

Soybean Cyst Nematode - Part II – Management Options

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Once established, soybean cyst nematode (SCN) is nearly impossible to eliminate. Crop rotation is the most effective way to manage SCN. Fortunately, many non-host crops like small grains, corn, canola, sunflowers and sugarbeets fit northern crop rotations (Table 1). One or more years of non-host SCN crops is recommended between soybean crops if SCN hasn't been detected in a field. If SCN is identified in a field, the number of non-host crops in the rotation depends on the population of SCN. For example, corn is a non-host crop, University of Minnesota research shows that 20-80% of the SCN egg population will remain, based on the impact of environmental conditions. It may take several years to reduce a population that exceeds the economic threshold to level where soybeans can be grown without significant yield loss. In most cases, one year of corn is insufficient to reduce established SCN populations to sub-economic loss levels that won't damage susceptible soybean varieties. Populations can rebound quickly if a susceptible soybean variety is grown on infested soil.

The SCN management plan will have to include SCN resistant varieties in addition to crop rotation once SCN populations reach yield-limiting thresholds. A limited number of SCN resistant soybean varieties adapted to northern production areas. Nearly all of these varieties have the PI- 88788 SCN resistance gene which is effective against the Race 3 SCN in this area. NDSU conducts annual variety tests on SCN infested soil which provides growers with the best indication of how varieties will perform under SCN stress. (www.ag.ndsu.edu/pubs/plantsci/rowcrops/a843.pdf) Although all of the varieties may have the same SCN resistance gene, performance can vary based on the soybean genetics matching the soil and environmental characteristics of individual fields. In addition to yield performance, growers must be aware of how SCN-resistant varieties affect SCN reproduction. Not all varieties that yield similarly reduce the SCN population equally. High yielding varieties may still allow substantial nematode reproduction. The University of MN conducts variety trials and rates SCN varieties SCN resistance based on the reproductive index (RI) which is calculated by dividing the egg count after R6 by the egg count at planting. Varieties with a reproductive index of 0.5 or less are generally considered resistant (www.soybeans.umn.edu/crop/variety/State_Trials/index.htm).

There are other resistance genes (Peking, PI-209332, CystX[®]) used in varieties where SCN has been established for some time, have multiple SCN races or have developed resistance to PI-88788. A new discovery from Kansas State University has recently patented a unique way to inhibit genes necessary for SCN to survive. Several companies are working on biotech solutions to nematode problems in corn and soybeans.

Any successful SCN management plan will incorporate options that limit the environmental and pest stresses that interact or exacerbate SCN stress on soybeans. SCN is known to interact with seedling and foliar diseases as well as IDC. High pH soils favor SCN and IDC. Compaction can result in more intense effects of SCN. Optimum soil fertility contributes to stress reduction, particularly potassium to help promote early development and facilitate aphid management. Seed treatments with active ingredients to reduce disease and insect stress on seedling vigor will help soybeans tolerate SCN feeding damage.

Foliar protection from soybean aphid and foliar diseases during flowering and pod development (R2-4) promotes stress reduction at a critical stage of development.

Seed applied nematicides may be a way to supplement crop rotation in an integrated management plan for SCN. Novel products have been registered for nematode control in soybeans and corn. VOTiVO™, a seed treatment from Bayer, has a unique mechanism of action. VOTiVO is a bacterium that grows in association with the soybean root system and competes with nematodes for access to roots. The bacteria consume root exudates which nematodes use as a food source as well as a mechanism to locate soybean roots. Although VOTiVO doesn't kill nematodes it prevents them from infecting soybean roots which limits damage to soybeans. Avicta is a seed treatment from Syngenta that contains the active ingredient abamectin. Abamectin interferes with the signal transmission between nerve cells inside the nematode which kills the nematode upon contact. Avicta has low soil mobility and is non-systemic in the plant and offers early season protection. More field experience is needed with both products to determine the level of effectiveness and the impact on integrated management of soybean nematodes.

Soybean producers in ND and northwest MN should be most concerned with finding fields infested with SCN and be aware of management options to prevent the rapid dispersal of SCN that is possible in the RRV production area. A management plan should consider:

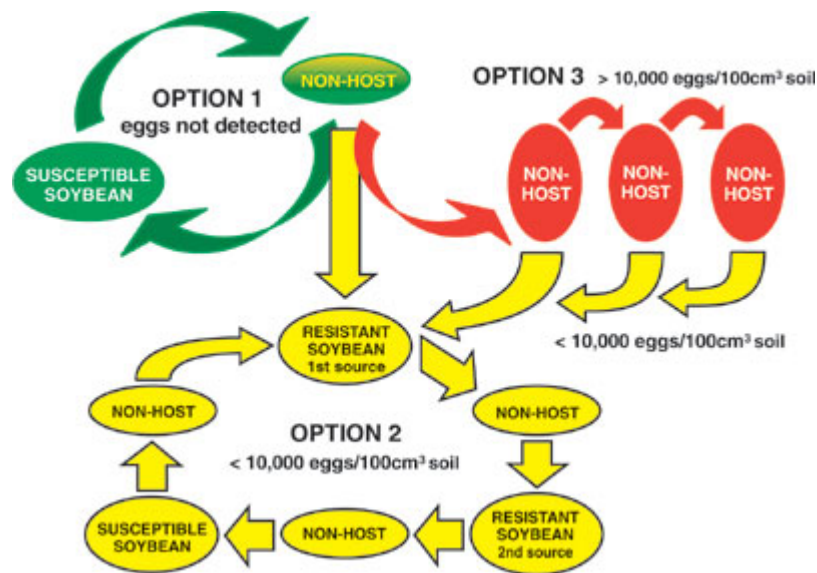
- Implementing a soil and plant sampling procedure to determine if fields are infested and monitor population levels.
- Planning crop rotations that integrate non-host crops with soybeans to prevent establishment or intensification of SCN (Figure 1).
- Managing soybean stress factors to limit the potential impact of SCN which includes seed treatments, fertility, insect and disease pests in addition to optimum planting and harvest dates.
- Planting SCN-resistant soybean varieties adapted to local production conditions for optimum yield, if SCN infestations warrant use.

Table 1. Host/non-host crops and weeds

Poor or Non-Host Crops	Host Crops	Host Weeds
Alfalfa	Soybean	Chickweed
Barley	Dry edible bean	Common mullein
Oats	Snap bean	Henbit
Wheat	Pea	Hop clovers
Canola	Common & hairy vetch	Milk & wood vetch
Sugarbeets	Crimson clover	Mouse-ear chickweed
Sunflower	Sweet clover	
Corn	Cowpea	
Potato	White & yellow lupine	
Sorghum		

Adapted from – The Soybean Cyst Nematode; UMN Extension publication FO-03935-S. S. Chen, J.E. Kurlle & D.A. Reynolds.

Figure 1. SCN management scheme.



Source – The Soybean Cyst Nematode UMN Extension publication FO-03035-S by S. Chen, J.E. Kurlle & D.A. Reynolds.

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