MEASURE AND MANAGE

Sampling and Managing for Soybean Cyst Nematode

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Sampling for Soybean Cyst Nematode (SCN) is an important part of managing this pest. SCN was most likely introduced into North America in the 1800's in soil imported from the Orient for purposes of isolating soybean inoculants to nodulate soybean roots. It may have spread from research stations over time as bacterial strains for nodulation were being developed from this contaminated soil. In hind sight it certainly drives home the point how innocently and easily contamination can happen when intentions are good. Nonetheless SCN is here and we need to manage the field population of this pest. Controlling the buildup 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. This can take years. Growers maybe experiencing 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.

SCN is a plant parasite. It is a microscopic round worm. The infective stage is the juveniles (worm) that hatches from eggs 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 a while then leave and cause no further damage. If it is a female it stays and grows in size to where it cannot stay in the root and an oval shape protrudes. The head stays in the root the body is what we see on the root surface. Plant damage is done by the females feeding on the root. As the female ages 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 eggs from the environment. The eggs eventually hatch to start the cycle over again, up to 6 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-mobile nutrients such as manganese.

Plants become chlorotic losing there 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. SCN themselves do not reduce seed pods or seeds per pod but rather their impact on plant development and the plants ability to handle stress.

The impact of SCN on plant disease may be related. Plants that are infected with SCN tend to also be more affected by Sudden Death Syndrome and Brown Stem Rot. Whether or not it is a direct link is unknown however feeding sites on roots can be points of entry for a host of soybean disease complexes. Fields where disease incidence is increasing may very well be fields with increasing nematode populations. It is important to measure the SCN population the producer may be making varietal selections based on diseases when in actual fact it maybe SCN influencing the expression of diseases. Look after SCN fist.

Sampling

Sampling for SCN can occur at any time. However the preferable time is when the fields are in soybeans. Sampling can be done 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 zig zag pattern, keep soil textures separated and submit them separately. Sample at 6 to 8 inch depth take 10 to 20 cores per sample bulk them together into a composite sample, keep them cool out of direct sunlight, fill the laboratory container, and complete the submission forms clearly indicating “SCN” test. (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 expectation of massively high numbers is 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 are and the food source to support high populations.

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

Managing SCN Populations

To manage for SCN involves a strategy of stress relief. Crop rotation of non-host crops, wise use of SCN resistant varieties, weed control and fertility management are part of the strategy required.
Crop rotation to non –host crops provides for a decline in population numbers. This is why sampling is so important it is the report card on how successful you are in reducing SCN populations. Knowing the direction of SCN population growth then determines the need for SCN resistant varieties. Resistant varieties are used as part of a control strategy but their use needs careful management if you grow them too often you may increase selection pressure and shift the race of your SCN population in your fields to the point where the genetics may no longer be effective. Again sampling to know your population number helps to determine if your strategy is effective. We need to preserve the genetics .of these resistant varieties and use them in the crop rotation wisely.
Weed control is one less stress to negatively impact on yield formation, spray early. Soil fertility is often overlooked on soybeans. The corn in the rotation often receives the fertilizer and the soybeans feed on the reserves. The issue here is the cut back on corn fertilizer applications which will eventually impact on soybean yield. Growing soybean on single digit P soil test and double digit K tests leaves little margin for error when weather and management related stresses occur.

Summary
If you have never tested, start testing for SCN this fall. If you have sampled before and 2 years have passed, it is time to do it again and every 3 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 to for wise and judicious use of a crop rotation and resistant varieties and the already known best management practices for high yield soybeans. .

See article number 74 - ***Interpreting your AgTest SCN Report.***