

Evaluation of Foliar Insecticides for Whitefly Control in Cantaloupes

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Abstract

The pyrethroid insecticides esfenvalerate (Asana®), bifenthrin (Capture®), or fenpropathrin (Danitol®) combined with endosulfan effectively reduced whitefly (WF, *Bemisia argentifolii*) counts at 1 week after treatment (WAT) following each of five applications. Asana, Capture, or Danitol combined with endosulfan effectively reduced WF counts at 1 WAT following each of five applications. Danitol treated melons exhibited fewer adult WF compared to Asana or Capture at most of the rating dates at 6 days after treatment (DAT) of each of the applications and also at 11 DAT of the last application. A single application of buprofezin (Applaud®) treatments or pymetrozine (Fulfill®) effectively reduced WF nymphs for 18 to 24 DAT and adults were reduced for 18 DAT. Fulfill exhibited a rate response where the higher rate reduced WF counts more than the lower rate.

Introduction

Whitefly (WF, *Bemisia argentifolii*) management schemes in melons have improved in recent years with newly introduced and strategic uses of soil-applied and foliar insecticides. Previously, esfenvalerate (Asana®), a pyrethroid insecticide, and endosulfan were the only available foliar insecticides to control adult WF. Bifenthrin (Capture®), another pyrethroid insecticide, was used extensively under an emergency exemption and is now labeled for use in melons. A third pyrethroid insecticide, fenpropathrin (Danitol®), is expected to gain registration for use in melons soon. The pyrethroids are recommended to be used in a limited manner in rotation with a single foliar application of the insect growth regulator, buprofezin (Applaud®), to manage WF in melons. These foliar insecticides could also supplement the soil application of imidacloprid (Admire®) if it diminishes in efficacy over the long growing season. This field study was conducted to evaluate and compare the efficacy of the pyrethroid insecticides against WF in cantaloupes.

Materials and Methods

A small plot field test was conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, Arizona. Cantaloupe cv. Charantais was direct-seeded in April 1999. The single row of melons was planted on a single 40-inch bed using a 4-row planter. Three beds were unplanted to provide a buffer of 10 ft between rows. The individual plot length was 36 ft. The test was arranged in a randomized complete block design with four replicates. Each treatment replicate plot was sprayed 6.7 ft wide. The cantaloupes were furrow irrigated on one side of the bed regularly as necessary. Treatments are listed in Tables 1 and 2. Pyrethroid insecticides combined with endosulfan were applied

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five times at weekly intervals. All other treatments were applied only one time at the first application date on 25 June 1999. The applications were initiated when the adult WF counts indicated 1.2 adults/leaf on 24 June. On 25 June, the weather conditions were temperature at 98F with scattered clouds and a slight breeze with melons beginning to set. On 02 July, the temperature was 102F, overcast sky and few sprinkles. On 09 July, the temperature was 93F, partly cloudy with slight breezes, 0.04 in rainfall occurred on the next day and the ground was very wet from a total of 1.02 inch rainfall that also occurred 2 and 3 days prior to the application. On 16 July, the temperature was 100F and 0.91 inch rain fell 2 days before and then again 2 days after the application. The last application on 23 July occurred when the temperature was 92F with partly cloudy skies and no wind.

All of the foliar broadcast sprays were made with a CO₂ backpack sprayer pressurized to 40 psi and 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 30 gpa water and an adjuvant, Latron CS-7 at 0.25% v/v was added to all sprays. At intervals after each application date, ratings were made using the leaf-turn method by counting the total number of adult WF on the 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

At 6 days after treatment (DAT), following each of the five weekly applications, each of the pyrethroid insecticides combined with endosulfan demonstrated efficacy by reducing the number of adult and immature WF relative to the untreated check (Table 1 and 2). The immature counts were similar to the adult counts with Danitol treated melons exhibiting fewer nymphs compared to Asana or Capture at most of the rating dates. Danitol combined with Applaud applied one time was comparable to three applications of pyrethroids plus endosulfan by reducing nymphs and adult WF for 3 weeks. Applaud treatments showed that WF adults were reduced in melons for 18 DAT until the counts increased at 24 DAT. Similarly, the immature counts were less than the untreated check at 18 DAT for all Applaud treatments. At 24 DAT of one application, immature and adult WF in the Applaud treated melons showed an increase comparable to or greater than the untreated check. One application of Applaud was comparable to three applications of pyrethroid insecticide applications. Applaud at 0.25 or 0.38 lb AI/A did not consistently demonstrate significant differences at each of the rating dates in reducing immature counts. Fulfill applied one time was effective in reducing immature WF for 24 DAT at the higher rate of application compared to the lower rate. Adult WF counts on melons treated with Fulfill were less than the untreated check for 18 DAT.

A single application of Applaud treatments or Fulfill effectively reduced WF nymphs for 18 to 24 DAT and adults were reduced for 18 DAT until numbers increased at 24 DAT relative to the untreated check. Fulfill exhibited a rate response where the higher rate reduced WF counts more than the lower rate. Asana, Capture, or Danitol combined with endosulfan effectively reduced WF counts at 1 WAT following each of five applications.

Table 1. Evaluation of foliar insecticides for whitefly control in cantaloupes. (Umeda, MacNeil, Roberts, Lund.)

Treatment	Rate (lb AI/A)	Mean Number Whiteflies						
		Adults/leaf						
		24 Jun	01 Jul	08 Jul	15 Jul	22 Jul	29 Jul	03 Aug
Untreated check		1.2	2.6	1.1	7.0	19.0	23.4	24.3
Asana + Endosulfan ¹	0.05 + 0.75		2.2	0.9	3.3	12.9	12.3	25.5
Capture + Endosulfan ¹	0.08 + 0.75		2.4	1.1	3.0	17.2	5.3	22.4
Danitol + Endosulfan ¹	0.2 + 0.75		2.5	0.4	2.6	10.4	4.7	14.8
Fulfill ²	0.047		3.4	0.9	4.5	27.3	23.6	27.1
Fulfill ²	0.086		2.4	0.9	3.7	24.5	21.9	22.3
Applaud ²	0.25		2.8	0.8	4.1	18.6	21.1	20.2
Applaud ²	0.38		3.2	0.8	3.8	12.5	15.4	21.8
Applaud + Danitol ²	0.25 + 0.2		2.9	1.0	3.3	13.4	19.2	29.3
Applaud + Endosulfan ²	0.25 + 0.75		1.7	0.7	4.6	17.1	21.7	24.5
LSD (p=0.05)			1.76	0.70	2.21	8.91	10.07	15.61

¹Treatments applied weekly for five consecutive weeks: 25 Jun, 02, 09, 16, 23 Jul 1999.

²Treatments applied once at first application date: 25 Jun 1999.

Table 2. Evaluation of foliar insecticides for whitefly control in cantaloupes. (Umeda, MacNeil, Roberts, Lund.)

Treatment	Rate (lb AI/A)	Mean Number Whiteflies					
		Immatures/leaf					
		01 Jul	08 Jul	15 Jul	22 Jul	29 Jul	03 Aug
Untreated check		6.0	9.1	3.4	3.3	31.0	76.8
Asana + Endosulfan ¹	0.05 + 0.75	3.0	2.9	1.0	1.8	13.4	25.6
Capture + Endosulfan ¹	0.08 + 0.75	1.9	3.9	0.9	1.2	3.4	21.0
Danitol + Endosulfan ¹	0.2 + 0.75	2.9	3.0	0.5	0.6	4.8	14.4
Fulfill ²	0.047	2.1	1.5	1.7	7.4	23.9	72.5
Fulfill ²	0.086	3.8	1.0	1.6	2.6	25.6	71.6
Applaud ²	0.25	4.0	5.4	1.8	6.1	27.7	66.7
Applaud ²	0.38	4.8	4.2	1.1	6.3	33.6	52.8
Applaud + Danitol ²	0.25 + 0.2	4.1	3.8	2.0	3.4	17.3	51.5
Applaud + Endosulfan ²	0.25 + 0.75	1.7	6.1	1.9	4.1	15.8	61.4
LSD (p=0.05)		2.84	5.72	1.69	3.68	20.39	29.32

¹Treatments applied weekly for five consecutive weeks: 25 Jun, 02, 09, 16, 23 Jul 1999.

²Treatments applied once at first application date: 25 Jun 1999.