<u>Evaluation of N-Viro Soil</u>

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. Each year, several different products have been tested in a randomized complete block experiment containing both SCN-susceptible and SCN-resistant soybean varieties. For simplicity, only the results of N-Viro Soil 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 cm^3 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.

Plots were measured and marked off with wooden stakes prior to planting. N-Viro Soil was applied at 5 T/A, 10 T/A, and 15 T/A rates on May 31, 2002. It was then incorporated using a field cultivator. All of the plots treated with 5 T/A and 15 T/A were planted with Asgrow 2301 (a SCN-susceptible variety) at a rate of 10 seeds per foot (33 seeds per m) on June 6, 2002. Some of the 10 T/A treated plots were also planted with the Asgrow 2301, but some of them were left fallow as a control.   In addition, one treatment tested the 10 T/A rate broadcast over the plot (June 7, 2002) but not incorporated.

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-μm-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-μm-pore sieve and subsequently were stained with acid fuchsin and counted with 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≤0.05, Fisher's least-significant-difference (LSD) test was performed (α=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/100cc soil)
Untreated SCN-susceptible	35.6	5,883
N-Viro Soil 5 T/A SCN-susceptible, incorporated	35.3	13,740
N-Viro Soil 10 T/A SCN-susceptible, incorporated	27.5	22,816
N-Viro Soil 15 T/A SCN-susceptible, incorporated	29.2	25,383
N-Viro Soil 10 T/A surface applied	32.8	16,616
N-Viro Soil 10 T/A fallow	.	2,767
LSD	5.8	9,098

Conclusions:

In none of the N-Viro Soil treatments was there a significant increase in yield or decrease in final SCN soil population density relative the untreated control. Several of the treatments (10 T/A incorporated and 15 T/A incorporated) had statistically meaningful yield decreases and statistically higher final SCN counts (10 T/A incorporated, 15 T/A incorporated, and 10 T/A surface applied) than the untreated control.

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 cm^3 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.

Plots were measured and marked off with wooden stakes prior to planting. In contrast with 2002, N-Viro Soil was applied on plots planted with both SCN-susceptible (DEKALB 26-51) and SCN-resistant (DEKALB 26-52) varieties. It was applied at rates of 5 T/A and 15 T/A and incorporated on June 5 2003 using a field cultivator. It was also applied at a rate of 15 T/A on plots which remained fallow throughout the season.

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 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/100cc soil)
Untreated SCN-susceptible	32.7	6,450
N-Viro Soil 5 T/A SCN-susceptible, incorporated	29.4	7,417
N-Viro Soil 15 T/A SCN-susceptible, incorporated	31.1	6,983
Untreated SCN-resistant	44.2	3,733
N-Viro Soil 5 T/A SCN-resistant, incorporated	47.5	3,700
N-Viro Soil 15 T/A SCN-resistant, incorporated	48.3	2,583
Untreated fallow	.	2,467
N-Viro Soil 15 T/A fallow	.	2,583
LSD	5.3	3,306

Conclusions:

There were no differences between yield or final SCN population densities between the N-Viro Soil-treated plots and the appropriate untreated control plots.

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2004

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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 (8 km) north of Ames, Iowa. The average initial soybean cyst nematode population density was 3,130 eggs per 100 cm^3 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.

Plots were measured and marked off with wooden stakes prior to planting. The same treatments, varieties, and planting rates were used in 2004 as in 2003. N-Viro soil was spread and incorporated on May 26th and 27th, 2004 and the plots were planted on May 28, 2004.

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≤0.05, Fisher's least-significant-difference (LSD) test was performed (α=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/100cc soil)
Untreated SCN-susceptible	63.9	4,467
N-Viro Soil 5 T/A SCN-susceptible, incorporated	61.7	8,933
N-Viro Soil 15 T/A SCN-susceptible, incorporated	64.4	6,850
Untreated SCN-resistant	68.1	1,050
N-Viro Soil 5 T/A SCN-resistant, incorporated	67.3	2,817
N-Viro Soil 15 T/A SCN-resistant, incorporated	68.2	1,417
Untreated fallow	.	2,467
N-Viro Soil 15 T/A fallow	.	2,583
LSD	4.8	3,720

Conclusions:

The yield in the N-Viro Soil-treated plots was not statistically different from the appropriate untreated control plots. Similarly, the fall SCN population densities were not different from one another.