



Plant Diseases

What's your type? An HG type test for SCN populations

by Greg Tylka, Department of Plant Pathology

SCN-resistant soybean varieties reduce the amount of SCN reproduction that occurs when soybeans are grown. But if resistant soybean varieties are grown repeatedly, an SCN population capable of reproducing readily on the resistant varieties can develop. This is because resistant varieties are not immune; they allow some low level of SCN reproduction. The possibility of SCN populations building up on resistant varieties is especially a concern because almost all resistant soybean varieties have SCN resistance genes from the soybean breeding line PI88788 (see article on newly published list of SCN-resistant soybean varieties for 2007 on page 250 in this issue).

The HG type test (“HG” for *Heterodera glycines*, the scientific name for SCN) is a greenhouse test that provides information on how well an SCN population can reproduce on the sources of SCN resistance currently available in soybean varieties. The HG type test is a replacement for the SCN race test, which was devised in the late 1960s and used widely until the late 1990s. In recent years, the race concept was shown to be inadequate and inaccurate to describe and predict SCN reproduction on resistant soybean varieties.

When should an HG type test be done?

Soybean growers who have experienced sub-par yield performance from SCN-resistant soybean varieties in SCN-infested fields should consider having an HG type test conducted. Also, if numerous SCN females are observed on the roots of SCN-resistant soybean plants during the growing season, an HG type test probably is warranted. Soybean growers who have grown SCN-resistant soybean varieties in SCN-infested fields numerous times in the past might consider having an HG type test performed, too.

How is an HG type test conducted?

To determine the HG type of the SCN population, reproduction of the SCN population is measured on “HG type indicator” soybean lines with SCN resistance genes. The test is conducted in a greenhouse under controlled temperature and moisture conditions.



Temperature-controlled water bath in greenhouse in which HG type tests are conducted. (Greg Tylka)



White SCN females to be counted on root of soybean plant in HG type test. (Greg Gebhart)

After 30 days, enough time for SCN females to develop, the numbers of females on the roots of the 7 (currently) HG type indicator soybean lines (see table) are counted and compared to the number of females formed on a standard susceptible soybean line. The numbers of the HG type indicator soybean lines on which elevated SCN reproduction occurred are the numbers in the HG type designation. “Elevated reproduction” means that the number of females that formed on an HG type indicator soybean line was ≥ 10 percent of the number formed on the susceptible line.

HG type test indicator lines that are also sources of SCN resistance.

indicator line 1 = Peking	indicator line 5 = PI209332
indicator line 2 = PI88788	indicator line 6 = PI89772
indicator line 3 = PI90763	indicator line 7 = Cloud
indicator line 4 = PI437654	

How do I interpret the results of an HG type test?

The number or numbers in the HG type designation correspond directly to the HG type indicator lines on which the SCN population exhibits elevated reproduction. Only soybean lines that are available as sources of SCN resistance in soybean varieties are HG type indicator lines.

An HG type 2.4 SCN population has elevated reproduction on the HG type indicator lines 2 and 4, PI88788 and PI437654, respectively. SCN populations that do not have ≥ 10 percent reproduction on any HG type indicator line are given the numerical designation of 0 (HG type 0).

A grower with a field infested with an HG type 2.4 SCN population should avoid growing SCN-resistant varieties with resistance from PI88788 or PI437654, if possible. A grower with a field infested with HG type 0 SCN would be able to use soybean varieties with any source of SCN resistance for management of the pest.

Results of the HG type test also indicate how strongly the SCN population is able to reproduce on the sources of SCN resistance. The “strength” (scientifically called virulence) of the SCN population is indicated by the percentage of SCN females formed on the various indicator soybean lines relative to the number formed on a standard SCN-susceptible soybean variety in the test. If there were an average of 200 females produced on the roots of the standard susceptible line used in the HG type test, an HG type 1.2 SCN population with 33 percent reproduction on Peking (indicator line 1) and 45 percent reproduction on PI88788 (indicator line 2) would have produced an average of 66 females (33% of 200) on Peking and 90 females on PI88788 (45% of 200). And this HG type 1.2 SCN population has three times the ability to reproduce on Peking and PI88788 (and thus, would be much more damaging) as an HG type 1.2 SCN population with 11 percent reproduction on Peking and 15 percent reproduction on PI88788 even though they both have the same 1.2 HG type designation.

Can a field have more than one HG type in it?

The HG type test describes the overall SCN population in the soil sample. Soils do not have a mix of HG types. Any individual soybean cyst nematode may or may not have the ability to successfully feed and reproduce on each of the HG type test indicator lines. The HG type test indicates the relative ability of the overall SCN population represented in the sample to reproduce on the HG type indicator soybean lines.

What kind of sample is needed for an HG type test?

Two gallons of soil are needed to conduct this test. The results of the test will be only as good as the quality of sample collected and submitted. To get meaningful results, the sample submitted needs to be representative of the area of interest (usually an entire field). The sample must contain soil collected from throughout the area sampled, not just from one spot in the area. Soil should be collected to a depth of 6 to 8 inches from 20 to 40 locations throughout the area being sampled. All of the soil should be combined and submitted for the HG type testing.

Where can I get an HG type test performed?

The Iowa State University Plant Disease Clinic conducts HG type tests. The fee for the test is \$150 per sample. It will take a minimum of 6 weeks to get results back from the test, possibly longer depending on how many samples are submitted for testing and what other activities are ongoing in the greenhouse. Samples should be sent, along with name, address, and telephone number, to the Plant Disease Clinic, 327 Bessey Hall, Iowa State University, Ames, IA 50011.

ACTS, Inc., in Carroll, Iowa, performs HG type tests for \$125 per sample. ACTS, Inc. also offers an abbreviated HG type test for \$75 in which only the sources of SCN resistance currently available in soybean varieties in Iowa (Peking, PI88788, PI437654) and a variety of the submitter's choice are used. Contact ACTS, Inc. (telephone: 712-792-3966, e-mail: ralph@phytopath.com, Web site: www.phytopath.com) for more details.

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