



A survey of plant parasitic nematodes of soybeans in Delaware and Maryland 2019-2021

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Nematodes in the Mid-Atlantic

- SCN is considered the most yielding limiting disease in soybeans and is prevalent in Delaware (DE) and Maryland (MD) (Figure 1).
- Previous regional surveys showed elevated reproduction of SCN, but focused solely on SCN.^{1,2}
- This survey recovered 8 species, primarily SCN, RKN, and Lesion nematodes across 311 samples (Table 1).



Figure 1: Field with areas of soybean stunting due to SCN.

Site Selection & Sampling

- Survey sites spanned 12 counties in DE and MD (Figure 2).
- Locations included sites with a history of nematodes and fields for diagnostic screening
- 20-30 soil cores at a depth of 10-15 cm were collected per sample location (Figure 3).
- Samples were processed at the North Carolina Department of Agriculture Nematode Assay Lab.

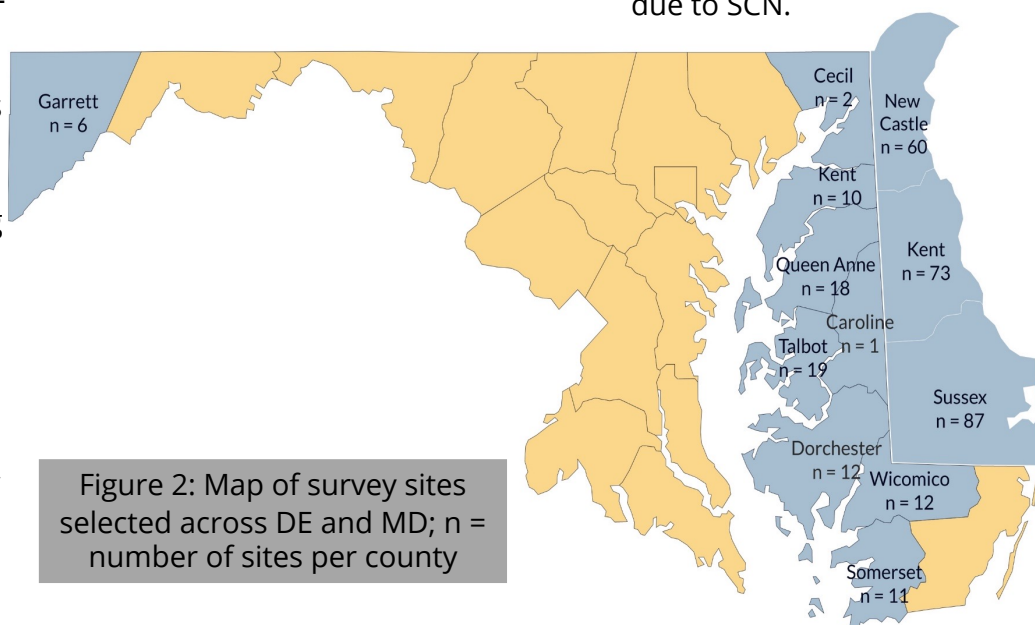


Figure 2: Map of survey sites selected across DE and MD; n = number of sites per county

SCN in DE & MD

- SCN was recovered from 53% of all samples taken across DE & MD.
- 66% of samples had SCN populations above the high EDT (> 60 per 500 cc soil).
- Wicomico (100%), Talbot (73%), Sussex (71%) and Kent, DE (69%) had highest recovery rates for SCN.
- Wicomico, Somerset, Dorchester (100%) had the highest number of samples with populations above the high EDT.
- SCN continues to be an issue across the peninsula.

Table 1: Percent of soil samples testing positive for nematodes

Number of Nematode Taxa	Number of samples (% of total samples)
0	25 (8.0)
1	6 (1.9)
2	82 (26.4)
3	66 (21.2)
4	73 (23.5)
5	17 (5.5)
6	36 (11.6)
7	6 (1.9)
8	0 (0)
9	0 (0)
Total	311 (100)



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RKN in DE & MD

- Root-knot nematode (RKN) was recovered from 18% of all samples (Figure 4).
- Wicomico (62.5%), Somerset (33%), and Sussex (23%) counties had highest recovery rates RKN.
- Queen Anne's (50%), Kent, DE (33%), and Sussex (33%) had the largest percentage of samples with populations above high EDT (>170 per 500 cc soil).
- RKN is not as widespread as SCN but is of concern across many fields in the region.

Lesion in DE & MD

- Lesion nematode was recovered from 57% of all samples, but only 14% of samples were above high EDT (>300 per 500 cc soil).
- Lesion nematode recovery ranged from 0% (Kent, MD) to 100% (Cecil, Caroline, & Wicomico).
- Kent, DE and Dorchester had the highest percent of samples above high EDT (43%)
- Lesion presence was found to be widespread throughout the region.

Conclusions

- SCN, RKN, and Lesion are the most widespread nematode genera impacting soybeans in DE & MD.
- This survey was the first to examine the scope and depth RKN and Lesion nematode infestation throughout the region.
- More work could be done to examine the effect of co-infestation by multiple nematode genera.
- Common management practices for elevated nematode populations include host resistance, crop rotation, and seed treatments.



Figure 3: Soil probe and soil sample bags at the time of planting SCN field trials.



Figure 4: Soybean roots with various levels of galling from RKN.

References

- ¹ Mulrooney R., Gregory, N. 2010. 2009 Soybean Cyst Nematode Survey Results. UD Extension Bulletin #144: 15-17.
- ² Mulrooney, R. Gregory, N.F., Caroll, R.B. 1997. Distribution and diversity of Heterodera glycines in Delaware Proceedings of the Southern Soybean Disease Workers. 24th Annual Meeting. March 15-16, 1997, Fort Walton Beach, FL.



Nematode Soil Sampling in Soybeans

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When and Where to Soil Sample

- When observing unexplained stunting, wilting, or death in crops.
- When planting into a field with a history of nematodes.
- In areas with prior poor performance.
- In fall when nematode populations should be at their peak. While you can sample at any time of year, fall sampling gives the best overview of population diversity and density in soybeans.

Types of Sampling

- Two methods: Predictive and Diagnostic
- Predictive sampling measures the species diversity and population density throughout a field using representative samples. This provides an overview for the field.
- Diagnostic sampling measures species diversity and population density from a singular area of the field, typically the edge of a hotspot or area of unexplained stunting, wilting, or death.

How to Soil Sample

- Collect 15-20, 1-inch diameter cores, 8 inches deep for every 20 acres and mix well into a bag (Figure 1).
- For predictive sampling, use representative samples of an area. These can be collected following management zones in the field or by following a zig zag pattern through the field.
- For diagnostic sampling, take soil cores from the problematic or high-risk area and a nearby better-looking area to compare nematode populations.
- Store samples at 50-60°F) until shipping. Do not freeze samples or add water to samples.



Figure 1: Sampling pattern for predictive samples

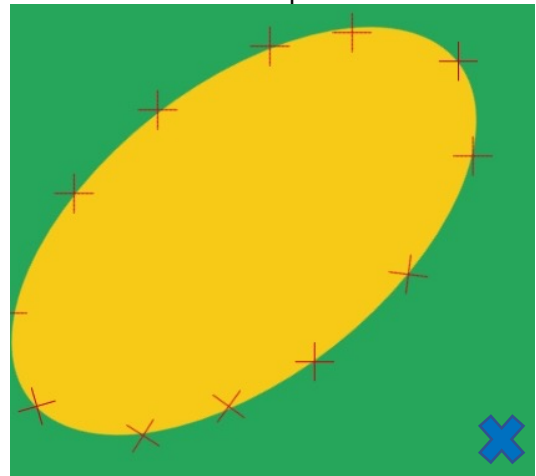


Figure 2: Sampling pattern for diagnostic samples; take on the edges of the hotspots (red) after taking a separate sample from a nearby healthy areas (blue)

References

Barker, K.R., Campbell, C.L. 1981. Chapter 18. In B.M. Zuckerman & R.A., Rhode (Eds.), *Plant Parasitic Nematodes: Volume 3*, (pp. 451-473). Academic Press. ISBN 0-12-782203-8