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Sampling for Soybean Cyst Nematode (SCN)

By Dale Cowan, CCA-ON

Sampling for Soybean Cyst Nematode (SCN) is an important part of managing this pest.

Controlling the build-up of threshold levels is a major strategy in pest control. Before you can manage, you need to measure the size of the population. Yield loss is insidious, as populations build yield loss increases however this can take years. Growers may be experiencing a slight yield depression for years and may blame seed vigor, varieties, tillage practices, soil fertility and weed control when in fact it may be the continuous build-up of SCN populations.

A SCN is a plant parasite, a microscopic round worm. The infective stage is the juveniles (worm) that hatches from eggs that were contained in the cyst. The juveniles penetrate the soybean root and cause the formation of specialized feeding cells in the plants phloem system. If the juvenile is male it will feed for awhile then leave and cause no further damage. If it is a female, it stays and grows until it forms an oval shape protrusion from the root. The head stays in the root and the body is what we see on the root surface. Plant damage is done by the females feeding on the root. As the females age, they turn from yellow to brown at time of death. The brown stage is the cyst which can contain up to 500 eggs. The cyst protects the eggs from the environment. The eggs eventually hatch to start the cycle over again. Up to six generations can be produced per season depending on planting date, soil temperature and maturity range of the soybeans.

The yield impact of SCN is manifested in many ways. Infected plants have water and nutrient uptake disrupted. The impact is directly related to the number of SCN on the roots. The number of nitrogen fixing nodules can be reduced lowering the plants ability to fix nitrogen. Root extension and absorbing surface area is reduced lowering the ability of the plant to take up sufficient P and K and other non-mobility nutrients such as manganese.

Plants become chlorotic, losing their ability to photosynthesize sufficient sugars for growth. Dwarf stunted plants with fewer pods and seeds per pod are the usual symptoms of a high infestation level. The reduction in the

number of seed pods and also seeds per pod are a result of reduced plant development and the plant's decreased ability to handle stress due to SCN infestation.

Sampling

Sampling for SCN can occur at any time, however, the preferable time is when the fields are still in soybeans in late August. This is when the SCN numbers tend to be the highest. Fall sampling takes the pressure off turnaround time at the laboratory and affords managers ample time to evaluate results, choose varieties and come up with crop rotation strategies to mitigate build up of SCN.

The sampling procedure is much the same as regular fertility testing. Randomized zigzag pattern, keep soil textures separated and submit them separately. Sample at six to eight inch depth, take 10 to 20 cores per sample, and bulk them together into a composite sample. Keep the sample cool and out of direct sunlight, fill the laboratory container, and complete the submission forms clearly indicating "SCN" test. The most likely areas to start sampling are entry points to fields, areas subject to deposition of soil from wind and water erosion, low yielding areas from yield maps and high pH field sections. Submit a separate sample for fertility determination.

On severely infested fields, there are hotspots that are very tempting to sample and submit for analysis. Often times the expected massively high numbers are not found and farmers question the validity of the SCN test.

The proper way to test hotspots is not in the center of the poor areas but rather on the edge of the trouble spot where it transitions into "good"

soybeans. At the center of the hotspot, the populations are usually below threshold because the damage is done and there is insufficient root mass left to support the SCN. The population has crashed because of lack of food source. The periphery is where the roots and the food source are sufficient to support high populations.

Fields can be variable in the SCN number. Hundreds of eggs are in the cyst and cysts and are immobile. Overwintering survival can vary, soil moisture, soil pH, and sampling hotspots incorrectly all contribute to fluctuating numbers. Soils with pH consistently over 7.0 tend to support higher populations than pH areas of 5.9 to 6.5. Soil movement such as erosion, and movement by tillage and harvesting equipment can also be vectors for transient populations.

Positive Test Results

If SCN cysts and eggs are detected, at any level, then a rotation scheme that incorporates non-host crops and resistant varieties needs to be followed. If nothing is done, yields of susceptible varieties will be reduced and SCN populations will increase rapidly. The year following detection, it is best advised to plant a non-host crop that will reduce the population. For example, when a preplant SCN egg count exceeds 50 eggs per 100 grams of coarse textured (sandy soils) or 100 eggs per 100 grams of fine textured silt (clay soils) a resistant variety should be planted. A simpler approach would be to use SCN resistant varieties in all fields that the nematode has been detected.

The following table rates your SCN risk and potential yield loss based on SCN population levels.

SCN Population (Eggs per 100 grams of soil)	RISK Rating	Potential Yield Loss	Rotation
0 - 500 (Coarse Sandy Soils)	LOW RISK	0 to 20 %	4 Year
0 - 1000 (Fine Textured Silt or Clay)	LOW RISK	0 to 20 %	4 Year
> 1,000 (Coarse Sandy Soils)	HIGH RISK	20 to 50 %	6 Year
> 2,000 (Fine Textured Silt or Clay)	HIGH RISK	20 to 50 %	6 Year
> 10,000 (all soil types)	Resistant Variety May Be Damaged	50 to 100 %	Non-Host

(Source: Welacky, Anderson and Tenuta)

Summary: If you are a soybean grower and have never tested, start testing for SCN this August. If you have sampled before and two years or more have passed, it is time to do it again and then every three years after that.

Determine an effective strategy based on the direction of SCN population growth from past samples. First time samplers will need to form a strategy based on initial threshold values. Plan for the wise and judicious use of resistant varieties and an appropriate crop rotation, and adopt the already known best management practices for high yield soybeans. Your local Certified Crop Adviser is ready to help.

References: SCN Management Guide NCRSP

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