TEMPORAL AND SPATIAL DISTRIBUTION OF WHITEFLIES IN GEORGIA

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Abstract

Whitefly populations were monitored weekly at 125 sites throughout southern Georgia using yellow sticky cards from January through December 2018. Populations remained low through July, but rapidly increased during the months of August and September, and the population dropped abruptly following Hurricane Michael, which struck during the second week of October. Based on the average number of whitefly captures per trap, it was observed that traps located in Tift, Ben Hill, Worth, Colquitt and Thomas Counties exhibited more whiteflies compared to the traps located in the remaining 17 counties. A comparison of trap height indicated that traps placed at approximately 0.5 feet above ground captured as many as four times more whiteflies than the traps placed at 4.5 feet above ground. More whiteflies were captured on traps located near vegetable fields, followed by cotton. Conversely, fewer whiteflies were captured on traps located near grassland or pastures. Silverleaf whitefly, *Bemisia tabaci*, was the most abundant species captured, but at least four other whitefly species were observed on the traps. Out of the four others, bearberry whitefly, *Teraleurodes ursorum*, was found to be widely present in the sampled area. Future research will explore the relationship of host habitat and insect abundance to understand and manage whitefly population build up in the region.

Introduction

Silverleaf whitefly, *Bemisia tabaci* (Hemiptera: Aleyrodidae) is a polyphagous insect pest of many crops around the world (De Barro et al. 2011). In Georgia, silverleaf whitefly is common in cotton and several vegetable crops annually. However, in 2017, economic impact of whitefly on Georgia crops was unprecedented and the losses exceeded $200 million dollars. A mild winter and year round availability of favorable agronomic hosts are believed to contribute to population outbreaks (Sparks et al. 2018). It is important for the growers to be aware of increasing whitefly populations. Monitoring to determine the seasonal activities of the pest and can provide valuable information for decision support (Palumbo et al. 1995). Such monitoring across a greater landscape can also provide information on the spatial abundance of the insect population and possibly reveal some underlying factors contributing to the observed population dynamics. This study was designed to understand the temporal and spatial population dynamics of whitefly in Georgia.

Materials and Methods

Double-sided yellow sticky cards (3 x 4 inch) (Sensor, BASF Inc.) were suspended on a metal loop and placed at ground level near field margins. At each of 125 sites, spaced approximately 5 miles apart, one trap was placed at 0.5 feet and a second trap was located 4.5 feet above ground (Fig. 1). Both traps were placed in proximity to each other to compare number of whitefly captured at any given time. Traps were retrieved and replaced every week starting from January through December of 2018. After one week, the traps were collected and placed individually in a clear plastic bag and stored in freezer at -10 C. Whitefly adults captured on each trap were enumerated under a magnifying lens or a stereoscope. Crop or habitat next to the trap site was noted and considered in the analysis to explore the effect of adjacent habitats on trap capture. Whiteflies suspected to be species other than *B. tabaci* were sent to the USDA-ARS Systematic Entomology Laboratory at Beltsville, MD for proper identification.

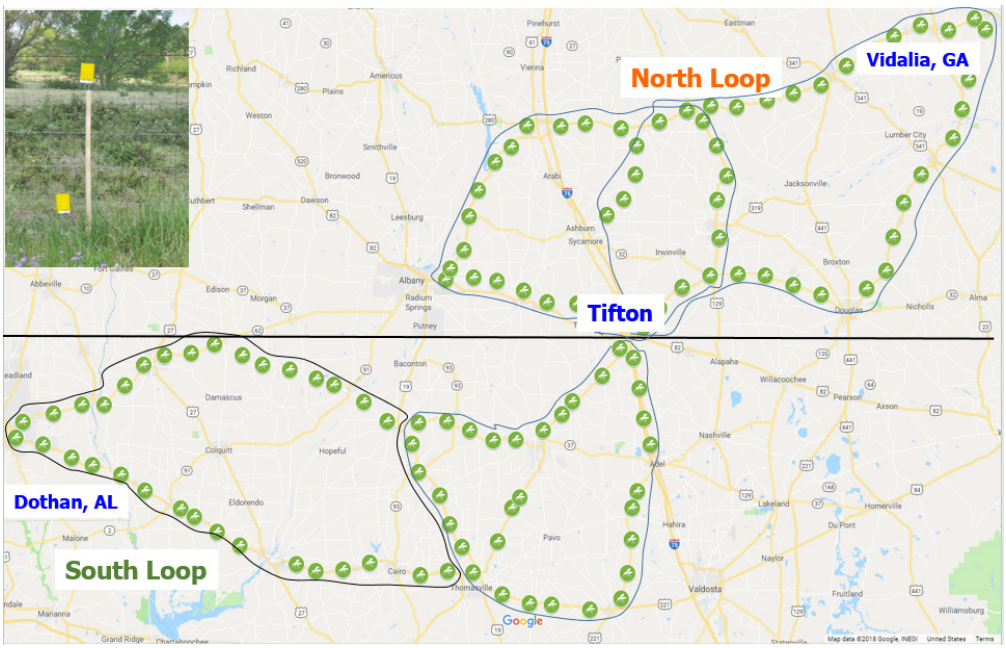

Fig. 1 Location of traps distributed across south Georgia (green circles). Example of trap placement at two different height (inset).

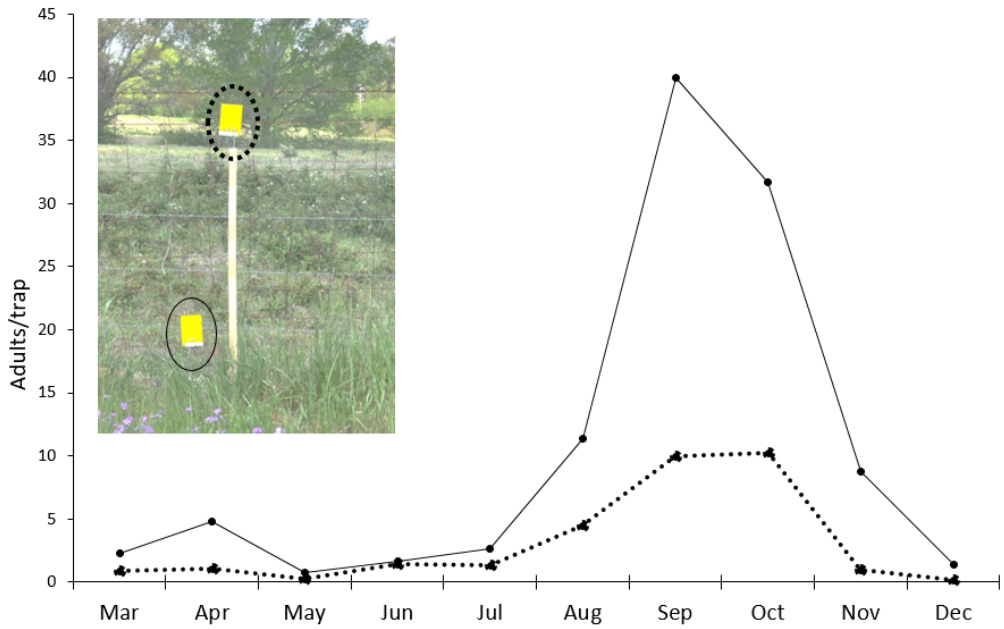

Fig. 2 Mean number of whitefly captures in traps at two different height; 0.5 feet (solid balck line), 4.5 feet (dotted black line).

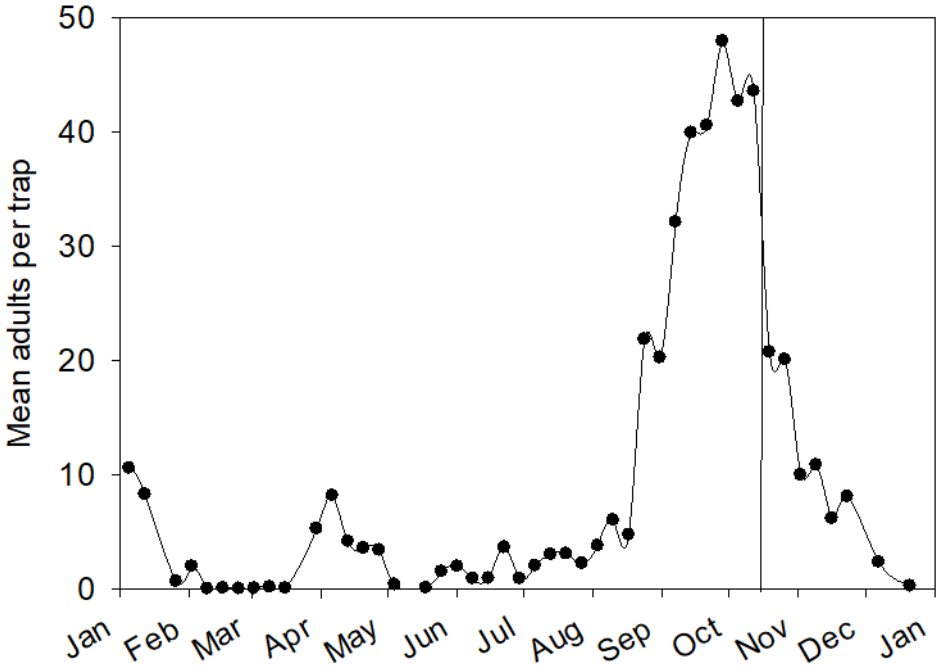

Fig. 3. Mean capture of whiteflies across all traps in calander year 2018. Vertical line indicates timing of Hurricane Michael.

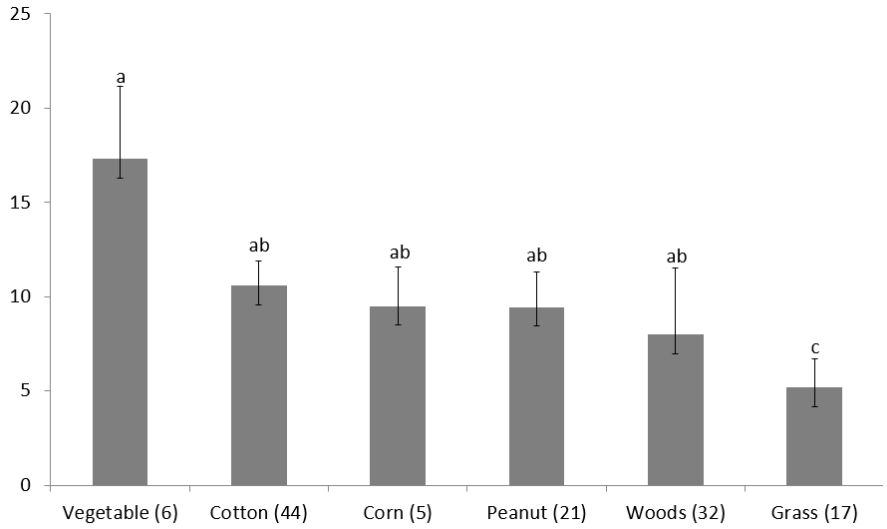

Fig. 4. Mean number of whitefly capture in traps separated by the crop/habitat type. Number in bracket following the habitat is total number of traps for that habitat.

Results and Discussion

Traps placed at 125 different locations represents 22 different counties in southern part of Georgia and part of south-west Alabama (Houston Co.). Traps placed at 0.5 feet above ground consistently captured more whiteflies than the trap placed at 4.5 feet aboveground (Fig. 2). This difference tween trap heights was more pronounced during August and September. Increased captures in low traps may be due to the height of the surrounding vegetation and movement behavior of whitefly itself. Further work is needed to understand this phenomenon, but for practical purposes, use of traps at ground level appears to be a more sensitive location. The seasonal abundance of whiteflies in the sampled

area indicated that whitefly captures remained very low through July, except for a few small peaks in late-April and early-May. Later, we discovered that these small peaks were largely due to the capture of *Tetraleurodes ursorum,* a similar looking species to *Bemisia tabaci.* Closer observation indicated that *Tetraleurodes ursorum* is only associated with dewberry plants (*Rubus flagellaris*). *Bemisia tabaci* whitefly populations started building up in late-July and grow significantly in later part of August and September (Fig. 3). The population was abruptly disrupted following a strong hurricane event on October 10, which destroyed many acres of cotton and vegetable crops. Whitefly captures following hurricane remained low for rest of the year. Comparing across adjacent habitats, it was observed that highest capture was in traps near vegetable fields and lowest capture was in traps near grassland (Fig. 4). Traps placed near cotton fields had numerically more whitefly captures, but it did not vary significantly from the captures seen in traps located near peanut fields, corn fields or woods. It appears that vegetables are highly favored habitat of whiteflies, but there are other components such as presence of certain weed hosts surrounding a trap can also influence whitefly capture. Generally speaking, whitefly populations were considerably lower in 2018 compared to the outbreaks observed in 2017.

Summary

Overall, whitefly activity in South Georgia in 2018 was less severe than the epidemic levels experienced in 2017. Researchers hypothesize that several frost events in early 2018 helped to suppress the spring population growth; additionally, frequent summer rainfall likely suppressed dispersal. As a result, populations did not reach levels that prohibited crop production. Positioning traps at 0.5 feet above the ground was the most efficient location for detection and monitoring of whitefly. To avoid mistaking silverleaf whitefly with *Tetraleurodes ursorum*, especially early in the year, traps should be placed away from any dewberry habitats. It is difficult to distinguish between these two species without some detail observations under microscope. Population trends observed during 2018 may change from year to year, based on the weather events and changes in host plant availability. This study will be continued in 2019 to compare contribution of some primary factors such as temperature and host plants in overall whitefly population dynamics.

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