

North American Soybean Rust Monitoring System in Ontario “Early Warning System”

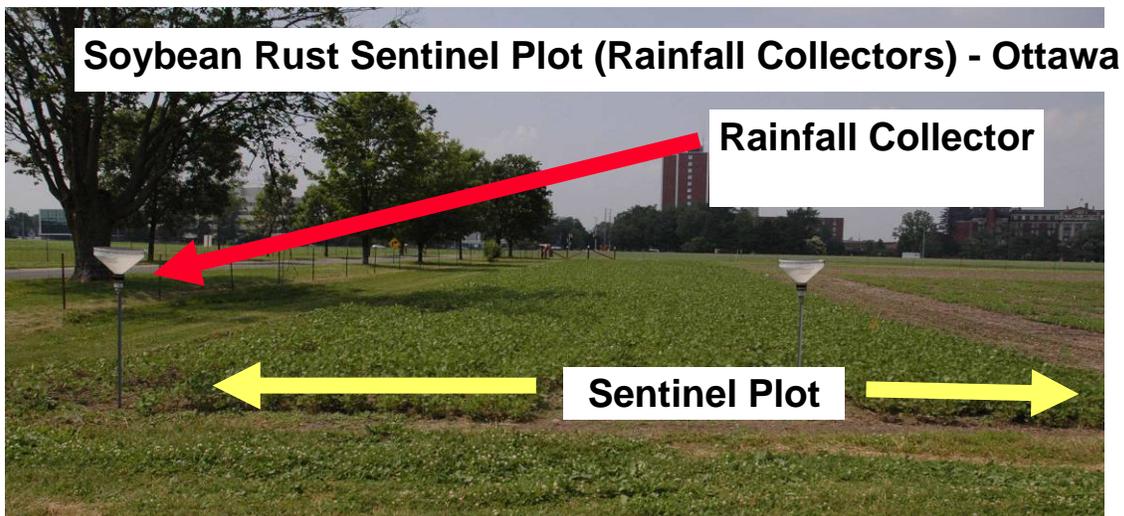
Purpose:

Asian soybean rust (*Phakopsora pachyrhizi*) is a new and invasive fungal disease of soybean in North America and as we found with the first confirmed soybean infection in 2007 (Ridgetown), the disease can occur in Ontario. The establishment of the disease in the southern United States and Mexico continues and like many “new” diseases the overall pattern will take a few more years to determine. The threat of soybean rust has led to unparalleled international cooperation and partnerships and the comprehensive soybean rust “sentinel plot” monitoring program put in place by the United States Department of Agriculture (USDA) and OMAFRA/OSG is one such example. Ontario’s involvement in this innovative network resulted in a series of soybean sentinel plots being established across the soybean production area of southern Ontario (from Windsor to Ottawa). One of the primary functions of sentinel plot monitoring for soybean rust is to create a warning system for early disease detection in soybean production areas. This “early warning” sentinel plot system in conjunction with education, monitoring, spore traps, prediction models, fungicides give producers the tools or weapons needed to track and combat this destructive disease and limit yield losses.

Methods and Results:

Ontario’s involvement in this innovative network resulted in a series of soybean sentinel plots (30 in 2008, 31 in 2007, 38 in 2006 and 44 in 2005) being established across the soybean production area of southern Ontario (from Windsor to Ottawa) and although soybeans were the main focus of scouting activities in commercial fields, other legume crops (such as dry edible beans) were scouted throughout the season.

The majority of sentinel plots were planted 5 to 14 days ahead of most of the grower fields in the areas with the majority having a single planted variety however multiply



variety locations were established primarily on research stations. Varieties were selected based on appropriateness for the selected region. Due to the variation in growing areas within the province, maturity groups ranged from late group two in the southwest to mid group zero in the east.

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Unlike 2007, soybean rust infection was not detected in 2008 on either soybeans from sentinel plots or commercial fields. To date the only confirmed Canadian detection of a plant infected with soybean rust occurred from plots on the University of Guelph Ridgetown Campus in Ridgetown, Ontario, Canada in the fall of 2007. This detection was important since it confirmed that the disease can travel and infect Ontario soybeans. In addition to the intensive monitoring for the disease through the sentinel plots, we continued in 2008 to deploy DNA-based screening techniques and airborne spore detection equipment (rainfall and air) as well. This spore trap monitoring network in was established mainly in Ontario but other provinces (Manitoba, Quebec and



Saskatchewan) were included as well. Samples were collected weekly and screened using the species-specific real-time PCR (qPCR) assay developed by the USDA, and additional confirmatory DNA-based approaches. As in previous years, spore detections began in June with the most noticeable events occurring in mid-July and mid- to late August. Most of the broad detection events (large geographical areas) corresponded to storm front events from the US which suggested long distance transport of the spores.

The information collected from this North American “early warning system” is posted on the Ontario

Soybean Growers website (www.soybean.on.ca) and the USDA soybean rust website (www.sbrusa.net).

Summary:

The sentinel plots and spore trapping networks provide an effective “early warning system” and a decision support tool for producers and advisors considering fungicide applications. A “preventative” fungicide for instance, must be applied prior to the disease establishing and this network provides sufficient lead time. In addition, tracking the disease within the province can assist in the switch from “protective” to “curative” fungicides. The sentinel plot system has proven to be a very effective and successful tool for producers, extension, consultants and the soybean industry.

Next Steps:

Now that we know soybean rust can make it to Ontario and infect our crop, it will be even more critical for Ontario’s participating in the most comprehensive disease monitoring and forecasting program in North America. The sentinel plot network also provided an opportunity to evaluate the protocols and technology transfer mechanisms created. Additional observations made in the sentinel plots included other soybean diseases and soybean aphid population levels which assisted in producer management decisions.

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Acknowledgements:

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The Ontario Soybean Rust Coalition which is a partnership of key soybean stakeholders encompassing extension (government), producer, researcher, equipment and chemical company representatives. These partners are not only committed to collect, compile, disseminate information and resources to tackle this debilitating crop disease but to provide a "unified" voice concerning soybean rust to not only Ontario producers but soybean producers in other provinces as well.

We would like to thank colleagues at the USDA (Minneapolis) (L. Szaebo, C. Barnes and J. Johnson) and all cooperators -growers, retailers, agri-business, retailers, OMAFRA, AAFC, U of Guelph - Ridgetown Campus (R. Gray, D. Fischer and B. Sterling) and many others for their hard work. A special thanks to Dr. Sarah Hambleton and her lab at AAFC-Ottawa as well as Dr. Terry Anderson and his lab at AAFC-Harrow. The cooperative effort is greatly appreciated !

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Location of Project Final Report:

Please visit the Ontario Soybean Growers Website (www.soybean.on.ca), the USDA Soybean Rust website (www.sbrusa.net) and OMAFRA site (www.omafra.gov.on.ca) for more information on the sentinel plots and other soybean rust related materials.