INTRODUCTION

The purpose of the Northern Regional Soybean Cyst Nematode (SCN) Tests is to evaluate the best experimental SCN resistant soybean lines developed by public researchers in the U. S. and Canada and to provide soybean breeders with a source of genetically diverse germplasm for continued progress in the release of well adapted, SCN resistant breeding lines and varieties. Participants are encouraged to exchange germplasm within the legal guidelines pertaining to transgenic strains.

Experimental strains are evaluated in Preliminary Tests grown at a limited number of locations for one year before they are entered in Uniform Tests. Uniform Tests are grown at more locations with more replications than Preliminary Tests.

POLICY ON EVALUATION AND RELEASE OF STRAINS

Qualifications for inclusion in the Northern Regional SCN Tests

- 1) Participants must be willing and able to conduct separate tests for conventional strains and strains containing proprietary and/or transgenic traits. However, all participants are not required to evaluate both; and, placement of entries in tests depends on whether the entries are transgenic or non-transgenic.
- 2) Participants are individually responsible to ensure than any proprietary and/or transgenic strains that they submit are approved for human consumption and are cleared for sale as commodity seed.
- 3) Participants must disclose pedigrees to the Uniform Test Coordinator for publication with performance data in Uniform Soybean Test Report unless contract arrangements prohibit disclosure of information.
- 4) It is recommended that breeders obtain written permission for the use of privately developed varieties or strains as parents in the development of lines included in the Uniform Tests.

Use of Northern Regional SCN Test Entries in Soybean Breeding and Research

- 1) Seed of Uniform test entries is for evaluation in the Uniform tests only and may not be distributed to nonparticipants of these tests without prior approval by the originator of the entry.
- 2) Uniform Test participants must obtain written approval before using any entry, other than their own, in any breeding or genetic studies, or for any other research.
- 3) Experimental strains entered in the Uniform Tests should be labeled "Experimental Strain" and should not be identified by strain designation when grown in demonstration plots or when the Uniform Tests are shown on field days or farm tours.
- 4) Seed of any transgenic entry must not be used for further evaluation without written permission from the originator of the entry, and must be discarded at the end of the season, except for crossing purposes, subject to the restrictions outlined in the preceding section two.

Release of Northern Regional SCN Test Entries

- 1) Entries in the Northern Regional SCN Tests are released according to the policies and procedures of the originating institution.
- 2) Restricted or contractual releases cannot impose any restriction on the prior use of an entry as a parent by SCN Test Participants.

METHODS

Regional SCN Uniform Tests and Preliminary Tests are planted in multiple-row plots with the center rows used for data collection and harvested for yield. Plots in the Uniform Tests are generally replicated three times while plots in the Preliminary Tests are generally replicated twice. The coefficient of variability (CV) is reported for replicated data at each location. Yield data with a CV value of greater than 15 is generally not included in the test means.

Descriptive Code is abbreviated as underlined below.

Flower color: <u>Purple, White, M</u> indicates mixed flower color Pubescence color: <u>Tawny, G</u>ray, <u>Light tawny, M</u> indicates mixed pubescence color Hilum color: <u>black, imperfect black, brown, buff, gray, y</u>ellow

Previous testing is the number of previous years in the same SCN Uniform Test or a reference to the previous year's test, abbreviated to SCN PIII for SCN Preliminary Test III, for example.

Yield is measured after the seeds have been dried to a uniform moisture content and is recorded in bushels (60 pounds) per acre.

Maturity is the date when 95% of the pods have ripened. Delayed leaf drop and green stems are not considered in assigning maturity. Maturity is expressed as days earlier (-) or later (+) than the reference variety.

Height is the average length in inches from the ground to the tip of the main stem at maturity.

Lodging is rated at maturity according to the following scores:

- 1 = Almost all plants erect.
- 2 = All plants leaning slightly or a few plants down.
- 3 = All plants leaning moderately (45 degrees), or 25 to 0% of the plants down.
- 4 = AII plants leaning considerably, or 50 to 80% of the plants down.
- 5 = Almost all plants down.

Seed quality is rated according to the following scores considering the amount and degree of wrinkling, defective seed coat (growth cracks), greenishness, and moldy or rotten seeds. Threshing or handling damage is not included, nor is mottling or other pigment.

1 = Very good 2 = Good 3 = Fair 4 = Poor 5 = Very poor

Seed size is recorded in grams per 100 seeds based on a 100 or 200 seed sample.

Seed Composition is measured on samples submitted to the University of Minnesota. A 25-gram sample of clean seed is prepared by taking an equal volume or weight of seed from each replication. Protein and oil content is measured on these samples using infrared reflectance and is reported as dry-weight percentage values. The values listed in this report have been converted to a 13% moisture basis.

Shattering is scored at a specified time after maturity and is based on estimates of the percent of open pods as follows:

- 1 no shattering
- 2 1 to 10% shattered
- 3 10 to 25% shattered
- 4 25 to 50% shattered
- 5 over 50% shattered

Minnesota Iron Chlorosis scores (IDC) Scores are the mean of 2 reps and 2 observation and are based on the amount and severity of chlorosis (leaf yellowing). Scale; 1 = no chlorosis to 5 = severe chlorosis, leaf necrosis and possibly plant death. Data was collected from Lake Lillian and Wilkin Co. Minnesota.

Green Stem is a rating of delayed green stem at time of plant maturity (R8 = 95% of the pods have reached mature pod color). The condition is rated according to the following scores.

- 1 = almost all plant stems yellowing or have ripened, as indicated by their mature stem color.
- 2 = 1 10% plants with green stems
- 3 = 11 25% plants with green stems
- 4 = 26 50% plants with green stems
- 5 = > 50% plants with green stems.

Missouri Frogeye Leaf Spot (FELS) was rated by Dr. Allen Wrather at Portageville, MO on a 0 to 9 scale with 0=no frogeye and 9=severe.

Missouri Rootknot Nematode (RKNT) was rated on 2 reps on a 1 to 5 scale with 1=no galls and 5=severe galls at 2 locations in plantings behind potatoes near Bertrand, MO.

Nebraska Gall Midge scores were based on the average visual observation of two reps using a 1 to 9 scale where 1=10% infection, 2=20% infection, etc.

SCN/DISEASE SCREENING

SCN greenhouse test: Soybean cyst nematode resistance bioassays were conducted in a greenhouse at the University of Missouri. Seeds for each test line along with susceptible controls and indicator lines were germinated in a 27°C incubator. Seedlings were transplanted into pots (100 cm³) of steam pasteurized sandy loam soil and inoculated with 1,000 eggs. Each soybean line had five replicates and were organized in a randomized complete block design. Experiments were conducted in temperature-controlled water tanks to maintain 27°C soil temperature. Twenty-eight days after inoculation each root was soaked in water and the females were collected by rinsing the root with high pressure water. The females from each sample were counted using a stereo microscope and the mean number from each line was obtained. Female index (FI) values were determined by dividing the mean number of females from the test line by the mean number of females from the susceptible control and multiplying by 100. Coefficient of variation (CV) was calculated for lines with FI 25 or greater. Lines were rated according to the Illinois resistance scale as: highly resistant (FI < 10), resistant (FI = 10-24), moderately resistant (FI = 25-39), low resistance (FI = 40-59), or no effective resistance (FI ≥ 60). Ratings were not determined if CV values were greater than 35, if there were fewer than 3 data points from a test line, or if resistant and susceptible individuals were present within a line yet fell below the FI or CV thresholds.

HR = FI of < 10 R = FI of 10 to 24 MR = FI of 25 to 39 LR = FI of 40 to 59 NR = FI of > 60 nd = not determined FI>10, CV>35

Heterodera glycines (HG) Type testing: Cooperators submit soil samples taken in the spring from SCN infested locations. Each soil sample is homogenized thoughtfully, and 100 ccs of soil are used for nematode extraction. All samples are planted to a mix of Essex, Williams 82, and Lee 74 for scn increase. Seed of each indicator line is germinated in germination paper at 27° C for two days. One healthy seedling of each line is then placed in an individual container of sterilized sandy soil and infested with 1,000 eggs (+or- 50). Each line is replicated five times. Infected seedlings are grown in a greenhouse under 16 hour light in a water bath system that maintains a constant 27° C soil temperature. After 30 days, SCN females and cysts are washed from the roots of each seedling and counted. A female index (FI) is calculated for each indicator line by dividing the mean number of SCN females and cysts on the entry by the mean number of cysts on the susceptible check Lee 74 and multiplying by 100. A FI greater than or equal to 10 is considered a positive (+) response on each indicator line. HG Type classifications of the SCN populations are determined using the following table:

	HG Туре							
Indicator line	0	1	2	3	4	5	6	7
PI 548402 (Peking)		+						
PI 88788			+					
PI 90763				+				
PI 437654					+			
PI 209332						+		
PI 89772							+	
PI 548316 (Cloud)								+