

New Insecticides for Potential Use for Whitefly Control in Cantaloupes

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Abstract

Most experimental treatments effectively reduced Bemisia tabaci [sweetpotato whitefly (WF) also known as silverleaf WF, B. argentifolii] adults and eggs in cantaloupes relative to the untreated check at 6 days after treatment of each of five applications. Acephate (Orthene®), buprofezin (Applaud®), bifenthrin (Capture®), endosulfan, fenpropathrin (Danitol®), naled (Dibrom®), and pymetrozine (CGA-215944, Ciba) treatments had the fewest adults and eggs. Insect growth regulator (IGR) materials in combinations, pyriproxyfen (S-71639, Valent) and fenoxycarb (Ciba), were more effective in reducing WF relative to the untreated check than when applied alone. Registered products, Dibrom®, endosulfan, and methamidaphos (Monitor®) were effective in combinations or in alternating applications.

Introduction

In recent years, the primary pest of desert melon production has been *Bemisia tabaci* [sweetpotato whitefly (WF) also known as silverleaf WF, *B. argentifolii*] and achieving economic control has been challenging because few foliar insecticides are available for use in melons. Many new insecticides classified as insect growth regulators (IGR), pyrethroids, and new chemistries are being registered for use in other major agronomic crops such as cotton and may be considered for possible use in vegetable and fruit crops. New products need to be evaluated to determine effective use rates, intervals for applications, and combinations to compliment different modes of activity against a pest. Better understanding of new products would allow development of more efficient integrated pest management programs to economically utilize insecticides with biological and cultural control methods. This field study was conducted to evaluate and determine efficacy of several new insecticides that have potential for use in melons to control WF.

Materials and Methods

A small plot field study was conducted at the University of Arizona Maricopa Agricultural Center. Cantaloupe cv. Earlimark was planted on May 3 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 three, four, or five TX-10 hollow cone nozzle tips spaced 20-inches apart and delivered in water pressurized with a CO₂ backpack sprayer at 50 psi. Applications were initiated on June 21 when adult WF counts reached the economic threshold level of 3 adults/leaf. A three-nozzle boom was used to deliver 30 gallons per acre (gpa) spray to adequately broadcast over the top of the blooming melon vines. The weather was cloudy with a slight wind and 86°F during the late morning application. The Applaud® plus endosulfan combination treatment was initiated with endosulfan alone to be applied at the next application date then rotated again to the combination and alternated each application date. All insecticide treatments included spreader-sticker Kinetic® at 0.125% (v/v) except two fenoxycarb treatments. The second application was made

on June 28 with a four-nozzle boom delivering 30 gpa of spray and temperatures at 96°F with fruit beginning to set on the vines. The third application on July 5 and all remaining applications were sprayed with a five-nozzle boom delivering 26 gpa of spray over the top of the vines. The temperature on July 5 was 95°F; July 13 for the fourth application was 106°F; and July 20 for the fifth application was 96°F. Sampling for WF was done 6 days after treatment (DAT) of every application for adults, immature nymphs, and eggs. Adults were evaluated by turning the third to fifth fully expanded terminal leaf of a vine on ten randomly selected plants per replicate for each treatment. Nymphs and eggs 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 average number of adults and eggs for all treatments were determined and subjected to mean separation using Duncan's Multiple Range Test.

Results and Discussion

All insecticide treatments were effective in reducing WF adults and eggs relative to the untreated check at all rating dates at 6 DAT of five applications (Tables 1 and 2). Weekly counts of immature stages of WF were negligible and inconsistent throughout the test for all treatments. Pyrethroid insecticide treatments, Danitol® and Capture® in combinations with Orthene®, S-71639, endosulfan, or Monitor® were extremely effective in maintaining lowest levels of adults and eggs. Comparable efficacy was observed for IGR insecticide treatments in combination with endosulfan, Dibrom®, or CGA-215944. The IGR's alone, fenoxycarb and S-71693 were not effective in reducing WF adults as compared to combination treatments. No cantaloupe phytotoxicity was observed for any treatment following any of the multiple applications.

The efficacy of several new insecticides as well as incorporating the use of existing available products demonstrated the potential to effectively manage WF populations in melons. Rotating insecticides to avoid several consecutive applications of the same chemistry would appear to be possible if new pyrethroids, IGR's, new chemistries, and old chemistries can be registered and labels for use be maintained.

References

Palumbo, J.C., A. Tonhasca Jr., and D.N. Byrne. 1994. Sampling Plans and Action Thresholds for Whiteflies on Spring Melons. IPM Series, Number 1. 194021- March 1991. Coop. Ext., College of Agric., The Univ. of Ariz., Tucson, AZ 85721

Table 1. New insecticides for potential use for whitefly control in cantaloupes at U of A MAC. (Umeda)

Treatment	Rate (lb a.i./A)	Average weekly number of adult whitefly/leaf					
		06/20	06/27	07/04	07/11	07/19	07/26
Untreated check		4.5 a	20.9 a	60.1 a	198.0 a	385.0 a	149.1 abc
Fenoxycarb ¹	0.125	3.6 a	18.0 ab	34.4 b	125.3 b	224.4 b	163.0 ab
Fenoxycarb	0.125	5.0 a	20.9 a	30.9 b	119.8 b	195.5 b	157.4 ab
Fenoxycarb ¹ + CGA-215944	0.125 + 0.178	4.6 a	5.8 d	12.2 c-f	71.7 c	93.8 cd	120.9 b-e
Danitol® + Orthene®	0.200 + 0.500	3.6 a	5.2 d	5.3 f	25.8 e	33.3 f	61.3 e
Danitol® + S-71639	0.200 + 0.027	4.4 a	16.5 ab	15.1 cde	50.5 cde	34.0 f	80.4 de
S-71639	0.027	3.3 a	19.0 a	20.1 c	68.1 cd	107.9 c	194.8 a
Capture® + Endosulfan	0.080 + 0.500	3.8 a	9.5 cd	10.5 def	42.6 de	41.8 ef	124.8 bcd
Capture® + Monitor®	0.080 + 0.500	3.8 a	6.7 d	14.6 cde	39.5 e	45.0 ef	120.4 b-e
Applaud® + Endosulfan ²	0.250 + 0.750	4.1 a	5.5 d	7.1 ef	39.6 e	53.7 def	92.9 cde
Dibrom® + S-71639	2.000 + 0.027	5.2 a	13.4 bc	16.6 cd	51.3 cde	84.4 cde	128.8 bcd
Dibrom® + Applaud®	2.000 + 0.250	2.9 a	16.0 ab	13.6 c-f	51.9 cde	85.8 cde	129.4 bcd

Spreader-sticker Kinetic® at 0.125% (v/v) added to all treatments except as noted.

¹ Fenoxycarb treatments without Kinetic® added.

² Alternating treatments every other week; started with combination followed by endosulfan alone.
Application dates: June 21, 28, July 5, 13, 20, 1994.

Means within a column followed by the same letter do not differ significantly by
Duncan's MRT at the 5% level.

Table 2. New insecticides for potential use for whitefly control in cantaloupes at U of A MAC. (Umeda)

Treatment	Rate (lb a.i./A)	Average weekly number of whitefly eggs/leaf				
		06/27	07/04	07/11	07/19	07/26
Untreated check		42.2 a	61.7 a	271.8 a	251.9 a	317.5 a
Fenoxycarb ¹	0.125	36.1 ab	24.4 b	175.1 b	130.8 b	265.0 a
Fenoxycarb	0.125	32.0 abc	21.9 b	145.8 b	113.2 b	291.3 a
Fenoxycarb ¹ + CGA-215944	0.125 + 0.178	6.5 e	3.9 cd	45.5 cd	31.2 c	130.8 cd
Danitol® + Orthene®	0.200 + 0.500	4.1 e	2.1 d	13.6 d	9.5 c	32.3 e
Danitol® + S-71639	0.200 + 0.027	32.5 abc	8.2 bcd	37.8 cd	11.1 c	61.2 de
S-71639	0.027	26.4 a-d	19.9 bc	78.8 c	49.8 c	230.0 ab
Capture® + Endosulfan	0.080 + 0.500	14.6 cde	3.3 cd	30.2 cd	15.8 c	78.3 cde
Capture® + Monitor®	0.080 + 0.500	5.9 e	7.6 bcd	28.1 cd	13.2 c	117.3 cde
Applaud® + Endosulfan ²	0.250 + 0.750	8.5 de	3.2 cd	30.1 cd	14.0 c	79.3 cde
Dibrom® + S-71639	2.000 + 0.027	19.7 b-e	13.9 bcd	58.6 cd	37.5 c	162.5 bc
Dibrom® + Applaud®	2.000 + 0.250	15.1 cde	13.7 bcd	51.3 cd	41.5 c	146.5 bcd

Spreader-sticker Kinetic® at 0.125% (v/v) added to all treatments except as noted.

¹ Fenoxycarb treatments without Kinetic® added.

² Alternating treatments every other week; started with combination followed by endosulfan alone. Application dates: June 21, 28, July 5, 13, 20, 1994.

Means within a column followed by the same letter do not differ significantly by Duncan's MRT at the 5% level.