Development of Sampling and Decision Plans for Silverleaf Whitefly on Pima Cotton

Larry D. Godfrey, Dept. of Entomology, Univ. of California, Davis, CA 95616; (530) 752-0473; ldgodfrey@ucdavis.edu
Treanna Pierce, Dept. of Entomology, Univ. of California, Shafter, CA 93263; (661) 746-8032
Field Assistants: Sandra Bravo, Erika Brimage, Mitzi Medina, Richard Perez

INTRODUCTION

Bemisia whitefly populations are a significant annual threat to cotton production, particularly pima cotton, in the San Joaquin Valley. This pest has the potential to reduce cotton yields; however, the prospect of cotton lint contamination, creating a condition called sticky cotton, is the primary concern associated with whitefly infestations. Important research on sampling, damage potential, and management of *Bemisia* whiteflies has been conducted in Arizona. This research has formed the backbone of our present management scheme in California. In summary, this research supported three stages of whitefly management during the season with different insecticide chemistries during each stage. The need to management resistance and the characteristics of the insecticides have led to this plan and to the particular management tools. A presence-absence sampling plan based on adult infestation (a leaf must have 3 or more adults to be considered infested) and on nymphal infestation (large nymphs in a quarter-sized leaf disk) and the fifth leaf as the recommended sampling universe was developed. However, significant differences in whitefly infestation patterns, biology, crop landscapes, environmental conditions, and particularly cotton species (upland [*Gossypium hirsutum*] versus pima cotton [G. *barbardense*]) have created the need to adapt and modify this management program for the SJV. Most importantly, our infestations generally occur late enough in the season that yield reductions are not the norm but rather the threat of sticky cotton is more important. The presence of cotton aphids in the SJV production system is another reality that must be considered.

Results from the 2005 studies will be briefly summarized herein. Studies are just beginning for the 2006 season.

SUMMARY

In 2005, whitefly populations were very low at the Shafter REC (at least in this particular plot). Cotton aphids were, however, present in significant numbers. Therefore, this project was altered to accommodate the insect infestations and late-season cotton aphid populations and sticky cotton was the focus. A similar study was ongoing in a neighboring acala cotton plot so the comparison between the two cotton species could be made.

Studies were conducted at the Univ. of California Shafter Research and Extension Center in irrigated Acala (‘Phytogen 72’) and irrigated Pima ('Phytogen 800') cotton in 2005. Insecticides were used to manipulate naturally-occurring populations of cotton aphids and silverleaf whiteflies in neighboring field plots of Acala and Pima cotton. Treatments were applied with ground equipment to plots measuring 13 x 90 feet with 4 replicates. Treatments were started at the initiation of boll opening (12 Sept.) and continued at approximately weekly intervals until (and

including) the time of defoliation (7 Oct. in Acala plot and 25 Oct. in Pima plot). The treatments applied were Assail 70WP (1.7 oz./A) to control aphids and to reduce whitefly levels, Warrior (3.8 fl. oz./A) to flare aphid populations, and Lorsban 4E at 24 oz./A to control aphids only. Untreated plots were also included. Insect populations were quantified every 5 to 7 days; leaf samples (10 fifth main stem node leaves per plot) were collected and aphids and whitefly nymphs counted in the laboratory. Aphid control treatments were re-applied if there was evidence of aphid build-up once a treatment regime was initiated.

Cotton lint was hand-harvested from the Acala plots on 20 Sept., 6 Oct., 18 Oct., 2 Nov., and 7 Nov. and from Pima plots on 4 Oct., 20 Oct., 1 Nov., 14 Nov., and 18 Nov. Cotton was machine-harvested on 7 Nov. (Acala) and 18 Nov. (Pima). Additional samples of lint were hand-harvested from selected treatments on 5 Dec. following ~0.5 inch precipitation. All lint samples were ginned and stickiness determined at CIRAD (French Agricultural Research Centre for International Development) by high speed stickiness detector.

In 2005, populations of whiteflies were very low in the Acala and Pima cotton plots; levels of cotton aphids were moderate and persistent during the open boll period. The insecticide treatments generally altered the populations as desired. Treatment regimes with the highest and lowest accumulation of aphid-days are indicated in Fig. 1 and 2. Aphid populations in the Pima cotton plot were twice that of the Acala cotton plot. Stickiness in the acala cotton ranged 2.7 sticky spots (Assail applied on 12 Sept.) to 47.8 sticky spots (Warrior applied on 12 Sept.). Sticky spot values greater than ~15 are problematic in acala cotton. Overall, the values correlated with the insect numbers quite well. In the pima cotton, the sticky spot data ranged from 8.5 to 43.8 sticky spots. There was less agreement with the treatment regime in the sticky spot data in the pima than the acala cotton. In addition, the "threshold" for stickiness is lower in pima cotton than acala cotton.

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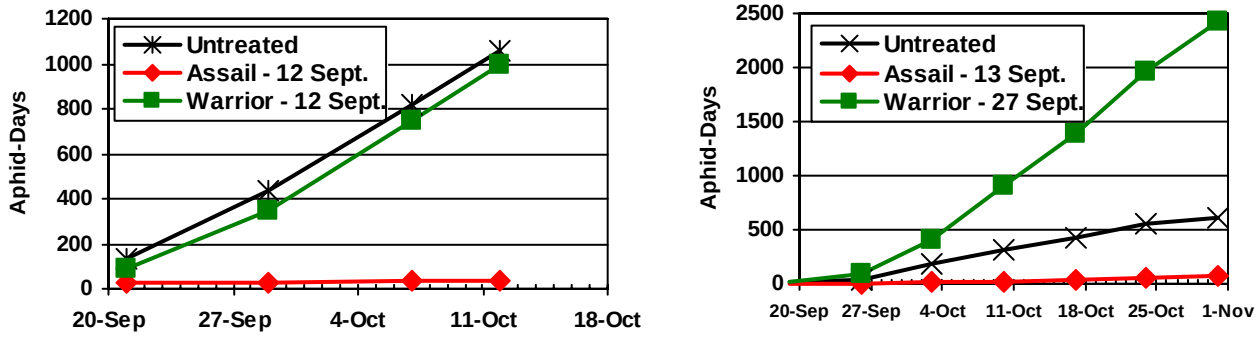

Figure 1 (left) and 2 (right). Aphid populations (accumulated aphid-days) as influenced by insecticide application made to late-season Acala (left) and Pima (right) cotton, 2005. Populations in the treatments and application dates with the highest and lowest aphid-day numbers are shown as well as the level in untreated plots.