Diversity of soybean cyst nematode populations in Kansas

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Introduction

- In the United States SCN is a major pest of soybean (Guo et al., 2006).

- Crop losses of 35-40% have been observed in Kansas soybean fields (Todd, 1993).

- SCN disrupts root function causing decreased plant growth and yield.

- Characterization of SCN diversity provides beneficial information to assist Kansas producers in their management decisions.

Objectives

Characterize the Soybean Cyst Nematode diversity in the state of Kansas.

Materials and methods

Heterodera glycines **(HG) Type test:** The HG Type test is a greenhouse test that uses increased SCN populations collected from Kansas soybean fields under production. This test determines the virulence of the SCN population being tested. Seven differential soybean lines were used in the test plus one susceptible check (cv. Lee 74).

Phenotyping: SCN populations were increased in the greenhouse from Kansas soybean fields with known SCN populations. Following a sufficient SCN population increase, each differential and susceptible check were planted in conetainers in a randomized complete block design with seven replications (Fig.1b). Each conetainer was inoculated at planting time (Niblack et al., 2002) with approximately 15,000 SCN eggs (Fig. 1c). The total number of mature SCN cysts produced on each plant root was counted 5 weeks after infestation (Fig.1d).

Female Index: The female index (FI) is used to determine the susceptibility or resistance of a soybean differential line. The FI = (mean # of cysts on test differential line/mean # of cysts on susceptible check) x 100. A low FI (<10) means that the SCN population was not able to reproduce well on the differential line, and a high FI means that the SCN population was able to reproduce well.
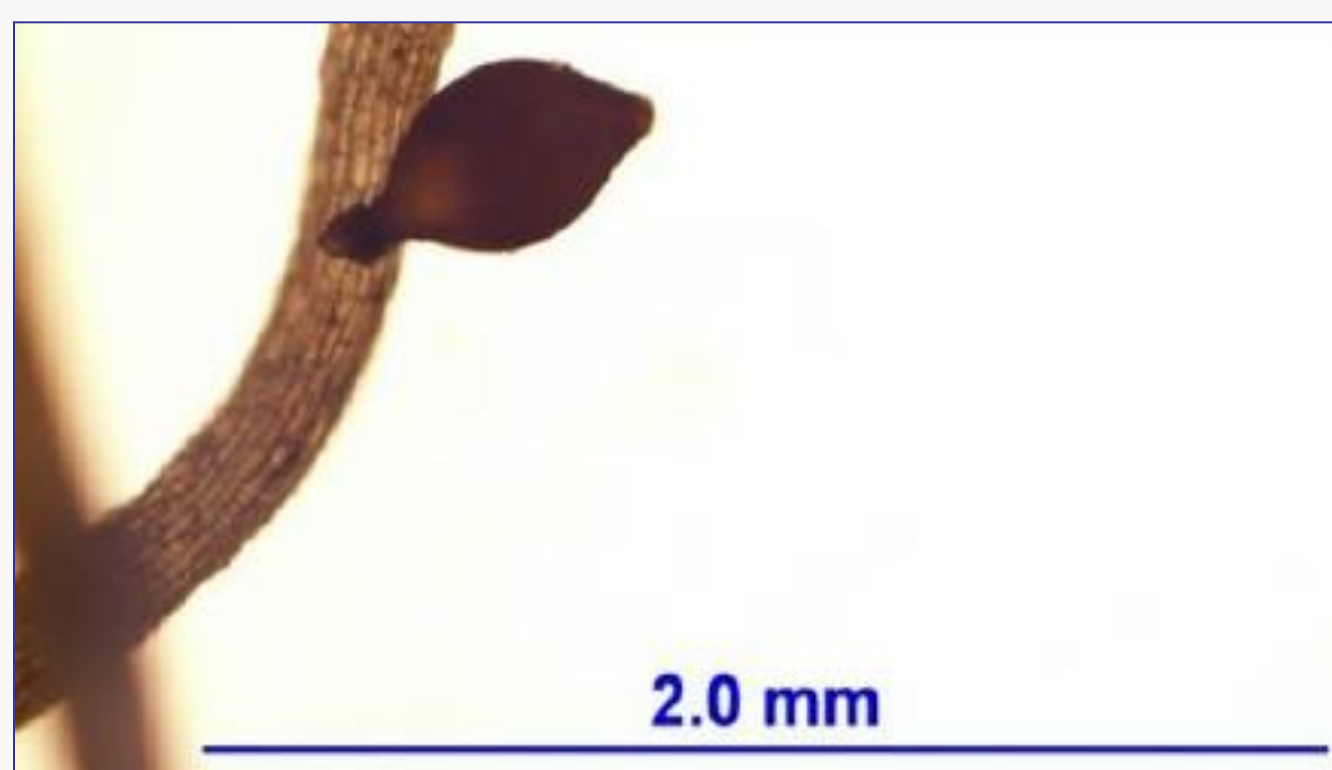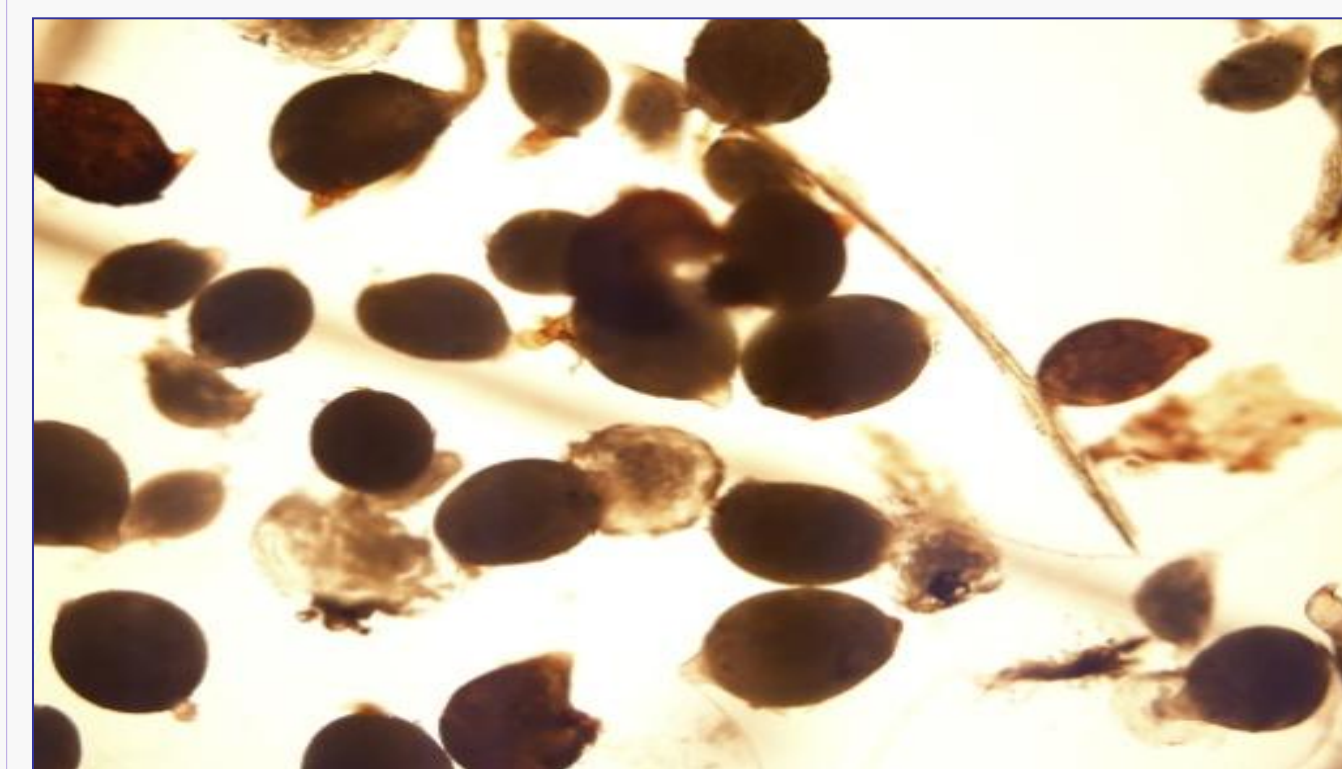

a

b
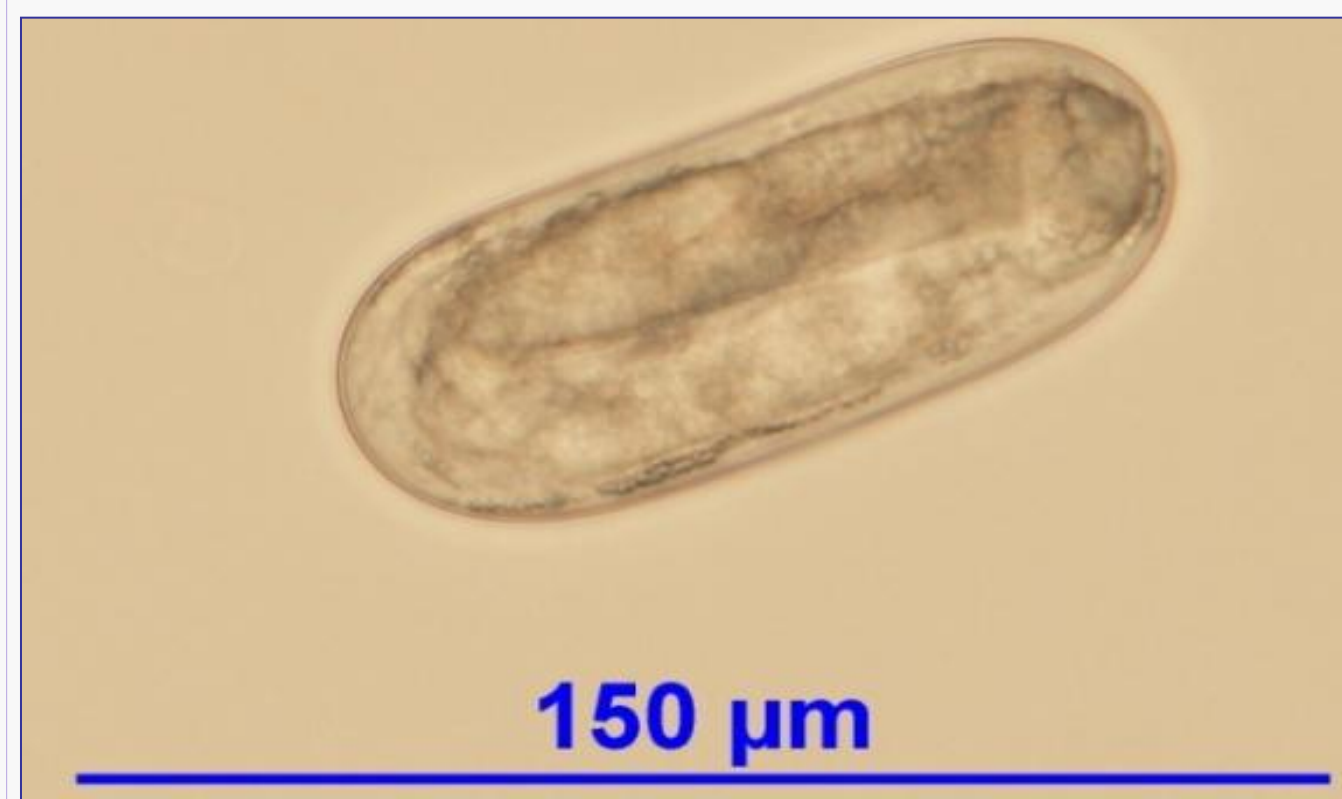
c

d

Fig.1a. Mature SCN cyst attached to soybean root; b. Phenotyping layout in greenhouse; c. Soybean cyst nematode egg; d.Total numbers of SCN cysts on each plant root were counted 35 days following infestation.

Results

Diverse SCN populations: 10 HG Types were observed from all Kansas SCN populations tested. Female indices >10% were observed for all but 2 of the differentials. One-half of the SCN populations had female indices >10% on PI 88788, the most common source of commercial resistance; PI 437654 confers good resistance to all Kansas SCN populations tested to date. Soybean varieties had consistently higher female indices than their resistance sources; HG Type Test results should be used with caution (Fig. 2).

Additional HG Type testing is underway.

HG Type	Number of Populations	% of Total Populations	Mean cysts/plant on Lee (range=459)
1.2.3.5.6.7	2	7.4	149 (120-172)
1.2.5.6.7	2	7.4	222 (46-477)
1.2.5.7	3	11.0	206 (98-320)
1.2.7	1	3.7	1186 (170-201)
1.3.6.7	2	7.4	140 (118-150)
2.3.5.7	1	3.7	94
2.5.7	3	11.0	220 (40-319)
2.6.7	1	3.7	266
2.7	4	14.8	105 (42-186)
7	8	29.6	203 (51-364)

Figure 2. Distribution of HG Types from all locations tested in Kansas.

Conclusions

Soybean cyst nematode populations are diverse across the state of Kansas. PI 437654 confers good resistance to all Kansas SCN populations tested to date.

Future work

Continue SCN characterization due to spread into new fields and counties.

Literature cited

Guo, B., et al. 2006. Quantitative trait loci underlying resistance to three soybean cyst nematode populations in soybean PI 404198A Crop Sci. 46:224-233.

Niblack, T., et al. 2002. A revised classification scheme for genetically diverse populations of *Heterodera glycines*.J.Nematol. 34(4):279-288.

Todd, T., 1993. Soybean planting date and maturity planting effects on *Heterodera glycines* and *Macrophomina phaseolina* in Southeastern Kansas. Supp. J. Nematol. 25(45):731-737.

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