

## EFFICACY OF SELECTED INSECTICIDES AND ACARICIDES AGAINST TWO SPOTTED SPIDER MITES ON WATERMELON, 2004

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### **Introduction**

Spider mites are becoming a more consistent pest in a variety of vegetables grown in Georgia. In 2004, a spider mite outbreak in watermelons and cantaloupe was the worst in decades (County Agent testimonial). Little local information is available on efficacy of insecticides and acaricides against this pest. Additionally, reports of reduced efficacy of some of our more commonly used acaricides have been received from Florida and south Georgia. This experiment was conducted to evaluate the efficacy of selected acaricides against spider mites in south Georgia.

### **Materials and Methods**

A small plot trail was conducted in a commercial watermelon field in Tift County, Georgia. Single row plots were established at one end of the field. Plots were one row (6 feet) by 40 feet, with a non-treated row between plots. The test was arranged in a randomized complete block with four replications. A single application of each treatment was applied on 6 May, 2004. Treatments were applied with a CO<sub>2</sub> pressurized backpack sprayer (60 PSI) in 30 GPA with 4 hollow cone nozzles per row. The grower applied Asana to the entire field on 13 May for control of cucumber beetles. This application did not appear to effect the spider mite populations.

Treatments tested included two pyrethroid insecticides frequently used for spider mite control (Danitol at 16 oz/ac, Capture at 6.4 oz/ac), two acaricides frequently used for mite control (Kelthane at 0.5 lb AI/ac, Agrimek at 12 oz/ac), a recently registered acaricide (Acramite at 0.75 lb/ac) and two acaricides expected to be registered in the near future (Zeal at 2 oz/ac, Oberon at 7 and 8.5 oz/ac). One combination treatment was included (Danitol at 16oz/ac + Zeal at 2 oz/ac) to evaluate the potential for rapid knockdown (from Danitol) and long residual control (from Zeal). Agrimek, Acramite, and Zeal are relatively expensive products and were tested at the low end of their rate ranges to reduce cost of the pesticide. All insecticide and acaricide treatments were tank mixed with Flood (silicone surfactant) at 4 oz/100 gal.

Mites were monitored periodically after treatment (Table 1 and 2). Five leaves were collected from the crown area of five plants (one leaf per plant) on each sample

date. Leaves were selected based on the presence of typical 'infested' leaf appearance (whitish color or yellow spots). Leaves were taken back to the laboratory and examined under a dissecting scope. A single 'infested' microscope field of each leaf was selected and all live mites and mite eggs counted (sample area was about the size of a dime). Although five leaves were selected from each plot on each sample date, time restrictions occasionally limited the number examined in the lab. Actual number of leaves counted on each date were as follows: May 7 - 5 leaves per plot in reps 1 and 3, 3 leaves per plot in rep 4, rep 2 not counted; May 11 - 5 leaves per plot in reps 1 and 2, 3 leaves per plot in reps 3 and 4; May 14, 20 and 26 - 5 leaves per plot in all 4 reps.

On May 7 (reps 1 and 3), 11 and 14, a relative mite population density rating was conducted on each of the five leaves from each plot. Each leaf was scored on a 1 to 5 scale as follows: 1 = very low density (zero or near zero, no colony spots), 2 = low density (one or two small colonies or low even distribution), 3 = moderate (multiple small colonies), 4 = heavy (moderate density over entire leaf or multiple high density spots), 5 = very heavy (high density over most of the leaf). The five individual leaf scores were averaged for a plot rating prior to analysis.

A final efficacy rating was conducted on the leaves collected from each plot on the last sample date (May 26). The five leaves were examined and a 1 to 5 rating assigned to each plot as follows: 1 - very poor control, very heavy mite populations, 2 - poor control, moderate to heavy mite populations, 3 - moderate control, 4 - good control, 5 - excellent control.

All data were analyzed with the PROC GLM procedure of PC-SAS. Where significant differences were detected ( $P < 0.05$ ), means were separated with LSD ( $P = 0.05$ ).

## **Results and Discussion**

**Mite densities (Table 1).** No obvious reductions in spider mite densities were detected the day after treatment (May 7) and the check actually showed the lowest numerical population. At five and eight days after treatment (May 11 and 14), all of the treatments except Danitol and Capture were statistically in the lowest population grouping. At 14 and 20 days after treatment, Danitol, Capture and Kelthane had densities above that of the lowest population grouping.

**Egg densities (Table 2).** Mite egg densities were erratic and were generally low in those treatments with low mite densities. The notable exception to this was the two treatments containing Zeal. Both Zeal treatments generally had more eggs than the check, despite showing low mite densities. The two pyrethroid treatments also generally had higher egg densities than the check, but also had mite densities similar to the check.

**Mite density ratings (Table 3).** Mite density ratings showed results similar to the live mite counts, with no statistical differences the day after treatment, and all treatments except Danitol and Capture with low ratings (2 or below) at 5 and 8 days after treatment (May 11 and 14).

**Efficacy Rating (Table 3).** The final efficacy rating was taken at 20 days after treatment (May 26), which would incorporate initial efficacy and residual control. This rating showed only Agrimek to have an average rating of 5 (excellent control). Both Zeal treatments and both Oberon treatments had ratings above 4, indicating very good control.

Acramite and Kelthane (and the check) were statistically similar to Zeal and Oberon, but both had average ratings below 4. Danitol and Capture had final efficacy ratings numerically lower than the check.

Overall, Agrimek appeared to provide the best control in this test. Although it did not statistically separate from all other treatments, Agrimek consistently had the lowest mite densities, egg densities, and mite population ratings, and the highest efficacy rating. Oberon provided good to excellent control of spider mites, with no obvious differences between the two rates tested. Zeal also provided good to excellent control, but showed increased egg production or accumulation as compared to the check (however, this did not appear to influence mite population). Addition of Danitol to the Zeal did not appear to provide significant improvement. Acramite appeared to provide good to excellent control, but generally had more 'escapes' than other efficacious treatments. It was not uncommon for Acramite plots to have three or four leaves with minimal numbers of mites and one leaf with a moderate to heavy infestation. This may well be an indication of coverage problems with a low growing crop. Kelthane provided good to excellent initial control, but did not show the residual activity of the previously discussed products. The two pyrethroid insecticides (Danitol and Capture) provided minimal initial suppression of mites in this test and by the end of the test appeared worse than the check.

**Table 1. Live mites per microscope field, Twospotted spider mite efficacy study, Tift County, Georgia, 2004.**

Treatment	Mites per field				
	May 7	May 11	May 14	May 20	May 26
Check	18.85 b	23.68 a	15.15 ab	20.30 b	9.50 b
Danitol	33.08 b	31.13 a	18.90 a	29.20 a	17.05 a
Capture	29.15 b	14.38 b	11.35 bc	20.35 b	20.15 a
Kelthane	27.46 b	6.00 c	5.45 cd	8.55 c	8.30 bc
Zeal	63.15 a	5.13 c	1.05 d	1.10 cd	0.75 d
Danitol+Zeal	26.15 b	2.00 c	1.80 d	2.45 cd	0.70 d
Oberon 7oz	63.15 a	4.38 c	1.10 d	1.75 cd	3.45 cd
Oberon 8.5oz	34.92 b	2.44 c	1.30 d	2.70 cd	2.20 d
Acramite	39.85 b	8.50 bc	4.10 d	3.05 cd	3.35 cd
Agrimek	28.92 b	0.63 c	0.15 d	0.10 d	0.25 d

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

**Table 2. Twospotted spider mite eggs per microscope field, Twospotted spider mite efficacy study, Tift County, Georgia, 2004.**

Treatment	Mite eggs per field				
	May 7	May 11	May 14	May 20	May 26
Check	33.62 a	6.00 cd	11.40 bcd	3.70 cde	9.40 ab
Danitol	34.69 a	36.69 a	38.25 a	10.05 abc	10.25 ab
Capture	25.69 a	21.50 b	22.50 b	15.85 a	6.85 abc
Kelthane	53.85 a	9.81 bcd	8.05 cd	11.40 ab	6.85 abc
Zeal	42.46 a	14.88 bc	22.65 b	12.55 ab	14.25 a
Danitol+Zeal	27.69 a	14.56 bc	20.85 bc	9.30 abcd	5.30 bc
Oberon 7oz	25.00 a	4.50 cd	1.15 d	2.00 de	5.05 bc
Oberon 8.5oz	30.38 a	5.44 cd	5.75 d	8.15 bcd	2.75 bc
Acramite	27.54 a	9.81 bcd	2.85 d	2.30 de	14.15 a
Agrimek	37.77 a	0.19 d	0.00 d	0.05 e	0.00 c

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

**Table 3. Mite population ratings and final efficacy ratings, Twospotted spider mite efficacy study, Tift County, Georgia, 2004.**

Treatment	Mite population rating			Efficacy Rating
	May 7	May 11	May 14	May 26
Check	3.10 a	2.75 abc	2.30 abc	3.50 bc
Danitol	3.10 a	3.50 a	3.00 a	2.50 c
Capture	3.00 a	2.80 ab	2.45 ab	2.50 c
Kelthane	3.30 a	1.85 bcde	2.00 bcd	3.25 bc
Zeal	4.10 a	1.60 de	1.65 bcde	4.25 ab
Danitol+Zeal	2.70 a	1.60 de	1.45 cde	4.50 ab
Oberon 7oz	3.80 a	1.80 cde	1.15 de	4.25 ab
Oberon 8.5oz	3.30 a	1.50 de	1.30 de	4.50 ab
Acramite	3.20 a	2.10 bcd	1.55 bcde	3.50 bc
Agrimek	3.40 a	1.05 e	1.00 e	5.00 a

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