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Greenbug Control on Grain Sorghum

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In 1968 the greenbug, *Schizaphis graminum* (Rondani), successfully infested grain sorghum, causing extensive damage and economic loss in Kansas and other major sorghum producing areas of the United States. It was determined to be a new variant that was designated as biotype C (taxonomically similar to but physiologically different from biotypes A and B which attack small grains). Since that time, two additional biotypes (D and E) have developed on sorghum.

Sorghum greenbugs are yellowish-green in color and measure approximately 1/16-inch when fully grown. Mature greenbugs have a dark green stripe down their backs which distinguishes them from other aphids found on sorghum. They give birth to living young (parthenogenesis) and most offspring are females. Most females begin reproduction in approximately 7 days under optimum conditions and one female can produce three to five offspring per day during a 25-day period. Consequently, enormous numbers can build up in just a short period of time.

Greenbugs can inflict economic damage to the sorghum plant at any time from seedling through the heading stage. They usually attack the underside of the lowermost leaves and gradually work their way upward. Under heavy infestations, maturing plants can have large numbers of greenbugs feeding in the sorghum heads. Greenbug infestations are detected by

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reddish spots on the upper leaf surface caused by small colonies feeding on the underside of the leaf. The reddened leaf areas enlarge and coalesce as greenbug numbers increase. Finally, the leaf begins to die, turning brown from the outer edges toward the center. While feeding, greenbugs apparently inject the plant with a toxin which causes a general breakdown of the cell walls and eventual collapse of the epidermal layer. This effect is particularly evident in young sorghum; a few greenbugs may completely kill a seedling stand or severely retard its growth. Older plants generally survive attack, but grain production may be reduced. In addition to causing direct damage by their feeding, greenbugs are excellent carriers and vectors for maize dwarf mosaic, a serious virus disease that can infect sorghum.

Various biological and cultural control practices have been utilized to reduce greenbug populations. However, when those become inadequate, sorghum growers must rely on chemical control to suppress greenbug outbreaks and prevent economic damage. As part of an ongoing program to evaluate registered and non-registered insecticides for greenbug control, studies were continued in 1982 and 1983.

Procedure

Insecticidal control tests were conducted in dryland fields of hybrid NC+160 grain sorghum at the Kansas Branch Agricultural Experiment Station near Garden City. Treatments and the untreated check were replicated four times in a randomized block design. Plots were 30 ft. by four rows (row=30 in.) wide. Spray treatments were applied August 17, 1982 and August 2, 1983, at the rate of 15.5 gallons total spray per acre. Applications were made when plants were in the late boot stage of growth. Treatments and dosages are given in Table 1.

Both tests were evaluted by using greenbug counts and grain yields. Greenbugs were counted on five plants randomly selected from the middle two rows of each four-row plot. Grain yields were obtained by machine harvesting the middle two rows of each plot. All data were subjected to analysis of variance, and Duncan's multiple range test was applied to separate treatment means.

Results

New insecticides for greenbug control are being developed continually by chemical companies and many are being evaluated. However, only results from currently labeled insecticides are reported here.

Data from the 1982 test are presented in Table 1. All treated plots had significantly fewer greenbugs than the untreated check by 3 days after application, with no significant differences among insecticides at the rates tested. All gave at least 97% control or better. After 7 days, all treated plots still had significantly fewer greenbugs than the untreated check. Furadan gave excellent greenbug control (99%), but it was not significantly better than Cygon or the parathion stan-

Table 1. Comparative effectiveness of several insecticides applied to grain sorghum for greenbug control, 1982-83.

Treatment & formulation	Dosage (lb. AI/acre)	Mean no. greenbugs/plant after (days)[1] Pretreatment	3	7	14	Yield[1, 2] (lbs/acre)
		1982				
Furadan 4F	0.05	603	6 a	20 a	—[3]	5532 a
Dyfonate 4E	1.00	639	17 a	92 b	—	5213 a
Parathion 8E	0.50	591	18 a	45 a	—	5357 a
Cygon 4E	0.33	712	27 a	40 a	—	5397 a
Check	——	594	1045 b	1752 c	—	5207 a
		1983				
Furadan 4F	0.50	270	11 a	30 a	50 a	1926 a
Trithion 8E	1.00	185	15 a	36 a	60 a	1820 a
Parathion 8E	0.50	174	17 a	95 a	184 a	1742 ab
Check	——	281	740 b	1479 b	1490 b	1557 b

[1] Means followed by the same letter are not significantly different at the 5% level.
[2] Grain yields corrected to 12.5% moisture.
[3] No evaluations taken because of greenbug reduction from parasite activity.

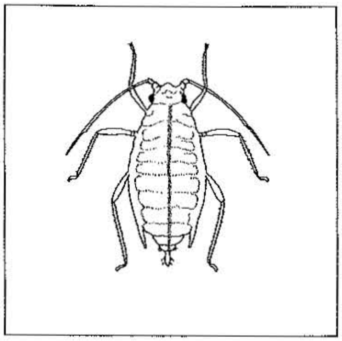

Figure 1. Greenbug, Schizaphis graminum (Rodani).

dard. Dyfonate was less effective, but still gave good control (95%). Greenbug numbers decreased rapidly 2 weeks after treatment as a result of natural infestations of parasites and predators, so further residual evaluations of insecticides were not made. Most insecticidal treatments gave slight numerical increases in grain yields over the untreated check, but differences were not statistically significant. Yields were highly variable within plots and between replications. This may explain why larger yield differences did not occur. The short time span between insecticidal treatment and biological control of grenbugs also may have been a contributing factor. No phytotoxicity was noted in any of the spray treatments.

Data from the 1983 test are presented in Table 1. All insecticides significantly reduced greenbug populations by 3, 7, and 14 days posttreatment. Furadan gave the best control (97%) at the end of the 2-week counting period, but it did not differ significantly from Trithion or the parathion standard which gave 94 and 80% control, respectively. Grain yields were increased in all treated plots as a result of greenbug control, but only sorghum treated with Furadan and Trithion had significantly higher grain yields than the untreated check. No phytotoxicity was noted from any of the spray treatments.

Summary

Results of this study indicate that foliar spray applications of several recommended insecticides will provide satisfactory initial control of greenbug, but residual control may vary. Of the insecticides tested, Furadan and Trithion were the most effective treatments during the sampling period. In general, grain yields were increased as a result of insecticidal treatment for greenbug control.

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