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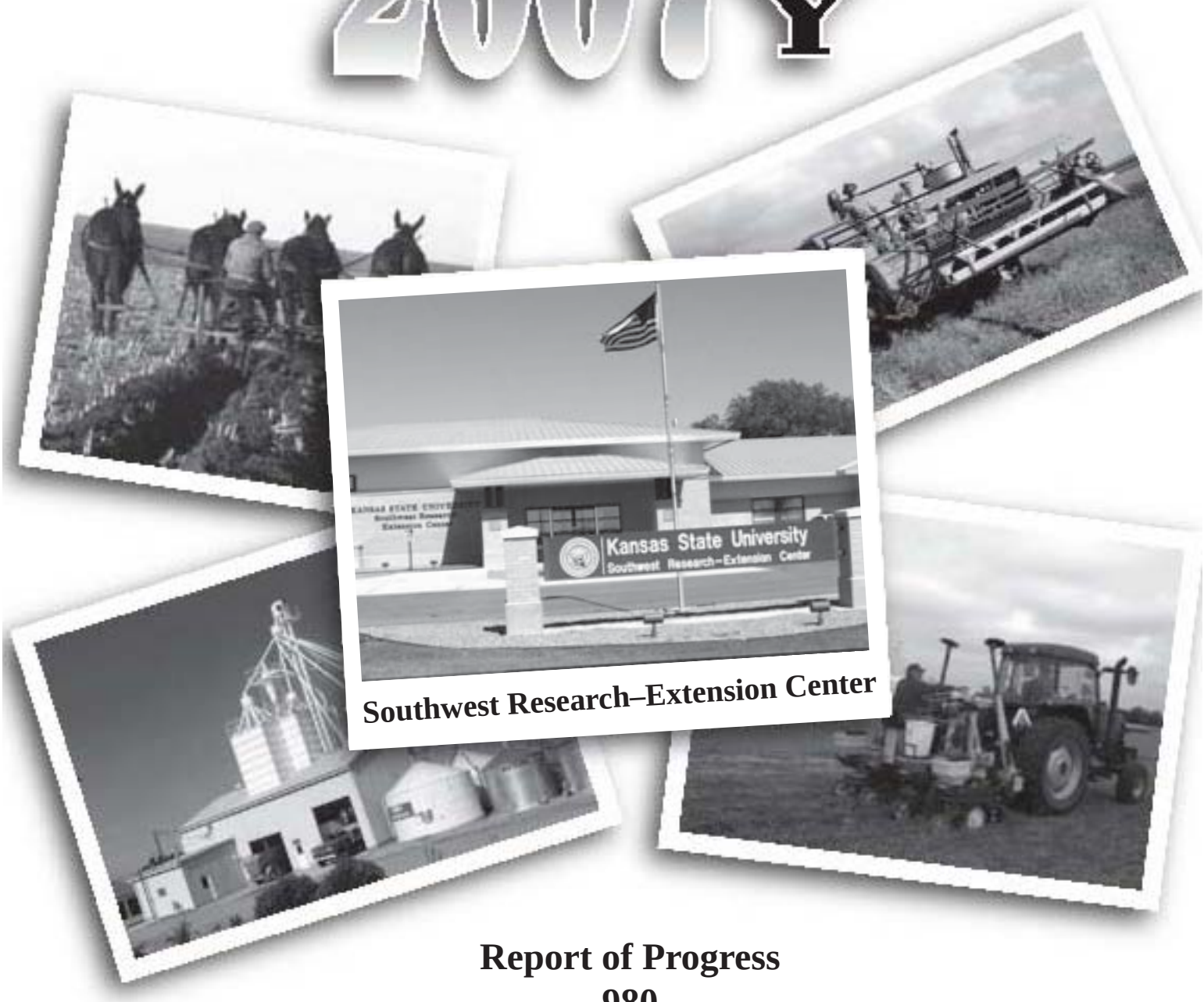

Southwest Research–Extension Center

Report of Progress 980

Kansas State University
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EFFICACY OF SYSTEMIC INSECTICIDES APPLIED AS FOLIAR OR SEED TREATMENTS TO CONTROL DECTES STEM BORERS IN SOYBEAN AT GARDEN CITY, KS, 2006

by

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SUMMARY

We tested systemic insecticides applied as seed treatments for their effectiveness in reducing Dectes stem borers (Dectes texanus) in soybean. Fipronil was applied to the foliage later in the season as a positive check based on previous studies. Of the seed treatments tested, only fipronil significantly reduced Dectes stem borer infestations, but it gave 100% control. The foliar application of fipronil also significantly reduced Dectes stem borer infestations, but it gave 85% control. Dectes stem borer infestation averaged 34% infested plants.

PROCEDURES

Soybean seed (Pioneer 93B85, maturity group 3.8) was machine-planted at 10 seeds per row-foot on May 27, 2006, in a half circle of irrigated soybeans of the same variety on the Ramsey Brothers Farm four miles north of Garden City, Kansas. A quantity of seed was sent to be treated with the seed treatments. Other seed without seed treatments was saved and planted in plots designated to receive foliar treatments later in the season or to serve as check plots. The plots were four rows wide and 20 feet long. There was a 3-foot-wide alley at each end of the plot. The original design was compromised when some plots were over-sprayed with insecticides later in the season, so the experiment was analyzed as a completely randomized experiment. We analyzed only those treatments with three or four surviving plots together with 14 check plots and 14 plots receiving the foliar fipronil treatment. The foliar treatment of fipronil was applied August 3, after the plants had recovered from hail damage. This treatment targeted the first two instars of the insect developing inside the plants. The foliar treatment was applied with a backpack sprayer, a hand-held boom, and two nozzles (Conejet TXVS 6) directed at a single row. The nozzles were held 6-8 inches from the plants to maximize coverage of the upper canopy. The sprayer was calibrated to deliver 20 gal/acre (8.0 sec per 20 ft row at 30 psi). A chronometer was used to measure the time spent on each row to help maintain appropriate speed. For statictical analysis, we used multiple t-test comparisons of the least square means (LSMeans) produced with the SAS-GLM procedure. LSMeans were compared with the check LSMean.

Dectes stem borer beetle populations were estimated by making 100 sweeps across the plants in single rows. Sweep samples were made at irregular intervals during the flight and the numbers were plotted to determine the relationship between the treatment timing and the beetle flight. Dectes larval infestations were recorded at the end of the season (September 18-20) by dissecting 20 plants in each plot. Five consecutive plants were taken from each of the four rows in each plot. The plants were dissected to record entry nodes, upper stem tunneling, tunneling that reached the base of the plant, and presence of live Dectes larvae. When dissected, plants showed very few larvae had tunneled to the base of the plant, so that variable is not reported. Grain yield data was not collected because infestations were low and the plants had been heavily damaged by a hail storm.

RESULTS AND DISCUSSION

Dectes stem borer populations were lower in 2006 than in 2005. On July 11, a hail storm seriously defoliated the soybeans. This defoliation not only damaged plants, but also knocked off many leaf petioles in which the Dectes beetles had oviposited, thus reducing the potential infestation. The hail also broke or bruised the stems, making it difficult for the larvae to tunnel to the base of the plants. Although the plants recovered, the resulting plants were smaller, later maturing, and more branched than normal. The plants were almost a month late in developing the larger petioles that are attractive to the Dectes beetles. This meant most of the plants escaped Dectes infestation. The Dectes infested an average of 34% of the plants. The delayed development of

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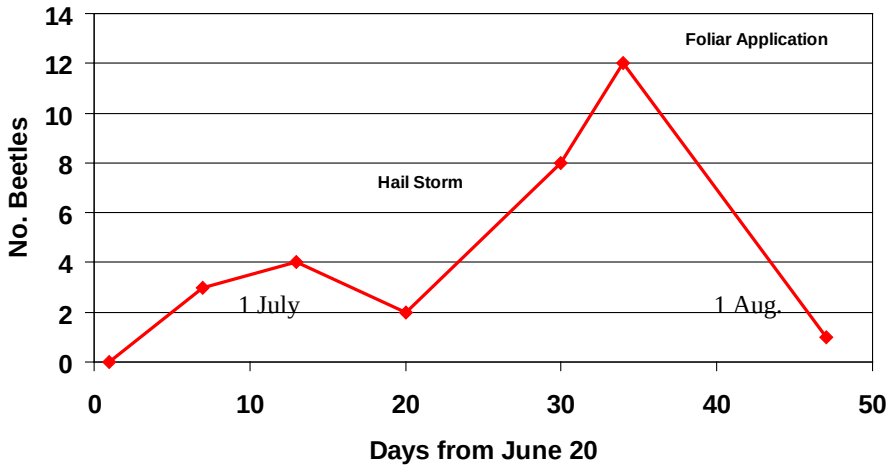
the Dectes infestation also made it difficult to time the foliar treatment.

Of the seed treatments tested, only fipronil appeared to suppress the Dectes stem borer. It gave 100% control, significantly reducing Dectes stem borer infestations (Table 1). The foliar treatment of fipronil also gave a significant (69-85%) control of the Dectes stem borer. It was clear that the timing of the foliar application was late, because many of the larvae had begun tunneling in the main stem, but were killed there. The fipronil treatment was able to kill larvae tunneling in the main stem and thus prevent them from girdling the plants later in the season. It is hoped the fipronil seed treatments can be registered for use in soybean production, because it appears to be an extremely effective treatment option for the Dectes stem borer.

In 2004, we were able to show a significant difference in yield (4.6 to 6.6 bu/acre) for the fipronil treatments. However, we were not able to take yield data in this trial due to the heavy hail damage and resulting low infestation rate.

Fig 1. Dectes Stem Beetles in 100 sweeps in soybeans 2006



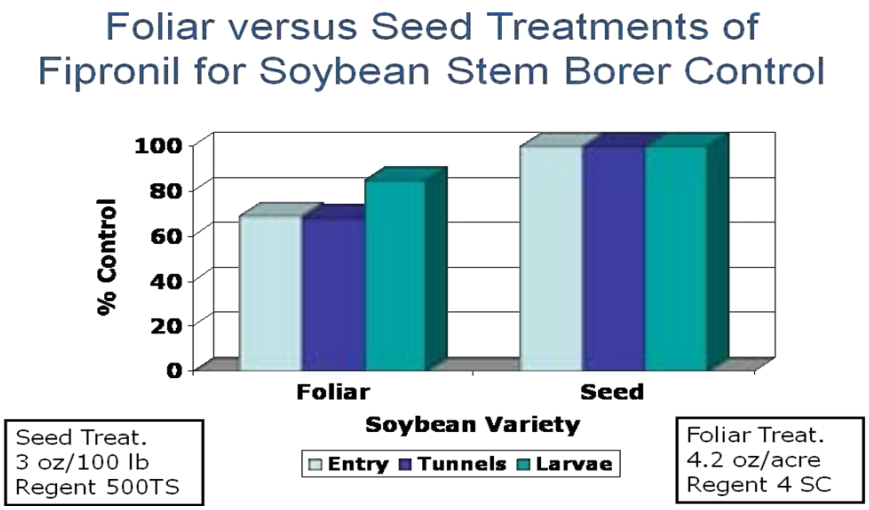


Table 1. F-test Probability values for the ANOVA tests of the two main effects, variety and insecticide treatment. Fipronil treatments were applied as foliar treatments. Irrigation Experiment Field, Scandia, Kansas, 2006.

	Soybean Maturity Group	Entry Nodes /20 plants	Stem Tunneling /20 plants	Base Tunneling /20 plants	Live Larvae /20 plants	Grain Yield Bu/Acre
ANOVA F-Test Probability						
Replication		**0.001**	**0.0191**	0.0669	0.0566	**0.0383**
Variety		**0.0027**	0.3505	**0.0087**	<0.5000	0.3909
Insecticide		**>0.0001**	**>0.0001**	**>0.0001**	**>0.0001**	<0.5000
V x I Interaction		**0.0175**	<0.5000	**0.0465**	<0.5000	<0.5000
Variety Means—Untreated						
Nex2403K2RR	Mid II	8.7	7.3	4.7	4.3	58.9
Dyna-GroDB32C25	Early III	25.0	12.7	2.3	7.7	61.4
Pioneer 93M50	Mid III	17.7	13.3	2.0	6.0	69.0
Ohlde 3727NRS	Late III	13.7	10.3	8.0	6.7	63.2
KS4404RR	Early IV	16.7	12.0	6.0	3.3	69.7
KS4704RR	Mid IV	13.0	9.7	5.3	5.7	66.9
Mean		15.8	10.9	4.7	5.6	64.85
Variety Means—Fipronil—Treated						
Nex2403K2RR	Mid II	2.7	2.7	1.0	0.7	67.5
Dyna-GroDB32C25	Early III	4.0	3.0	1.0	0.7	61.4
Pioneer 93M50	Mid III	4.0	3.0	0.0	0.0	69.0
Ohlde 3727NRS	Late III	1.7	1.0	1.0	0.7	63.2
KS4404RR	Early IV	2.7	2.7	1.0	1.0	69.7
KS4704RR	Mid IV	3.3	2.3	1.0	1.0	66.9
Mean		3.06	2.5	0.8	0.7	66.76

Note: Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

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