Insecticides for Whitefly Control in Cantaloupe

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Abstract

In small plot field testing, the new IGR's, buprofezine, pyriproxyfen, and fenoxycarb plus CGA-215944 , offered very good reduction of the WF adults and immature stages for several weeks. Combinations of the new insecticides and alternating weekly applications were effective in minimizing WF season-long. Pyrethroids, bifenthrin and esfenvalerate plus endosulfan treatments, were effective after early applications and nymph counts were elevated after the third application. Oxydemeton-methyl and imidacloprid treatments applied weekly compared favorably with the new chemistries to reduce adults and immatures. Pyridaben applied weekly reduced adult counts relative to the untreated check but immatures increased after the third application.

Introduction

Whiteflies [*Bemisia argentifolii*, silverleaf whitefly (WF) also known as sweet potato WF, *B. tabaci*] in desert melon production seasons is the primary insect pest. Imidacloprid (Admire®) offers adequate protection for the melon crops against WF when applied to the soil under the seed at planting time. Developing plants are able to absorb and translocate Admire through the roots to the shoots to provide protection. Foliarly applied insecticides are very limited and offer very little efficacy against the WF in melons. New insect growth regulator (IGR) insecticides have been utilized in cotton for WF control programs and have demonstrated a potential for use in vegetable crops. New products have been evaluated in past years as a single treatment applied on a regularly scheduled application basis against WF. The IGR's were evaluated in this field test when applied in a limited number of applications during a season in sequence with other conventionally available insecticides. Combinations of commercially available insecticides were also evaluated for efficacy against the WF in this field test.

Materials and Methods

A small plot field study was conducted at the University of Arizona Maricopa Agricultural Center. Cantaloupe cv. Gold Eagle was planted on 09 Apr 1997 on 40-inch beds spaced 10 ft apart to buffer and minimize WF movement between plots and the single row plots measured 50 ft long. The test was established as a randomized complete block design with four replicates. All insecticide treatments were applied using a hand-held boom configured with four TX-10 hollow cone nozzle tips spaced 20-inches apart and delivered in 32 gallons per acre of water pressurized with a CO_2 backpack sprayer at 45 psi. Treatment applications were made at 7 day intervals on 18, 25 Jun and 02, 09 Jul. All applications were made during the morning hours when temperatures ranged from 95 to 110 degF with mostly clear skies and almost no wind. All insecticide treatments included spreader-sticker Latron CS-7 at 0.25% v/v. Sampling for WF was done prior to initiating applications and at 6 days after treatment (DAT) of every application for adults and immatures. A 13 DAT sampling was done after the last application. Adults were evaluated by turning the 3rd to 5th fully expanded

terminal leaf of a vine on ten randomly selected plants per replicate of each treatment. Immatures were counted on the underside on the midrib of five similar fully expanded leaves in a 0.5-inch by 0.5-inch square area under a microscope. The data was analyzed using ANOVA and LSD.

Results and Discussion

The test was initiated when leaf-turn counts showed that WF adults ranged from 2.1 to 3.8 per leaf and immature nymphs numbered 0.4 to 1.5 per leaf (Table). At 6 DAT following all application dates, all treatments had fewer adults compared to the untreated check. All treatments were significantly different from the untreated check in demonstrating reduction of adult WF at 6 DAT of the first three applications. Following the last application, esfenvalerate treatments were equivalent to the untreated check with 9.5 adults/leaf at 6 DAT and exceeded the untreated check at 13 DAT when combined with endosulfan for repeated seasonal applications. Bifenthrin or esfenvalerate combined with endosulfan applied weekly for four weeks was effective until after the fourth application when adult counts increased. CGA-215944 combined with fenoxycarb, an IGR, applied consecutively for four weeks or in combination with bifenthrin and followed by endosulfan performed similarly to reduce adults season-long compared to the untreated check. Buprofezine, an IGR, treatments applied in combination with endosulfan (one application) or bifenthrin (two applications) were highly effective in reducing WF season-long. Oxydemeton-methyl plus endosulfan applied consecutively performed comparable to the buprofenzine treatments for reducing adults. A single application of pyriproxyfen, an IGR, plus methamidaphos followed by three applications of fenpropathrin plus methamidaphos had the fewest number of detectable adults for most of the season and through 13 DAT of the last application. Successive applications of two rates pyridaben reduced the number of adults relative to the untreated check at all rating dates. Imidacloprid combined with esfenvalerate significantly reduced the adult WF after the first three applications and then the counts increased slightly after the last application.

Immature nymph counts were low for all treatments until the rating date at 6 DAT of the third application. CGA-215944 treatments had the fewest number of nymphs at 6 DAT of the third application and was consistently among the treatments having the lowest number at subsequent rating dates. The pyriproxyfen, imidacloprid, buprofenzine, and oxydemeton-methyl treatments performed similarly as the CGA-215944 and had consistently low numbers of detectable nymphs relative to the untreated check. The pyrethroid plus endosulfan and the pyridaben treatments exhibited elevated nymph counts approaching the levels of the untreated check after the last application.

The new IGR's, buprofezine, pyriproxyfen, and fenoxycarb plus CGA-215944 , offered very good reduction of the WF adults and immature stages for several weeks during the spring cantaloupe production season. Single applications performed similarly to the multiple applications for buprofezine and fenoxycarb plus CGA-215944. Pyridaben compared favorably with the pyrethroid plus endosulfan treatments during the early application dates but efficacy declined after the third consecutive application. Alternating insecticides during the season provided efficacy to minimize WF adults and nymphs as the populations began to inicrease. In the future, integration of new chemistries with currently available products will provide growers alternative combinations to effectively reduce WF in melon crops.

Table. Insecticides for Whitefly Control in Cantaloupe, 1997. (Umeda, Gal, Strickland)

Treatment	Rate (lb AI/A)	Mean Whitefly / Leaf											
		18 Jun	24 Jun	01 Jul	08 Jul	15 Jul	22 Jul	18 Jun	24 Jun	01 Jul	08 Jul	15 Jul	22 Jul
		adults						immatures					
Untreated Check		3.8	7.2	15.2	19.6	9.5	26.6	1.3	1.6	0.7	8.8	65.3	30.9
Bifenthrin + Endosulfan[1]	0.08 + 0.75	2.6	1.8	3.2	8.5	8.2	18.2	1.5	0.0	0.6	9.4	54.1	56.0
Esfenvalerate + Endosulfan[1]	0.05 + 0.75	3.5	3.2	9.5	10.2	9.5	32.0	0.4	0.1	0.1	21.5	64.7	58.0
CGA-215944 + Fenoxycarb[1]	0.094 + 0.062	2.1	2.1	1.4	4.4	5.3	17.5	1.4	0.3	0.1	1.6	17.5	22.8
Pyridaben[1]	0.15	2.3	4.2	5.0	12.1	5.1	16.3	0.3	0.1	0.3	4.5	53.1	46.3
Pyridaben[1]	0.30	3.1	3.4	10.4	10.9	3.7	14.4	0.4	0.1	0.3	21.8	55.6	53.0
Oxydemeton-methyl + Endosulfan[1]	0.50 + 0.75	2.4	1.0	0.9	5.7	3.9	13.5	0.1	0.0	0.3	6.3	34.4	11.3
Buprofezine + Endosulfan and Endosulfan[2]	0.25 + 0.75 0.75	2.1	1.2	1.4	4.6	3.5	13.1	1.0	0.0	0.1	5.7	25.5	26.7
Buprofezine + Bifenthrin[3]	0.25 + 0.08	2.2	2.8	4.1	4.0	2.7	14.3	0.8	0.1	0.4	9.7	21.3	18.2
Pyriproxyfen + Methamidaphos and Fenpropathrin + Methamidaphos[4]	0.05 + 0.50 0.20 + 0.50	2.8	4.3	1.0	2.2	6.2	9.9	0.8	0.0	0.1	2.8	18.9	29.0
Bifenthrin + CGA-215944 + Fenoxycarb and Endosulfan[5]	0.08 + 0.094 + 0.062 0.75	3.0	1.0	1.6	1.9	5.1	18.0	1.0	0.1	0.8	2.4	20.9	24.5
Esfenvalerate + Imidacloprid[1]	0.05 + 0.047	2.9	1.1	2.0	3.2	9.5	16.5	1.3	0.2	0.4	3.6	21.8	12.4
LSD (p=0.05)		2.3	1.9	3.0	2.6	3.4	16.9	1.7	0.6	1.0	14.5	28.3	24.5

[1]Series of 4 weekly applications.

[2]Sequence for 4 applications - buprofezine + endosulfan, endosulfan, buprofezine + endosulfan, endosulfan.

[3]Sequence for 4 applications - buprofezine +bifenthrin, buprofezine +bifenthrin + endosulfan, endosulfan, endosulfan.

[4]Single application of pyriproxyfen +methamidaphos followed by 3 applications of fenpropathrin + methamidaphos.

[5]Single application of bifenthrin + CGA-215944 + fenoxycarb followed by 3 applications of endosulfan.