01-08. Evaluation of Assail® for the Control of Early Season Cotton Aphids in Upland Cotton

COOPERATIVE RESEARCH PROJECT 2001

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BACKGROUND:

The cotton aphid (*Aphis gossypii*) is considered a secondary pest of cotton in the Northern Texas Blacklands. Normally, the aphid populations are suppressed by beneficial insects, which include ladybeetles and lacewings. In this region, an aphid problem is most often associated with an in-season bollworm/budworm or boll weevil control program. Aphid populations can "explode" when a non-selective insecticide is used to control one of these primary pests. The TAMU economic threshold for aphids is 50 or more per leaf. High populations that are not controlled will cause a reduction in both boll size and lint yield.

OBJECTIVE:

The purpose of this experiment was to study the efficacy of Assail® for the control of cotton aphid (*Aphis gossypii*) in upland cotton. This material was compared at various rates to the control standard of Furadan®. Control ratings were made at 3, 7, and 11 days after treatment (DAT).

MATERIALS AND METHODS:

A block of cotton (variety: DP 422BG/RR)) was planted on the TAMU-Commerce research farm near Fairlie on June 12 for this experiment. Starting at the 5-leaf stage, the field was sprayed weekly with a rotation of pyrethroid insecticides at the full-labeled rate to suppress beneficials and "create" an aphid infestation. On July 26, cotton aphid populations had reached levels in excess of 50 aphids per leaf, and the following insecticide treatments were applied the following day:

Treatment	Rate A. I. /Acre
Untreated check	-
Assail 70WP	.038
Assail 70WP	.05
Assail 70WP	.075
Assail 70WP	.10
Furadan 4 F	.25

At the time of application, the cotton was approximately 12 inches tall and at the first 1/3 grown square stage of development. Each plot consisted of one 38" row, 20 feet long. An untreated row was left between treatments to minimize the border effect. The experimental design was a randomized complete block with six replications. Environmental conditions at the time of application were as follows: temperature – 90°F; wind – calm; relative humidity - 70%. The applications were made using a three-nozzle boom (19 inch nozzle spacing) with the center nozzle held directly over the row. All insecticides were applied at 20" height through Tee Jet 8002VS flat-fan nozzles in 14.5 gallons of water per acre at 24 psi.

A "baseline" count was made on the uppermost fully expanded leaf of twenty plants in all of the untreated check plots to determine the aphid population at the first rating date. Following this estimate, all plots were rated for percent control by a consensus of two people on a scale of 1 – 100, with 1 representing no control, and 100 designating complete control. Aphid populations were then calculated by subtracting percent control from 100, and multiplying the remainder by the baseline aphid number. Ratings were made at 3, 7, and 11 DAT. The baseline aphid population was used as a basis for all three rating dates.

RESULTS AND DISCUSSION:

At 3 DAT, all rates of Assail®, and the Furadan® treatment were providing excellent control, and everything was significantly better than the untreated check. There was no rate response with Assail®-all rates were performing equally (Summary tables 1 and 2).

At 7 DAT, all of the insecticide treatments had improved, and were providing superb control. There were no aphids observed in plots with the three highest rates of Assail®, and only a few with the lowest rate.

The rating scheduled for 14 DAT was moved up to11 DAT when it was noted that the aphid population was threatened by an invasion of ladybird beetles. At that time, all of the Assail® treatments were providing 100 percent control.

CONCLUSIONS:

Furadan® has been the standard of excellence for cotton aphid control in this region. However, since Furadan® does not have a Federal registration and has only been available under a series of Section 18's, its availability to the growers is not assured. Assail® is the best aphid material we have ever seen. When it receives a federal label, it will provide more dependable aphid control for growers at much lower mammalian toxicities.

APPENDIX

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Table 1: Number of Cotton Aphids on Uppermost Fully Expanded Leaf

3 DAT

Treatments (Lb. a. i. /A)	1	2	3	4	5	6	Mean
Assail 70 WP @ .10	6	6	6	6	6	6	6.0a
Assail 70 WP @ .075	6	6	6	6	13	6	7.2a
Furadan 4 F @ .25	13	6	13	6	6	13	9.5a
Assail 70 WP @ .038	6	19	19	6	6	6	10.3a
Assail 70 WP @ .05	13	13	13	6	13	6	10.7a
Untreated Check	113	119	113	113	113	119	115.0b

ANOVA

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (DF)	Mean Square (MS)	F	Appx p
Between Subject	82.22	5			
Within Subject	56934.67	30			
Repeated Factor	56563.89	5	11312.78	762.77**	< .001
Error	370.78	25	14.83		
TOTAL	57016.89	35			

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Table 2: Percent Aphid Control

3 DAT

Treatments (Lb. a. i./A)	1	2	3	4	5	6	Mean
Assail 70 WP @ .10	95	95	95	95	95	95	95.0a
Assail 70 WP @ .075	95	95	95	95	90	95	94.2a
Furadan 4 F @ .25	90	95	90	95	95	90	92.5a
Assail 70 WP @ .038	95	85	85	95	95	95	91.7a
Assail 70 WP @ .05	90	90	90	95	90	95	91.7a
Untreated Check	10	5	10	10	10	5	8.3b

ANOVA

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (DF)	Mean Square (MS)	F	Appx p
Between Subject	47.22	5			
Within Subject	36108.33	30			
Repeated Factor	3587.22	5	7179.44	850.20**	< .001
Error	211.11	25	8.44		
TOTAL	36155.55	35			

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Table 3: Number of Cotton Aphids on Uppermost Fully Expanded Leaf

7 DAT

Treatments (Lb. a. i. /A)	1	2	3	4	5	6	Mean
Assail 70 WP @ .05	0	0	0	0	0	0	0.0a
Assail 70 WP @ .075	0	0	0	0	0	0	0.0a
Assail 70 WP@ .10	0	0	0	0	0	0	0.0a
Assail 70 WP @ .038	0	6	0	0	0	0	1.0a
Furadan 4L @ .25	6	0	6	0	0	0	2.0a
Untreated Check	100	81	94	100	63	106	90.7b

ANOVA

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (DF)	Mean Square (MS)	F	Appx p
Between Subject	228.22	5			
Within Subject	41708.33	30			
Repeated Factor	40579.22	5	8115.84	179.70**	< .001
Error	1129.11	25	45.16		
TOTAL	41936.55	35			

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Table 4: Percent Aphid Control

7 DAT

Treatments (Lb. a. i./A)	1	2	3	4	5	6	Mean
Assail 70 WP @ .05	100	100	100	100	100	100	100.0a
Assail 70 WP @ .075.	100	100	100	100	100	100	100.0a
Assail 70 WP @ .10	100	100	100	100	100	100	100.0a
Assail 70 WP @ .038	100	95	100	100	100	100	99.2a
Furadan 4L @ .25	95	100	95	100	100	100	98.3a
Untreated Check	20	35	25	20	50	15	27.5b

ANOVA

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (DF)	Mean Square (MS)	F	Appx p
Between Subject	150.00	5			
Within Subject	26675.00	30			
Repeated Factor	25933.33	5	5186.67	174.83**	< .001
Error	741.67	25	29.67		
TOTAL	26825.00	35			

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Table 5: Number of Cotton Aphids on Uppermost Fully Expanded Leaf

11 DAT

Treatments (Lb. a. i. /A)	1	2	3	4	5	6	Mean
Assail 70 WP @ .038	0	0	0	0	0	0	0.0a
Assail 70 WP @ .05	0	0	0	0	0	0	0.0a
Assail 70 WP@ .075	0	0	0	0	0	0	0.0a
Assail 70 WP @ .10	0	0	0	0	0	0	0.0a
Furadan 4L @ .25	6	0	6	0	0	0	2.0a
Untreated Check	63	50	44	38	25	50	45.0b

ANOVA

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (DF)	Mean Square (MS)	F	Appx p
Between Subject	179.33	5			
Within Subject	10657.67	30			
Repeated Factor	9965.00	5	1993.00	71.93**	< .001
Error	692.67	25	27.71		
TOTAL	10837.00	35			

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Table 6: Percent Aphid Control

11 DAT

Treatments (Lb. a. i./A)	1	2	3	4	5	6	Mean
Assail 70 WP @ .05	100	100	100	100	100	100	100.0a
Assail 70 WP @ .075.	100	100	100	100	100	100	100.0a
Assail 70 WP @ .10	100	100	100	100	100	100	100.0a
Assail 70 WP @ .038	100	100	100	100	100	100	100.0a
Furadan 4L @ .25	95	100	95	100	100	100	98.3a
Untreated Check	50	60	65	70	80	60	64.2b

ANOVA

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (DF)	Mean Square (MS)	F	Appx p
Between Subject	150.00	5			
Within Subject	26675.00	30			
Repeated Factor	25933.33	5	5186.67	174.83**	< .001
Error	741.67	25	29.67		
TOTAL	26825.00	35			

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Summary Table 1: Number of cotton aphids on uppermost fully expanded leaf

Treatment	Rate a. i. /A	3 DAT	7 DAT	11 DAT
Assail 70WP	.10 lb.	6.0a	0.0a	0.0a
Assail 70WP	.075 lb.	7.2a	0.0a	0.0a
Furadan 4F	.25 lb.	9.5a	2.0a	2.0a
Assail 70WP	.05 lb.	10.7a	0.0a	0.0a
Assail 70WP	.038 lb.	10.3a	1.0a	0.0a
Untreated check	-	115.0b	90.7b	45.0b
P value		<.001	<.001	<.001

Summary Table 2: Percent Aphid Control

Treatment	Rate a. i. /A	3 DAT	7 DAT	11 DAT
Assail 70WP	.10 lb.	95.0a	100.0a	100.0a
Assail 70WP	.075 lb.	94.2a	100.0a	100.0a
Furadan 4F	.25 lb.	92.5a	98.3a	98.3a
Assail 70WP	.05 lb.	91.7a	100.0a	100.0a
Assail 70WP	.038 lb.	91.7a	99.2a	100.0a
Untreated check	-	8.3b	27.5b	64.2b
P value		<.001	<.001	<.001