

Evaluation of Foliar Insecticides for Whiteflies in Cantaloupes

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Abstract

A single application of buprofezin (Applaud7) at 0.38 lb AI/A had the fewest number of adult whiteflies (WF) on rating dates at 13, 21, and 27 days after treatment (DAT). The number of immature WF at 21 DAT of a single Applaud application ranged from 0.8 to 5.2 nymphs/leaf, significantly less than the untreated. Applaud treatments were effective in minimizing the immatures for 21 DAT of a single application and then numbers began to increase before 27 DAT. Applaud plus two subsequent weekly applications of bifenthrin (Capture7) plus endosulfan (Thiodan7, Phaser7) was almost similar to single applications of Applaud alone and adult numbers were also low. Weekly applications of the pyrethroids plus endosulfan reduced the adult WF relative to the untreated at 1 week after treatment (WAT). At 2 WAT of the third application, fenpropathrin (Danitol7) and Capture continued to show reduced numbers of adults and esfenvalerate (Asana7) was similar to the untreated. Danitol treatments had numerically fewer adults than Capture which was lower than Asana. The lowest adult and immature WF populations were observed season-long in the CGA-293343 (Novartis) treated cantaloupes. Both rates, 0.067 and 0.09 lb AI/A performed similarly and numerically slightly fewer nymphs were observed for the higher rate. CGA-293343 plus CGA-215944 (pymetrozine, Fulfill7) performed similar to the two rates of CGA-293343 alone.

Introduction

During the 1998 melon production season, a new insecticide, Applaud, gained an emergency exemption for use against the whitefly (WF, silverleaf WF, *Bemisia argentifolii*, a.k.a. sweetpotato whitefly, *B. tabaci*). Applaud, an insect growth regulator, effectively prevents the molting process between the developing nymphal stages of the WF. It does not have immediate knockdown activity against the adults. In previous years, Capture received Section 18 emergency exemptions to be used against the adult WF; however, efficacy was diminishing in recent years. The emergence of Applaud and its activity against the immature stages of the WF presents new challenges in the approach to timing of applications against the WF on melons. The selective activity against only the immature stages and not the adults will require diligent monitoring of WF activity and specific knowledge of crop growth parameters (time to harvest and length of harvest). This study was conducted to evaluate and compare Applaud efficacy against WF when applied alone and in combinations. Combination treatments were included to determine knockdown activity against the adult WF. Comparative treatments evaluated also included pyrethroid insecticide combinations and experimental compounds.

Materials and Methods

A small plot field test was conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, Arizona. Cantaloupe cv. Archer was direct-seeded on 23 April 1998. The single row of melons was planted on a single 40-inch bed with a 4-row planter. Three beds were unplanted to provide a buffer of about 10 ft between rows. The individual plot length was 45 ft. The test was arranged in a randomized complete block design with four replicates. Each treatment replicate plot was broadcast sprayed 6.7 ft in width. The cantaloupes were furrow irrigated weekly. Treatments were pyrethroids - Asana, Capture, or Danitol combined with endosulfan and CGA-293343 treatments applied weekly for three consecutive weeks. Applaud alone or in tank-mix combinations was applied only at the first application date and one treatment was a single Applaud application followed by two consecutive weekly Capture applications. Insecticide applications were made during three consecutive weeks in July. Initial treatments were made when adult WF counts indicated 1.7 adults/leaf on 06 July. The conditions on 08 July were cloudy skies with air temperature at 84°F, high humidity, slight breezes at less than 3 mph, and wet soil due to rains on the previous day. The melons were beginning to net at the first application. The second application date was 15 July with clear skies, no winds, and temperature at 80°F. The last application was made on 22 July with temperatures at 84°F and cloudy skies with a trace of light rain shower after the application.

The foliar broadcast sprays were made with CO₂ backpack sprayer equipped with a hand-held boom. The boom was outfitted with four hollowcone TX-10 nozzle tips spaced 20 inches apart. The sprays were delivered in 36 gpa water pressurized to 45 psi. All treatments included an adjuvant Latron CS-7 at 0.50% v/v. At intervals after each application date, ratings were made using the leaf-turn method by counting the total number of adult WF on underside of the 3rd or 4th leaf from the terminal end of the vine. Ten terminal leaves per treatment replicate were examined for adults. Immature WF were observed on the underside of five leaves per treatment replicate. The underside of the 4th terminal leaf was examined in a 0.25 sq inch area along the midrib under a microscope and all nymphs were counted.

Results and Discussion

A single application of Applaud at 0.38 lb AI/A had the fewest number of adult WF on rating dates at 13, 21, and 27 DAT. The number of immature WF at 21 DAT of a single Applaud application ranged from 0.8 to 5.2 nymphs/leaf, significantly less than the untreated. Applaud plus endosulfan treated cantaloupe had the fewest number of immatures among the various Applaud combination treatments. At 1 WAT, Applaud plus endosulfan had the fewest number of adults compared to the other Applaud treatments.

A major increase in the number of immatures was observed between 21 and 27 DAT of the first application. Numerically, the Applaud plus endosulfan treatment had the fewest immatures at 27 DAT of a single application. Applaud plus two weekly applications of Capture plus endosulfan was almost similar and adult numbers were also low. Applaud treatments were effective in minimizing the immatures for 3 WAT of a single application and then numbers began to increase before 4 WAT.

Weekly applications of the pyrethroids plus endosulfan reduced the adult WF relative to the untreated at 1 week after treatment (WAT). At 2 WAT of the third application, Danitol and Capture continued to show reduced numbers of adults and Asana was similar to the untreated. Danitol treatments had numerically fewer adults than Capture which was lower than Asana. The number of immature WF for the pyrethroid plus endosulfan treatments was significantly lower than the untreated at 2 WAT of the third application.

The lowest adult and immature WF populations were observed season-long in the CGA-293343 treated cantaloupes. CGA-293343 at 0.067 and 0.09 lb AI/A significantly reduced the adult WF relative to the untreated and the pyrethroid plus endosulfan treatments. Both rates performed similarly and numerically slightly fewer nymphs were observed for the higher rate. CGA-293343 at 0.045 lb AI/A plus CGA-215944 at 0.045 lb AI/A performed similar to the CGA-293343 alone treatments.

Table. Evaluation of foliar insecticides for whiteflies in cantaloupes. (Umeda)

Treatment	Rate (lb AI/A)	Mean Number Whiteflies						
		<u>Adults/leaf</u>					<u>Immatures/leaf</u>	
		06 Jul	14 Jul	21 Jul	29 Jul	04 Aug	29 Jul	04 Aug
Untreated check		1.7	18.8	21.5	47.3	55.5	25.7	139.3
Asana + Endosulfan ¹	0.05 + 0.75		12.3	9.2	24.5	55.6	3.0	35.9
Applaud ²	0.25		9.8	5.9	30.6	48.7	2.8	36.0
Applaud ²	0.38		9.0	4.0	18.6	39.7	5.2	33.3
Applaud + Endosulfan ²	0.25 + 0.75		6.7	4.5	23.7	45.8	0.8	18.5
Applaud	0.25		11.3	1.7	18.3	27.3	1.2	21.6
Capture + Endosulfan ³	0.08 + 0.75							
Applaud + Danitol ²	0.25 + 0.2		16.9	7.4	33.6	54.0	4.4	43.9
Danitol + Endosulfan ¹	0.2 + 0.75		10.7	4.5	14.1	23.5	1.4	12.1
Capture + Endosulfan ¹	0.08 + 0.75		11.3	7.3	20.5	35.3	1.3	31.8
CGA - 293343 ¹	0.067		2.8	1.4	8.0	19.0	0.5	3.9
CGA - 293343 ¹	0.09		3.1	1.7	4.9	13.9	0.0	1.1
CGA - 293343 + CGA - 215944 ¹	0.045 + 0.045		2.5	1.4	12.0	16.6	0.1	4.1
LSD (p=0.05)			6.1	5.1	10.0	16.9	11.4	31.6

¹ Applied weekly for three consecutive weeks: 08, 15, and 22 July 1998.

² Applied once at first week application timing.

³ Applaud applied at first week application timing then followed by two consecutive weekly applications of Capture plus endosulfan.