Distribution and management of soybean cyst nematode, *Heterodera glycines,* in soybean and dry bean fields in New York State

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Introduction

Soybean Cyst Nematode (SCN), a plant-parasitic roundworm, is the pest of greatest economic concern for soybeans and dry beans are also a known host. SCN feeding causes stunting, yellowing, and wilting, and allows soil-borne pathogens into roots. The above ground symptoms are often not present but still result in a 10-30% loss in yield. When symptoms are present, symptoms are often confused with nutrient deficiencies, herbicide damage, and environmental stress, which makes positive diagnosis difficult.

SCN spreads through movement of soil on farm equipment, by wind, through water, contaminated seed or plants, and even through animals such as birds. After feeding and mating, the body of a female SCN will develop into a cyst that houses 200+ eggs. The cyst can survive in the soil for more than 10 years. Once SCN is present in a field it is impossible to eradicate.

Positive identification of SCN requires collection of a soil sample. In 2017, only one county in New York was known to contain SCN. Here, we present results of SCN surveys conducted in 2020 and 2021.

Field with Soybean cyst nematode

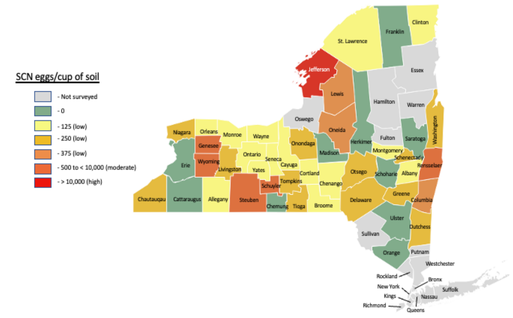
Female soybean cyst nematode in host roots (a) will emerge to form cysts on roots (b). Cysts (c) are distributed within the soil and contain ~200 eggs each.

Materials and Methods

Following harvest, we collected 10 soil subsamples from the top eight inches of soil nearest the root zone within each field, mixed subsamples together, and a pint-sized sample was shipped to SCN Diagnostics in Columbia, MO. Soil was collected from 21 dry bean fields and 186 soybean fields in 46 counties.

Results and Discussion

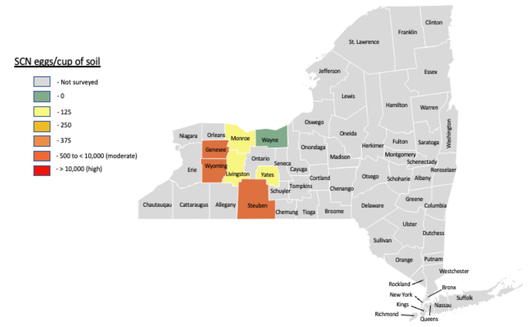
In 2017, only Cayuga county was known to be positive for SCN (in soybean). In 2020, after surveying eight dry bean fields and over 100 soybean fields, 29 counties were known to have SCN. In 2021, an additional 13 dry bean fields and 86 soybean fields were surveyed, resulting in a total of 36 positive counties of the 46 surveyed in both years. Of those 36 counties, six had samples in the moderate or high range for SCN (<500 eggs per cup of soil is considered low, 500-10,000 eggs is moderate, >10,000 is high) and three of those samples came from dry bean fields. Once a field reaches the moderate range, crop rotation is recommended to decrease the SCN levels.



NY map showing the counties surveyed for SCN, in both dry beans and soybeans, and the highest reported egg count for each county.

Discussion and Management guidelines for NY

For SCN as well as other nematodes a strong relationship exists between soil texture and nematode distribution within a field. In the future, we plan to determine whether electrical conductivity (EC) measurements, indicators of soil texture, are a viable option to improve soil sampling and managing of SCN. EC is used to inform management of other nematode pests.



NY map showing the counties surveyed for SCN in dry beans and the highest reported egg count for each county.

Eradication of SCN is impossible, so keeping populations below the economic threshold is the only management option.. Therefore, management to reduce the number below the economic threshold is the only option. There are several management options with crop rotation being the best. SCN has several host crops but rotating away from a known host to corn or another non-legume crop has shown to decrease the SCN levels by 50% the following year. Another option is to clean equipment before moving from a known SCN field to another field. Resistant varieties are only available in soybeans, but certain dry bean varieties are more tolerant to SCN and can be planted in fields with known or suspected SCN presence. The final option is using seed treatments. This can be costly, with benefits seen mainly in areas with high SCN levels.

Acknowledgements

This work was supported by a grant from the New York Dry Bean Industry, the USDA Animal and Plant Health Inspection Service (APHIS) Cooperative Agricultural Pest Survey (CAPS) pest detection program, and the New York Corn and Soybean Growers Association (NYCSGA).
We would also like to thank all the farmers and cooperators that collected soil samples.

Further Information

2020 Soybean Cyst Nematode Survey in Dry Beans project report (https://hdl.handle.net/1813/103764)

Cornell Field Crops Blog post (https://blogs.cornell.edu/whatscroppingup/2020/12/04/soybean-cyst-nematode-the-greatest-threat-to-ny-soybean-production-is-here-to-stay-now-what/)

The SCN Coalition website (https://www.thescncoalition.com/)