PRESERVING GRAIN SORGHUM STAND DENSITY IN THE PRESENCE OF THE RED IMPORTED FIRE ANT

B.A. Castro[1], T.J. Riley[1], and B.R. Leonard[2]

AUTHORS: [1]LSU Agricultural Center, Department of Entomology, 402 Life Sciences Building, Baton Rouge, LA 70803 and [2]LSU Agricultural Center, Northeast Research Station, 212 Macon Ridge Road, Winnsboro, LA 71295. Corresponding author, B.A. Castro (bcastro@lsu.edu).

INTERPRETIVE SUMMARY

INTRODUCTION

The red imported fire ant (RIFA), *Solenopsis invicta* (Buren) is an introduced pest that continues to spread steadily into areas of the United States with mild climates and adequate sources of food. The RIFA has been a serious pest in the southeastern United States for many years. This pest affects several agricultural crops, including soybean, corn, and grain sorghum. With the increasing adoption of conservation tillage in Louisiana production systems, the RIFA has become more important as a pest, causing severe damage to grain sorghum seeds and seedlings.

The use of reduced-tillage systems results in a favorable environment for RIFA colonies, increasing its pest severity in sorghum fields. Conservation tillage methods often leave sorghum seeds exposed in an open or partially-closed seed furrow. This is especially true when planting occurs in *dry* soil conditions. Conservation tillage is also less disruptive to RIFA colonies established in crop fields. The RIFA takes advantage of these conditions and attacks the exposed sorghum seeds by breaking the seed coat, and removing the germ followed by the starch. Because of their small size, sorghum seeds are also easily removed from the furrow and carried to the ant nest.

Research conducted in Louisiana has focused on developing insecticide use strategies to maintain low levels of RIFA damage while keeping control costs to a minimum. An essential component of this research has been the evaluation of seed treatments and different methods and rates of soil insecticides to prevent RIFA damage to grain sorghum. The purpose of this experiment is to study the efficacy of Gaucho (imidacloprid) as a sorghum seed treatment and compare it with the efficacy of selected soil insecticides for control of the RIFA in seedling, no-till grain sorghum.

MATERIALS AND METHODS

Experiments were conducted at the Macon Ridge location of the Northeast Research Station, near Winnsboro, Franklin Parish, LA, from 1994 to 1999. Sorghum hybrids used in the experiments across the years included Pioneer Brands 8333 and 8282, Asgrow A570 and Mycogen 3636 planted from May to early June. These hybrids were planted no-till with a John Deere planter into a Bermudagrass sod containing high densities of RIFA mounds. Insecticide treatments and years of evaluation included Gaucho 480FS from 1994 to 1999; Lorsban 15G from 1994 to 1997; Lorsban 4E from 1996 to 1999; and Furadan 4F from 1995 to 1997. Gaucho 480FS (8.0 fl oz of product per hundredweight seed) was applied directly to the sorghum seeds as seed treatment (SEEDT) prior to planting. A granular insecticide (Lorsban 15G at 0.5 lb ai/A) was applied T-banded at planting (T-BAND). Lorsban 4E (0.5 lb ai/A) was applied as a pre-emergence surface spray (PRE) immediately post-plant. Furadan 4F (1.0 lb ai/A) was applied as

in-furrow spray at planting (IFSAP). A CO_2 charged system calibrated to deliver 5 gpa at 35 psi through 8002E flat fan nozzles (1/row) was used for the IFSAP insecticide. The PRE insecticide was applied at 10 gpa at 35 psi through 8001 flat fan nozzles (1/row) in a band 20 inches wide over the row center.

RIFA densities were recorded on a weekly basis during the first month after planting. RIFA numbers were estimated by placing in each plot an unruled index card (3 X 5 inches) baited with peanut butter and recording the number of ants attracted to it after 1 to 3 hours. Plant population densities, plant heights, and intra-row skips > 12 inches between plants were counted approximately 1 month after planting. Plant population densities were measured by sampling the entire two center rows in each plot. Plant height estimates were obtained by measuring 20 plants in each plot. Intra-row skips were recorded by counting the number of skips > 12 inches between plants in the two center rows in each plot.

All data were analyzed by analysis of variance (ANOVA), and treatment means were compared with the untreated control using Dunnett's two-tailed ***t***-test. Differences are significant at the 5.0% level.

RESULTS AND DISSCUSSION

Numbers of RIFA were reduced by both Lorsban treatments compared with all other insecticide treatments and the untreated control. RIFA numbers in the Gaucho- and in the Furadan-treated plots tended to be lower but not significantly different from those in the untreated plots. Plant population densities were significantly improved with the use of Gaucho-treated seeds and the granular Lorsban compared with all other insecticide treatments and the untreated control. Over the years, there was a consistent trend of higher plant densities in plots planted with Gaucho-treated seeds. The overall values indicate a 77% improvement in plant densities in Gaucho-treated plots compared with plots where no protection was used.

Although the average plant height was significantly improved with the use of insecticide treatments (with the exception of Lorsban 4E), yearly plant height data did not show a consistent pattern for any of the insecticide treatments evaluated during the 6 years of this study.

All insecticide treatments, except Lorsban 4E, significantly reduced the number of intra-row skips > 12 inches between plants compared with the untreated control. Plant skips were reduced by half in the Gaucho treatment when compared with other insecticide treatments and by almost two thirds when compared with the untreated control.

Gaucho seed treatment performed consistently well during this 6-year study. It improved sorghum plantings as indicated by higher plant population densities and fewer intra-row skips > 12 inches between plants. The consistent performance of Gaucho is important since effectiveness of many approved soil insecticides varies with soil moisture conditions.