Soybean Cyst Nematode Management:
Understanding How Management Actions Influence Nematode Populations

Although soybean cyst nematode (SCN) is the most yield limiting disease of soybean in the United States and Ontario, many soybean growers are not properly managing it. Extension plant pathologists and nematologists from the North Central states and Ontario are collaborating on a SCN management project funded by the North Central Soybean Research Program with the objective of delivering a consistent message on SCN management.

The Strategic Goal of this project is "To improve soybean cyst nematode (SCN) management in the North Central states." As part of this overall goal, on-farm demonstration and research plots were established in participating states. In addition to the direct effect on yield, the effects of different sources of SCN resistance on SCN populations are also being evaluated.

During 2008, field strip trials were established in the following states and Ontario, Canada (number of locations): IL (2), NE (2), IA (3), OH (2), MN (3), MO (2), ND (3), WI (2), KS (2, one conventional planted and one double crop), MI (3), SD (2), ON (2). Strip plots with a minimum length of 250 ft were established with at least four replications. All locations had strip plots with the exception of ND, where only small areas of a small number of fields are known to have SCN at this time. At all locations, multiple soybean varieties were grown, which represent the main sources of resistance currently available for SCN management. The number of varieties in an experiment varied from 4 to 8 among locations. Plots were harvested and yields were determined. Changes in SCN population densities were monitored by comparing SCN egg counts from spring and fall soil samples at all locations. In addition, HG type of the SCN population present from each site was determined. The HG type identifies the ability of the population to reproduce on each of the sources of resistance used in the trials.

At a few of the locations, varieties with the four major sources of resistance were not available. Several locations had multiple PI88788 varieties grown when they could not obtain other genetic sources. Yields for each plot were determined at maturity and were grouped into low (0-499 SCN eggs/100 cc soil), medium (500-2,999 SCN eggs/100 cc soil) and high (≥ 3,000 SCN eggs/100 cc soil) SCN population densities based on the spring population density assessment (Figures 1, 2, and 3).

Yield was consistently increased with the use of resistant varieties over the susceptible checks, and the degree of the response varied significantly among locations. The yields were highest for varieties with the PI 548402 (a.k.a Peking) source of resistance, which had a 5.3 bu/A yield advantage over susceptible varieties averaged over all locations. In fields with high SCN population densities, the average yields of varieties with Peking, PI 88788, and PI 437654 (a.k.a. Hartwig) sources of resistance were 15.5, 11.8, and 6.3 bu/A higher than those of the susceptible varieties, respectively.

Resistant varieties reduced the reproduction of SCN in the field trials compared with the susceptible varieties (Figure 4). The exception to

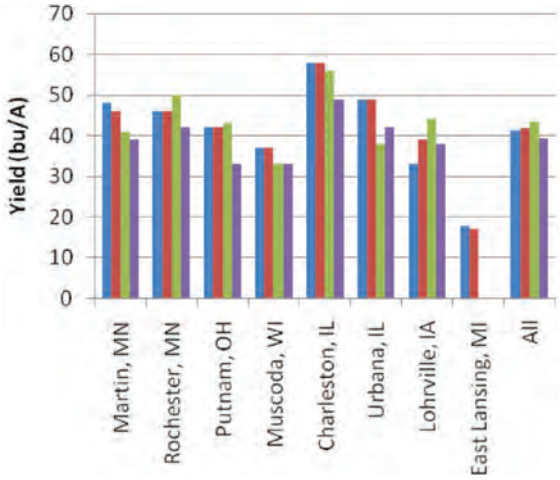


FIGURE 1. Effect of SCN source of resistance on yield in fields with low SCN population densities (0-499 eggs/100 cc soil). Numbers represent the mean from four or more replications per location.

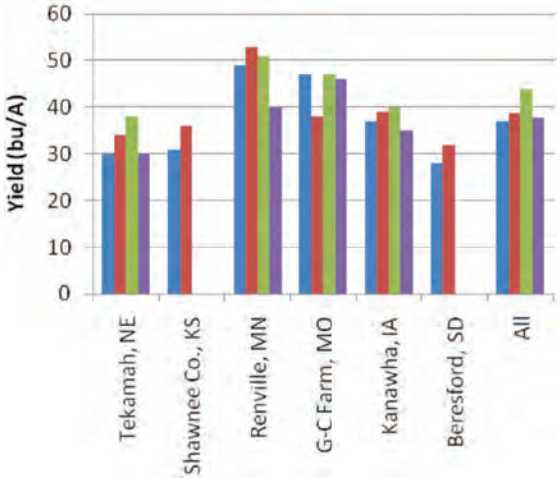
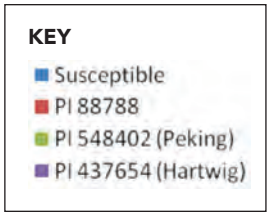


FIGURE 2. Effect of SCN source of resistance on yield in fields with medium SCN population densities (500-2,999 eggs/100 cc soil). Numbers represent the mean from four or more replications per location.



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this was at the Renville, MN location, where varieties with the PI 88788 source of resistance did not reduce SCN reproduction. At this site and some other sites, HG type 2 populations were present. HG Type 2 populations of SCN have 10% or more reproduction on the PI 88788 source of resistance relative to the amount of reproduction that occurs on a susceptible variety in standardized greenhouse tests. Table 1 reports on the HG types observed in the soil samples collected in the spring of 2008. HG types also will be determined from soil samples collected in the fall of 2008 from the research sites.

Determinations of HG Types present in soil samples collected in the Fall of 2008 were not complete at the time of development of this fact sheet. Updates on the influence of soybean genetics on SCN population densities and HG type will be presented in future reports throughout the course of this study.

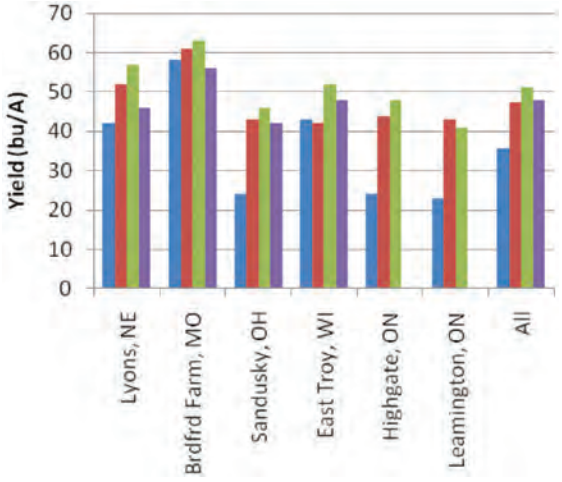

FIGURE 3. Effect of SCN source of resistance on yield in fields with high SCN population densities (> 3,000 eggs/100 cc soil). Numbers represent the mean from four or more replications per location.

TABLE 1. HG types present in soil samples collected in the spring of 2008 at research sites (results were not available from all research sites at the time of printing).

State	Location	HG Type*
Illinois	Urbana	0–
Illinois	Charleston	0–
Iowa	Ames	2–
Iowa	Kanawha	2–
Iowa	Lohrville	0–
Kansas	Edwards Co.	0–
Kansas	Shawnee Co.	1.2–
Michigan	East Lansing	2–
Minnesota	Renville	1.2–
Minnesota	Martin	2–
Missouri	Bradford Farm	1.2–
Missouri	Graves-Chapple Farm	2–
Nebraska	Lyons	0–
Nebraska	Tekamah	2–
North Dakota	Richland Co. 1	0–
North Dakota	Richland Co. 2	0–
Ohio	Sandusky	2–
Ohio	Putnam	0–
Wisconsin	Muscoda	2–

*A modified HG Type test was used in this research. This modified HG Type test determines the ability of the nematode population to develop on three indicator lines: PI 548402 (Peking), PI 88788, and PI 437654 (Hartwig). A Type 0 cannot develop on any of the three; a Type 1 develops on Peking, a Type 2 on PI 88788, and a Type 4 on Hartwig (there is no Type 3 in this test).

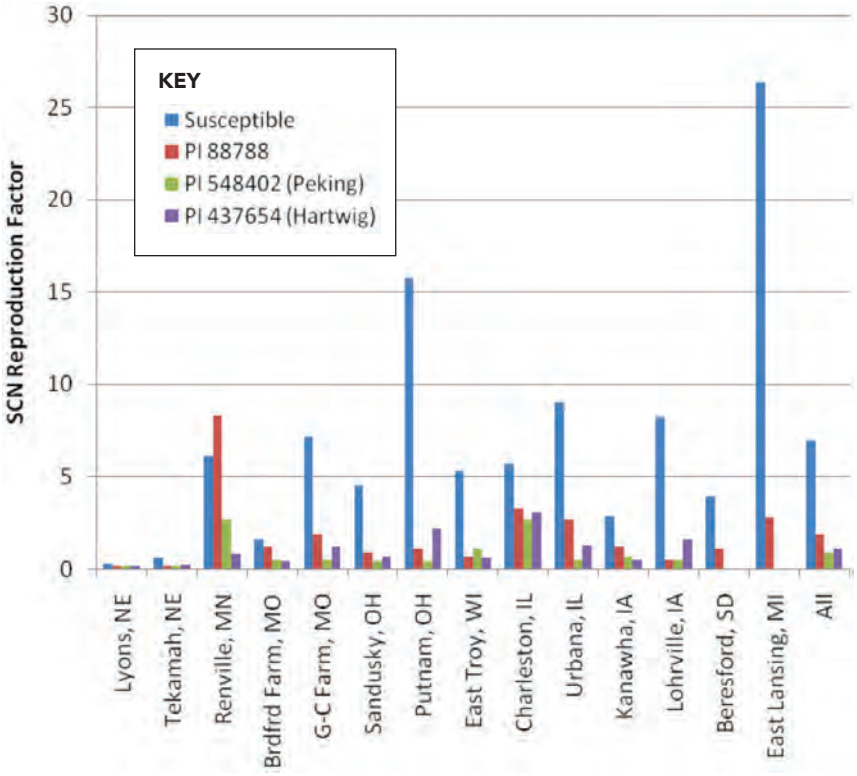

FIGURE 4. Effects of soybean variety resistance source on SCN reproduction factors (SCN population density at harvest / initial SCN population density). Numbers represent the mean from four or more replications per location. SCN population densities decreased when the reproduction factor was less than 1.0 and increased when the reproduction factor was greater than 1.0.

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