

(E90)

TOMATO: *Lycopersicon esculentum* Miller, 'Florida 47'

CONTROL OF SILVERLEAF WHITEFLY IN STAKED TOMATO WITH SOIL-APPLIED INSECTICIDES, AND FOLIAR SPRAYS, 2004

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Silverleaf whitefly: *Bemisia argentifolii* Bellows & Perring

Populations of silverleaf whitefly and incidence of whitefly-borne TYLCV continue to increase in southwest Florida and with it the dependence on soil-applied neonicotinoid insecticides to provide the control upon which profitability is so dependent. It is therefore of interest to examine additional options to supplement these all-important systemic insecticides. Seedlings from a commercial greenhouse were transplanted 31 Mar at 18-inch spacing on eight drip-irrigated beds, 240 ft long on 12-ft centers. The beds were divided into consecutive two bed sets to make four replications with each divided into 12 plots, each 40 ft long and assigned to treatments in a RCB design. The Admire 2F, Platinum 2SC and Assail WP treatments were applied as soil drenches on 2 Apr in 10 ml of solution. Admire 2F was also applied as a soil drench at 16 fl oz product/acre on 13 Apr to plants receiving Root Feed and those receiving one of three rates of the horticultural mineral oil (HMO). Root Feed I and II were alternated and applied weekly from 5 Apr until harvest for a total of eight applications. Root Feed I was applied at a rate of 5 gal product/acre and Root Feed II at 15 lbs product/acre in a soil drench to each plant in 30 ml of solution. The Oberon 2 SC was applied 11 May, for three weekly applications, to one set of the Admire plots after the whitefly had become established. Actigard 50WG and Fulfill 50WG were also applied midseason to one set of the Platinum plots. Actigard was applied weekly for four weeks beginning 4 May at 0.33 lb product/acre and increased incrementally at 0.75 oz product/acre. The Fulfill was applied in two weekly applications beginning 11 May and tank mixed with an organosilicant, Kinetic, at 0.1% v/v. The HMO's were tank mixed with the weekly fungicide applications. Normal cultural practices were followed to control other pest and diseases. Eight weekly evaluations of whitefly adults were made beginning 8 Apr by beating one side of four plants at three locations per plot with a 9 × 13-inch pie pan painted black and coated with a 9:1 mixture of vegetable oil and liquid detergent. Immature stages were monitored 26 Apr, 11 and 24 May, and 1 Jun using one leaf removed from the sixth node of four centrally located plants in each plot. All whitefly stages were counted that appeared in a 2-cm² ring placed once on the three terminal leaflets from each leaf collected. Plants were evaluated five times from 29 Apr to 24 May for the presence of severe TYLC symptoms. Fruit was harvested from the 20 plants per plot on 2 Jun and the number and weights of insect, disease and marketable fruit were recorded. Data were subjected to ANOVA and means were separated using LSD ($P \leq 0.05$).

On 8 Apr adult counts averaged 7.4 ± 1.4 (mean \pm SE) per pan with fewest seen in treatments 1, 3, 4, 5 and 6 comprising all those receiving the earliest applications of a neonicotinoid on 2 Apr (Tables 1 and

2). Mean counts of adults increased to 12.9 ± 2.4 on 19 Apr, with fewer in all treatments than the control except for either HMO alone at 1%. The adult count jumped to 85.0 ± 11.2 on 26 Apr. with lowest counts seen on plants receiving Admire and sprayed with 1% PureSpray Green Oil. Counts of nymphs on that day were lowest on plants receiving a neonicotinoid drench alone or supplemented with PureSpray Green Oil. On 3 May adult counts averaged 68.2 ± 7.4 with fewest seen on plants treated with Admire followed by PureSpray Green Oil at 1%. The only weekly evaluation for new virus incidence that showed significant treatment differences occurred on 5 May when fewest newly symptomatic plants had been treated with Admire followed by weekly sprays with 1% PureSpray Green Oil (Table 3). Soon after ward all plants were symptomatic for TYLCV, regardless of what they were treated with. On 11 May mean adult counts had risen to 183.0 ± 10.3 with no treatments showing significant differences from the untreated check although fewest large nymphs and pupae were again seen with the Admire + 1% PureSpray Green Oil treatment. The adult count on 17 May was of similar magnitude with fewest seen on plants treated with the Admire drench followed by either Oberon or 1% PureSpray Green Oil. Fewest adults and nymphs were seen 24 May in response to the Admire drench followed by Oberon, although in regard to adults, differences were not significant with any treatment receiving a neonicotinoid drench, nor in regard to pupae, to those including Platinum + Fulfill and Actigard, or Admire + PureSpray Green Oil at 0.5 or 1%. Again on June 1 fewest nymphs were seen on plants treated with Admire followed by Oberon, although differences with Admire alone, Admire + PureSpray Green Oil at 0.5% and 1% or Platinum were not significant. Thus, no treatments really resisted the onslaught of whiteflies and TYLCV, although significant levels of suppression were observed with most treatments including Admire or Platinum drenches, and these in turn were improved by follow-up foliar applications of horticultural mineral oil, Oberon, or Fulfill/Actigard.

Table 1.

		Whitefly adults per beat sample and immature counts from 6 cm ²													
		8 Apr		19 Apr		26 Apr			3 May		11 May				
No. Treatment/ formulation	Rate amt product/acre	Adult	Adult	Adult	Egg	Small	Large	Pupa	Adult	Adult	Egg	Small	Large	Pupa	
1.	Assail 70WP	5.7 oz	1.3c	7.9b	103.7ab	2.1ab	1.3d	0.3d	0.0b	84.8abc	193.3ab	5.3a	11.8abc	8.1b	7.6bc
2.	Root Feed I + Root Feed II + Admire 2F	5 gal + 15 lb + 16 fl oz	13.5ab	7.9b	79.6ab	3.4ab	3.4bcd	1.9cd	0.0b	100.8a	258.3a	10.3a	7.1c	2.9cde	4.6cde
3.	Admire 2F	16 fl oz	2.5c	9.4b	54.4ab	0.8b	1.1d	0.3d	0.0b	52.9cd	147.5b	5.1a	7.9bc	2.3de	1.8de
4.	Admire 2F Oberon 2SC ^a	16 fl oz 8.5 fl oz	3.0c	10.9b	56.5ab	0.6b	1.0d	0.4d	0.3b	41.1d	135.8b	6.6a	5.7c	2.3de	1.6de
5.	Platinum 2SC	8 fl oz	3.9c	12.8b	76.6ab	1.5b	2.4cd	0.6d	0.5b	59.7bcd	149.2b	7.4a	14.1ab	7.0bc	4.0cde
6.	Platinum 2SC Actigard 50WG ^b + Fulfill 50WG ^c	8 fl oz 0.33 oz + 2.75 oz	1.9c	13.3b	66.7ab	0.4b	2.0d	0.3d	0.1b	53.4cd	165.0b	10.8a	14.0ab	3.1cde	2.6de
7.	Admire 2F PureSpray Green Oil	16 fl oz 0.25 % v/v	8.9abc	5.8b	60.5ab	1.2b	2.9cd	0.8d	0.0b	46.3cd	154.2b	8.2a	8.9bc	6.3bcd	3.9cde
8.	Admire 2F PureSpray Green Oil	16 oz 0.5 % v/v	13.2ab	5.8b	65.8ab	4.9a	1.2d	0.1d	0.1b	50.7cd	190.0ab	3.8a	8.6bc	3.3cde	3.6de
9.	Admire 2F PureSpray Green Oil	16 fl oz 1.0 % v/v	6.7bc	3.0b	30.2b	2.6ab	1.4d	0.0d	0.0b	34.8d	173.8b	6.6a	5.8c	1.5e	0.4e
10.	PureSpray Green Oil	1.0% v/v	7.3bc	24.3a	155.8a	3.3ab	6.8a	2.9bc	0.1b	102.9a	201.7ab	4.7a	14.2ab	9.9b	5.6bcd
11.	SunSpray Ultrafine Oil	1.0% v/v	15.3a	26.2a	139.6a	3.2ab	5.7ab	3.8b	0.1b	96.3ab	208.8ab	3.4a	13.9ab	8.2b	9.0b
12.	Untreated Check	--	11.1ab	27.6a	130.8ab	4.8a	4.8abc	6.4a	1.4a	94.6ab	218.3ab	9.4a	15.4a	17.2a	16.4a

Means in the same column followed by the same letter are not significantly different ($P > 0.05$, LSD).

^aThree weekly applications beginning 11 May.

^bFour weekly applications beginning 4 May at 0.33 lb product per acre and increasing incrementally to 0.75 oz per acre.

^cTwo weekly applications beginning 11 May and tank mixed with an organosilicant, Kinetic at 0.1% v/v.

Table 2.

Whitefly adults per beat sample and immature counts from 6 cm²

No.	Treatment/ formulation	Rate amt product/acre	Whitefly adults per beat sample and immature counts from 6 cm ²										
			17 May		24 May				1 Jun				
			Adult	Adult	Egg	Small	Large	Pupa	Adult	Egg	Small	Large	Pupa
1.	Assail 70WP	5.7 oz	188.3ab	320.0ab	6.2a	8.6a	5.2abc	9.9abcd	362.5a	1.5ab	18.9bc	22.4b	27.8ab
2.	Root Feed I + Root Feed II + Admire 2F	5 gal + 15 lb + 16 fl oz	183.7ab	305.0ab	5.5a	22.3a	8.1a	13.5ab	398.8a	4.6ab	32.9b	21.6b	24.9abc
3.	Admire 2F	16 fl oz	105.0bc	238.3ab	4.5a	12.1a	4.4abc	6.1cde	388.8a	6.4a	20.4bc	6.4cd	6.6ef
4.	Admire 2F Oberon 2SC ^a	16 fl oz 8.5 fl oz	80.4c	61.2b	3.3a	17.3a	1.1c	1.2e	75.9b	1.4ab	5.0c	0.9d	0.5f
5.	Platinum 2SC	8 fl oz	141.3bc	174.3ab	3.2a	20.4a	8.1a	10.9abcd	388.8a	5.6ab	30.6b	18.7bc	16.2bcde
6.	Platinum 2SC Actigard 50WG ^b + Fulfill 50WG ^c	8 fl oz 0.33 oz + 2.75 oz	108.8bc	160.0ab	1.9a	7.1a	2.4c	4.3de	390.6a	3.5ab	13.3bc	19.3bc	14.1cde
7.	Admire 2F PureSpray Green Oil	16 fl oz 0.25 % v/v	96.3bc	307.3ab	4.9a	19.1a	8.5a	9.1bcd	388.8a	1.8ab	12.8bc	9.6bcd	16.8bcde
8.	Admire 2F PureSpray Green Oil	16 oz 0.5 % v/v	137.5bc	263.3ab	1.9a	11.3a	6.1ab	4.6de	391.3a	1.6ab	15.8bc	12.0bcd	13.6cde
9.	Admire 2F PureSpray Green Oil	16 fl oz 1.0 % v/v	83.8c	132.3ab	3.1a	19.9a	4.9abc	5.3de	370.0a	2.2ab	14.2bc	9.1bcd	11.6de
10.	PureSpray Green Oil	1.0% v/v	177.5abc	361.7a	4.0a	11.1a	4.3abc	13.4ab	385.0a	0.9ab	13.6bc	11.8bcd	18.4abcd
11.	SunSpray Ultrafine Oil	1.0% v/v	177.5abc	311.7ab	10.6a	24.2a	5.2abc	12.5abc	393.8a	0.1b	16.1bc	22.1b	29.7a
12.	Untreated Check	--	238.3a	351.7a	3.4a	11.5a	8.3a	16.3a	400.0a	6.9a	51.6a	44.2a	26.1ab

Means in the same column followed by the same letter are not significantly different ($P > 0.05$, LSD).

^aThree weekly applications beginning 11 May.

^bFour weekly applications beginning 4 May at 0.33 lb product per acre and increasing incrementally to 0.75 oz per acre.

^cTwo weekly applications beginning 11 May and tank mixed with an organosilicant, Kinetic at 0.1% v/v.

Table 3.

No.	Treatment/ formulation	Rate amt product/acre	Harvest of 20 plants per plot on 2 Jun				TYLCV new symptoms ^d 5 May
			X-large		Total		
			No	Wt	No	Wt	
1.	Assail 70WP	5.7 oz	17.8ab	7.0b	86.3ab	34.6a	24.0b
2.	Root Feed I + Root Feed II + Admire 2F	5 gal + 15 lb + 16 fl oz	18.3ab	6.9b	96.5ab	35.5a	17.1bc
3.	Admire 2F	16 fl oz	31.3ab	12.4ab	125.0a	52.1a	20.2ab
4.	Admire 2F Oberon 2SC ^a	16 fl oz 8.5 fl oz	36.3ab	15.2a	121.0	55.9a	13.8bc
5.	Platinum 2SC	8 fl oz	26.5ab	10.7ab	94.3ab	42.5a	19.2b
6.	Platinum 2SC Actigard 50WG ^b + Fulfill 50WG ^c	8 fl oz 0.33 oz + 2.75 oz	30.0ab	12.0ab	106.8ab	47.9a	14.8bc
7.	Admire 2F PureSpray Green Oil	16 fl oz 0.25 % v/v	21.3ab	8.8ab	90.3ab	36.8a	15.3bc
8.	Admire 2F PureSpray Green Oil	16 oz 0.5 % v/v	28.3ab	11.3ab	108.8ab	48.1a	23.3ab
9.	Admire 2F PureSpray Green Oil	16 fl oz 1.0 % v/v	24.3ab	9.7ab	97.8ab	41.3a	5.7c
10.	PureSpray Green Oil	1.0% v/v	19.5ab	7.9ab	81.5ab	33.4a	16.1bc
11.	SunSpray Ultrafine Oil	1.0% v/v	16.5b	6.6b	93.5ab	33.8a	21.8ab
12.	Untreated Check	--	18.0ab	7.0b	76.8b	31.6a	33.3a

Means in the same column followed by the same letter are not significantly different ($P > 0.05$, LSD).

^aThree weekly applications beginning 11 May.

^bFour weekly applications beginning 4 May at 0.33 lb product per acre and increasing incrementally to 0.75 oz per acre.

^cTwo weekly applications beginning 11 May and tank mixed with an organosilicant, Kinetic at 0.1% v/v.

^dMean percent of new plants with TYLC virus symptoms from total of 28 plants per plot, also evaluated on 29 Apr, 17 and 24 May with no significant differences.