FIPRONIL INSECTICIDE FOR EARLY SEASON THRIPS CONTROL ACROSS THE COTTON BELT

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Abstract

Foliar applications of fipronil 80 WG insecticide were evaluated in 10 states during 1995 for early season thrips control. Fipronil at 0.025 and 0.038 lbs ai/a provided effective and competitive thrips control across all trial locations. Control was comparable to the standards: Orthene at 0.1-0.25 lbs ai/a, Bidrin at 0.2 lbs ai/a and Dimethoate at 0.2 lbs ai/a. All insecticide treatments were usually significantly better than the UTC when larval counts were > 1/plant or total thrips counts were > 2/plant. Fipronil also was efficacious on all thrips species identified.

Introduction

Fipronil is a new insecticide being developed worldwide by Rhone-Poulenc Ag Company for insect control in cotton. Commercial introduction in the US cotton market is planned for 1999 under the trade name REGENT®. It belongs to the pyrazole family of chemistry. The specific chemical structure and unique mode of action of fipronil has been previously described by Colliot, et al. (1992), Gant, et al. (1994) and Hamon, et al. (1996).

Since 1989, fipronil has been evaluated for various insect control across the cotton belt. Significant activity on thrips, plant bugs and boll weevil has been reported by Burris, et al. (1994), Shaw and Yang (1996) and Hamon, et al. (1996). The purpose of this paper is to provide efficacy data from several research trials conducted across most of the cotton belt during 1995, evaluating foliar applications of fipronil for early season thrips control.

Materials and Methods

The data presented was extracted form small plot research trials conducted by university, experiment station, extension service or Rhone-Poulenc personnel. Trials were selected on the basis of having thrips pressure > 1/plant with emphasis placed on larval counts. All trials utilized a randomized complete block design having 3-5 replications/treatment. 1-2 foliar applications were applied with either back pack or mechanical ground sprayer equipment 2-4 weeks after planting. Water was the carrier in all trials in which application volumes ranging from 5-20 gallons/acre (gpa), with most being 10 gpa or less. Thrips counts were either made in the field or plants were washed and insects collected for examination under a microscope.

All trials had an untreated check (UTC), and at least 1 fipronil treatment along with a competitive treatment. Fipronil 80 WG rates evaluated were 0.025 and/or 0.038 lbs ai/a and the competitive treatments and rates evaluated were Orthene at 0.1-0.25 lbs ai/a, Bidrin at 0.2 lbs ai/a and/or Dimethoate at 0.2 lbs ai/a. Efficacy data is presented as mean % control of thrips by evaluation date/treatment evaluated. Control of larvae is presented when available, otherwise total thrips control is presented. Individual trial data was most commonly analyzed with Duncan's multiple test range at P=0.05.

Discussion

In the South Carolina (SC) trial (Table 1) fipronil and Orthene provided significant larval control at 3 and 8 days after treatment (DAT). Also, fipronil at 0.038 lbs ai/a and Orthene were significantly better than fipronil at 0.025 lbs ai/a. Similar results were observed for adult control at 3 DAT and fipronil at 0.038 lbs ai/a and Orthene were significantly better than the UTC at 8 DAT. Larval thrips pressure was heavy at 3 DAT and had declined by 8 DAT, although it was still significant. Speciation of adults at 0 DAT indicated that 90% of the population was tobacco thrips with the remainder being a composite of flower and western flower thrips.

In the Alabama trial (Table 2) populations fluctuated due in part to erratic plant emergence. Still fipronil at 0.025 and 0.038 lbs ai/a and Orthene at .15 lbs ai/a provided significant larval control at 6 days after the second application (DAT2) Control of larvae at 8 days after the first application (DAT1) was highly erratic and non significant. The same was true of adult control at 6 DAT2. Only Orthene provided significant control of adults at 8 DAT1. An earlier post treatment evaluation might have provided more evidence of initial control of both adult and larvae. Since adults migrate freely, control of these pests isn't always a reliable indicator of product performance. More emphasis should be placed on larval control.

Table 3 shows data from North Carolina (NC) and Georgia (GA). In the NC trial significant larval control was observed with both rates of fipronil and Orthene at 8 DAT with no differences between insecticides. Control at 2 DAT was highly erratic and non significant. In the GA trial fipronil at 0.038 and Orthene at 0.25 provided significant larval control 7 DAT. Fipronil at 0.025 lbs ai/a wasn't different from the UTC or the other 2 previously mentioned treatments.

Data from 2 trials conducted in Tennessee (TN) is presented in Table 4. In the trial conducted by Dr. G. Lentz, all insecticides gave significant control of larvae over the UTC at 5 and 12 DAT. Insecticide performance was comparable

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between treatments and evaluation dates. In the trial conducted by Dr. P. Roberts, fipronil at 0.038 and Orthene at 0.18 lbs ai/a provided significantly greater larval control over the UTC at 3 and 6 DAT. Thrips pressure was heavy in both trials.

In the Missouri (MO) trial, under moderate to heavy pressure (Table 5) fipronil at 0.025 and 0.038 lbs ai/a and Orthene at 0.18 lbs ai/a provided significant larvae and adult control on each evaluation date following each application. Insecticide performance was comparable between treatments and evaluation dates. Larval thrips pressure was also high.

Trial data form Arkansas and Mississippi (MS) is presented in Table 6. Under heavy thrips pressure all insecticides provided excellent larval control and were significantly better than the UTC. There weren't any performance differences between insecticide treatments, i.e., fipronil 0.025, fipronil 0.038, Orthene 0.2 and Dimethoate 0.2 lbs ai/a. In the MS trial, tobacco, soybean, flower and western flower thrips species were identified as being present at trial initiation.

In Louisiana (LA) 2 trials were conducted (Table 7) with all insecticides providing excellent and significant larval control at 3 DAT. Insecticide performance was comparable in both trials. Thrips populations were very high in the trail conducted at the Red River Station.

In the New Mexico (NM) trial the thrips population was predominately western flower with some onion (Table 8). Control of total thrips present is listed, since larvae and adults weren't segregated. Control was significantly better as compared to the UTC, but lower than observed in other trials. This could be due to adult migration influences. Similar to most other trial data, insecticide performance was comparable between treatments.

A summary across locations indicated that fipronil performance was comparable to Orthene, Bidrin and Dimethoate (Table 9). A slight increase in efficacy was observed when the fipronil rate was increased from 0.025 to 0.038 lbs ai/a. However, the 0.025 rate provided control equal to the standards.

Summary

Both rates of fipronil evaluated (0.025 and 0.038 lbs ai/a) provided effective and competitive thrips control across all trial locations. Control was comparable to the standards: Orthene at 0.1-0.25 lbs ai/a, Bidrin at 0.2 lbs ai/a and Dimethoate at 0.2 lbs ai/a. All insecticide treatments were usually significantly better than the UTC when larval counts were > 1/plant or total thrips counts were > 2/plant. Fipronil also was efficacious on all thrips species identified.

Acknowledgments

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Bidrin® is a registered trademark of Amvac Chemical Corporation.

Dimethoate is a product of Helena Chemical Company.

Orthene® is a registered trademark of Valent US Corporation.

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Table 1. Mean percent control of thrips adults and larvae following foliar insecticide applications in South Carolina, 1995.

Treatment	Rate lbs ai/a	Adults 3DAT	Adults 8DAT	Larvae 3DAT	Larvae 8DAT
UTC	---	(0.5)*	(1.1)	(11)*	(4.1)
Fipronil	0.025	76b	84ab	81b	81b
Fipronil	0.038	94c	100b	97c	96c
Orthene	0.14	100c	98b	96c	96c

Dr. J. DuRant, Florence, SC. (Thrips species: 90% tobacco , 10% flower/western flower at application).
DAT = Days after treatment, (1 application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Fisher's protected LSD test).

Table 2. Mean percent control of thrips adults and larvae following foliar insecticide applications in Alabama, 1995.

Treatment	Rate lbs ai/a	Adults 8DAT	Adults 6DAT	Larvae 8DAT	Larvae 6DAT
UTC	---	(5)*	(2)	(7)*	(26)
Fipronil	0.025	58ab	-14	68	81b
Fipronil	0.038	46ab	74	4	94b
Orthene	0.15	75b	39	78	86b

Dr. B. Freeman, Limestone Co., AL..
DAT = Days after treatment , (8 days after the first application and 6 days after the second application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Duncan's MRT).

Table 3. Mean percent control of thrips larvae following foliar insecticide applications in North Carolina and Georgia, 1995.

Treatment	Rate lbs ai/a	(NC) Larvae 2DAT	(NC) Larvae 8DAT	(GA) Larvae 7DAT
UTC	---	(2)*	(8)	(2.8)*
Fipronil	0.025	42	80b	49ab
Fipronil	0.038	55	87b	68b
Orthene	0.1; 0.25	-15	94b	55b

Dr. J. R. Bradley, Plymouth, NC. H. Young, Tifton, GA.
DAT = Days after treatment, (1 application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Duncan's MRT).

Table 4. Mean percent control of thrips larvae following foliar insecticide applications in 2 trial locations in Tennessee, 1995.

Treatment	Rate lbs ai/a	(Lentz) Larvae 5DAT	(Lentz) Larvae 12DAT	(Roberts) Larvae 3DAT	(Roberts) Larvae 6DAT
UTC	---	(11)*	(3)	(12)*	(14)
Fipronil	0.025	86b	97b		
Fipronil	0.038	85b	87b	65b	76b
Orthene	0.18			77b	77b
Bidrin	0.2	79b	90b		

Dr.'s G. Lentz and P. Roberts, Madison Co., TN.
DAT = Days after treatment, (1 application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Duncan's MRT).

Table 5. Mean percent control of thrips adults and larvae following foliar insecticide applications in Missouri, 1995.

Treatment	Rate lbs ai/a	Adults 1DAT	Adults 3DAT	Larvae 1DAT	Larvae 3DAT
UTC	---	(5)*	(2.6)	(4)*	(8.4)
Fipronil	0.025	95b	95b	78b	100b
Fipronil	0.038	91b	95b	64b	96b
Orthene	0.18	96b	97b	87b	97b

Dr. C. Sorenson, Portage, MO..
DAT = Days after treatment, (1 day after the first application and 3 days after the second application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Duncan's MRT).

Table 6. Mean percent control of thrips larvae following foliar insecticide applications in Arkansas and Mississippi, 1995.

Treatment	Rate lbs ai/a	(AR) Larvae 3DAT	(AR) Larvae 7DAT	(MS) Larvae 5DAT	(MS) Larvae 12DAT
UTC	---	(16)*	(10)	(13)*	(1)*
Fipronil	0.025	99b	93b	100b	85b
Fipronil	0.038	98b	95b	98b	100b
Orthene	0.2	98b	94b	100b	85b
Dimethoate	0.2	87b	80b	97b	95b

Dr. G. Studebaker, Keiser, AR. Dr. J. Reed, Starkeville, MS. (MS trial: thrips species were tobacco, flower and western flower at application).
DAT = Days after treatment, (1 application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Duncan's MRT).

Table 7. Mean percent control of thrips larvae following foliar insecticide applications in 2 trial locations in Louisiana, 1995.

Treatment	Rate lbs ai/a	M. Ridge Larvae 3DAT	M. Ridge Larvae 7DAT	R. River Larvae 2DAT	R. River Larvae 5DAT
UTC	---	(1.7)*	(0.7)	(9)*	(14)
Fipronil	0.025	96b	100	91b	91b
Fipronil	0.038	100b	96	93b	90b
Orthene	0.2	94b	75	91b	92b
Bidrin	0.2	92b	100		

Dr. R. Leonard, Macon Ridge Station and Dr. S. Micinski, Red River Station, LA.
DAT = Days after treatment, (1 application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Duncan's MRT).

Table 8. Mean percent control of thrips following foliar insecticide applications in New Mexico, 1995.

Treatment	Rate lbs ai/a	Total Thrips 3DAT	Total Thrips 7DAT
UTC	---	(2.6)*	(0.7)
Fipronil	0.025	61b	0
Fipronil	0.038	65b	14
Orthene	0.1	50b	14

Mr. B. Lewis, Las Cruces, NM. (Thrips species: primarily western flower with some onion at application).
DAT = Days after treatment, (1 application).
* (#) equals the number of thrips/plant in the UTC.
Means followed by the same letter within a column are not significantly different (P=0.05, Duncan's MRT).

Table 9. Mean percent control of thrips following foliar insecticide applications across trial locations, 1995. Mean percent thrips control represents larval control from trials with the exception of the NM trial which is a composite of adults and larvae.

Treatment	Rate lbs ai/a	DAT 2-3	DAT 5-8	DAT 5-8	DAT 5-8
UTC	---	(8.7)*	(9.3)	(11.5)*	(5.9)*
Fipronil	0.025	88	75	97	93
Fipronil	0.038	92	82	97	91
Orthene	0.1-0.25	88	78	97	
Dimethoate	0.2			89	
Bidrin	0.2				90
number of	trials	6	9	2	2

DAT = Days after treatment .
* (#) equals the number of thrips/plant in the UTC.