Whitefly Control with Foliar Insecticides in Cantaloupes

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Abstract

Courier, Knack, Assail, Calypso, and Oberon treatments on cantaloupe were effective in maintaining reduced numbers of WF eggs, immatures, and adults for 30 DAT. After 30 DAT, all treatments showed that WF adult counts began to increase. Courier, Knack, Assail, Calypso, and Oberon treated cantaloupe leaves had adult WF counts of one-half or less that of the untreated check and remaining treatments. The pyrethroid plus endosulfan treatments were effective for 7 to 13 DAT in reducing immature WF. After 21DAT, the pyrethroid plus endosulfan treatments and Actara showed a greater increase in the numbers of eggs, immatures, and adults compared to Courier, Knack, Assail, Calypso, and Oberon treatments. The seasonal average number of eggs, immatures, and adults was the least on Assail treated cantaloupes. Knack, Courier, Calypso, and Oberon treated cantaloupes consistently had less eggs, immatures, and adults compared to the untreated check.

Introduction

New insecticide chemistries have been developed and are being introduced for use in both cotton and vegetable crops in the desert crop production regions. These compounds include Courier* (buprofezin, also Applaud*), Knack* (pyriproxifen), Actara* (thiamethoxam, also Platinum*), Assail* (acetamiprid), Calypso* (thiacloprid), and Oberon* (spiromesifen or BSN-2060, Bayer Crop Science). Highly specific in controlling whiteflies (WF, *Bemisia* spp.), some of these compounds are showing efficacy when applied both foliarly or taken up from the soil and translocated to the infested leaves. They are effective against various growth stages of the WF. These new insecticides provide an extended period of WF control that can reduce the number of pesticide applications necessary to manage the pest. This field trial was conducted to evaluate and compare the relative efficacy of the several new insecticides for WF management in cantaloupes.

Materials and Methods

A small plot field trial was conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ. Cantaloupe cv. Sol Dorado was direct seeded on 40-in raised beds on 25 March 2002. The melons were planted in every fourth bed with a tractor- mounted air planter so that there was 13 ft between rows to minimize movement of WF between plots. Typical furrow irrigation was used to apply water at regular intervals during the growing season and fertilizer was applied prior to planting and once during the growing season. Individual treatment replicates consisted of a single row measuring 43 ft long. Each treatment was replicated four times and the test was arranged in a randomized complete block design. The insecticides were applied one time on 19 June when the fruit was set and

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approaching maturity. Applications were made using a backpack CO_2 sprayer consisting of a hand-held boom with four TX-10 hollow cone nozzle tips spaced 20 in apart. The sprays were applied in 38 gpa water pressurized to 40 psi. All treatments included a non-ionic adjuvant, Latron CS-7 added at 0.25% v/v. At the time of applications, the weather was clear with no wind and air temperature was at 95EF during the morning hours. A pre-count and weekly evaluations of WF infestations was done by counting adults on leaf turns on 10 leaves per treatment replicate. The randomly selected leaves were the 5^{th} or 6^{th} leaf from the terminal on the vines. Eggs and immature WF were counted in a 0.5 in x 0.5 in square area on the bottom mid-rib of the 5^{th} or 6^{th} terminal leaf of five randomly selected leaves per treatment replicate.

Results and Discussion

At 7 days after treatment (DAT), all stages of WF on cantaloupe leaves were fewer for all treatments compared to the untreated check (Figures 1-3 and Tables 1-3). At 13 DAT, immature stages of WF remained fewer for all treatments relative to the untreated check. Adult counts remained lower for most treatments except Capture (bifenthrin) plus endosulfan treated cantaloupe that showed WF adults counts exceeding the untreated check. For the remainder of the season at 21 and 30 DAT, cantaloupes treated with Courier, Knack, Assail, Calypso, and Oberon consistently had less adults, immatures, and eggs relative to the untreated check and the other treatments. At 30 DAT, all treatments showed that WF adult counts began to increase. Courier, Knack, Assail, Calypso, and Oberon treated cantaloupe leaves had adult WF counts of one-half or less that of the untreated check and remaining treatments. Eggs and immature WF counts for Courier, Knack, Assail, Calypso, and Oberon also continued to be maintained at the lowest levels through 30 DAT.

The seasonal average number of eggs, immatures, and adults was the least for Assail treated cantaloupes (Figures 4-6). Knack, Courier, Calypso, and Oberon treated cantaloupes consistently had less eggs, immatures, and adults compared to the untreated check. Actara, Danitol (fenpropathrin) plus endosulfan treatments and the untreated check showed similar numbers of eggs and adults on the cantaloupes. Actara reduced the average number of immatures compared to the pyrethroid (Capture or Danitol) treatments and the untreated.

Courier, Knack, Assail, Calypso, and Oberon treatments on cantaloupe were effective in maintaining reduced numbers of WF eggs, immatures, and adults for 30 DAT. The WF eggs, immatures, and adults were suppressed for all of the treatments for 13 to 21 DAT except for the pyrethroid treatments. The pyrethroid treatments were effective for 7 to 13 DAT in reducing immature WF. After 21DAT, the pyrethroid treatments and Actara showed a greater increase in the numbers of eggs, immatures, and adults compared to Courier, Knack, Assail, Calypso, and Oberon treatments. Single applications of all of the foliar insecticides demonstrated that effective WF control could be achieved for short-term control of one week or so, intermediate control for 21 DAT, and extended control for up to 30 DAT with the newly introduced chemistries.

The development of several of these new insecticides offers the potential for improving WF management in melons produced in the desert. The use of the pyrethroids combined with endosulfan continues to demonstrate limited efficacy against WF in melons. Effective WF control strategies should incorporate these products in use patterns that will sustain their long-term efficacy.

Figure 1. Whitefly egg counts

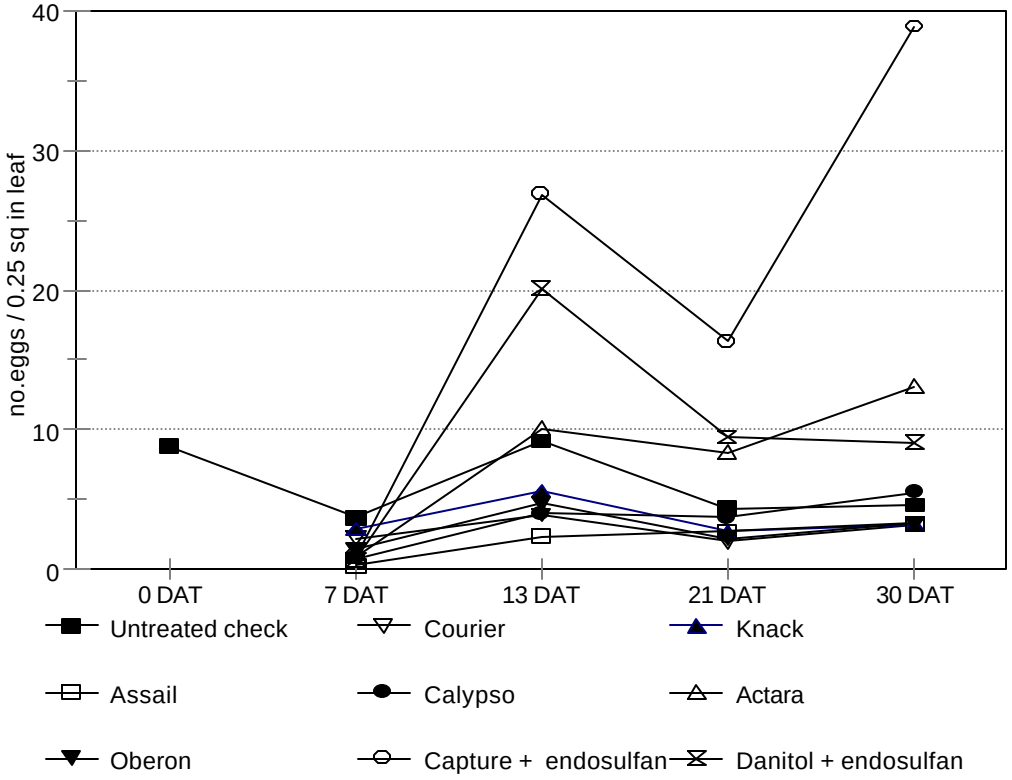

Figure 2. Whitefly immature count

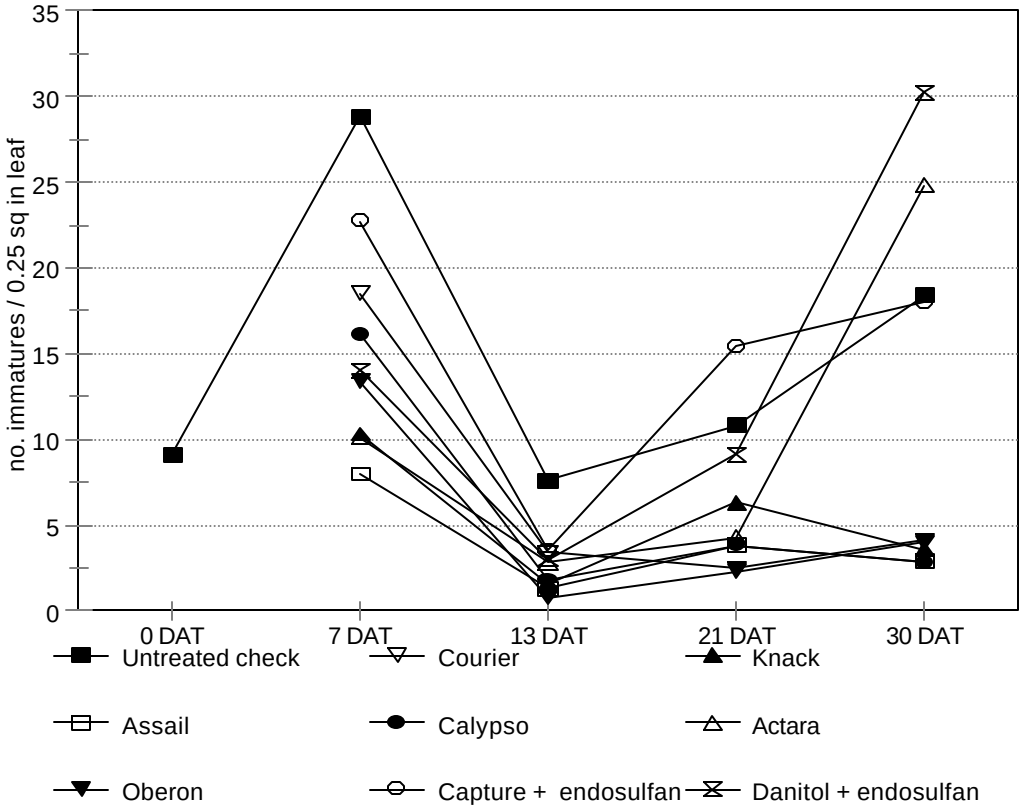

Figure 3. Whitefly adult counts

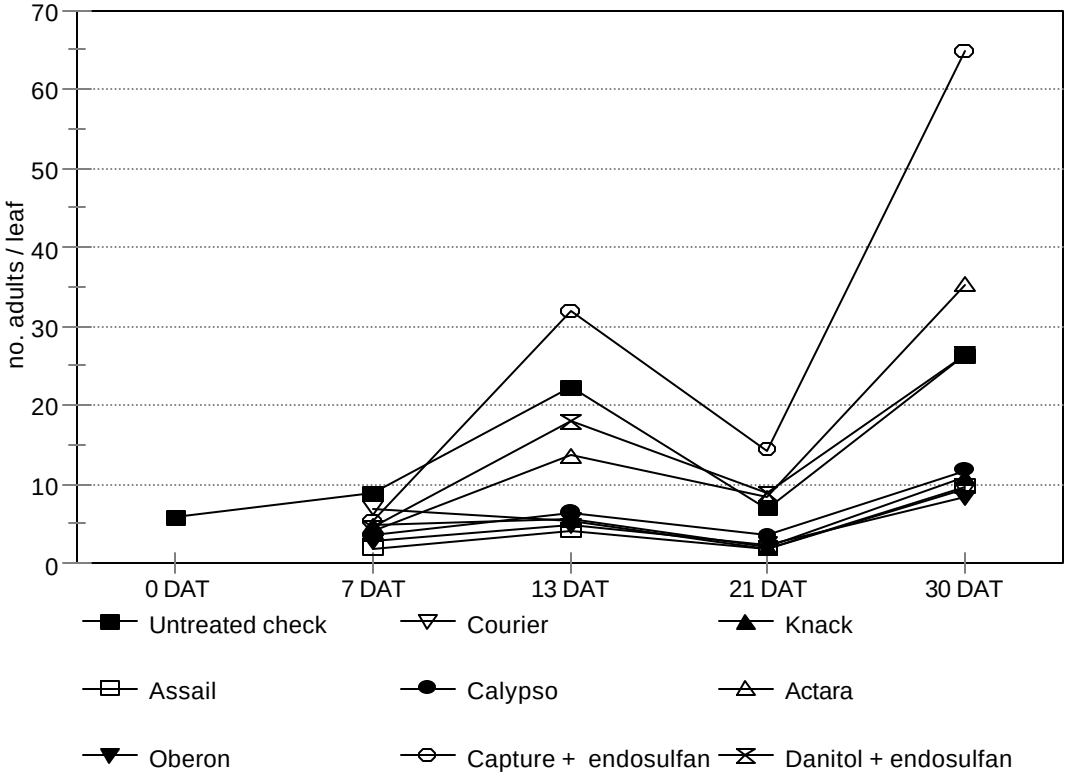

Figure 4. Seasonal average
Whitefly eggs

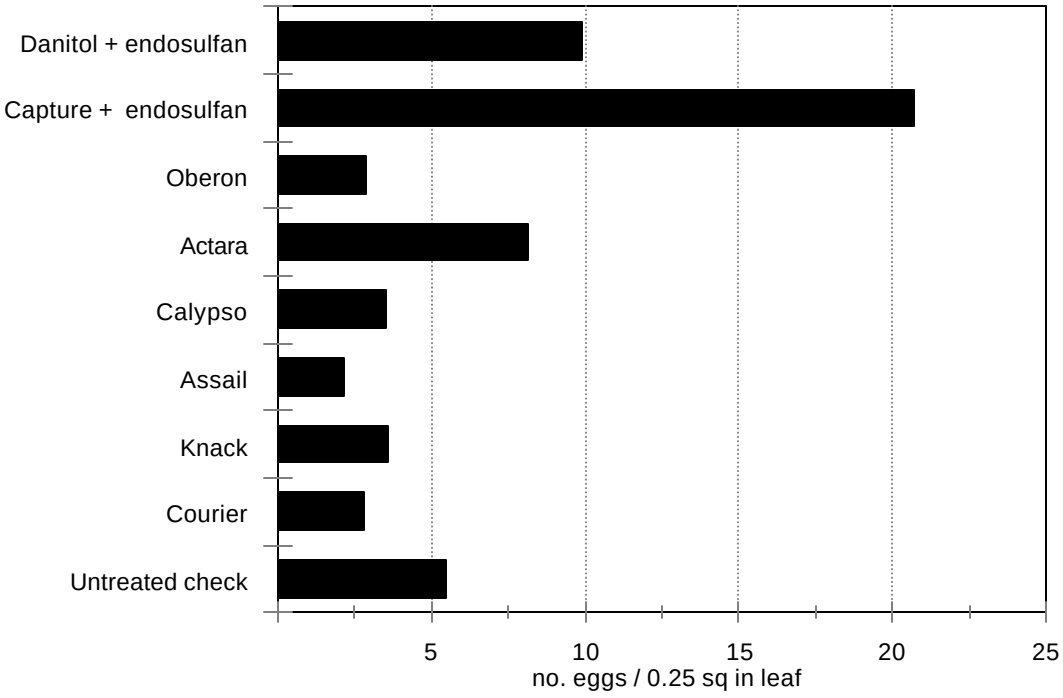

Figure 5. Seasonal average
Whitefly immatures

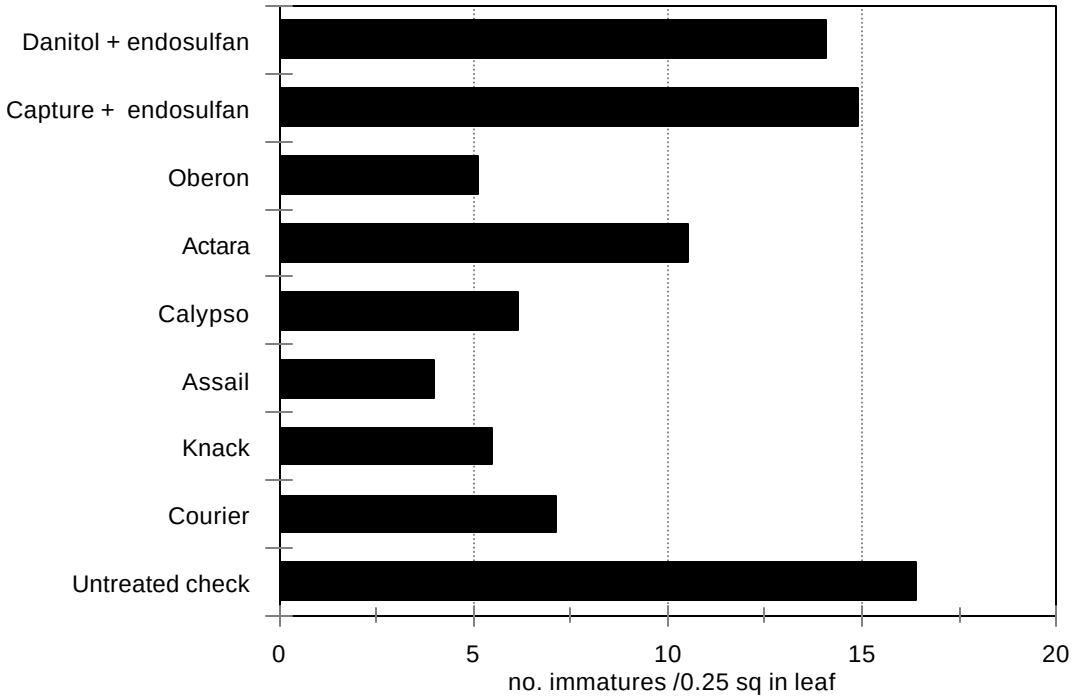

Figure 6. Seasonal average Whitefly adults

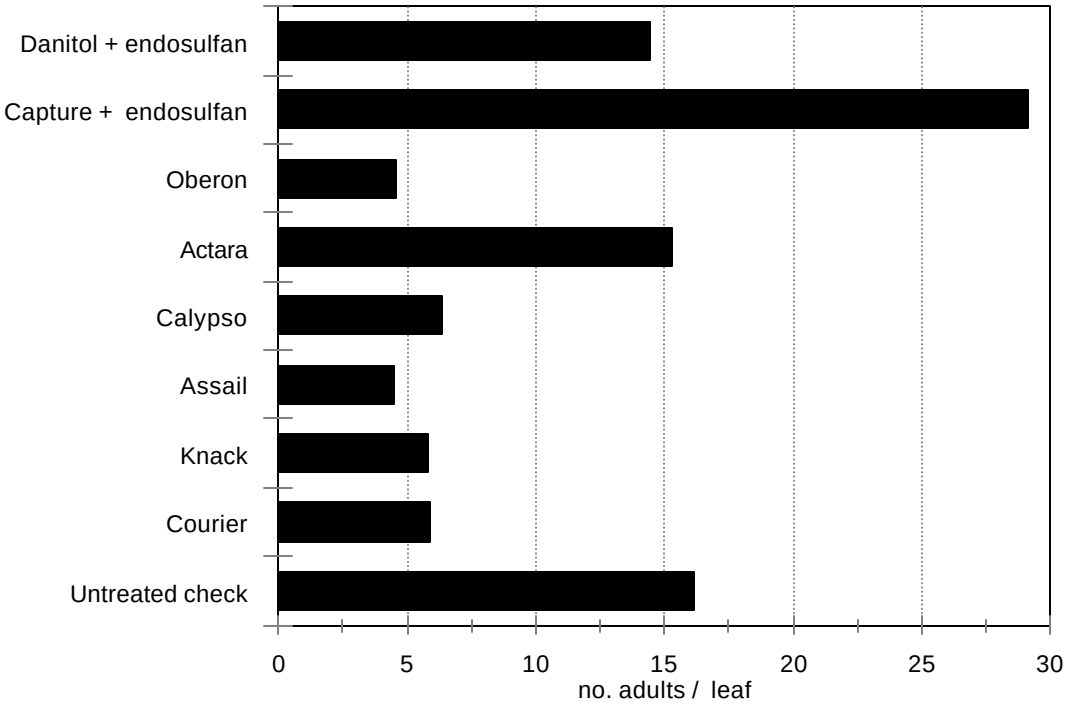

Table 1. Whitefly egg counts in cantaloupe

Treatment	Rate	Number of WF eggs / 0.25 sq. in. leaf					
		0 DAT	7 DAT	13 DAT	21 DAT	30 DAT	Season Avg.
Untreated check		8.8	3.7	9.2	4.4	4.6	5.5
Courier	0.38		2.2	3.9	2.0	3.2	2.9
Knack	0.05		2.9	5.6	2.7	3.2	3.6
Assail	0.1		0.3	2.4	2.7	3.3	2.2
Calypso	0.21		0.8	4.0	3.7	5.5	3.5
Actara	0.063		0.9	10.1	8.4	13.1	8.2
Oberon	0.133		1.4	4.7	2.2	3.3	3.0
Capture + endosulfan	0.08 + 0.75		0.9	26.8	16.3	38.8	20.7
Danitol + endosulfan	0.2 + 0.75		0.7	20.1	9.5	9.1	9.8
LSD (p=0.05)			2.58	8.66	6.38	17.11	6.75

Table 2. Whitefly immature counts in cantaloupe

Treatment	Rate	Number of WF immatures / 0.25 sq. in. leaf					
		0 DAT	7 DAT	13 DAT	21 DAT	30 DAT	Season Avg.
Untreated check		9.1	28.8	7.6	10.8	18.4	16.4
Courier	0.38		18.5	3.4	2.5	4.1	7.1
Knack	0.05		10.3	1.6	6.3	3.6	5.5
Assail	0.1		8.0	1.3	3.8	2.9	4.0
Calypso	0.21		16.1	1.8	3.8	2.8	6.1
Actara	0.063		10.1	2.8	4.3	24.8	10.5
Oberon	0.133		13.4	0.8	2.3	4.0	4.9
Capture + endosulfan	0.08 + 0.75		22.7	3.5	15.4	18.0	14.9
Danitol + endosulfan	0.2 + 0.75		14.0	3.0	9.1	30.2	14.5
LSD (P=0.05)			15.58	3.73	7.05	17.48	8.15

Table 3. Whitefly adult counts in cantaloupe

Treatment	Rate	Number of adult WF / leaf					
		0 DAT	7 DAT	13 DAT	21 DAT	30 DAT	Season Avg.
Untreated check		5.8	8.9	22.3	7.0	26.3	16.1
Courier	0.38		7.0	5.5	1.9	9.3	5.9
Knack	0.05		4.8	5.6	2.1	10.8	5.8
Assail	0.1		1.9	4.2	1.9	9.8	4.5
Calypso	0.21		3.6	6.4	3.6	11.8	6.3
Actara	0.063		4.1	13.6	8.3	35.3	15.3
Oberon	0.133		2.7	4.8	2.4	8.4	4.6
Capture + endosulfan	0.08 + 0.75		5.4	31.9	14.3	64.8	29.1
Danitol + endosulfan	0.2 + 0.75		4.5	18.0	8.8	26.5	14.5
LSD (P=0.05)			3.49	6.68	4.72	24.75	7.91