EFFECTIVENESS OF DIFLUBENZURON IN THE UPPER GULF COAST OF TEXAS

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ABSTRACT

Diflubenzuron was compared to azinphosmethyl as a control for overwintered boll weevils. Punctured squares were detected earlier in fields treated with diflubenzuron than in those treated with azinphosmethyl. Dissections of punctured squares showed a reduction in boll weevil survival where 3 or 5 applications of diflubenzuron were applied. In fields treated with 5 applications of diflubenzuron, the retention of punctured squares after 2 wk exceeded 70%.

INTRODUCTION

The activity of diflubenzuron on the boll weevil, Anthonomus grandis Boheman, has been demonstrated by a number of scientists (Moore and Taft 1975, Taft and Hopkins 1975, Ganyard et al. 1977, Ganyard et al. 1978, Lloyd et al. 1977). These authors have shown that diflubenzuron suppresses reproduction by inhibiting egg hatch. A population suppression of 98 to 99.9% was reported by Taft and Hopkins (1975) and Lloyd et al. (1977). However, most of these data were collected from small isolated plots with light boll weevil populations. Field studies by House et al. (1978) showed less reduction in boll weevil populations when diflubenzuron was applied to unisolated cotton. Rummel et al. (1979) investigated the effectiveness of diflubenzuron applied to a 296-ha field with heavy boll weevil populations and found no significant difference in numbers of oviposition punctures in treated and untreated plots. However, they observed less square loss as a result of oviposition punctures in treated fields.

The present study was conducted to compare the effectiveness of diflubenzuron and azinphosmethyl as a control for overwintered boll weevils in the Upper Gulf Coast area of Texas.

METHODS AND MATERIALS

Diflubenzuron and azinphosmethyl were compared in an early season boll weevil control test on 512-ha near Wharton, TX. Both compounds were used alone and in different combinations (Table 1). The materials were applied at the rate of 113.4 g AI/ha. The 1st application was made at the stage where pin-head-size squares were 1st found in the field; subsequent applications were made at 7-day intervals.

Punctured squares were collected from test fields at weekly intervals. All punctured squares were dissected to determine what % of the eggs had hatched into developing larvae. Also, squares with obvious oviposition punctures, in the field treated with 5 applications of diflubenzuron, were tagged and observed for 2 wk to determine if they continued to develop and set bolls.

TABLE 1. Tests Comparing Diflubenzuron and Azinphosmethyl in an Early Season Boll Weevil Control Program.

Insecticide	Applications	Number of fields	Total ha
Diflubenzuron	5	1	40.5
Diflubenzuron	3	3	171.7
Azinphosmethyl + Diflubenzuron	1+2	4	93.5
Azinphosmethyl + Diflubenzuron	1+3	1	10.1
Azinphosmethyl	1	4	131.6
Azinphosmethyl	2	1	24.3
Check	0	3	40.5

RESULTS AND DISCUSSION

Results of weekly field inspections and pheromone trapping studies indicated that boll weevil populations in the study area were very low. Punctured square counts remained below 1% until mid-July, then they began to increase in both treated and untreated fields. However, populations never reached the economic threshold of 15 to 25% punctured squares during the test period. In some fields, both treated and untreated, insufficient punctured squares were found for dissections.

Dissections of punctured squares showed a decrease in the survival rate of boll weevils where 3 or more applications of diflubenzuron were used. However, these treatments failed to reduce the survival rate below a mean of 43%. The seasonal average survival rate for the different treatments is shown in Fig. 1.

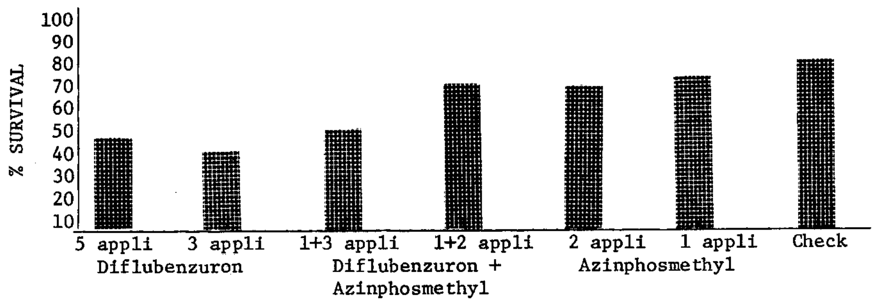

FIG. 1. Seasonal average survival rate for boll weevil eggs in squares collected from fields treated with diflubenzuron and/or azinphosmethyl.

In the field where 5 applications of diflubenzuron were made, survival of weevils in punctured squares declined from 90% in early June to ca. 25% in early July (only 11.7% survival was recorded in 1 collection). The survival rate then increased each subsequent week that squares were dissected (Table 2). In the fields treated with 3 applications of diflubenzuron, boll weevil survival ranged from 20 to 70%. The survival of boll weevils in punctured squares collected in the field treated with 1 application of azinphosmethyl followed by 3 applications of diflubenzuron ranged from 22 to 57%. In fields where 1 application of azinphosmethyl was followed by 2 applications of diflubenzuron, the survival rate ranged from 61 to 87%.

TABLE 2. Survival of Boll Weevil Eggs in Squares Collected in Fields Treated with Diflubenzuron and Azinphosmethyl.

Treatment	Date of application	Date collected	% survival (average)
Diflubenzuron	May 24	June 4	92.0
Diflubenzuron	May 31	June 8	28.2
Diflubenzuron	June 7	June 11	42.0
Diflubenzuron	June 14	June 18	11.7
Diflubenzuron	June 21	June 25	41.0
		July 1	23.7
		July 9	35.0
		July 16	77.0
		July 23	78.0
Diflubenzuron	June 7	June 4	25.0
Diflubenzuron	June 14	June 27	20.0
Diflubenzuron	June 21	July 14	50.0
		July 23	50.0
		July 31	70.0
Azinphosmethyl	May 25	June 19	57.0
Diflubenzuron	June 9	July 3	22.0
Diflubenzuron	June 16	July 17	64.0
Diflubenzuron	June 23		
Azinphosmethyl	May 25	June 19	86.7
Diflubenzuron	June 8	June 26	64.7
Diflubenzuron	June 15	July 1	68.3
		July 9	71.1
		July 16	71.0
		July 23	75.8
Azinphosmethyl	May 24	July 12	70.0
		July 17	74.0
Azinphosmethyl	May 24	July 3	53.0
		July 12	78.0
		July 16	79.6
		July 23	86.5
Azinphosmethyl	May 31		
Check		July 20	92.0
		July 26	69.0

Punctured squares were found in only 5 of the 7 fields treated only with azinphosmethyl. The 1st damaged squares were detected in these fields during the 1st wk of July and the observed survival rate ranged from 53 to 92%.

Populations of boll weevils in the 3 untreated fields were as low as in treated fields. Only 1 check field yielded enough punctured squares for dissections. The survival rate for boll weevils in this field was 92% in squares collected July 20 and 69% in squares collected July 26.

A study was made of the effects of egg-deposition by boll weevils on the shedding of squares in diflubenzuron-treated fields. The 1st application of diflubenzuron was made on May 24 and continued at weekly intervals until June 21. The 1st group of squares was tagged on June 6 and additional groups were tagged at weekly intervals until July 16. Results indicated that only ca. 25% of the punctured squares dropped within 1 wk and ca. 50% dropped within 2 wk (Table 3).

TABLE 3. Retention of Damaged Fruit in Diflubenzuron-Treated Fields.

Date tagged	% remaining after 7 days	% remaining after 14 days
June 3	73	50
June 1	74	69
June 18	78	48
June 25	93	71
July 9	75	25
July 16	75	--

Field inspections revealed that punctured squares were detected 15 days later in fields where 1 application of azinphosmethyl was used in combination with 2 or 3 applications of diflubenzuron than in fields where diflubenzuron was used alone. Where azinphosmethyl was used alone, punctured squares were found 29-38 days later than where only diflubenzuron was used (Table 4).

TABLE 4. Comparison of Number of Days Between Last Application of Insecticide and Collection of 1st Punctured Squares.

	Date of last application		Date 1st punctured squares collected	No. days from last application to date of 1st punctured squares	
Applications	Azinphos-methyl	Diflu-benzuron		Azinphos-methyl	Diflu-benzuron
5 of diflubenzuron	--	June 21	June 4	--	-17
3 of diflubenzuron	--	June 21	June 4	--	-17
1 of azinphosmethyl and 3 of diflubenzuron	May 25	June 23	June 19	24	- 4
1 of azinphosmethyl and 2 of diflubenzuron	May 25	June 15	June 19	24	4
1 of azinphosmethyl	May 24	--	July 3	40	--
2 of azinphosmethyl	May 31	--	July 12	42	--

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