SORGHUM MIDGE INFESTATION RELATIONSHIP WITH DISTANCE FROM FIELD MARGIN[1]

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ABSTRACT

Border effects were demonstrated for injury by the sorghum midge, *Contarinia sorghiella* (Coquillet). Distinct and rather limited distance effects on yeild loss were observed within 30 m of an adjoining field which had produced many midges. This suggests that border treatments with an effective insecticide might be used to advantage and that more central parts of a field could receive less insecticide.

Sorghum midge, *Contarinia sorghiella* (Coquillet), infestations are very abundant in Florida during the summer rainy season. This insect may be so abundant on grain sorghum that little grain is produced.

It is of interest and often of economic value to know the distances of dispersion of an insect. Infested grains were found most abundant in field margins nearest midge sources in mature grain sorghum fields and became progressively less abundant as the distance increased from the margins (Fig. 1). This provided an opportunity to obtain information on dispersion of the sorghum midge.

METHODS

An older planting of grain sorghum in a field had produced an abundant midge population at a time when a later planting adjacent in another field was flowering. A field road 3 to 4 m wide separated the 2 fields. Both were on level Rockdale soils common to the area; grain sorghum variety was Savanna.

When the younger field was nearly mature, samples of sorghum panicles were plucked from plants growing at 0.9, 6.1, 12.2, 18.3, 24.4, 30.5, 36.6, 42.7, 48.8, 54.9 and 61.0 m from the margin nearest the older planting. The number of filled and empty glumes in the samples was counted and these figures were converted to percentage of glumes containing sound grain. Data were taken from each of 8 rows at the indicated distances. Data from 2 rows were pooled to 4 replications. Statistical analyses were made and the results are summarized in Table 1.

RESULTS

Statistically significant differences were found between distance classes, with samples taken at 18.3 m or more from the field margin having significantly more sound grains than samples taken nearer the margin. These results justified the use of a regression curve according to Wadley and Wolfenbarger (1944). This curve defined the gradient of sound grain expected as related to distance from the field border. The curve was computed according to the multiple regression and covariance method outlined by Snedecor (1940, Chap. 13) and gave the following through a modified semi-logarithmic formula: Expected % of grain $= 63.1935 (\log x) + 40.9932$

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TABLE 1. MEANS PERCENTAGE OF SOUND GAINS AT DISTANCES INDICATED FROM THE FIELD MIRGIN.

M. from field margin	0.9	6.1	12.2	18.3	24.4	30.5	36.6	42.7	48.8	54.9	61.0
Observed percentage of glumes with grain	18.1	29.4	44.9	55.2	64.2	76.9	78.7	87.0	83.6	84.5	77.2
Significance, Duncan's method (1%)*	ab	abc	bcd	bcde	cde	cde	de	e	de	de	de
Expected percentage of glumes with grains, computed from regression formula	17.8	31.1	47.2	57.2	64.5	70.3	75.1	79.2	82.7	85.9	88.7

* Any 2 means followed by the same letter are not significantly different at the 95% level.

Fig. 1. Sorghum midge infested grains of sorghum heads nearest the margin of field, left, to heads almost non-infested at right, 100 ft or more from the field margin.

(1/x)-24.8217. X refers to distance in meters from the margin of the field to the sampling site. Computations gave an R^2 value of 0.957 and a "t" value 0.181, both of which are less than the 5% level and are considered significant.

Discussion

The lowest observed percentage of sorghum grain destroyed by the midge was at 42.7 m and the highest at 0.9 m from the field margin. The regression curve made the most rapid change at distances up to 18 m from the margin and at greater distances approached a plateau suggesting that midge incidence had become static.

These observations emphasize the importance of adjoining fields or other areas serving as sources of pest insects. Protective measures applied to an 18 m border of the sorghum field would be expected to reduce infestations on plants in the margin and perhaps throughout the field. Less toxicant would have been used on the field border, at less cost to the producer, and with less contamination of the sorghum, the atmosphere, and the soil.

Literature Cited

Snedecor, George W. 1940. Statistical methods. Chap. 13. The Collegiate Press, Inc. Ames.

Wadley, F. M., and D. O. Wolfenbarger. 1944. Regression of insect density on distance from center of dispersion as shown by a study of the smaller European elm bark beetle. J. Agr. Res. 69(7):299-308.