

CHEMICAL CONTROL OF THE SWEETPOTATO WHITEFLY IN COTTON

T.F. Watson, M.A. Tellez, M. Peña

Abstract

*Various registered and experimental insecticides were evaluated for sweetpotato whitefly (*Bemisia tabaci* Gennadius) control in several field experiments at Yuma, Arizona in 1994. Best controls were obtained with insecticide mixtures, particularly a pyrethroid and an organophosphate, rather than with individual materials. Results of these experiments indicate that severe population densities can be controlled using insecticide combinations, even though sustained use of these insecticides would probably lead quickly to the development of resistance.*

Introduction

Three field experiments were conducted at Yuma, Arizona in the summer of 1994, to evaluate insecticidal control of the sweet potato whitefly (= silverleaf whitefly).. All of these experiments (1-16, 2-16, 3-16) were conducted on cotton planted on March 17th. Several of the insecticides in these trials were included primarily for evaluation of efficacy against the pink bollworm. Therefore, their lack of efficacy against the sweetpotato whitefly should not reflect adversely on their overall potential as useful cotton insecticides.

Materials and Methods

The methods utilized were the same for all the experiments with foliar applications. The experiments were done in a randomized complete block design with four replications. Plots were 4 rows wide and 60 feet long with a 5-foot alley between the ends of plots, and 2 rows were skipped between adjacent plots (4x2 planting pattern); the cotton variety was DPL-5415.

Applications were made with a tractor-mounted CO₂-powered sprayer, using 3 nozzles per row and 40 psi pressure to deliver 20 gal. total spray per acre. Weekly applications were made with sampling occurring weekly beginning after the first application.

Whitefly sampling consisted of randomly pulling 5 fully-expanded leaves near the fifth node from the terminal from each plot. A 1" diameter leaf disc was cut from each leaf for the microscopic counting of eggs and immature whiteflies. Adult whitefly sampling was conducted differently. A small rectangular pan (Ca 6x9) was marked near both ends with a 50cm² area. The entire bottom of the pan was coated with a light vegetable oil or cottonseed oil and a plant terminal was slapped across the pan to constitute a sample. Therefore, each sample consisted of 2, 50cm² areas where adult whiteflies were trapped.

Results

When these tests were initiated the cotton was growing well and had a healthy appearance (test 1-16, 2-16, and 3-16). A low to fair whitefly infestation was present at the beginning of the season, and subsequently developed into high population levels.

Results are presented in tabular form. The tables present infestation counts on a weekly basis as well as yield data. For most of the tests individual tables are presented for each whitefly stage-eggs, immatures and adults.

Results are referenced on the tables by both a test number and letter. The test number was used to distinguish tests during the course of the research and these numbers are equated to letter designation for purposes of the discussion in this report. Thus tests were 1-16(A), 2-16(B), 3-16(C).

For purposes of brevity, only the more effective whitefly control materials will be discussed in each test. No discussion will be made of the efficacy of the various treatments on pink bollworm and lygus bugs.

Test A(1-16)

Table 1 presents the treatments and rates, and tables 2, 3, & 4 display weekly counts of whitefly eggs, immatures and adults, respectively.

Table 5 presents treatment yields and statistics (Randomized Complete Block four replications, ANOVA/COSTAT, Duncan's Multiple Range Test $P < .05$). Data of the following tests will be presented in the same order. In all tests it was apparent that individual insecticides were not nearly as efficacious as certain combinations. However, in test A, the most efficacious treatments were the following: Phaser, Karate, HR-20900+Ovasyn, HR-20900+PBO, All of these insecticide combinations showed acceptable control on the distinct life stages of the sweetpotato whitefly.

Test B (2-16)

Results of this experiment are presented in tables B-1 through B-5. As in the previous test the most effective treatments were combinations. Several combinations gave good to excellent control. These were Admire+Thiodan, Karate(CSO)+Orthene, Karate+Orthene Karate+Endosulfan, Baythroid+Monitor, Admire+Monitor, and Admire+Baythroid. All of the treatments showed some type of acceptable control of the SPWF.

Test C (3-16)

Results of this trial are found in tables C-1 through C-5. Insecticide combinations proved to be the most effective treatments against the SPWF. Some of the most effective treatments were: Capture+Endosulfan, Danitol+Endosulfan, Danitol+Orthene, Capture+Orthene, Danitol+Vydate, Danitol+Lannate, Karate+Vydate, and Capture+Lannate. All of the treatments displayed effective control(except; Vydate+Orthene) compared to the untreated.

Summary:

These experiments indicate several things of importance. First, sweetpotato whiteflies can be controlled in cotton at the present time with a number of commercially-available insecticides and some that are in the process of being registered. Second, in general, the most effective control is achieved with insecticide combinations, especially a pyrethroid with some other class of chemistry. And third, these materials controlled the whitefly when applications were initiated on either low or high SPWF infestations, although when control was initiated on high populations, overall control was not as satisfactory as when

initiated at low levels.

Although there are several very effective combinations of insecticides that can now be used to control the SPWF on cotton, resistance is an ever-present threat and their utilization must be made with this in mind.

Table A-1. Insecticide treatments and rates used for control of the sweetpotato whitefly (Test 1-16).

TREATMENT NUMBER	CHEMICAL	RATE(a.i./acre)
1	HR-2900	6.8 gr.
2	HR-2900	9.51 gr.
3	HR-2900	12.22 gr.
4	HR-2900 + Ovasyn	6.8+56.66 gr.
5	HR-2900 + Ovasyn	9.51+56.66 gr.
6	HR-2900 + PBO	9.51+28.53 gr.
7	HR-2900 + Azadractin	9.51+3.97 gr.
8	HR-2900 + Comply	9.51+28.53 gr.
9	Scout X-tra	8.13 gr.
10	Scout X-tra	9.71 gr.
11	Scout X-tra Gel	8.13 gr.
12	Scout X-tra Gel	9.71 gr.
13	Phaser	113.31 gr.
14	Phaser	242.82 gr.
15	Karate	13.6 gr.
16	CHECK	UNTREATED

Application dates: 6/16, 6/22, 6/28, 7/6, 7/12, 7/20.

Mean No. of SPWF Eggs/1"leaf disc

TREATMENT	RATE(A.I/A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	SEASONAL	
									MEAN	
16 CHECK	Untreated	8.2	14.0	40.9	75.2	298.0	247.0	520.3	199.2	a
1 HR-20900	6.8 grams	14.7	15.5	66.7	72.6	121.9	357.9	465.9	183.4	ab
8 HR-20900+COMPLY	9.51+28.53 grams	9.8	14.9	34.9	45.1	93.7	144.6	634.5	161.3	abc
9 SCOUT XTRA	8.13 grams	21.6	11.2	36.3	79.7	126.3	332.1	329.0	152.4	abc
12 SCOUT XTRA GEL	9.71 grams	18.4	14.0	44.9	92.0	187.8	71.1	420.8	138.4	abc
7 HR-20900+AZADRAC	9.51+3.97 grams	6.8	10.5	29.5	53.9	108.5	119.5	435.8	126.3	abcd
11 SCOUT XTRA GEL	8.13 grams	12.6	6.2	31.8	47.9	73.7	55.7	393.9	101.5	bode
10 SCOUT XTRA	9.71 grams	13.1	14.8	49.6	76.0	138.2	89.3	240.6	101.4	bode
2 HR-20900	9.51 grams	9.0	12.7	31.9	52.4	145.2	83.9	148.1	79.0	cde
5 HR-20900+OVASYN	9.51+56.66 grams	6.7	5.8	9.6	18.9	55.7	40.9	339.1	78.3	cde
3 HR-20900	12.22 grams	11.4	23.6	29.8	41.7	62.5	43.6	251.6	75.5	cde
13 PHASER	113.31 grams	5.5	12.3	17.8	29.3	47.9	41.4	102.3	41.8	de
15 KARATE	13.60 grams	6.0	7.4	7.7	14.7	18.2	29.2	81.0	26.3	e
6 HR-20900+PBO	9.51+113.31 grams	9.6	6.4	9.4	20.0	30.8	28.3	43.8	23.1	e
4 HR-20900+OVASYN	6.8+56.66 grams	11.9	12.7	14.2	13.1	33.8	16.7	33.3	20.6	e
14 PHASER	242.82 grams	10.9	6.4	9.0	11.2	16.4	16.6	25.6	14.2	e

Note: Numbers of eggs are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05)

Table A-3 Effect of various insecticide treatments on populations of immature SPWF on cotton.

Mean No. of Immatures/1"leaf disc.

TREATMENT	RATE(A.I/A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	SEASONAL	
									MEAN	
16 CHECK	Untreated	4.1	21.4	22.2	32.9	93.4	85.1	166.8	70.3	a
1 HR-20900	6.8 grams	4.3	33.0	20.5	40.9	27.5	156.9	34.7	52.2	ab
9 SCOUT XTRA	8.13 grams	5.4	17.3	16.1	14.7	38.2	119.8	37.0	40.5	bc
8 HR-20900+COMPLY	9.51+28.53 grams	4.2	25.5	11.5	12.3	17.9	44.5	122.0	38.9	bcd
10 SCOUT XTRA	9.71 grams	14.1	26.8	21.3	14.3	41.2	44.8	51.0	33.2	bode
7 HR-20900+AZADRAC	9.51+3.97 grams	4.2	19.5	14.6	11.0	23.8	58.6	69.8	32.9	bode
2 HR-20900	9.51 grams	3.2	33.9	11.6	16.7	29.8	52.1	44.2	31.4	bode
12 SCOUT XTRA GEL	9.71 grams	5.4	14.3	20.0	17.7	28.9	49.1	43.4	28.9	cde
3 HR-20900	12.22 grams	7.2	25.0	10.4	29.5	14.4	25.6	54.8	26.6	cde
11 SCOUT XTRA GEL	8.13 grams	6.9	14.2	23.3	9.0	19.4	30.1	47.7	23.9	cde
13 PHASER	113.31 grams	3.5	27.6	15.0	7.2	20.7	24.1	21.0	19.2	de
5 HR-20900+OVASYN	9.51+56.66 grams	6.5	9.8	4.3	7.9	14.3	25.5	45.3	17.8	de
6 HR-20900+PBO	9.51+113.31 grams	4.4	17.0	9.3	6.3	16.7	30.2	12.6	15.3	e
4 HR-20900+OVASYN	6.8+56.66 grams	5.5	16.1	6.3	6.1	10.2	15.8	13.1	11.3	e
15 KARATE	13.60 grams	6.3	13.5	9.7	2.6	4.2	12.0	23.8	10.9	e
14 PHASER	242.82 grams	4.2	17.3	9.4	3.6	9.6	10.4	11.5	10.3	e

Note: Numbers of immatures are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05)

Mean number of Whitefly adults/50 square cm:

TREATMENT	RATE(A.I./A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	SEASONAL	
									MEAN	
16 CHECK	Untreated	2.0	6.5	5.4	21.8	54.3	41.0	66.0	32.5	a
12 SCOUT XTRA GEL	9.71 grams	5.0	4.8	7.8	13.6	22.9	25.4	47.1	20.3	b
11 SCOUT XTRA GEL	8.13 grams	1.6	4.6	5.9	15.0	20.6	19.8	39.3	17.5	bc
2 HR-20900	9.51 grams	3.3	7.8	9.9	19.9	23.0	14.9	24.8	16.7	bc
1 HR-20900	6.8 grams	3.9	4.8	4.6	17.3	23.1	18.3	27.1	15.9	bcd
9 SCOUT XTRA	8.13 grams	2.5	3.3	5.6	16.6	15.4	17.6	33.9	15.4	bcd
5 HR-20900+OVASYN	9.51+56.66 grams	4.3	4.3	5.0	15.0	19.3	15.9	25.5	14.1	bcd
7 HR-20900+AZADRACT	9.51+3.97 grams	2.8	3.0	4.9	19.6	12.4	12.1	31.0	13.8	bcd
3 HR-20900	12.22 grams	7.5	10.4	5.8	14.5	12.6	9.4	29.8	13.7	bcd
10 SCOUT XTRA	9.71 grams	3.3	3.9	10.6	15.1	11.5	13.1	24.6	13.2	bcd
13 PHASER	113.31 grams	3.5	4.3	3.1	10.1	8.5	17.8	31.8	12.6	cde
15 KARATE	13.60 grams	4.4	2.5	2.8	8.1	7.6	13.1	31.5	10.9	cde
8 HR-20900+COMPLY	9.51+28.53 grams	4.1	4.5	7.0	9.3	10.3	15.9	16.8	10.6	cde
14 PHASER	242.82 grams	2.9	2.8	4.3	6.6	5.3	10.0	23.8	8.8	de
6 HR-20900+PBO	9.51+113.31 grams	5.5	2.6	2.9	13.6	4.5	4.5	17.5	7.6	e
4 HR-20900+OVASYN	6.8+56.66 grams	1.9	7.9	3.6	5.5	10.8	4.0	12.9	7.4	e

Note: Adult numbers are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05)

Table A-5 Effect of various SPWF treatments on cotton yields.

Yields were taken on : September 15, 1994.

TREATMENT	RATE(A.I./A)	R E P S .							RNG
		I	II	III	IV	SUM	MEAN		
15 KARATE	13.60 grams	36.5	32.5	35.5	32.5	137.0	34.3	a	
14 PHASER	242.82 grams	41.0	34.0	26.0	32.0	133.0	33.3	ab	
6 HR-20900+PBO	9.51+113.31 grams	35.0	31.0	27.5	36.5	130.0	32.5	ab	
4 HR-20900+OVASYN	6.8+56.66 grams	36.5	29.0	36.5	26.0	128.0	32.0	ab	
13 PHASER	113.31 grams	32.5	31.0	29.0	31.5	124.0	31.0	ab	
5 HR-20900+OVASYN	9.51+56.66 grams	34.5	29.5	31.0	28.5	123.5	30.9	ab	
7 HR-20900+AZADRACT	9.51+3.97 grams	37.5	23.5	27.0	34.5	122.5	30.6	ab	
2 HR-20900	9.51 grams	33.0	28.0	32.0	25.0	118.0	29.5	ab	
11 SCOUT XTRA GEL	8.13 grams	29.5	34.0	24.5	29.5	117.5	29.4	ab	
3 HR-20900	12.22 grams	33.0	33.5	31.5	17.0	115.0	28.8	ab	
1 HR-20900	6.8 grams	36.0	34.0	26.0	18.0	114.0	28.5	ab	
10 SCOUT XTRA	9.71 grams	30.0	35.5	25.0	23.5	114.0	28.5	ab	
8 HR-20900+COMPLY	9.51+28.53 grams	33.0	36.0	26.0	18.0	113.0	28.3	ab	
9 SCOUT XTRA	8.13 grams	28.0	27.5	29.5	25.0	110.0	27.5	ab	
12 SCOUT XTRA GEL	9.71 grams	31.5	26.0	22.5	26.0	106.0	26.5	b	
16 CHECK	Untreated	18.0	25.0	18.5	19.0	80.5	20.1	c	

NOTE: Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05).

Table B-1. Insecticides and rates used in Test 2-16 for control of the SPWF in cotton.

TREATMENT NUMBER	CHEMICAL	RATE(a.i./acre)
1	Admire*	.022 gr.
2	Admire	.044 gr.
3	Admire	.089 gr.
4	Admire + Thiodan	.044+.75 gr.
5	Admire + Monitor	0.22+.25 gr.
6	Admire + Monitor	0.22+.50 gr.
7	Admire + Baythroid	.022+.025 gr.
8	Baythroid + Monitor	.025+.5 gr.
9	TD-2348	.63 gr.
10	Penncap-M + Ovasyn	.5+.25 gr.+0.75
11	Penncap + Baythroid	.5+.05 gr.
12	Penncap + Ovasyn + Microthiol	.5+.25+4.0 gr.
13	Karate + Endosulfan	.03+.5
14	Karate + Orthene	.03+.5
15	Karate(CSO) + Orthene	.03+.5
16	CHECK	UNTREATED

Application dates: 6/14, 6/22, 6/28, 7/6, 7/12, 7/20.

*Kinetic oil with all Admire treatments (.1%).

Mean No. of SPWF Eggs/1"leaf disc

TREATMENT	RATE(A.L/A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	08/01
16 CHECK	Untreated	9.0	16.5	19.5	22.9	42.8	14.8	70.2	255.9
9 TD-2348	.63	12.7	5.1	9.1	14.9	15.3	4.3	25.3	43.5
10 PENNCAP-M+OVASYN	.5+.25	9.9	4.0	4.8	3.9	4.3	2.9	11.0	25.6
12 PENNCAP-M+OVASYN+MICROTHIOL	.5+.25+4.0	10.7	6.3	3.9	3.2	5.3	6.1	8.3	14.0
1 ADMIRE*	.022	20.4	4.4	3.4	8.0	5.4	2.2	6.3	11.0
6 ADMIRE+MONITOR	.022+.50	11.7	4.8	2.9	2.6	8.7	5.2	3.5	10.5
11 PENNCAP-M+BAYTHROID	.5+.05	7.3	6.7	3.0	4.5	5.2	2.1	7.3	6.4
5 ADMIRE+MONITOR	.022+.25	8.6	2.4	2.5	3.2	6.4	7.1	3.2	5.4
8 BAYTHROID+MONITOR	.025+.5	12.9	1.7	3.3	3.0	4.4	2.7	3.3	10.5
2 ADMIRE	.044	13.6	2.7	1.4	1.8	4.7	1.9	3.9	11.2
3 ADMIRE	.089	20.7	5.3	2.5	2.1	2.6	2.2	4.2	7.7
7 ADMIRE+BAYTHROID	.022+.025	10.3	1.8	2.9	2.4	6.5	2.3	4.0	5.4
13 KARATE+ENDOSULFAN	.03+.5	19.6	2.8	1.6	1.5	3.8	2.0	3.5	8.0
14 KARATE+ORTHENE	.03+.5	10.4	1.1	1.7	2.9	2.9	2.1	3.0	7.8
15 KARATE(CSO)+ORTHENE	.03+.5	13.3	2.5	1.2	1.4	3.2	1.3	4.4	2.3
4 ADMIRE+THIODAN	.044+.75	15.1	2.0	1.9	1.7	1.0	0.9	3.1	4.7

Note: Numbers of eggs are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05)

*Kinetic oil with all Admire treatments (.1%).

Table B-3 Effect of various insecticide treatments on populations of immature SPWF on cotton.

Mean No. of Immatures/1"leaf disc.

TREATMENT	RATE(A.L/A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	08/01
16 CHECK	Untreated	3.5	16.8	10.2	7.9	15.4	18.5	8.3	33.7
9 TD-2348	.63	5.5	15.6	4.1	2.2	4.3	4.3	1.3	4.4
11 PENNCAP-M+BAYTHROID	.5+.05	4.4	15.9	1.6	0.3	0.4	3.7	0.8	1.6
6 ADMIRE+MONITOR	.022+.50	6.4	11.5	2.1	0.6	1.0	5.8	1.4	1.4
12 PENNCAP-M+OVASYN+MICROTHIOL	.5+.25+4.0	6.3	12.0	1.5	0.4	1.6	2.0	1.6	2.5
5 ADMIRE+MONITOR	.022+.25	2.5	5.2	0.8	1.2	1.3	8.5	2.3	1.7
10 PENNCAP-M+OVASYN	.5+.25	5.0	8.6	3.2	1.2	0.6	1.2	0.3	2.1
3 ADMIRE	.089	2.4	7.5	1.6	0.1	3.6	1.6	1.3	0.9
1 ADMIRE*	.022	3.5	6.7	0.6	1.6	1.1	2.4	1.8	2.3
8 BAYTHROID+MONITOR	.025+.5	3.7	7.9	1.1	1.2	1.1	2.6	0.8	1.2
7 ADMIRE+BAYTHROID	.022+.025	2.7	4.0	3.1	0.6	0.8	2.7	1.0	1.2
13 KARATE+ENDOSULFAN	.03+.5	2.1	6.5	1.4	1.0	0.7	0.9	0.6	2.0
4 ADMIRE+THIODAN	.044+.75	4.0	6.6	0.9	0.3	0.5	1.5	0.4	1.8
2 ADMIRE	.044	4.6	6.3	0.2	0.8	1.3	0.5	0.9	1.6
14 KARATE+ORTHENE	.03+.5	2.1	5.1	0.4	0.2	0.2	1.0	0.4	2.3
15 KARATE(CSO)+ORTHENE	.03+.5	2.2	3.3	1.4	0.0	0.1	0.8	1.2	0.7

Note: Numbers of immatures are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05)

*Kinetic oil with all Admire treatments (.1%).

Table B-4

Sweetpotato whitefly (SPWF) adults populations on cotton following treatment with various insecticides.

		Mea number of Whitefly adults/50square cm:									SEASONAL
TREATMENT	RATE(A.L/A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	08/01	MEAN	
16 CHECK	Untreated	2.8	3.5	5.0	6.1	17.8	14.0	16.5	65.9	18.4	a
9 TD-2348	.63	4.8	1.9	3.5	3.8	2.6	2.8	4.9	13.5	4.7	b
6 ADMIRE+MONITOR	.022+.50	3.3	4.3	0.6	5.5	2.0	2.5	4.3	7.0	3.7	b
12 PENNCAP-M+OVASYN+MICROTHIOL	.5+.25+4.0	5.1	1.5	3.0	2.4	2.3	2.1	5.0	7.0	3.3	b
10 PENNCAP-M+OVASYN	.5+.25	2.8	3.6	1.3	1.8	3.5	2.4	1.1	7.0	2.9	b
5 ADMIRE+MONITOR	.022+.25	4.6	1.4	1.0	4.8	5.9	2.6	1.0	3.0	2.8	b
1 ADMIRE*	.022	3.4	1.4	0.9	4.4	2.8	2.9	1.9	4.3	2.6	b
13 KARATE+ENDOSULFAN	.03+.5	2.4	2.0	1.6	2.3	1.0	0.6	8.8	1.5	2.5	b
2 ADMIRE	.044	2.6	2.0	0.9	2.4	2.4	3.3	1.6	5.0	2.5	b
11 PENNCAP-M+BAYTHROID	.5+.05	3.8	1.3	1.1	3.6	1.8	1.0	1.6	6.3	2.4	b
7 ADMIRE+BAYTHROID	.022+.025	2.0	1.1	0.9	4.1	1.8	1.5	2.0	3.9	2.2	b
3 ADMIRE	.089	5.6	3.0	0.9	3.4	1.0	0.9	1.9	2.3	1.9	b
14 KARATE+ORTHENE	.03+.5	4.1	1.3	0.3	1.6	0.8	1.1	4.0	2.3	1.6	b
8 BAYTHROID+MONITOR	.025+.5	3.5	1.4	0.9	3.4	1.5	0.8	1.0	2.0	1.6	b
15 KARATE(CSO)+ORTHENE	.03+.5	3.4	1.6	0.6	1.6	0.5	1.0	3.6	1.1	1.4	b
4 ADMIRE+THIODAN	.044+.75	2.5	1.4	0.8	2.3	0.8	1.1	1.1	2.0	1.3	b

Note: Adult numbers are the mean of four replications

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05)

*Kinetic oil with all Admire treatments (.1%).

Table B-5

Effect of various SPWF treatments on cotton yields.

		Yields were taken on : September 15, 1994.							
		R E P S .							
TREATMENT	RATE(A.L/A)	I	II	III	IV	SUM	MEAN	RANGE	
13 KARATE+ENDOSULFAN	.03+.5	56.0	48.0	59.0	44.0	207.0	51.8	a	
15 KARATE(CSO)+ORTHENE	.03+.5	51.0	34.0	54.0	53.0	192.0	48.0	ab	
14 KARATE+ORTHENE	.03+.5	34.0	46.0	58.0	43.0	181.0	45.3	abc	
6 ADMIRE+MONITOR	.022+.50	34.0	43.0	40.0	58.0	175.0	43.8	abcd	
7 ADMIRE+BAYTHROID	.022+.025	41.0	41.0	43.0	42.0	167.0	41.8	bcde	
11 PENNCAP-M+BAYTHROID	.5+.05	43.0	42.0	35.0	39.0	159.0	39.8	bcdef	
8 BAYTHROID+MONITOR	.025+.5	33.0	52.0	31.0	42.0	158.0	39.5	bcdefg	
4 ADMIRE+THIODAN	.044+.75	37.5	40.0	37.0	36.0	150.5	37.6	cdefg	
3 ADMIRE	.089	37.0	40.0	37.0	34.0	148.0	37.0	cdefg	
9 TD-2348	.63	29.0	35.0	36.0	44.0	144.0	36.0	cdefg	
2 ADMIRE	.044	34.5	28.0	38.0	38.0	138.5	34.6	defgh	
10 PENNCAP-M+OVASYN	.5+.25	27.0	35.0	35.0	35.0	132.0	33.0	efgh	
12 PENNCAP-M+OVASYN+MICROTHIOL	.5+.25+4.0	28.0	31.0	31.0	37.0	127.0	31.8	efgh	
5 ADMIRE+MONITOR	.022+.25	32.0	23.0	27.0	39.0	121.0	30.3	fgh	
1 ADMIRE*	.022	29.5	32.0	26.0	31.0	118.5	29.6	gh	
16 CHECK	Untreated	20.0	24.0	25.0	31.0	100.0	25.0	h	

NOTE: Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05).

Table C-1. Insecticides and rates used in Test 3-16 for control of the SPWF in cotton.

TREATMENT NUMBER	CHEMICAL	RATE(a.i./acre)
1	Danitol + Vidate CLV	.2+.5 gr.
2	Danitol + Lannate LV	.2+.5 gr.
3	Capture + Vidate CLV	.06+.5 gr.
4	Capture + Lannate LV	.06+.5 gr.
5	Danitol + Orthene	.2+.5 gr.
6	Capture + Orthene	.08+.5 gr.
7	Mustang + Orthene	.05+.5 gr.
8	Vydate + Orthene	.5+.75 gr.
9	Danitol + Endosulfan	.2+.75 gr.
10	Vydate + Endosulfan	.5+.75 gr.
11	Ovasyn + Endosulfan	.25+.75 gr.
12	Capture + Endosulfan	.08+.75 gr.
13	Karate + Vydate	.04+.5 gr.
14	Vydate + Curacron	.5+.75 gr.
15	Mustang + Endosulfan	.05+.75 gr.
16	CHECK	UNTREATED

Application dates: 6/14, 6/22, 6/28, 7/6, 7/12, 7/21.

Table C-2

Effect of various insecticide treatments on populations of SPWF eggs on cotton.

		Mean No. of SPWF Eggs/1"leaf disc								SEASONAL	
TREATMENT	RATE(A.L/A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	MEAN		
16 CHECK	Untreated	14.2	6.5	6.4	6.0	9.7	4.0	31.7	10.7	a	
8 VYDATE+ORTHENE	.5+.75	34.1	4.0	7.4	7.9	14.2	5.0	11.3	8.3	a	
14 VYDATE+CURACRON	.5+.75	18.2	3.4	4.8	2.4	2.8	1.7	4.4	3.2	b	
10 VYDATE+ENDOSULFAN	.5+.75	10.1	2.2	6.4	2.2	1.8	1.8	2.1	2.8	b	
4 CAPTURE+LANNATE LV	.06+.5	13.4	4.2	1.3	0.8	0.9	2.7	4.6	2.4	b	
3 CAPTURE+VYDATE CLV	.06+.5	15.4	3.1	2.5	1.2	1.6	2.2	3.7	2.4	b	
15 MUSTANG+ENDOSULFAN	.05+.75	9.6	0.8	4.1	2.6	1.8	1.6	2.4	2.2	b	
1 DANITOL+VYDATE CLV	.2+.5	21.4	2.0	2.4	1.5	1.3	2.4	2.5	2.0	b	
7 MUSTANG+ORTHENE	.05+.5	19.0	2.8	2.5	2.2	1.4	1.0	1.5	1.9	b	
11 OVASYN+ENDOSULFAN	.25+.75	17.6	1.3	2.0	0.3	1.4	4.5	1.1	1.8	b	
13 KARATE+VYDATE	.04+.5	6.7	1.8	3.9	0.7	1.0	1.3	1.6	1.7	b	
2 DANITOL+LANNATE LV	.2+.5	25.4	3.1	3.2	1.1	0.7	0.7	1.4	1.7	b	
6 CAPTURE+ORTHENE	.08+.5	26.9	2.0	2.1	1.3	1.2	0.4	1.6	1.4	b	
5 DANITOL+ORTHENE	.2+.5	19.5	1.8	2.1	0.5	0.9	0.7	2.4	1.4	b	
9 DANITOL+ENDOSULFAN	.2+.75	9.5	1.0	1.4	0.6	1.3	1.1	1.5	1.1	b	
12 CAPTURE+ENDOSULFAN	.08+.75	9.0	1.2	1.5	0.2	0.4	0.1	1.5	0.8	b	

Note: Numbers of eggs are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05).

Table C-3

Effect of various insecticide treatments on populations of immature SPWF on cotton.

		Mean No. of Immatures/1"leaf disc.								SEASONAL	
TREATMENT	RATE(A.L/A)	06/13	06/20	06/27	07/05	07/11	07/18	07/25	MEAN		
8 VYDATE+ORTHENE	.5+.75	5.4	8.1	15.5	7.2	4.2	6.8	4.5	7.7	a	
16 CHECK	Untreated	2.1	11.8	6.6	6.3	4.8	4.0	7.4	6.8	ab	
10 VYDATE+ENDOSULFAN	.5+.75	5.9	10.8	10.6	2.7	1.3	1.8	1.4	4.8	bc	
2 DANITOL+LANNATE LV	.2+.5	4.5	16.4	5.4	0.9	0.4	0.9	0.5	4.1	cd	
14 VYDATE+CURACRON	.5+.75	6.1	7.85	7.3	4.4	0.6	1.7	1.5	3.9	cd	
6 CAPTURE+ORTHENE	.08+.5	4.1	14.1	7.1	1.3	0.1	0.3	0.4	3.9	cde	
11 OVASYN+ENDOSULFAN	.25+.75	4.8	8.6	4.6	1.6	1.0	4.5	0.3	3.4	cde	
3 CAPTURE+VYDATE CLV	.06+.5	3.4	10.4	5.2	1.3	0.2	1.6	1.9	3.4	cde	
7 MUSTANG+ORTHENE	.05+.5	2.75	8.5	6.7	1.9	0.1	0.8	0.2	3.0	cde	
13 KARATE+VYDATE	.04+.5	1.6	5.95	5.5	1.8	0.2	1.3	0.6	2.6	cde	
4 CAPTURE+LANNATE LV	.06+.5	3.3	7.3	2.6	1.4	0.7	1.4	1.1	2.4	cde	
15 MUSTANG+ENDOSULFAN	.05+.75	3.3	4.1	5.2	1.8	0.3	1.6	0.8	2.3	cde	
1 DANITOL+VYDATE CLV	.2+.5	5.3	3.2	5.1	2.0	0.4	1.7	0.8	2.2	cde	
9 DANITOL+ENDOSULFAN	.2+.75	4.4	5.3	3.1	1.0	0.7	1.4	0.2	2.0	de	
5 DANITOL+ORTHENE	.2+.5	2.58	3.6	1.5	0.5	0.1	0.5	1.0	1.2	e	
12 CAPTURE+ENDOSULFAN	.08+.75	3.4	3.3	2.3	0.3	0.2	0.1	0.0	1.0	e	

Note: Numbers of immatures are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test (P<.05).

Mean number of Whitefly adults/50 square cm:

TREATMENTS	RATE(A./A)	SEASONAL								
		06/13	06/20	06/27	07/05	07/11	07/18	07/25	MEAN	
16 CHECK	Untreated	3.9	3.5	1.6	6.9	1.9	5.3	7.5	4.4	a
8 VYDATE+ORTHENE	.5+.75	3.3	2.8	2.9	6.0	2.8	1.3	0.9	2.8	b
15 MUSTANG+ENDOSULFAN	.05+.75	9.0	0.5	1.1	3.6	0.5	0.9	6.0	2.1	bc
14 VYDATE+CURACRON	.5+.75	7.1	2.5	1.5	2.9	1.1	0.5	3.6	2.0	bcd
10 VYDATE+ENDOSULFAN	.5+.75	5.3	2.9	0.5	1.5	0.4	0.8	0.6	1.1	cde
12 CAPTURE+ENDOSULFAN	.08+.75	3.6	0.4	0.3	0.8	0.8	0.8	2.6	0.9	cde
13 KARATE+VYDATE	.04+.5	3.1	1.4	0.3	1.9	0.1	0.6	0.9	0.9	cde
7 MUSTANG+ORTHENE	.05+.5	3.6	0.4	0.6	1.0	0.6	0.5	1.6	0.8	cde
4 CAPTURE+LANNATE LV	.06+.5	4.0	1.9	1.0	0.9	0.1	0.6	0.1	0.8	cde
2 DANITOL+LANNATE LV	.2+.5	5.3	1.4	0.4	1.1	0.4	1.0	0.1	0.7	cde
1 DANITOL+VYDATE CLV	.2+.5	3.3	0.4	0.8	1.1	0.3	1.3	0.5	0.7	cde
3 CAPTURE+VYDATE CLV	.06+.5	4.0	0.8	0.3	1.5	0.4	1.3	0.1	0.7	cde
9 DANITOL+ENDOSULFAN	.2+.75	4.3	1.1	0.4	0.6	0.1	0.4	1.3	0.7	cde
11 OVASYN+ENDOSULFAN	.25+.75	4.4	1.1	0.8	0.3	0.1	0.8	0.4	0.6	de
6 CAPTURE+ORTHENE	.08+.5	3.4	1.3	0.3	0.4	0.3	0.8	0.3	0.5	e
5 DANITOL+ORTHENE	.2+.5	4.1	1.1	0.4	0.8	0.1	0.1	0.4	0.5	e

Note: Adult numbers are the mean of four replications.

Pre-sample date (6/13) not included in seasonal mean.

Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test ($P < .05$).

Table C-5 Effect of various SPWF treatments on cotton yields.

TREATMENTS	RATE(A./A)	R E P S .						
		I	II	III	IV	SUM	MEAN	RNG
1 DANITOL+VYDATE CLV	.2+.5	32.0	25.0	21.5	21.5	100.0	25.0	a
2 DANITOL+LANNATE LV	.2+.5	40.5	24.5	21.0	18.5	104.5	26.1	a
3 CAPTURE+VYDATE CLV	.06+.5	39.0	23.0	29.5	18.0	109.5	27.4	a
4 CAPTURE+LANNATE LV	.06+.5	31.0	33.5	27.5	40.0	132.0	33.0	a
5 DANITOL+ORTHENE	.2+.5	30.0	39.5	23.0	21.0	113.5	28.4	a
6 CAPTURE+ORTHENE	.08+.5	36.5	25.0	18.5	21.0	101.0	25.3	a
7 MUSTANG+ORTHENE	.05+.5	35.0	38.0	21.5	42.5	137.0	34.3	a
8 VYDATE+ORTHENE	.5+.75	36.0	27.0	33.0	15.0	111.0	27.8	a
9 DANITOL+ENDOSULFAN	.2+.75	34.5	27.5	20.0	44.0	126.0	31.5	a
10 VYDATE+ENDOSULFAN	.5+.75	31.5	29.0	21.5	20.5	102.5	25.6	a
11 OVASYN+ENDOSULFAN	.25+.75	27.0	29.0	21.5	20.5	98.0	24.5	a
12 CAPTURE+ENDOSULFAN	.08+.75	32.0	31.0	38.0	26.5	127.5	31.9	a
13 KARATE+VYDATE	.04+.5	33.5	23.5	21.0	25.0	103.0	25.8	a
14 VYDATE+CURACRON	.5+.75	33.0	34.5	20.0	32.5	120.0	30.0	a
15 MUSTANG+ENDOSULFAN	.05+.75	34.5	36.0	32.0	20.0	122.5	30.6	a
16 CHECK	Untreated	28.0	22.0	27.0	26.0	103.0	25.8	a

NOTE: Treatments followed by the same letter are not statistically significant, using ANOVA/COSTAT Duncan's Multiple Range Test ($P < .05$).