UNIVERSITY OF ILLINOIS EXTENSION
College of Agricultural, Consumer and Environmental Sciences

report on
PLANT
DISEASE

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DEPARTMENT OF CROP SCIENCES
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

# PREDICTIVE SOIL SAMPLING AND ANALYSIS PROCEDURES FOR THE SOYBEAN CYST NEMATODE

Predictive soil sampling and analysis for soybean cyst nematodes (SCN) is a procedure designed to provide timely information for growers about SCN population levels. Growers can use this information for selecting SCN management strategies and tactics because it is gathered before the growing season, whereas diagnostic information is usually gathered **before** the growing season when no remedial management practices are available.

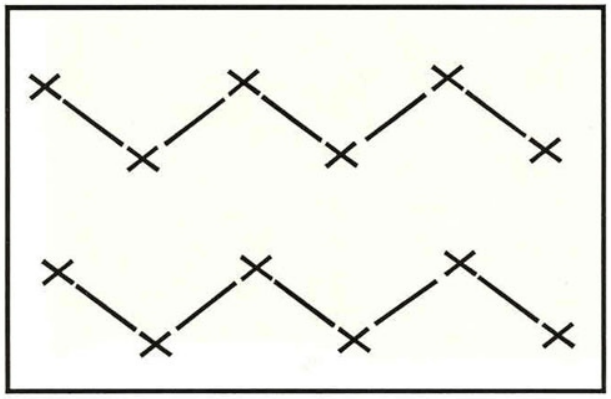

*Figure 1. Pattern for predictive SCN sampling in a 10-acre area. Each x = 1 subsample, 12 subsamples minimum.*

Although SCN samples are usually analyzed in University nematology laboratories, state extension and agricultural industry personnel have learned the procedures and are capable of analyzing samples on a local basis. The primary advantages of local analyses are rapid results (30 minutes), lower shipping costs, and overall increased service to clientele. Area Extension personnel are excellent initial contacts for growers because they can furnish information on how to collect and ship samples and will usually know of University or private laboratories that can correctly analyze samples for SCN. The number of gravid cysts and the contents within these cysts (eggs and larvae) are important information that should be furnished as part of the diagnostic service. If in doubt, assistance in interpreting results is always available from Extension Plant Pathology, N-533 Turner Hall, 1102 S. Goodwin Avenue, Urbana, IL 61801 (217/244-2011).

## COLLECTING SOIL SAMPLES

- **When** – Fall (preferred) or early Spring
- **Where** – In fields known or suspected of being infested with SCN that may be planted to soybeans the next growing season.
- **How** –Take 12 to 24 subsamples in a zigzag pattern through each 10-acre area to be sampled (Figure 1). Using a trowel, narrow-bladed shovel, or soil probe, collect soil from old soybean rows to a 6-inch depth, discarding the top 1 inch. Thoroughly mix the soil and place 1 quart in a sturdy plastic bag.

*For further information contact an Extension Specialist in the Department of Crop Sciences, University of Illinois at Urbana-Champaign.*

Repeat for each 10-acre area. If the entire field will not be sampled, sample at least several 10-acre areas. Avoid areas where smartwood, pigweed, clovers or lezpedezas have grown during the past four years; these plants all are parasitized by other species of nematodes that also produce cysts. These species do not affect soybean production.

ANALYSIS OF SOIL SAMPLES (DOUBLE WASH METHOD)

1. If soil samples are not analyzed soon after collection, they can be stored in sturdy plastic bags and placed in a refrigerator. Do not allow soil samples to become dry or hot, as this may increase cyst deterioration and cause inaccurate analysis. For each sample, mix the soil subsamples thoroughly and measure 100 cc (100 ml) of soil for analysis.
2. Thoroughly mix the 100 cc of soil with 2 quarts of water (Figure 2), breaking up all soil clods. After all clods are dissolved, stir for 1 minute to thoroughly suspend the soil.

3. Allow 5 to 10 seconds for heavy soil particles to settle.


*Figure 2. Mix 100 cc of soil with 2 quarts of water for 1 minute after all clods are broken up by hand.*


*Figure 3. Pour liquid-soil suspension through a 20-mesh sieve nested on a 60-mesh sieve.*

4. Pour 95 percent of the liquid suspension through a 20- or 30-mesh sieve nested on top of a 60- or 80-mesh sieve (Figure 3). Leave 5 percent of the liquid with the soil residue. Do not dump excessive soil on the sieves.

5. Again, add 2 quarts of water to soil residue, stir, allow 5 to 10 seconds for soil particles to settle, and pour the liquid suspension through the sieves. Again, leave 5 percent of the liquid with the soil residue.

6. With the sieves still nested, rinse the top sieve to free any cysts from debris, take sieves apart, backwash and discard debris from the top sieve.

*Figure 4. Tilt 60-mesh sieve to 45-degree angle to wash cysts down to bottom edge.*


*Figure 5. Backwash cysts into a beaker with a squeeze bottle.*

7. Gently rinse the bottom sieve to remove the fine debris and then tilt it to a 45° angle (Figure 4) to flush the cysts and remaining debris toward the bottom edge. Use a gentle stream of water from a squeeze bottle or a hose to backwash the cysts into a beaker (Figure 5) or smaller clear plastic dish (e.g., a petri dish).

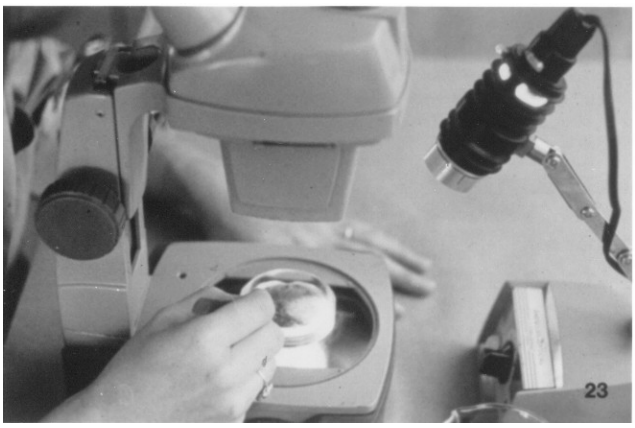


*Figure 6. Count cysts at 15X using a dissecting microscope and an above-stage light source.*

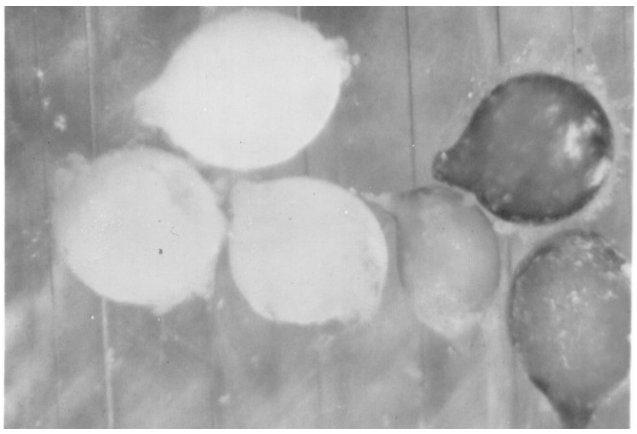

*Figure 7. Varying shapes and colors (white, yellow to dark brown) of cysts as seen at 30X.*

8. Use a 15 to 30X microscope (Figure 6) with an above-stage light source to count cysts (Figure 7) in the petri dish and identify as gravid (containing eggs or larvae) or nongravid. To check if cysts are gravid, crush several of them with a dissecting needle or forceps. Gravid cysts will have 20 to 400 white, shiny, and plump eggs (Figure 8). Worm-shaped larvae that have hatched from the eggs may also be present. Nongravid cysts will often be indented and the larvae or eggs, if present, will be dull, transparent, or shriveled. Counts can be classified into one of four categories:

   a) no cysts.
   b) only nongravid cysts (without eggs or larvae) present as determined by crushing.
   c) less than 3 gravid cysts or less than 150 eggs or larvae present.
   d) three or more gravid cysts or more than 150 eggs or larvae present in 100 cc of soil.

9. If your results are classified as “a” or “b”, susceptible soybeans may be planted; if “c” or “d”, an egg count needs to be conducted (see 10 below), preferably at a reputable diagnostic clinic; or if “d”, economic damage is probable and control measures should be implemented.

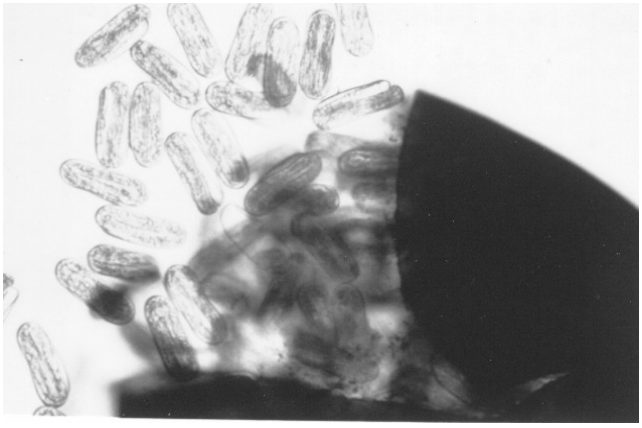

*Figure 8. Eggs (elongated oval structures) from a broken cyst (dark structure).*

*Figure 9. Use an eyedropper to place cysts in a clean dish with water. Break cysts and count eggs.*

10. For egg counts, either all cysts (if "c") or at least 10 percent of cysts (if "b" or "d") should be crushed in a drop of water in a clean dish (Figure 9). Greater than 150 eggs per 100 cc of soil may indicate a potential economic problem. Therefore, if 150 eggs were counted when all the cysts were examined, or if 15 eggs were counted when 10 percent of the cysts were examined, economic injury is probable and control measures should be implemented.

11. If available, also record data on cropping history, soybean cultivar, and cultivar resistance to cyst nematode races. This information will assist you and us in devising control measures and strategies. This information should also be included with soil samples submitted to a diagnostic clinic. The use of the Nematode Soil Sample Form on page 6, or one similar to it is highly recommended.

12. Whenever in doubt about an analysis or its interpretation, call either (217)244-2011 or (217)333-0519 (Plant Clinic) for help, or submit samples to: Plant Clinic, 1401 W. St. Mary's Road, Urbana, IL 61802.

13. The above procedure will produce accurate data if the soil samples are both truly representative and analyzed according to the above procedure. The person(s) collecting and analyzing the samples are therefore responsible for the results and their accuracy. the University of Illinois, the Cooperative Extension Service, and the authors are not responsible for results, recommendations, or actions based upon the use or misuse of the above procedure.

EQUIPMENT FOR ANALYSIS

1. Sieves, laboratory, full height, 8" diameter, brass or stainless steel.

   a. 20- or 20-mesh
   b. 60- or 80-mesh

2. Stereoscopic (dissecting) microscope with 15 to 30X magnification and an above-stage illuminator or microscopic lamp.

3. Plastic buckets, 8-quart size. available locally at many stores.

4. Forceps and/or dissecting needles.

5. Plastic petri plates or other shallow, clear dishes that can be easily grid-marked for counting cysts.

6. Wash bottles, squeeze type, polyethylene.

Sources for procuring the above-mentioned equipment and supplies can be obtained by contacting the Extension Nematologist in the Department of Crop Sciences at the University of Illinois.

UNIVERSITY OF ILLINOIS
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Clinic No(s).

# NEMATODE SOIL SAMPLE FORM

University of Illinois at Urbana-Champaign
PLANT CLINIC, St. Mary's Road, Urbana, IL 61802
(217) 333-0519

Submitted by _____ Date of Sampling _____

Address _____ Total Acres Sampled _____

County _____ Date Submitted _____

Phone _____ Date Received _____

| Clinic Numbers | Your Sample Number | Soil Type | Present Crop | | Previous Crop | | Crop 2 yrs ago | | Next Crop To Be Grown | Past Nematicide/ Insecticide Treatments | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Crop | Variety | Crop | Variety | Crop | Variety | | Year | Chemical |
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**Circle Appropriate Information**

Distribution of Symptoms: Scattered Clustered in Spots Uniform

Association with Terrain or Soil Type: Yes No

Weather Conditions Prior to Symptom Development:

Rainfall: Low Medium High Temperature: Low Medium High

Soil Test Information or Fertilizer Application: 2 yrs past_____ 1 yr past _____ Current yr _____

Herbicides Applied This Year _____

COMMENTS:

| For Lab Use | Soil | Roots | Juveniles | Cysts | Comments: |
|---|---|---|---|---|---|
| Date Processed | | | | | |
| Date Read | | | | | |