



COMPARISON OF NEW INSECTICIDES AND RATES FOR CONTROL OF HEADWORMS AND RICE STINK BUG ON SORGHUM

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Summary

All insecticides and rates tested provided effective control of headworms (nearly all corn earworm with a few fall armyworm). A higher level of control was not detected with increasing Prevathon rates. Rice stink bug numbers were not significantly reduced, but there was a fairly strong trend for fewer in any plots treated with pyrethroid insecticide (especially Baythroid). Yield was not enhanced by reduction in headworm numbers which may have resulted from a rapid decline in their numbers possibly due to attack by natural enemies before they reached the last larval instar.

Objective

The study was conducted to evaluate new insecticides for headworm control on sorghum and to measure their effects on secondary insect pests such as rice stink bug.

Materials/Methods

The test insecticides were applied to Pioneer 83G19 hybrid sorghum planted March 9, 2011 on County Road 30 about 0.75 miles west of the intersection with FM 892 on the David Mayo Farm. Some of the seed was already in soft dough when the insecticides were applied. Treatments were applied to 4 rows of 40 foot plots, and 3 nontreated rows were maintained on the side of each plot to prevent drift to evaluated rows. Treatments were arranged in a randomized complete block design with 4 replications of each treatment. Plots to which treatments were applied in each replication were established down the field rows so that each treatment in each replication was on the same set of rows. This arrangement was also used to limit the width of the test to allow the grower an easier way to skip over the test when applying treatment to the remainder of the field.

Insecticides were applied on 6/1 with a Spider Trac sprayer calibrated to deliver 5.1 gpa total volume through 4X hollow cone nozzles at 40 psi and at a speed of 4.2 mph.

Treatments were assessed by (1) shaking 10 heads exhibiting headworm damage into a 2.5 gallon bucket to count corn earworm, fall armyworm and rice stink bug on 5/31 [pretreatment], 6/3 [2 DAT], and 6/5 [4 DAT] from a different row section on each field visit; and (2) harvesting 13.75 feet row from one of the center rows in plots on 6/30. Sorghum samples were threshed on a laboratory machine, grain moisture and bushel weights were obtained for each plot, and grain yields were converted to 14% moisture.

Agriculture Research Manager (ARM revision 6.1.13) software was used to conduct analysis of variance and means were separated by LSD.

Results/Discussion

All tested insecticides and rates provided control of headworms in late milk and early soft dough sorghum at 2 and 4 days after treatment (DAT) compared with numbers found in the nontreated sorghum (Table 1). There were no statistical differences in headworm numbers among the insecticides nor was there a numerical response observed with increasing rates of Prevathon. By 4 DAT headworm numbers had begun to decline in the nontreated sorghum. Post-treatment averages did not reveal any insights other than the fact that all insecticides reduced headworm numbers.

These insecticides did not significantly reduce rice stink bug numbers, but there appeared to be a trend in the pyrethroid insecticide treated sorghum (Asana and Baythroid) for fewer rice stink bugs (Table 2). In fact, following treatment no rice stink bugs were found in any treatment containing Baythroid. Overall, rice stink bug numbers were not sufficiently high enough to obtain meaningful data.

Headworm numbers were near the established economic treatment threshold level, but no differences were detected in the yield level among the treatments (Table 3). There were also no differences in grain moisture or bushel weight. The headworm population was not sustained long enough to cause the amount of damage expected even at the relatively low populations encountered. Similar results were observed in a 2010 field experiment indicating that more focused studies need to be undertaken to find out why the headworms reach a certain size and then begin to slowly decline before entering the pupal stage.

Table 1. Effectiveness of insecticides on headworms on sorghum heads, David Mayo Farm, Nueces County, TX, 2011.

Treatment (rate)	Headworms /10 heads ^{2/}			
	Pretreat	2 DAT ^{3/}	4 DAT	Post-treat. average
Prevathon 0.43SC (9.8 oz/acre)	2.3 ^a	0.8 ^b	0.3 ^b	0.5 ^b
Prevathon 0.43SC (13.3 oz/acre)	2.0 ^a	1.3 ^b	0.0 ^b	0.6 ^b
Prevathon 0.43SC (19.9 oz/acre)	3.0 ^a	1.3 ^b	0.3 ^b	0.8 ^b
Prevathon 0.43SC + Asana XL 0.66EC (9.8 oz/acre + 5.82 oz/acre)	2.5 ^a	0.0 ^b	0.0 ^b	0.0 ^b
Belt 4SC (3.0 oz/acre)	2.8 ^a	0.5 ^b	0.8 ^b	0.6 ^b
Baythroid XL 1EC (2.8 oz/acre)	4.5 ^a	0.8 ^b	0.0 ^b	0.4 ^b
Belt 4SC + Baythroid XL 1EC (2.0 oz/acre + 1.3 oz/acre)	4.0 ^a	0.0 ^b	0.5 ^b	0.3 ^b
Nontreated	3.5 ^a	3.5 ^a	2.8 ^a	3.1 ^a
LSD (P = 0.05)	NS ^{1/}	1.44	0.84	0.87
P > F	.7958	.0015	.0001	.0001

Means in a column followed by the same letter are not significantly different by ANOVA.

^{1/}NS = Not Significant

^{2/}96% headworms were corn earworm

^{3/}DAT = Days After Treatment



Table 2. Effectiveness of insecticides on rice stink bug on sorghum heads, David Mayo Farm, Nueces County, TX, 2011.

Treatment (rate)	Rice stink bugs/10 heads			
	Pretreat	2 DAT ^{2/}	4 DAT	Post-treat. average
Prevathon 0.43SC (9.8 oz/acre)		1.0 ^a	0.5 ^a	0.8 ^a
Prevathon 0.43SC (13.3 oz/acre)	1.0 ^a	1.8 ^a	2.5 ^a	2.1 ^a
Prevathon 0.43SC (19.9 oz/acre)	1.5 ^a	0.8 ^a	0.8 ^a	0.8 ^a
Prevathon 0.43SC + Asana XL 0.66EC (9.8 oz/acre + 5.82 oz/acre)	0.5 ^a	0.0 ^a	0.5 ^a	0.3 ^a
Belt 4SC (3.0 oz/acre)	0.8 ^a	1.0 ^a	2.3 ^a	1.6 ^a
Baythroid XL 1EC (2.8 oz/acre)	0.3 ^a	0.0 ^a	0.0 ^a	0.0 ^a
Belt 4SC + Baythroid XL 1EC (2.0 oz/acre + 1.3 oz/acre)	4.0 ^a	0.0 ^a	0.0 ^a	0.0 ^a
Nontreated	2.5 ^a	1.5 ^a	4.5 ^a	3.0 ^a
LSD (P = 0.05)	NS ^{1/}	NS	NS	NS
P > F	.3453	.2305	.0835	.0891

Means in a column followed by the same letter are not significantly different by ANOVA.

^{1/}NS = Not Significant

^{2/}DAT = Days After Treatment



Table 3. Sorghum grain moisture, bushel weight and yield from plots treated with various insecticides, David Mayo Farm, Nueces County, TX, 2011.

Treatment (rate)	Grain moisture %	Bushel weight lb	Yield ^{2/} lb/acre
Prevathon 0.43SC (9.8 oz/acre)	9.7 ^a	55.0 ^a	3784 ^a
Prevathon 0.43SC (13.3 oz/acre)	9.7 ^a	55.1 ^a	4071 ^a
Prevathon 0.43SC (19.9 oz/acre)	9.7 ^a	55.0 ^a	4029 ^a
Prevathon 0.43SC + Asana XL 0.66EC (9.8 oz/acre + 5.82 oz/acre)	9.7 ^a	55.3 ^a	4409 ^a
Belt 4SC (3.0 oz/acre)	9.5 ^a	54.8 ^a	3847 ^a
Baythroid XL 1EC (2.8 oz/acre)	9.4 ^a	54.8 ^a	4052 ^a
Belt 4SC + Baythroid XL 1EC (2.0 oz/acre + 1.3 oz/acre)	9.4 ^a	55.1 ^a	3910 ^a
Nontreated	9.6 ^a	55.3 ^a	4131 ^a
LSD (P = 0.05)	NS ^{1/}	NS	NS
P > F	.2869	.9645	.1899

Means in a column followed by the same letter are not significantly different by ANOVA.

^{1/}NS = Not Significant

^{2/}Yield at 14% moisture sorghum.

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