MID-SEASON MANAGEMENT OF COTTON APHID AND SILVERLEAF WHITEFLY IN PIMA COTTON

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Abstract

Silverleaf whitefly (also known as sweetpotato whitefly strain 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 by causing sticky cotton. Insecticides are a key tool used to manage these infestations. The efficacy of several registered and experimental insecticides were evaluated against both pests in Pima cotton using two applications over a two-week period. We assessed pest population over five weeks to determine the efficacy of the tested insecticides. For cotton aphids and averaged over the entire study, both tested rates of Transform (1.5 and 2.25 oz/acre), Sivanto Prime, the mid-rate of Sivanto HL (5.25 oz/acre), and the high rate of Sefina (14 oz/acre) performed the best. Averaged across the entire study Danitol 2.4 EC + Orthene 97 reduced whitefly adult populations the most, followed by Sivanto Prime and the mid-rate of Sivanto HL. Whitefly nymph populations were lowest for the mid-rate of Sivanto HL, followed by the high rate of Sefina, Sivanto Prime, Cormoran, and Courier SC.

Introduction

The silverleaf whitefly, *Bemisia tabaci* Biotype B (formerly *B. argentifolii*), and the cotton aphid, *Aphis gossypii*, are important pests of California cotton. Both pests have wide host ranges and can quickly develop extremely high populations. They feed under leaves or on the plant's growing tips and damage plants through removal of phloem. They also excrete a sticky exudate called honeydew. Honeydew that collects on cotton lint creates sticky lint. This is one of the key problems these pests create because of production issue when cotton is ginned. Presence of sticky cotton significant affects all aspects of the cotton industry because sticky cotton can threaten the marketability of cotton and thus the profitability of cotton production. The objective of this project was to compare the efficacy of selected registered insecticides and experimental materials as foliar treatments against cotton aphids and whiteflies during the mid- and late-season period in Pima cotton.

Methods

We conducted a field experiment to evaluate the activity of the selected materials against mid-season whiteflies and aphids. The materials tested and application rates are detailed in Table 1. Efficacy was tested against a mixed populations of cotton aphids and whiteflies. The study was conducted at Shafter Research Station, Shafter, CA. Plots consisted of 5 rows × 55 ft of cotton, with 38 in rows, and four replications. The Pima cotton used was Phytogen 841 RF, which was planted 26 April, 2018. We made applications with a high-clearance, tractor-mounted sprayer, with applications made with 30 GPA, 40 PSI, five nozzles per row (TX-VS6 nozzles) and speed of three MPH to achieve good coverage. A nonionic surfactant, R-11 (Wilbur-Ellis Company), was included at 0.25% with all treatments. Whitefly and aphid populations were monitored weekly to assess populations and determine the timing to begin applications. The first application was made on 28 August and the second on 11 September. All insect data was collected from 10-leaf samples (5th main stem node leaf from terminal), four times after the first application and five times after the second application (days after treatment [DAT]: 2,7,10, and 13 DAT1; 2,7,10, 14, and 20 DAT2). To assess populations of whitefly adults, leaves were carefully examined and turned over in the field and adults counted. Cotton aphids and whitefly nymphs (2^{nd}, 3^{rd}, and 4^{th} instar nymphs) were counted on leaves using a dissecting microscope. Data on insects were collected per entire leaf. To assess yield, we picked the middle two rows with a commercial picker. We weighed seed cotton and calculated yield per acre.

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

Treatment	Rate (product/acre)
Assail 70WP	2.3 oz.
Assail 70WP+Lambda-Cy 1EC	2.3 oz. + 5.12 fl. oz.
Carbine 50DF	1.7 oz
Centric 40WG	2.5 oz.
Cormoran	12fl. oz.
Courier SC	12.5 fl. oz.
Danitol 2.4 EC + Orthene 97	16 fl. oz. + 9 oz.
Diamond	10 fl. oz.
Fulfill	2.75 oz
Knack - 1 application only	10 fl. oz.
Leverage 360	3 fl. oz.
Lorsban Advanced	32 fl. oz.
Sefina - Low Rate	3 fl. oz.
Sefina - High Rate	14 fl. oz.
Sivanto HL - Low rate	3.5 fl.oz.
Sivanto HL - Mid rate	5.25 fl. oz.
Sivanto HL - High rate	7 fl. oz.
Sivanto Prime	14 fl. oz.
Transform WG - Low Rate	1.5 oz.
Transform WG - High rate	2.25 oz.
Untreated	---

Results

Cotton Aphids

Cotton aphids were present in the plots for approximately four weeks before the study began and increased to above threshold levels at the time of treatment (234 aphids/leaf). At 2 DAT, only SivantoHL-Mid provided above 80% control (Fig. 1). At 7 DAT, both rates of Sefina and Transform-High provided >90% control. The mid and high rates of SivantoHL and Transform-Low gave 80-85%. At 10 DAT, Sivanto Prime and Transform-High gave >90% control. Six treatments gave 80-90% control. Following the second application at 2 DAT2, three treatments provided 80-90% control. Eight others provided >90% control, with Assail70, Sefina-High, SivantoHL-Mid and SivantoHL-High, Sivanto Prime, and both Transform rates above 95%. At 7 DAT2, only two treatments provided >85% (less than 90%) control. Three treatments gave >95% control 10 DAT2, with Transform-High performing best. At 14 DAT2, both Assail and both Transform treatments and Sefina-High gave >95% control. At 20 DAT2, both Transform treatments gave the best control.

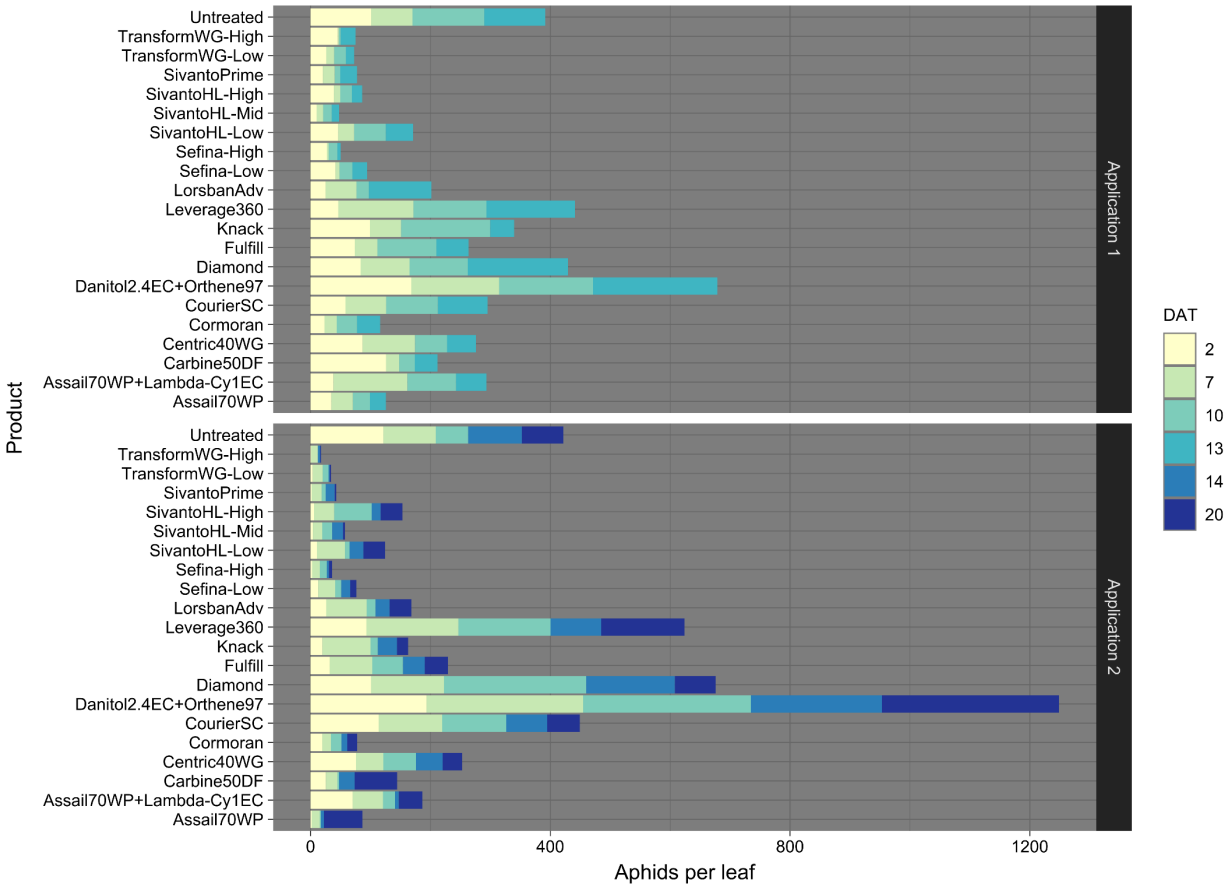

Figure 1. Average cotton aphid populations over the 34-day sampling period and two application periods for the tested materials. Days after treatment (DAT) are for a given application.

Whitefly Adults

Sivanto Prime and Lorsban provided 58 and 68% control 2 DAT (below 5/leaf; Fig. 2). Assail70+»-Cy, Sivanto-Mid and -High, and Danitol2.4+Orthene97 gave 45-51% control. Courier, Danitol+Orthene, and Sefina-High had the fewest adults 7 DAT. Sivanto-Mid and Danitol+Orthene had the fewest adults 10 DAT. At 2 DAT2, Danitol+Orthene, Lorsban, and Sivanto-High had the lowest pops. Danitol+ Orthene maintained the lowest pops. 10 and 14 DAT2 (3.9 and 5.2/leaf).

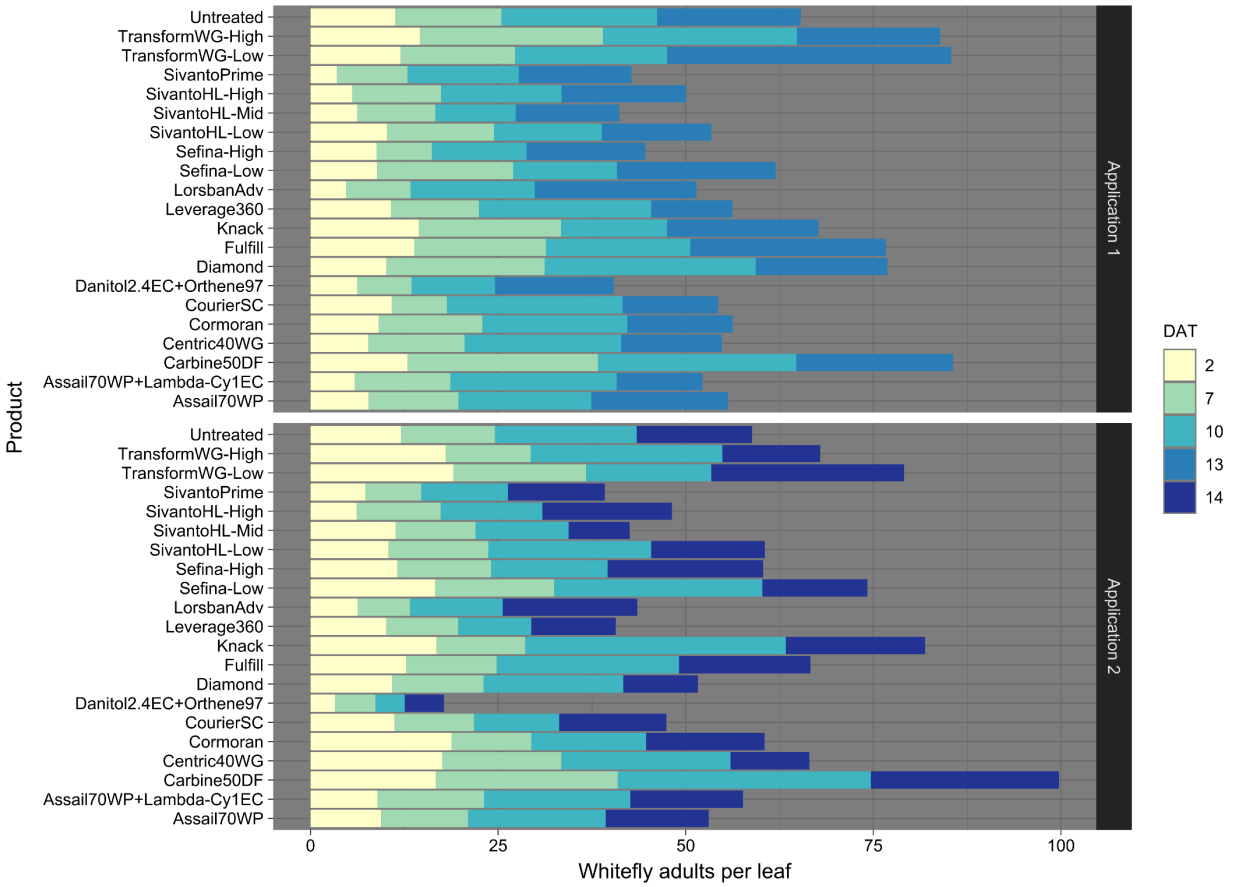

Figure 2. Average whitefly adult populations over the 28-day sampling period and two application periods for the tested materials. Days after treatment (DAT) are for a given application.

Whitefly Nymphs

Whitefly nymph populations were at 41 and 69/leaf 0 and 2 DAT in the untreated. Populations were not significantly different 2, 7, or 13 DAT (Fig. 3). At 7 DAT, four treatments (both Sefina rates, SivantoHL-Low, and Assail+»-Cy) had fewer than 30 nymphs/leaf. At 10 DAT, SivantoHL-Mid had the fewest nymphs, followed by Cormoran, Sivanto Prive, Sefina-High, and SivanotHL-Low. SivantoHL-Mid had the fewest nymphs 13 DAT. Sefina-High, Sivanto HL-Mid, and Sivanto Prime had the fewest nymphs 2 and 7 DAT2. At 10 DAT2, SivantoHL-Mid, Courier, and Cormoran had the fewest nymphs. SivantoHL-Mid and Cormoran performed best at 14 DAT2. At 20 DAT2, SivantoHL-Mid and Leverage 260 had the fewest nymphs.

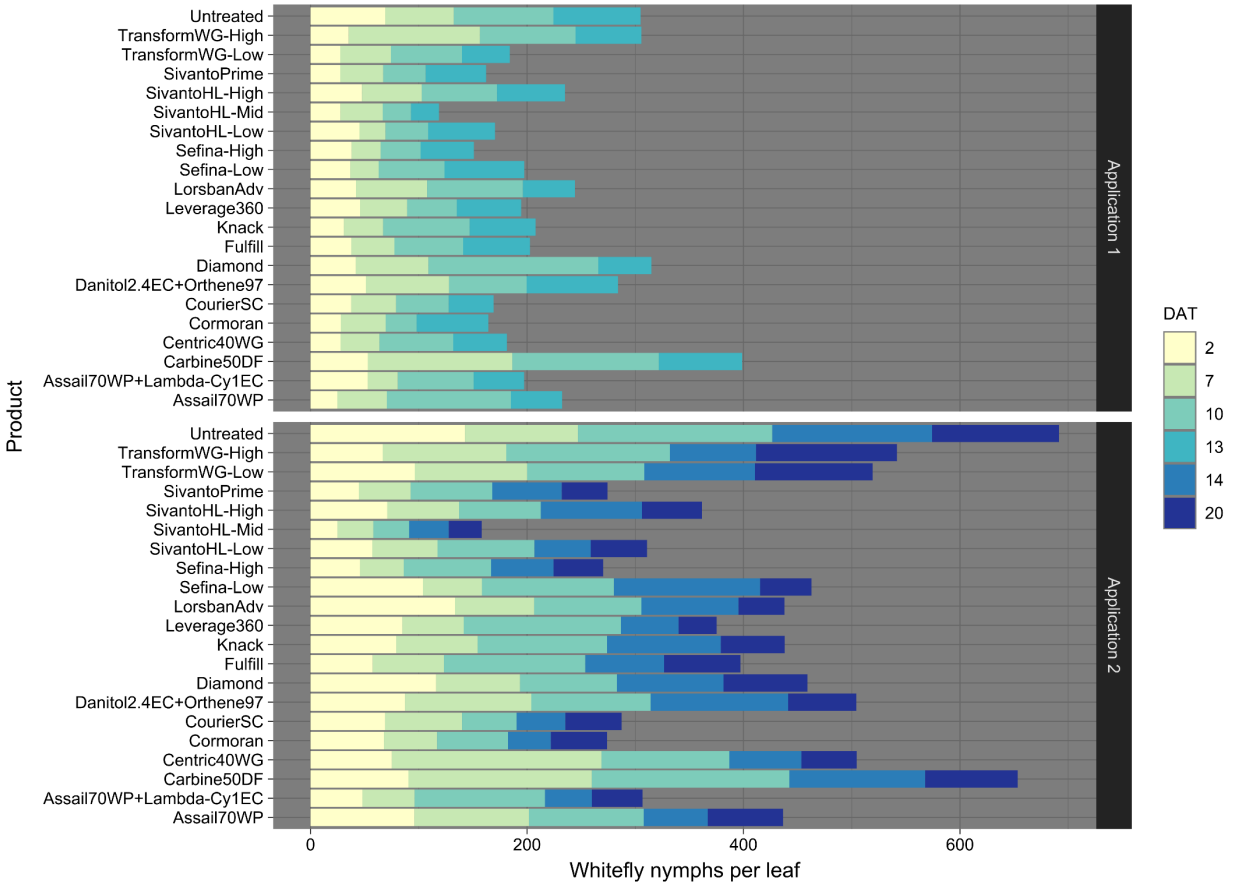

Figure 3. Average whitefly nymph populations over the 34-day sampling period and two application periods for the tested materials. Days after treatment (DAT) are for a given application.

Yield

Yields ranged from 2329 lbs seed cotton/acre at the low end (Assail70) to 3019 (Transform-High), 3037 (SivantoHL-Mid), and 3280 lbs seed cotton/acre (Cormoran) at the high end (Fig. 4). Centric40, Fulfill, Courier, Sefina-High, and Sefina-Low were the next highest in terms of yield.

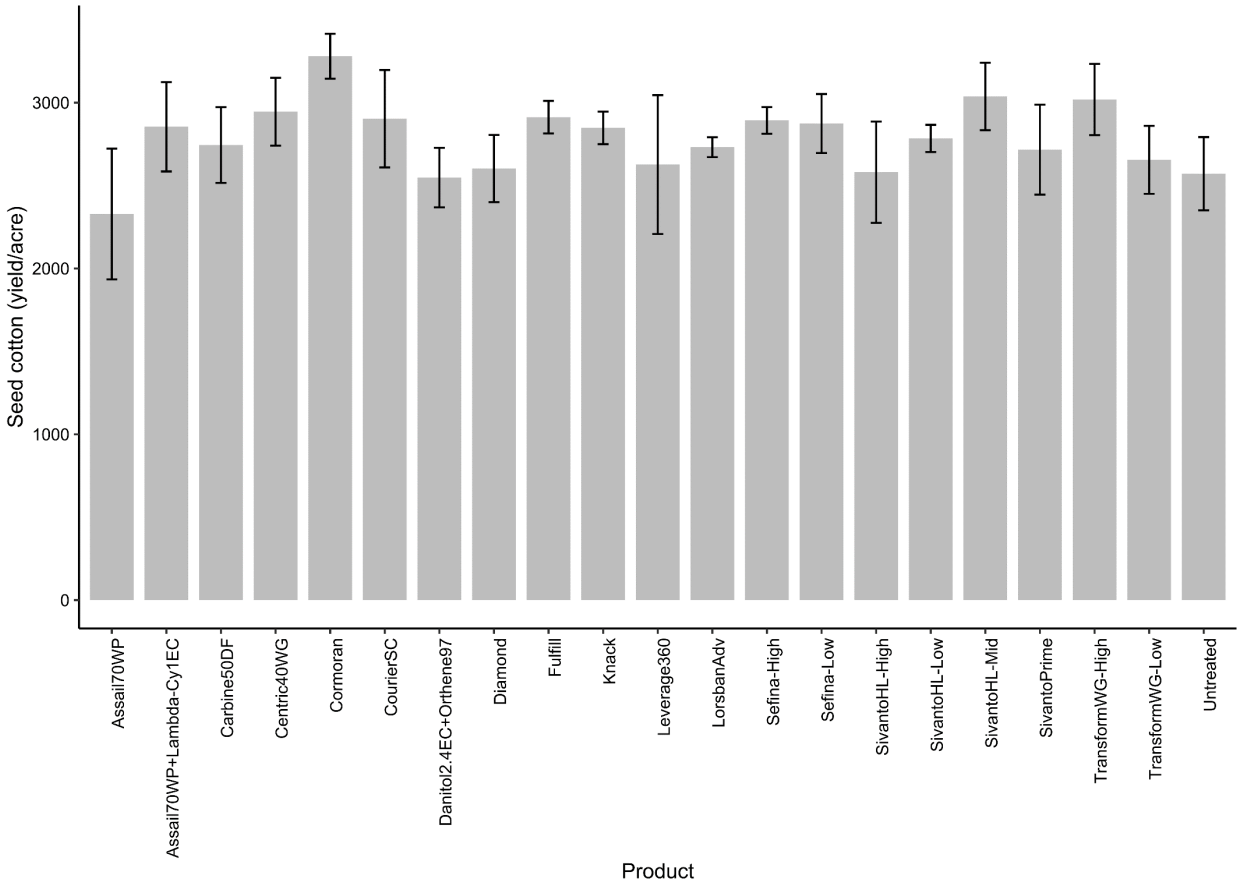

Figure 4. Seed cotton yield as influenced by treatments for mid-late-season cotton aphids and whiteflies. Values are means and error bars are ±1SE.

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