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Plant Pathology Fact Sheet

2008-09 Soybean Cyst Nematode (SCN) Management Recommendations for Kentucky

Donald E. Hershman
Extension Plant Pathologist

How to Interpret and Use the Results of SCN Soil Analyses

The SCN soil analysis result which accompanies this publication, along with the information below, can help you determine your production options for the specific field represented by the sample you submitted for SCN analysis. Assuming the sample collected and submitted to the SCN Laboratory was representative of the field situation, the number of SCN eggs per ½ pint (approx 250 cc dry basis) of soil, as determined for the sample, is a reasonable indicator of the potential impact of SCN on soybean yield, assuming that a SCN-susceptible soybean was planted. Use the table below to determine the yield loss potential for the field in question. If the potential for yield loss is unacceptable, seek other options, such as planting a SCN-resistant soybean or a non-host crop. The use and limitations of those options is outlined below.

SCN eggs per ½ pint of soil	Potential yield loss of a SCN-Susceptible variety*
0	0%
1 – 500	0 – 5%
501 – 1000	5 – 15%
1000 – 3000	15 – 20%
3001 – 5000	20 – 40%
5000 +	25 – 60%

***Note:** *A greater yield loss potential is associated with crops being impacted by other stresses, such as other pests, drought, herbicide injury, etc. Healthy crops are capable of compensating for some SCN damage; thus, the lower yield loss potential at the same SCN population. Thresholds are based on the best available information. Actual yields achieved at specific SCN levels may vary from the above due to the occurrence of random factors that impact crop yield, both positively and negatively.*

Management Options

SCN-Resistant Varieties

SCN-resistant soybean varieties are an essential tool in the management of SCN. Although some of the early resistant varieties lagged behind susceptible varieties in yield, newer resistant varieties adapted for use in Kentucky do not suffer the same yield penalty. In fact, in the absence of SCN, it is common for modern SCN-resistant varieties to out-yield the best susceptible varieties in university variety trials.

Due to the major emphasis soybean breeders have placed on developing SCN-resistant varieties over the last 15 years, most soybean varieties sold in Kentucky now have some level of SCN resistance. In fact, it is hard to find a Roundup Ready soybean variety that is NOT resistant to SCN. Most of the SCN-resistant soybean varieties sold in Kentucky (and elsewhere) have PI88788 in their pedigree. PI88788 is a black-seeded plant introduction from China that has been used as the main source of SCN resistance in almost all, if not all, soybean breeding programs over the past 20 years. Heavy use of PI88788 is due to its demonstrated effectiveness against historical SCN populations in the U.S. and its ease of use in breeding programs.

There has always been a range of effective SCN resistance in soybean varieties due to differences in the breeding programs. However, most resistant soybean varieties with PI88788 in their background have, historically, performed well in Kentucky. Preliminary data now suggest that many SCN populations in Kentucky (and elsewhere) are adapting to PI88788. This simply means that many of the populations of SCN we now encounter may have some ability to reproduce on PI88788-based resistant varieties. In order to retain the usefulness of SCN-resistant varieties over the long term, it is essential to use them properly.

The most important rule to follow is to plant a different SCN-resistant variety each time soybean is grown in an infested field. In other words, do not plant the same SCN-resistant variety two or more times in a row. Failure to heed this warning could result in the development of SCN populations that can damage most of the resistant varieties that are currently on the market. According to current research results from Missouri and Illinois, simply planting a different variety can virtually eliminate this as a possible problem. Regardless of the situation, however, nearly all resistant varieties will out-yield a SCN-susceptible variety if SCN populations exceed the damage threshold (refer to the table, above).

Some newer SCN-resistant varieties are derived from the highly resistant PI437654, which was first made available in the public variety “Hartwig”. Because PI437654 is highly resistant to almost all SCN populations at this time, there is a very good chance that it may eventually displace PI88788 has the main source of SCN resistant in most soybean breeding programs.

Most SCN scientists are discouraging producers from exclusive (or even frequent) use of any variety that is derived from PI437654. The concern is similar to the situation that is now playing out in several states due to overuse of PI88788 as the main source of SCN resistance. There is concern that populations will eventually develop that can reproduce on SCN-resistant soybean varieties with PI437654 in their pedigree. In fact, several SCN populations have already been identified that are capable of reproducing on PI437654. These SCN populations are able to reproduce on ***any and all soybean varieties, regardless of the source of SCN resistance***. In time, this scenario could begin to play out in producer’s fields and it could (at least for the short term) eliminate the value of resistance in managing SCN.

Admittedly, the probability of this happening is low, and would take widespread adoption and years of use of PI437654 resistance for that scenario to become a reality. Still, most SCN scientists have opted to take the conservative approach because of the catastrophic consequences of developing widely distributed "super populations" of SCN capable of reproducing PI437654.

Non-Host Crops

Alternating non-host crops with different SCN-resistant varieties, and occasionally planting a SCN-susceptible variety, **is** the basis of an effective, long-term SCN management program. Planting a non-host crop, such as corn, alfalfa, or forage grasses, reduces SCN populations by 50% to 80% in Kentucky, depending upon the starting SCN population and the soil conditions during the growing season and post-season periods. Populations may be further reduced by planting a resistant variety.

SCN-Susceptible Varieties

In the past, many SCN scientists recommended that producers periodically plant SCN-susceptible soybean to reduce the potential for SCN population shifts to occur in fields. The theory is that occasionally allowing for unrestricted nematode reproduction (i.e., on a susceptible variety) promotes genetic diversity and stability within the SCN population. The idea is similar to the reason why non-Bt corn refuge must be planted when growing Bt corn for the control of European corn rootworm. Not all nematologists are in agreement that planting a susceptible variety is necessary, or effective, for managing SCN; however, some continue to make this recommendation. I am presenting it here as an option to consider. Never plant a susceptible variety when the SCN populations are high enough to reduce yields, as per the above table.

Cultural Practices

Providing a crop with the best possible growing conditions will reduce stress and limit yield loss due to SCN. Maintain optimum soil fertility to optimize plant growth and development, and control weeds and other pests to reduce overall plant stress.

Nematicides

Nematicides are recommended only when a producer cannot rotate to a non-host crop or when SCN populations cannot be controlled with available resistant varieties. It is a "last resort" option because of high cost, safety concerns, and inconsistency in results.

(Revised June 2009)