

Evaluation of Messenger

A series of experiments was begun in 2002 to test products marketed as, or having promise for, reducing SCN (soybean cyst nematode) reproduction and/or increasing the growth and productivity of SCN-infested soybeans. Several different products have been tested in randomized complete block experiments containing both SCN-susceptible and SCN-resistant soybean varieties. For simplicity, only the results from Messenger and the appropriate control treatments are described in this report. The LSD values given however, are from the overall analysis of the larger experiment.

2002

An experiment was established in a field infested with the soybean cyst nematode at the Iowa State University Woodruff Research Farm located approximately 5 miles (8 km) southwest of Ames, Iowa. The average initial soybean cyst nematode population density was 4,440 eggs per 100 cm³ of soil. Individual plots consisted of four rows, 17 feet (5.2 m) long spaced 30 inches (76 cm) apart. All treatments were replicated six times in the experiment.

The varieties Asgrow 2301 (susceptible to SCN) and Asgrow 2201 (resistant to SCN) were planted at a rate of 10 seeds per foot (33 seeds per m) on June 6, 2002. Messenger was mixed according to package instructions and applied using a 4-row CO₂ sprayer on June 26, 2002, and again on July 19, 2002. Although subsequent applications were suggested by the manufacturer, they were not made because it was judged that the soybean rows had closed sufficiently to prohibit a farmer from making similar applications.

Several weeks after planting, the number of plants per linear foot (emergence) was assessed in each plot, and average plant height and lodging (1=all plants fully erect, 5=all plants flat) were assessed just prior to harvest. The center two rows of each plot were mechanically harvested with a plot combine. The collected seed was returned to the lab where seed weight and seed moisture were determined, and plot yields were calculated.

Soil samples consisting of ten 1-inch diameter (2.5-cm diameter), 6- to 8-inch-deep (15- to 20-cm-deep) soil cores were collected from the center two rows of each plot immediately following planting. Soybean cyst nematode cysts were extracted from a subsample of each soil sample using a semi-automatic elutriator and were recovered on a 250-um-pore sieve. Then the cysts were crushed with a motorized rubber stopper. The eggs that were released from the cysts were recovered on a 25-um-pore sieve and subsequently were stained with acid fuchsin and counted using a dissecting microscope. Soil samples were collected from each plot again immediately after harvest. Soybean cyst nematode egg population densities were determined from these samples in the same manner as samples collected in the spring, following planting.

Data were analyzed by analysis of variance (ANOVA) for a treatment main effect. If a significant difference among the treatments was detected with ANOVA at $P \leq 0.05$, Fisher's least-significant-difference test was performed ($\alpha = 0.05$) to discern specific differences among treatment means.

For simplicity, only yield and fall SCN population densities are presented here. The LSD values given are from the overall analysis of the larger experiment.

Results:

Treatment	Yield (bu/acre)	Fall SCN (eggs / 100 cc soil)
Untreated SCN-Susceptible	35.6	5,883
Messenger treated SCN-Susceptible	34.7	14,850
Untreated SCN-Resistant	49.0	1,642
Messenger treated SCN-Resistant	49.3	1,575
LSD	5.8	9,098

Conclusions:

There were no statistically significant effects of applying Messenger to either the SCN-resistant or the SCN-susceptible soybeans in terms of yield or final SCN infestation levels.

2003

An experiment was established in a field infested with the soybean cyst nematode at the Iowa State University Woodruff Research Farm located approximately 5 miles (8 km) southwest of Ames, Iowa. The average initial soybean cyst nematode population density was 10,079 eggs per 100 cm³ of soil. Individual plots consisted of four rows, 17 feet (5.2 m) long spaced 30 inches (76 cm) apart. All treatments were replicated six times in the experiment.

The varieties DeKalb 26-51 (susceptible to SCN) and DeKalb 26-52 (resistant to SCN) were planted at a rate of 10 seeds per foot (33 seeds per m) on June 5, 2003. Messenger was mixed according to package instructions and applied using a hand-pump sprayer on July 11, 2003 and again on July 31, 2003. As in 2002, subsequent applications were not made because it was judged that the soybean rows had closed sufficiently to prohibit a farmer from making similar applications.

All plant growth measurements were taken as in 2002. Similarly, soil samples were taken and processed in the same way that they were in 2002.

Data were analyzed by analysis of variance (ANOVA) for a treatment main effect. If a significant difference among treatments was detected with ANOVA of $P \leq 0.05$, Fisher's least-significant-difference (LSD) test was performed ($\alpha = 0.05$) to discern specific differences among treatment means.

For simplicity, only yield and fall SCN population densities are presented here. The LSD values given are from the overall analysis of the larger experiment.

Results:

Treatment	Yield (bu/acre)	Fall SCN (eggs / 100 cc soil)
Untreated SCN-Susceptible	32.7	6,450
Messenger treated SCN-Susceptible	29.4	8,317
Untreated SCN-Resistant	44.2	3,733
Messenger treated SCN-Resistant	42.8	3,567
LSD	5.3	3,306

Conclusions:

There were no significant differences between yield or final SCN population densities between the Messenger-treated plots and the untreated control plots.

2004

An experiment was established in a field infested with the soybean cyst nematode at the Iowa State University Hinds Research Farm located approximately 2 miles (3.2 km) north of Ames, Iowa. The average initial soybean cyst nematode population density was 3,130 eggs per 100 cm³ of soil. Individual plots consisted of four rows, 17 feet (5.2 m) long spaced 30 inches (76 cm) apart. All treatments were replicated six times in the experiment.

The varieties DeKalb 26-51 (susceptible to SCN) and DeKalb 26-52 (resistant to SCN) were planted at a rate of 10 seeds per foot (33 seeds per m) on May 28, 2004. Messenger was mixed according to package instructions and applied using a hand-pump sprayer approximately 4 weeks after planting and again 6 weeks after planting. As in 2002 and 2003, subsequent applications were not made because it was judged that the soybean rows had closed sufficiently to prohibit a farmer from making similar applications.

All plant growth measurements were taken as in 2002 and 2003. Similarly, soil samples were taken and processed in the same way that they were in 2002 and 2003.

Data were analyzed by analysis of variance (ANOVA) for a treatment main effect. If a significant difference among the treatments was detected with ANOVA at $P \leq 0.05$, Fisher's least-significant-difference (LSD) test was performed ($\alpha = 0.05$) to discern specific differences among treatment means.

For simplicity, only yield and fall SCN population densities are presented here. The LSD values given are from the overall analysis of the larger experiment.

Results:

Treatment	Yield (bu/acre)	Fall SCN (eggs / 100 cc soil)
Untreated SCN-Susceptible	63.9	4,467
Messenger treated SCN-Susceptible	67.4	5,350
Untreated SCN-Resistant	68.1	1,050
Messenger treated SCN-Resistant	70.7	1,820
LSD	4.8	3,720

Conclusions:

While yield in the Messenger treated plots was numerically higher in both the SCN-susceptible and SCN-resistant soybeans, this difference was not statistically significant. Similarly, the fall SCN infestations showed no differences between treated and untreated plots.