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MPSG FINAL EXTENSION REPORT

PROJECT TITLE: Manitoba Soybean Cyst Nematode Survey 2014/2015

PROJECT START DATE: February 2, 2015
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PART 1: PRINCIPAL RESEARCHER

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PART 2: EXECUTIVE SUMMARY

This report details results of soil sampling and analyses targeted for *Heterodera glycines*, (Soybean Cyst Nematode; SCN), conducted in 2014-2015, in the Province of Manitoba, Canada. *Heterodera glycines Ichinohe*, 1952, is recognized as the major pest of soybean (*Glycine max*) worldwide. With respect to the importance of soybean cultivation for Manitoba farmers, early detection and precise identification is of significant important. SCN has rapidly moved northward in the mid US states. It is now present in some of the counties Manitoba borders with North Dakota and Minnesota. It is only time until it is Manitoba, if not already. Recently, the Canadian Food Inspection Agency has declassified SCN as a regulated pest in Canada. This means to farmers that surveys for the nematode are not to be done in the future by the agency. In the current study, twenty eight fields were sampled for a total of 205 soil samples analyzed for the presence of SCN. Nematode cysts were recovered from 32 soil samples. The samples yielded one to a few cysts each, with the majority being empty and broken. Further most cysts were round and not lemon-shaped, the later a possible indicator of SCN. Further, most cysts circumfenestrate rather than bifenestrate cone tops, the later possibly indicating SCN. Only six samples yielded DNA suitable for PCR analysis and these were all negative for SCN. With the current and past survey conducted by the Soil Ecology Laboratory, a total of 76 commercial soybean fields in Manitoba have been sampled and are negative for the presence of SCN. Because SCN is near the North Dakota and Minnesota border, it is recommended surveys be conducted every two to three years.

PART 3: EXPERIMENT DESCRIPTION & RESULTS

The current project was initiated between the University of Manitoba, the Manitoba Pulse & Soybean Growers, Manitoba Agriculture, Food and Rural Affairs and the Western Grains Research Foundation to survey for the presence of SCN in Manitoba. In total, 28 commercial soybean fields were sampled with fields more prone to being infested selected. Each field was sectioned into areas that could be responsible for introduction, such as entrance ways, headlands near ditches, depressions, drainage ways etc. The "W' or zigzag pattern was used to sample soil in each section with the samples composited for a section. A total of 205 composite soil samples were obtained. A soil washing unit, a modified Fenwick elutriator based on the USDA soil cyst extractor was used to recover nematode cysts from samples. Five pound of air-dried soil was soaked in water and subjected to cyst extraction with the unit. Floated cysts and debris were collected on a 60 mesh screen. The collected material was dried and cysts recovered by flotation in ethanol.

In total, 32 composite soil samples had nematode cysts. One to a few cysts were recovered from each of the 32 composite samples. This indicates the unlikely presence of SCN because where present, it is in high populations. Cyst identification was performed based on morphology and microscopy and molecular analysis. Most of the cysts were round, damaged and empty but 14 were suitable for microscopic cone top pattern observation and six yield DNA suitable for PCR analysis. Of these cysts, none had bifenestrate cone top patterns possibly indicating SCN and they were negative for SCN by CoxII species specific conventional PCR analysis.

As the survey from 2012 and 2013 conducted by this laboratory, the current one did not find a field with SCN. The recovered cysts are not a concern to be a parasite of soybean or other crop plants. They belong to the genus Cactodera, and possibly Punctodera. These are cyst nematodes but not a pest of soybean or important pests of other crop plants in Manitoba.

PART 4: RELEVANCE TO FARMERS AND FUTURE RESEARCH

The primary target of the current study was soybean farmers in Manitoba. MPSG provided partial funding and communication means to outreach awareness of SCN's damage to yield, how to scout for it, control measures, and about this project's objectives and results to growers. MAFRI supported the project in providing farmer contacts to sample fields. In all, this was a very successful project again showing the synergy of University, a commodity group, Federal and Provincial Governments working to insure the growth of soybean acreage in the Province.

Our continued outreach activities has made more farmers aware of how to scout and identify problems of SCN. Further, the project has encouraged continued evaluation of SCN resistant varieties in Manitoba. The use of these varieties, if continued to show competitive yields to non-resistant varieties, means establishment of SCN in the Province will be slowed. This should result in lower yield loses. Thus the project will allow Manitoba farmers and seed companies to adapt to the presence of SCN and manage the pest to insure the commodity's growth is not restricted by this pest.

It is recommended that surveys for SCN be conducted every 2 to 3 years because at some point the pest will be established. Surveys on fields with many years of soybean crop years and close to the US border is encouraged.

PART 5: COMMUNICATION

The following is a list of published materials featuring results from this project:

1. Tenuta, M., and Tenuta, A. 2015. Slowing the Spread of Soybean Cyst Nematode. Crops & Soils Magazine 48: 28-30.
2. Ag Industry Keen on Biological Enhancements. Alberta Seed Guide, Fall 2015.
3. Soybean Cyst Nematode Co-evolved with Crop. Manitoba Cooperator, August 11, 2015.
4. Microscopic Worms can be Huge Problem. Portage Online. July 27 2015.
5. LIVE! Soybean Cyst Nematode: What to Look for and Prevention. Soybean Management and Research Transfer Day. Carman, Manitoba. July 22, 2015.
6. Soybean Cyst Nematode Inevitable? Western Producer. April 2 2015.
7. Soybean Cyst Nematode is Coming? Top Crop Manager Field Crops. March 2015.

8. Is Manitoba Still Free of Soybean Cyst Nematode? Soybean School. Real Agriculture. January, 2015.
9. Understanding Nematode Pests in Pulse Crops. Pulse Point October 2014.
10. Tenuta, M., Madani, M., and Lange, D. Results of the Manitoba soybean cyst nematode Survey. Poster presentation at the 6th International Food Legumes Research Conference. Saskatoon. July 7-11, 2014.
11. Tenuta, M.. Stalking the Soybean Cyst Nematode in Manitoba: What You Need to Know. Invited presentation to the Manitoba Agronomists Conference. Winnipeg. December 10, 2014