNIQUES

Michael D. Toews
Department of Entomology, University of Georgia, Tifton Campus

Abstract

Researchers and Extension professionals have promoted the use of internal feeding symptoms as the most accurate method for stink bug scouting in cotton. However, this method requires considerable time and effort; therefore, scouts and growers may be unwilling to invest adequate resources to make pest management decisions using this method. To examine differences among common stink bug scouting techniques, we scouted commercial cotton fields weekly using three common techniques, dissection of 20 quarter sized soft bolls, 50-sweeps with a 15-inch sweep net, and shaking 12-linear feet of row over a white drop cloth. Results clearly show that the internal method was the most accurate and the most time consuming.

Introduction

We monitored seven commercial cotton fields (~15-25 acres each) at a density of one sampling site per acre across the entire field. Fields (located in Colquitt, Mitchell, and Tift counties) were first mapped using GIS software and then 8-foot tall flags were placed at sampling locations for reference during the rest of the summer. Sampling methods included 50 double row sweeps, 12-linear feet on a shake sheet, and 20-quarter sized soft bolls. To avoid biasing the samples, each sampling procedure was executed on a different side of the sampling flag. Fields were scouted starting approximately the second week of bloom until no more soft bolls were available. Results were then plotted by week as contour maps using SigmaPlot software.

Results and Discussion

A summary of research findings is shown in Table 1 below. While internal boll damage required eight minutes to complete, sweep net sampling and drop cloth sampling could be completed in only a fraction of the time. However, nearly 90% of the 20-boll samples had at least one boll with internal feeding damage. In comparison, about 15% of the sweep net samples and less than 10% of the drop cloth samples indicated the presence of stink bugs. All three methods suggested that the stink bug populations were highly aggregated in cotton fields. These data strongly suggest that assessments of internal boll damage should be considered the “gold standard” by which all new methods are compared. Results conclusively show that using boll damage is nearly 6-times more sensitive than using a sweep net and nearly 10-times more sensitive than using a drop cloth. However, internal boll damage required 4-times longer than using a sweep net and 8-times longer than using a drop cloth. New detection technologies are needed that have the speed of the sweep net but the sensitively of the internal boll damage.

Table 1. Comparison of sampling procedures for stink bugs in cotton. Asterisks (*) indicate a significant departure from zero (P<0.05, n = 1115 samples per method).

Sampling method	Time per sample	% samples with insect or damage	Variance to mean ratio	Statistical distribution
Boll damage	8 min	88	2.25	Aggregated
Sweep net	2 min	15	4.36	Aggregated
Drop cloth	1 min	9	2.91	Aggregated

Data were also spatially mapped to related captures in time and space. Although all three sampling methods showed similar trends, the heightened sensitivity of the internal method was highly evident on the spatial maps (Figs.1 through 3). When the maps of sweep net captures and drop cloth samples detected insect populations along the northern edge of this field, the boll damage showed similar patterns, plus an additional incursion of damage from the west and a smaller area in the center of the field. Similar to the summary data shown in Table 1, the maps also show that internal boll damage is a much more sensitive detection method. Furthermore, these results suggest that scouts relying on quicker methods like a sweep net or drop cloth are likely missing significant damage.

Temporal analyses show that infestations tended to start near the edge of the field before possibly moving to the field center. Interestingly, infestations did not always increase in time and a few decreased during subsequent weeks. We hypothesize that that there are significant biotic or abiotic factors governing stink bug population dynamics. Perhaps biological control may be more important than currently appreciated to help keep stink bug populations in check. Alternatively, the stink bugs may be moving out of the cotton and into better quality host plants.

Acknowledgments

This work was supported by the Georgia Cotton Commission and the USDA ARS Special Grants Program. We appreciate excellent technical help from David Griffin, Jessica Corbett, and Blake Crabtree.

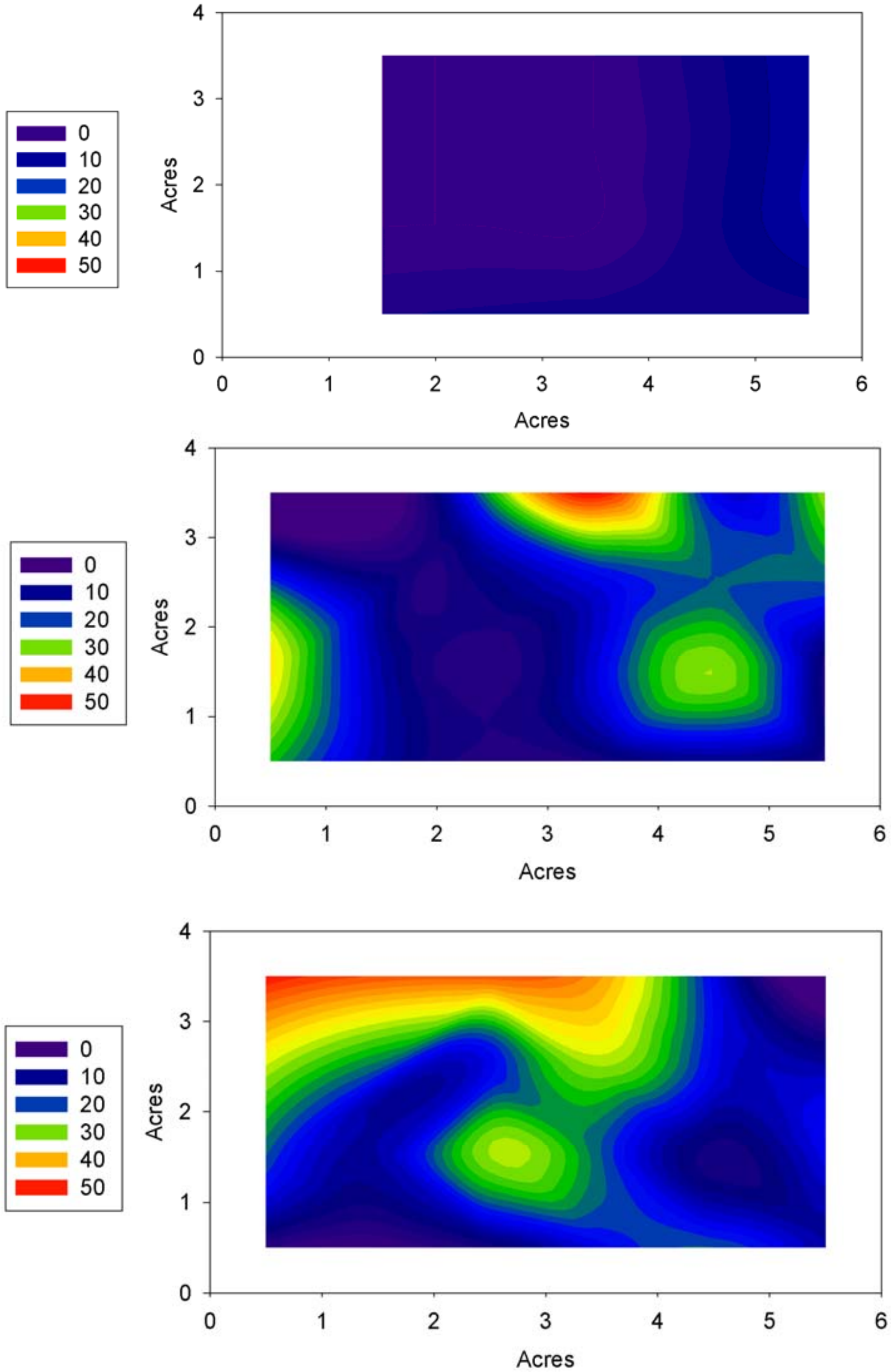

Fig. 1. Spatial mapping of internal boll damage in a single unsprayed field when sampled using internal boll damage. Data shown are percent damage (20 bolls dissected per sampling location). Sampling dates shown include August 3 (top), August 31 (middle), and September 9 (bottom).

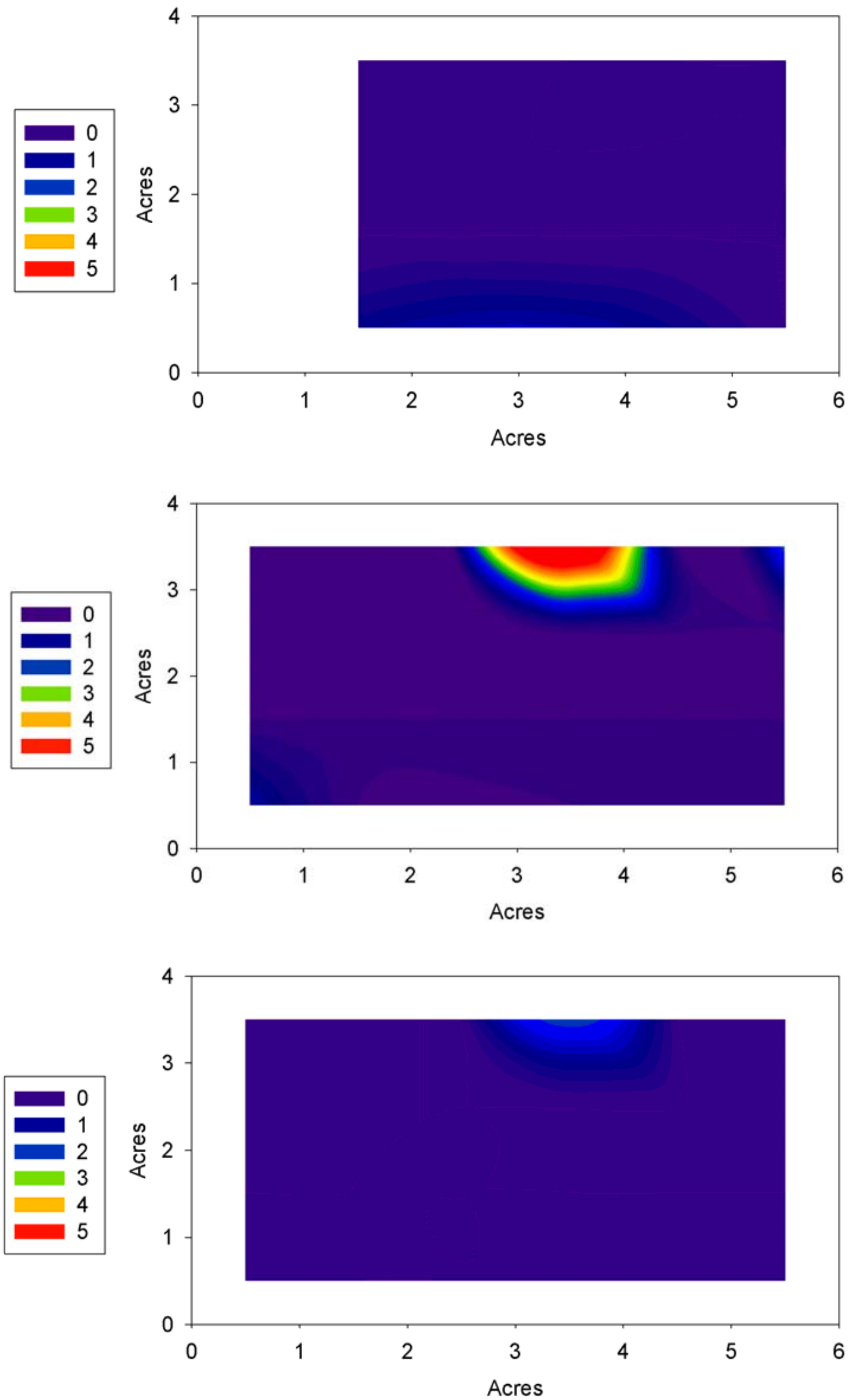

Fig. 2. Spatial mapping of stink bug individuals recovered in a single unsprayed field when sampled using 50 sweeps with a 15-inch sweep net at each sampling location. Sampling dates shown include August 3 (top), August 31 (middle), and September 9 (bottom).

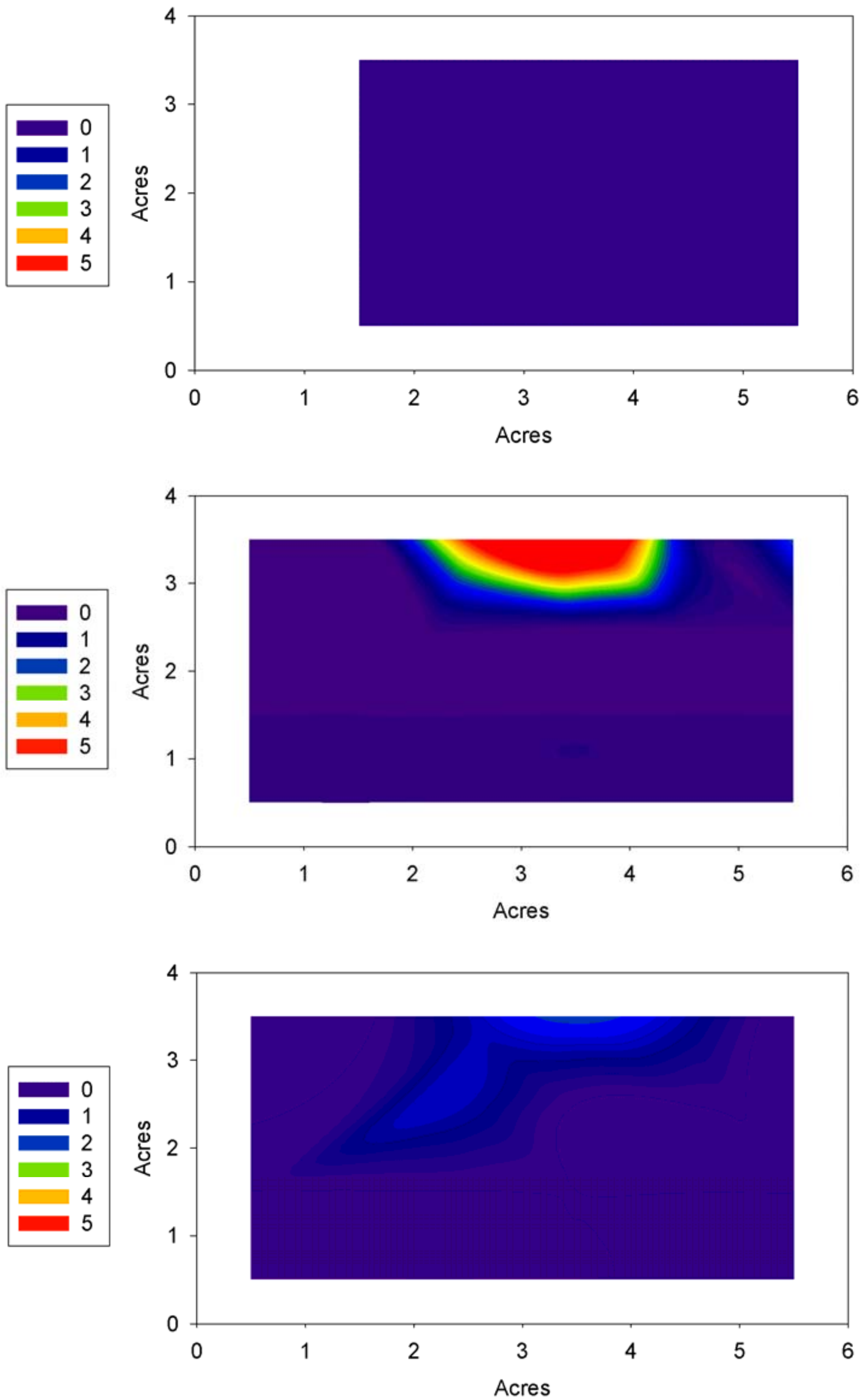

Fig. 3. Spatial mapping of stink bug individuals recovered in a single unsprayed field when sampled using 12-linear feet of row shaken over a drop cloth at each sampling location. Sampling dates shown include August 3 (top), August 31 (middle), and September 9 (bottom).