MID- SEASON MANAGEMENT OF COTTON APHID (*APHIS GOSSYPII*) AND SILVERLEAF WHITEFLY (*BEMISIA ARGENTIFOLII*) IN PIMA COTTON

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Abstract

Silverleaf whitefly (also known as sweetpotato whitefly biotype B) and cotton aphid are serious mid- to late-season pests of California cotton. The mid-season infestations potentially reduce yield, and late-season infestations threaten lint quality. Insecticides are a key tool used to mitigate these infestations. The efficacy of several registered and experimental insecticides was evaluated against both pests in Pima cotton using two applications over a ~4-wk period. For cotton aphids, averaging the entire period, Assail + Abamectin, Assail + Lambda-Cy + Abamectin, Transform (two rates – 0.75 and 2.25 oz.), WF2, and Carbine provided the best control (>90%). On WF nymphs, the best control was 64% control with Knack, NNI-0101, and Assail+Lambda-Cy + Abamectin.

Introduction

The silverleaf whitefly, *Bemisia argentifolii*, (also known as sweet potato whitefly biotype B (*B. tabaci*) and the cotton aphid, *Aphis gossypii,* are important pests of California cotton. Both the silverleaf whitefly and cotton aphid have wide host ranges and have a capability to develop extremely high populations quickly. They feed on phloem by sucking the sap from the underside of leaves or on the plant's growing tips and excrete a sticky exudate called honeydew. It is the honeydew collected on cotton lint that is one of the main problems from their presence in cotton fields. Populations of phloem-feeding insects in cotton fields can produce sufficient quantities of honeydew resulting in sticky lint. After removing the needed nutrients, phloem-feeding insects excrete the carbohydrates necessary for the formation of honeydew. Presence of sticky cotton has significant impacts on all aspects of the cotton industry as this can threaten the marketability and profitability of cotton production.

Methods

Field Research was conducted on Pima cotton, Phytogen 800, to evaluate the activity of several foliar treatments (experimental and registered products) against mid-season whitefly and aphids. The studies were conducted at the Univ. of Calif. Westside Research and Extension Center near Five Points, CA. A plot size of 5 rows by 50 feet long with 4 blocks was used. The applications were made with a high clearance sprayer at 20 gallons per acre with 5 nozzles per row to achieve good coverage. Whitefly and cotton aphid populations were monitored weekly from June 24 to Aug. 12, 2013 at which time their population densities reached a level to begin treatment. From Aug. 15 to Sept. 23, silverleaf whitefly and cotton aphid populations were quantified from 5th mainstem node leaves with 10 leaves sampled on each date in each plot. Silverleaf whitefly adults were visually counted in the field by carefully turning leaves over and recording numbers of adults. Sampled leaves were inspected in the laboratory using a dissecting microscope. The numbers of whitefly 2nd, 3rd, and 4th instar nymphs along with light and dark colored cotton aphid adults and nymphs were tabulated. The application dates were Aug. 16, 2013 with a reapplication on Sept. 3, 2013. Seed cotton yields were collected with a commercial picker; samples were ginned and lint turnout determined and lint yields per acre calculated.

The following treatments as detailed in Table 1 were evaluated. Some of these products have strengths in aphid control whereas others are stronger in terms of whitefly control. However with a mixed population as was present in this plot, the desire was to see which treatment had the greatest utility in this situation. A nonionic surfactant, Sylgard 309 silicone surfactant (Wilbur-Ellis Company), at 0.25% was included with all treatments except treatment 18 where methylated seed oil was substituted also at 0.25%.

Table 1. Treatment list for cotton aphid and whitefly test in Pima cotton 2013, California.

	Treatment	Rate (Product/A)
1	Lorsban Advanced	32 fl. oz.
2	Carbine 50DF	1.7 oz.
3	Untreated	---
4	Assail 70WP+Bifenture 10 DF+Abamectin 0.15 EC	2.3 oz. + 16 oz. + 16 fl. oz.
5	Assail 70WP+Lambda-Cy 1EC+Abamectin 0.15 EC	2.3 oz. +5.12 fl. oz. + 16 fl. oz.
6	WF1	6.84 fl. oz.
7	WF2	6.84 fl. oz.
8	Transform WG	0.75 oz.
9	Transform WG	2.25 oz.
10	Knack	10 fl. oz.
11	Venom 70SG	3 oz.
12	Belay 2.13SC	6 fl. oz.
13	Sivanto	10.5 fl. oz.
14	Assail 70WP + Abamectin 0.15EC	1.1 oz. + 16 fl. oz.
15	NNI-0101 SC	2.4 fl. oz.
16	NNI-0101 SC	3.2 fl. oz.
17	Torac 15EC	14 fl. oz.
18	HGW86 10 SE	13.5 fl. oz.

Results

Cotton Aphids

Aphid populations averaged 82 aphids per leaf on the day of treatment. In untreated plots, populations were >50 per leaf for ~3 weeks post-treatment and peaked at 228.6 aphids per leaf at 10 days after treatment (DAT). At 3 DAT, only the Transform (2.25 oz. rate), Assail + Abamectin and Assail + Lambda-Cy + Abamectin provided at least 90% control. Six of the treatments reached this level of control at 7 DAT (all three Assail treatments, Carbine, Transform [2.25 oz.], and WF1. Twelve of the seventeen treatments achieved 90% aphid control at 10 DAT. Residual aphid control was excellent as eight treatments still maintained ≥90% control at 21 DAT, including Assail, Assail + Lambda-Cy + Abamectin, Carbine, Knack, Sivanto, Transform [2.25 oz.], WF1, and WF2. Average aphid populations over the 5-week test sample period are shown in Fig. 1.

Whitefly Nymphs

Populations of WF nymphs in untreated plots averaged 10.4 and 14.5 nymphs per leaf at the time of application and for the period following the first application, respectively. NNI-0101 (2.4 oz.), Lorsban Advanced, and HGW86 provided the greatest immediate control (at 3 DAT) of WF nymphs with ~40% control. Later samples following the first application showed the maximum percentage control from NNI-0101 (3.2 oz.) at 74% reduction at 14 DAT. Following the second application, WF nymphal populations in untreated plots increased to >100 nymphs per leaf on 10 DAT. On this date of peak population, several treatments provided ≥85% including Assail+Bifenture+Abamectin, Assail+Lambda-Cy+Abamectin, Carbine, NNI-0101 (both rates), and Knack. Average whitefly nymphs populations averaged over the 5-week test sample period are shown in Fig. 2.

Whitefly Adults

Populations of WF adults in the untreated ranged from 0.75 to 7.9 adults per leaf. There were no strong trends for numbers across treatments.

Cotton Yield

Lint yield was highest in the Carbine and Transform (0.75 oz.) treatments, and these two treatments had significantly more yield than in Assail + Lambda-cyhalothrin + Abamectin, WF1, Venom, and HGW86. The difference from high to low was ~300 lbs./A (Fig. 3).

Acknowledgements

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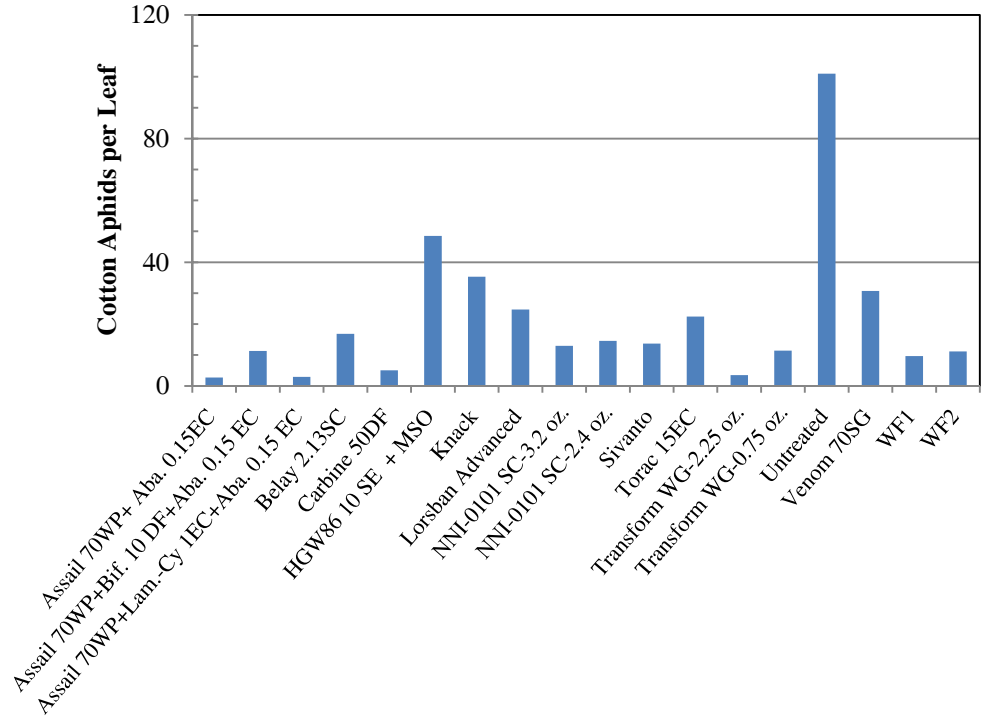

Figure 1. Average cotton aphid population over 5-week sampling period and two applications of indicated products.

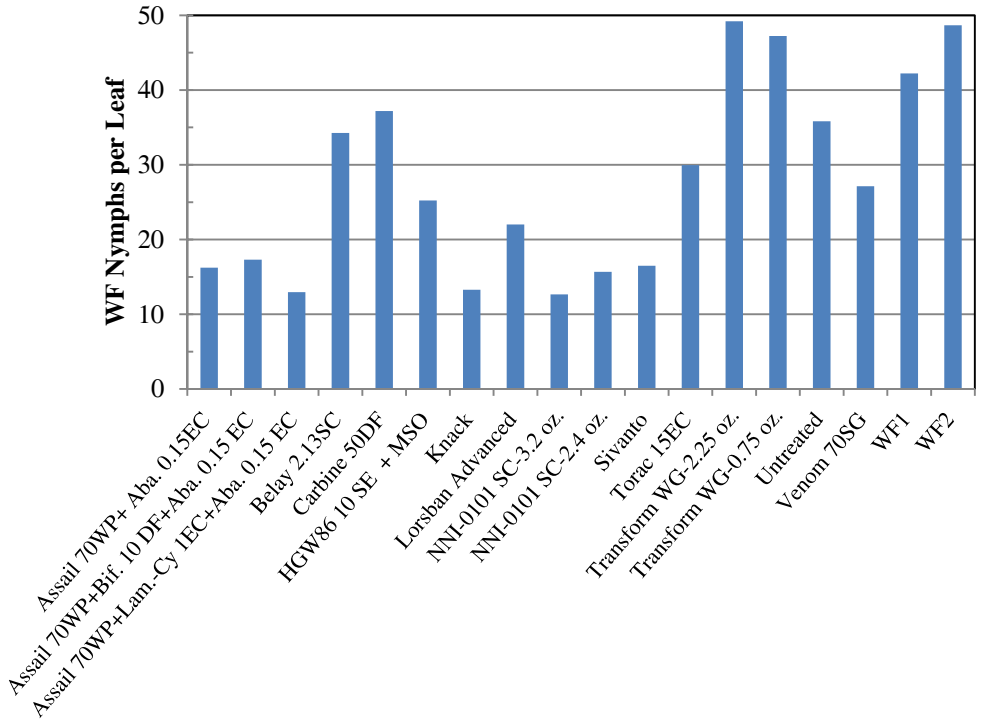

Figure 2. Average whitefly nymph population over 5-week sampling period and two applications of indicated products.

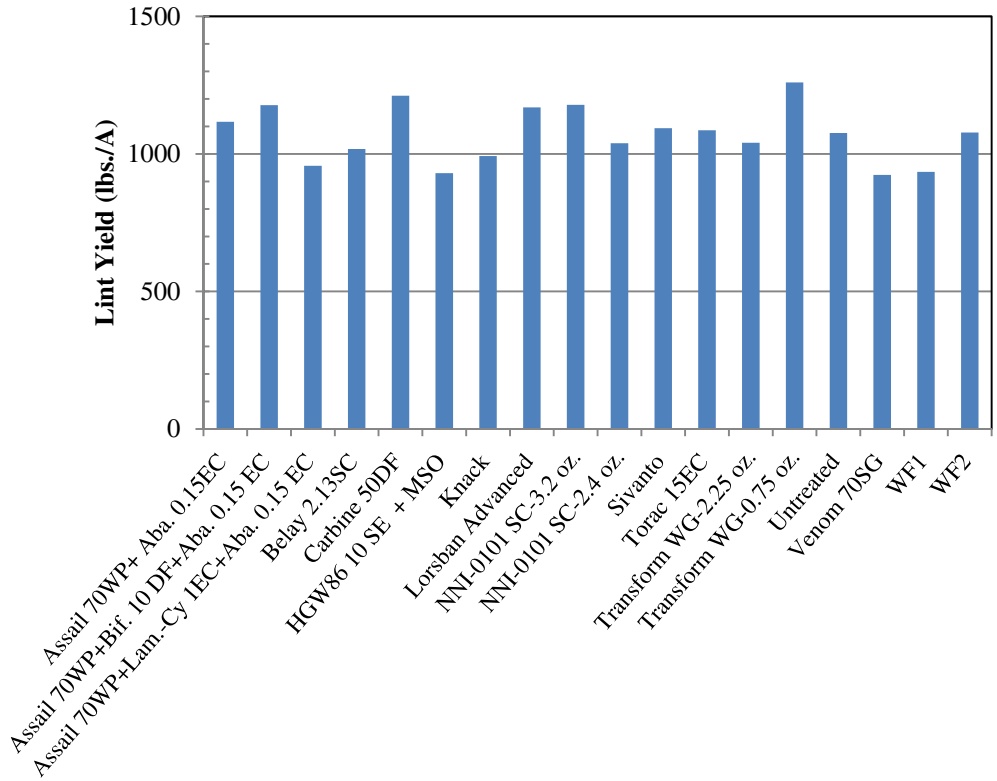

Figure 3. Cotton lint yield as influenced by treatments for mid- to late-season cotton aphids and whiteflies, 2013.