

THE EFFECT OF SEED AND SOIL APPLIED SYSTEMIC INSECTICIDES ON APHIDS IN SORGHUM

Texas Agricultural Experiment Station, Nueces County, 2000

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SUMMARY: Greenbug, yellow sugarcane aphid and corn leaf aphid numbers were considered to be below economically damaging levels throughout the season. Statistical differences were not found in at-planting insecticide treatment for plant stand, overall insect damage or yield. Numerically, however, more sorghum was produced by all seven insecticide treatments compared to the untreated sorghum, but this increase was relatively small (149 lb/acre).

OBJECTIVES: The experiment was established to compare seed and soil applied systemic insecticides on sorghum for effect on insect pests and impact on yield.

MATERIALS/METHODS: Cargill 839 hybrid sorghum (Concept III treated) was planted 2 Mar 2000 on the Meaney Annex of the Texas Agricultural Experiment Station at Corpus Christi. A research plot cone planter was used to seed the 4 row (38-inch centers) by 30 ft long plots. We intended to plant 5 seed/row ft but ended up with a much greater seeding rate. The experiment was arranged in a randomized complete block design with 4 replications. Planting conditions consisted of excellent soil moisture, 74.1°F soil temperature at the 3-inch depth and 80°F air temperature. Soil at the site was a clay loam (50% sand, 26% silt, 24% clay) with 1.1% organic matter and soil pH of 8.1. Cotton had been planted on the site in the previous season. Furadan 4F was applied into the seed furrows through a single 8002 E nozzle oriented with the row at 7.88 gpa total volume, 40 psi and 3.25 mph. Counter 20CR was applied with electric driven Gandy boxes equipped with standard John Deere 6-inch banders. Atrazine 4L (1.5 qt/acre) was broadcast one day after planting. Fertilizer consisted of 100-14-0 + 0.6 Zn/acre. A total of 7.64 inches of rain was received during the growing season.

Treatment effects were assessed by (1) counting the number of plants on 13.75 ft row on one of the center rows in each plot on 1 Apr, (2) assigning a visual damage rating to each plot on 1 Apr, with 1 = no damage up to 5 = stunted, dying, yellow plants or uneven plant stand, (3) counting greenbug (GB) and yellow sugarcane aphid (YSA) numbers on 10 lower leaves and estimating corn leaf aphids (CLA) per whorl in each plot on 20 Apr, 16 May and 23 May (i.e. 49, 75 and 82 days after planting) and (4) harvesting 10 row-ft on each of the two center rows (20 ft total) in each plot on 28 Jun. Grain weights were subsequently adjusted to 14% moisture.

RESULTS/DISCUSSION: GB, YSA and CLA numbers were considered to be below economically damaging levels throughout the season (Table 1-3). Statistically significant differences were not detected in GB numbers at 49 DAP, 75 DAP or for combined season average data (Table 1). At 82 DAP the Furadan treated sorghum containing significantly more GB than other treatments. Although relatively low numbers were counted 49 DAP, YSA populations were statistically lower in the Gaucho and Adage 50% treated/untreated seed mixture treatments compared to the Furadan treatment (Table 2). These results do not appear to have been caused by the insecticide treatments. YSA number differences were not found on

any other inspection nor were significant differences found in the season average number data. CLA numbers were lower 49 DAP in Gaucho and Adage (100% seed treated) treatment compared to untreated and Furadan treated sorghum (Table 3). By 75 DAP Gaucho (50% treated/untreated seed mixture) treated sorghum contained significantly more CLA than any other treatment. No other differences were measured nor did strong treatment effects occur; numbers were simply too low to have significant effect. Statistical differences were not detected in plant population, insect damage rating or yield (Table 4). Numerically, more sorghum was harvested in all insecticide treatments compared to untreated sorghum but the difference was small (83-273 lb/acre).

ACKNOWLEDGMENTS: Appreciation is expressed to Novartis Company for support of this field study.

Table 1. Comparison of seed and soil applied systemic insecticides for effect on greenbug , Texas Agricultural Experiment Station, Nueces County, TX, 2000.

Treatment	Rate ^a	Application method ^b	Greenbugs per 10 lower leaves			
			49 DAP ^e	75 DAP	82 DAP	Season avg.
Gaucho 480 FS	8.0	ST	0 a	82.5 a	0 b	27.5 a
Gaucho 480 FS	8.0 ^c	ST	0 a	32.3 a	0 b	10.8 a
Adage 5FS	5.1	ST	0 a	106.8 a	0 b	35.6 a
Adage 5FS	5.1 ^c	ST	0 a	59.0 a	0 b	19.7 a
Counter 20CR	3.0	IFGAP	0 a	94.0 a	0 b	31.3 a
Sorghum Guard ^d	5.34	ST	0 a	68.3 a	0 b	22.8 a
Furadan 4F	16.0	IFSAP	0 a	37.5 a	1.25 a	12.9 a
Untreated			4.25 a	15.3 a	0 b	6.5 a
LSD (P=0.05)			NS	NS	^f	NS
P > F			.0933	.1186	.0053	.1303

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

^a Formulated rates are expressed as oz/cwt seed for ST, oz/1000 row-ft for IFGAP and oz/acre for IFSAP.

^b ST = seed treatment, IFGAP = in-furrow granules at planting and IFSAP = in-furrow spray at planting.

^c A mixture of 50% treated and 50% untreated seed.

^d Sorghum Guard is a mixture of 32.75% captan and 16.6% lindane.

^e DAP = days after planting or 20 Apr, 16 May and 23 May.

^f The P > F is based on transformed [square root (x + 1)] data values; it is inappropriate to list LSD values based on transformed data.

Table 2. Comparison of seed and soil applied systemic insecticides for effect on yellow sugarcane aphid, Texas Agricultural Experiment Station, Nueces County, TX, 2000.

Treatment	Rate ^a	Application method ^b	Yellow sugarcane aphids per 10 lower leaves			
			49 DAP ^e	75 DAP	82 DAP	Season avg.
Gaucho 480 FS	8.0	ST	1.75 ab	67.3 a	2.5 a	23.8 a
Gaucho 480 FS	8.0 ^c	ST	0.0 b	65.3 a	0.5 a	21.9 a
Adage 5FS	5.1	ST	6.25 ab	99.0 a	0.0 a	35.1 a
Adage 5FS	5.1 ^c	ST	0.0 b	128.8 a	1.8 a	43.5 a
Counter 20CR	3.0	IFGAP	1.67 ab	120.7 a	0.0 a	40.8 a
Sorghum Guard ^d	5.34	ST	2.0 ab	79.0 a	0.5 a	27.2 a
Furadan 4F	16.0	IFSAP	7.5 a	92.0 a	0.8 a	33.4 a
Untreated			2.75 ab	69.5 a	0.5 a	24.3 a
LSD (P=0.05)			6.761	NS	NS	NS
P > F			.0469	.2866	.0807	.2966

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

^a Formulated rates are expressed as oz/cwt seed for ST, oz/1000 row-ft for IFGAP and oz/acre for IFSAP.

^b ST = seed treatment, IFGAP = in-furrow granules at planting and IFSAP = in-furrow spray at planting.

^c A mixture of 50% treated and 50% untreated seed.

^d Sorghum Guard is a mixture of 32.75% captan and 16% lindane.

^e DAP = days after planting or 20 Apr, 16 May and 23 May.

Table 3. Comparison of seed and soil applied systemic insecticides for effect on corn leaf aphid , Texas Agricultural Experiment Station, Nueces County, TX, 2000.

Treatment	Rate ^a	Application method ^b	Corn leaf aphids/plant whorl			
			49 DAP ^e	75 DAP	82 DAP	Season avg.
Gaucho 480 FS	8.0	ST	0.25 c	1.25 b	0 a	0.5 a
Gaucho 480 FS	8.0 ^c	ST	1.33 bc	13.75 a	0 a	5.0 a
Adage 5FS	5.1	ST	1.00 c	2.80 b	0 a	1.3 a
Adage 5FS	5.1 ^c	ST	3.25 bc	1.25 b	0 a	1.5 a
Counter 20CR	3.0	IFGAP	2.33 bc	0.0 b	0 a	0.8 a
Sorghum Guard ^d	5.34	ST	3.25 bc	0.0 b	0 a	1.1 a
Furadan 4F	16.0	IFSAP	4.50 ab	0.5 b	0 a	1.7 a
Untreated			7.00 a	0.0 b	0 a	2.3 a
LSD (P=0.05)			3.197	NS	NS	NS
P > F			.0011	.1142		.1388

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

^a Formulated rates are expressed as oz/cwt seed for ST, oz/1000 row-ft for IFGAP and oz/acre for IFSAP.

^b ST = seed treatment, IFGAP = in-furrow granules at planting and IFSAP = in-furrow spray at planting.

^c A mixture of 50% treated and 50% untreated seed.

^d Sorghum Guard is a mixture of 32.75% captan and 16.6% lindane.

^e DAP = days after planting or 20 Apr, 16 May and 23 May.

Table 4. Plant stand, overall insect damage rating and yield in sorghum with seed and soil applied systemic insecticides, Texas Agricultural Experiment Station, Nueces County, TX, 2000.

Treatment	Rate ^a	Application method ^b	Plants (1000's/acre) ^e	Overall insect damage rating ^f	Yield (lb/acre)	Return \$/acre over untreated ^g
Gauche 480 FS	8.0	ST	96.0 a	2.0 a	4080 a	-5.10
Gauche 480 FS	8.0 ^c	ST	90.3 a	2.0 a	4146 a	0.17
Adage 5FS	5.1	ST	100.8 a	2.3 a	4152 a	^h
Adage 5FS	5.1 ^c	ST	111.1 a	1.3 a	4059 a	^h
Counter 20CR	3.0	IFGAP	122.0 a	1.7 a	4270 a	-0.05
Sorghum Guard ^d	5.34	ST	103.0 a	1.8 a	4129 a	3.05
Furadan 4F	16.0	IFSAP	105.0 a	1.5 a	4184 a	-3.65
Untreated			114.0 a	2.0 a	3997 a	
LSD (P=0.05)			NS	NS	NS	
P > F			.1338	.1381	.3223	

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

^a Formulated rates are expressed as oz/cwt seed for ST, oz/1000 row-ft for IFGAP and oz/acre for IFSAP.

^b ST = seed treatment, IFGAP = in-furrow granules at planting and IFSAP = in-furrow spray at planting.

^c A mixture of 50% treated and 50% untreated seed.

^d Sorghum Guard is a mixture of 32.75% captan and 16.6% lindane.

^e Seeding rate was too high.

^f Damage ratings ranged from 1 = no damage up to 5 = stunted or dying yellow plants and uneven plant growth.

^g Sorghum value based on \$3.18/cwt; costs include Gauche 480FS (\$1.20/lb seed at 6.0 lb/acre), Counter 20CR (\$2.60/lb), Sorghum Guard (\$4.00/cwt seed at 6 lb/acre = \$0.24/acre) and Furadan 4F (\$65.00/gallon). Application costs include Counter 15G and Furadan 4F (\$0.25/acre), and Sorghum Guard planter box treatment (\$0.05/acre). Harvesting and hauling costs for extra yield above the untreated sorghum was set at \$0.65/cwt.

^h Adage is an experimental insecticide for which a cost has not been established