

## MANAGEMENT OF SILVERLEAF IN SQUASH WITH SOIL AND FOLIAR APPLIED INSECTICIDES

Alton N. Sparks, Jr., University of Georgia Cooperative Extension, Department of Entomology, Tifton, GA 31793, [asparks@uga.edu](mailto:asparks@uga.edu)

### **Introduction**

The sweetpotato whitefly (a.k.a. silverleaf whitefly) can be a severe pest in Fall vegetable production in some areas of south Georgia. This pest is of particular concern in squash, where even low populations cause silverleaf symptoms. Neonicotinoid insecticides play a key role in managing this problem. Soil application of these products typically provides long residual control but may not last throughout the production season. If additional foliar applied insecticides are needed, alternate insecticide chemistries should be used. This test was conducted to evaluate the efficacy of two non-neonicotinoid foliar insecticides for management of silverleaf in squash.

### **Materials and Methods**

A small plot trial was conducted at the University of Georgia Horticulture Farm in Tifton, Georgia. Squash, var. Destiny III, was direct seeded with a single row on six foot beds for this test on 11 Sept., 2006. Drip tape was immediately set on the rows to maintain adequate moisture for plant establishment and for irrigation during the season. Once plants were established, experimental plots measuring one row (assumed 36 inches for calculation of treatment rates) by 29 feet were arranged in a randomized complete block design with four replications.

Treatments evaluated in this test included soil applications of two neonicotinoid insecticides: Venom 70SG at 6 oz/ac and Admire Pro 4.6F at 7 oz/ac. Foliar applications evaluated were Oberon 2SC at 8.5 oz/ac and Rimon 0.83EC at 9 and 12 oz/ac. Sequential treatments evaluated were soil application of Admire Pro at 7 oz/ac followed by foliar applications of Oberon at 8.5

oz/ac or Rimon at 12 oz/ac. A non-treated control was included for comparison.

Insecticides applied through the drip system were applied on 28 Sept. Plants were well established at this time. Minimal signs of silverleaf were noted the day after this application. These applications were applied through drip irrigation lines placed next to the plants (adjacent to the irrigation lines). An injection manifold was designed for this test to apply a single treatment to all four replications at one time. The manifold had a single injection port followed by a 'mixing' assembly (two 90 degree turns) followed by T-connections leading to 4 solid injection lines (approximately 200 feet each). The injection lines were attached to 29 feet of drip tape. The drip tape was placed next to the plants of the specified plots for treatment. Once the tape was in place for all four plots of a treatment, the irrigation water was turned on and the system allowed to pressurize and run for approximately 5 minutes (and was checked for any leaks). The specified treatment (for all four plots) mixed in 3 liters of water was then injected. This required approximately 5 minutes to complete the injection. After injection of the treatment, the system was allowed to run for an additional 10 minutes to insure the full treatment was flushed from the irrigation lines and into the plots. The irrigation was then turned off and the lines were moved to the next set of plots and the process was repeated. After all treatments were applied, the field drip irrigation system was run for an additional 20 minutes on the entire test.

Foliar insecticide applications were applied with a CO<sub>2</sub> pressurized backpack sprayer (60 PSI) in a total volume of 40 GPA with three

hollow-cone nozzles per row (one over-the-top, 2 on drops). The Oberon and Rimon treatments without prior Admire use were applied on 29 Sept and 5 and 12 Oct. Silverleaf symptoms were first noted in the test on 29 Sept. The Rimon following Admire treatments were applied on 5 and 12 Oct. The Oberon following Admire treatment was applied a single time on 12 Oct. Rimon was applied more frequently than Oberon because it is a growth regulator and it was anticipated that a more preventative approach would be needed with this mode of action.

Efficacy of treatments was evaluated by rating plots for silverleaf symptoms and collection of yield data. Plots were visually inspected for silverleaf and rated as follows:

- 0 = no silverleaf
- 1 = light and spotty symptoms
- 2 = light symptoms throughout the plot or moderate spots within the plot
- 3 = moderate symptoms evenly distributed throughout the plot
- 4 = heavy spots in the plot
- 5 = severe symptoms throughout the plot.

Under moderate to heavy pest pressure, a 2 would represent acceptable control and a 1 would be excellent control. To determine yields, squash were hand picked, with the entire plot picked on each harvest date. Fruit from each plot were counted and weighed. All data were analyzed using the PROC ANOVA procedure of PC-SAS. Where significant differences were detected ( $P < 0.05$ ), means were separated with LSD ( $P = 0.05$ ).

### **Results and Discussion**

Silverleaf started appearing in plots shortly after the first foliar treatments. The first plot ratings were conducted at one week after the first foliar applications (Oct. 6). Silverleaf symptoms were moderate at that point, but only those treatments receiving Venom or Admire soil applications were rated below an average of three (Table 1). At the next rating, taken at 6 days after the second application, only Venom and the

Admire followed by Oberon treatments were rated below a three; although, there was no significant differences among all three Admire treatments. On the final rating date, only the Venom treatment was rated below a three and was significantly better than all other treatments.

Yield data followed similar trends to the silverleaf ratings, with the exception that Oberon provided yields similar to the Admire treatments (Tables 2 and 3). Venom provide the greatest overall yields, which appeared to result from longer residual control (later harvest dates showed significant increase in yield compared to all other treatments). All three Admire treatments performed statistically similarly. The Oberon alone foliar treatment provided yields similar to the Admire treatments, particularly after the first harvest.

Overall, the soil applied Venom treatment provided the best control and highest yields in this test. The Admire soil application also provided significant control, but did not appear to provide as long residual control as the Venom treatment. This may be related to potential resistance in the population of whitefly, or may be a result of application technique (with the drip line on top of the soil, Admire being less water soluble may not have penetrated into the root zone as well and may have been effected more by exposure to sunlight). Both Oberon and Rimon were not applied until foliar symptoms were noticed (although they were applied at first detection of foliar symptoms). Oberon did not effect silverleaf ratings, but did show a positive impact on yields. Initial harvest in the Oberon plots was low, indicating that treatments were probably started a little late for this product and that it may require initiation of treatments prior to detection of silverleaf symptoms (more of a preventative approach for this particular disorder). Rimon provided no benefit in this test, but likely suffered from similar restraints as the Oberon treatment and will likely require initiation of treatments prior to any symptom detection for this disorder.

**Table 1. Silverleaf ratings (0 to 6), silverleaf management test, UGA Horticulture Farm, Tifton, Georgia, 2006.**

Treatment	Silverleaf Rating (0 to 6)		
	6 Oct.	11 Oct.	20 Oct.
Check	3.75 a	4.38 a	4.88 a
Rimon 9 oz.	3.75 a	4.50 a	4.88 a
Rimon 12 oz.	3.50 ab	4.38 a	5.00 a
Oberon	3.75 a	4.13 ab	4.63 ab
Admire	2.63 cd	3.13 c	4.25 bc
Admire/Oberon	2.88 bc	2.88 c	4.13 c
Admire/Rimon	2.63 cd	3.50 bc	4.63 ab
Venom	2.00 d	1.88 d	2.38 d

Numbers within columns followed by the same letter are not significantly different (LSD; P=0.05).

**Table 2. Average number of fruit harvested per plot, silverleaf management test, UGA Horticulture Farm, Tifton, Georgia, 2006.**

Treatment	Number of fruit harvested				
	20 Oct.	25 Oct.	1 Nov.	10 Nov.	Total
Check	2.50 d	4.00 cd	0.50 c	2.00 cd	9.00 cd
Rimon 9 oz.	0.50 d	3.75 cd	0.75 c	0.25 d	5.25 d
Rimon 12 oz.	0.50 d	3.00 d	1.25 c	1.25 d	6.00 d
Oberon	4.75 bcd	10.00 bc	8.50 b	11.25 b	34.50 b
Admire	9.75 ab	13.00 b	9.75 b	10.75 b	43.25 b
Admire/Oberon	8.50 abc	14.25 ab	6.75 bc	11.75 b	41.25 b
Admire/Rimon	4.25 cd	9.25 bcd	3.50 bc	10.25 bc	27.25 bc
Venom	11.25 a	20.25 a	20.25 a	34.75 a	86.50 a

Numbers within columns followed by the same letter are not significantly different (LSD; P=0.05).

**Table 3. Average pounds of fruit harvested per plot, silverleaf management test, UGA Horticulture Farm, Tifton, Georgia, 2006.**

Treatment	Pounds of fruit harvested				
	20 Oct.	25 Oct.	1 Nov.	10 Nov.	Total
Check	0.27 d	0.31 c	0.03 d	0.11 cde	0.71 c
Rimon 9 oz.	0.06 d	0.27 c	0.06 d	0.02 e	0.40 c
Rimon 12 oz.	0.05 d	0.25 c	0.07 d	0.09 de	0.45 c
Oberon	0.68 bcd	1.22 b	0.70 bc	1.03 b	3.63 b
Admire	1.26 ab	1.50 ab	1.04 b	0.77 bcd	4.56 b
Admire/Oberon	1.14 abc	1.47 b	0.76 bc	0.96 b	4.32 b
Admire/Rimon	0.55 cd	0.96 bc	0.32 cd	0.84 bc	2.67 b
Venom	1.68 a	2.33 a	2.09 a	4.13 a	10.23 a

Numbers within columns followed by the same letter are not significantly different (LSD; P=0.05).