2007 Southern Ontario Soybean Insect and Disease Survey

Purpose:

To monitor for the presence of soybean aphids, soybean rust and soybean viruses in soybean fields in Ontario to provide growers with timely pest information to determine if management is necessary.

Methods:

In 2007, sixty four soybean fields were monitored for soybean insects and diseases across Southern and Eastern Ontario by OMAFRA staff and key consultants. 30 of these sites were soybean rust sentinel plots and 34 were “mobile” sites as described above. Monitored sites were effectively positioned to represent the key growing regions of Ontario and the reduction in the number of sites was not considered to have had an impact the ability to convey relative pest population dynamics across Ontario.

Fields were scouted weekly from May to early September. Also, during the month of August thirty trifoliates were collected from each site, as well as additional random field across the province for virus testing. Plant samples were kept in brown paper bags in cold storage and were sent within 48 hours to AAFC –Harrow Research Station for virus testing. In some fields, insect vector collections were also made in order to test whether they were carrying plant viruses. Virus testing is explained below.

The information collected in the project was included in the Ontario Soybean Growers website (www.soybean.on.ca) and on the US PIPE website (www.sbrusa.net). These maps assisted producers, industry and extension personnel in management of soybean aphid and increased awareness as to changes in population levels within the different regions of the province.

Funding requested through this proposal helped support a research assistant to assist in the collection of field samples, disease and insect monitoring in the summer and validation of thresholds.

Results:

Properly timed surveys help quantify the status of key insect and disease pest species within the province, allowing producers sufficient time for management to take place when necessary. Insect and disease populations continue to increase in the province and therefore so does the potential for increased yield loss and stress in the soybean crop. In addition new invasive species have recently been introduced (e.g. soybean aphids) or are imminent (e.g. soybean rust). With these new pests come other associated issues such as increased soybean viruses which are vectored by insects.

Based on the weekly scouting results, the OMAFRA Field Crop Entomologist and Field Crop Plant Pathologists provided commentary weekly, including scouting and management recommendations for pertinent soybean pest issues that would arise based on the monitoring program. Laresco, a land resource company in London, Ontario provided assistance with the development of these maps for inclusion on the

OSG website. Aphid scouting data were also uploaded onto a mapping program of the USDA Pest Information Platform for Extension and Education (PIPE) at www.sbrusa.net. Timely articles were also written for CropPest newsletter and other media sites to help distribute key pest information to Ontario soybean growers. Yearly results were also presented at various grower meetings and crop conferences throughout the winter months.

Soybean Viruses:
142 commercial fields were sampled and tested, using DAS-ELISA (Agdia Inc.), for the presence of *Alfalfa mosaic virus* (AMV), *Bean pod mottle virus* (BPMV), *Soybean dwarf virus* (SbDV), *Soybean mosaic virus* (SMV), and *Tobacco ringspot virus* (TRSV). Two fields were found positive for AMV, eight were found positive for BPMV, twenty one for SbDV, four for SMV and two for TRSV (Table 1). Many fields were found infested with the bean leaf beetle (*Cerotoma trifurcata* Forster), soybean aphid (*Aphis glycines* Matsumura) and Japanese beetle (*Popillia japonica* Newman). Positive samples will be retested by RT-PCR.

Table 1. Results from the Ontario Virus Survey conducted in commercial fields in 2007.

Virus	# of Fields Testing Positive	Percentage of fields sampled infected (%)
Alfalfa Mosaic	2	1
Bean Pod Mottle	8	5
Soybean dwarf*	21	15
Soybean Mosaic	4	3
Tobacco Ringspot	2	1

** First report of Soybean dwarf in the province of Ontario*

Although we often associate BPMV with bean leaf beetle transmission, 15 Japanese beetle (*Popillia japonica* Newman) collected in soybean fields, were tested for BPMV by DAS-ELISA and were found positive for this virus in 2007.

Soybean Aphid

Figure 1. Early infestation of Soybean aphid infestation on V2-V3 stage soybeans in 2007 in Arva, Ontario.

2007 was an exceptional year as soybean aphids arrived at some locations in Southern Ontario by May 12, 2007, one month earlier than previously experienced since their discovery in 2001 (Fig 1). Only a few locations in North America experienced this early of an infestation, where a few fields reached potential soybean aphid thresholds early within the V3-V4 stage of soybeans. By monitoring early in the season, we were able to capture data that can be further analyzed to determine what impacts this early infestation has on the crop. This early arrival resulted in a longer scouting season for many, with some fields reaching threshold by early August (Fig. 2). A smaller number of fields required more than one application of insecticide after reaching threshold a second time. By the third week of August, most infestations were below threshold, in part due to moderate to heavy levels of predators and parasitoids observed across the province.

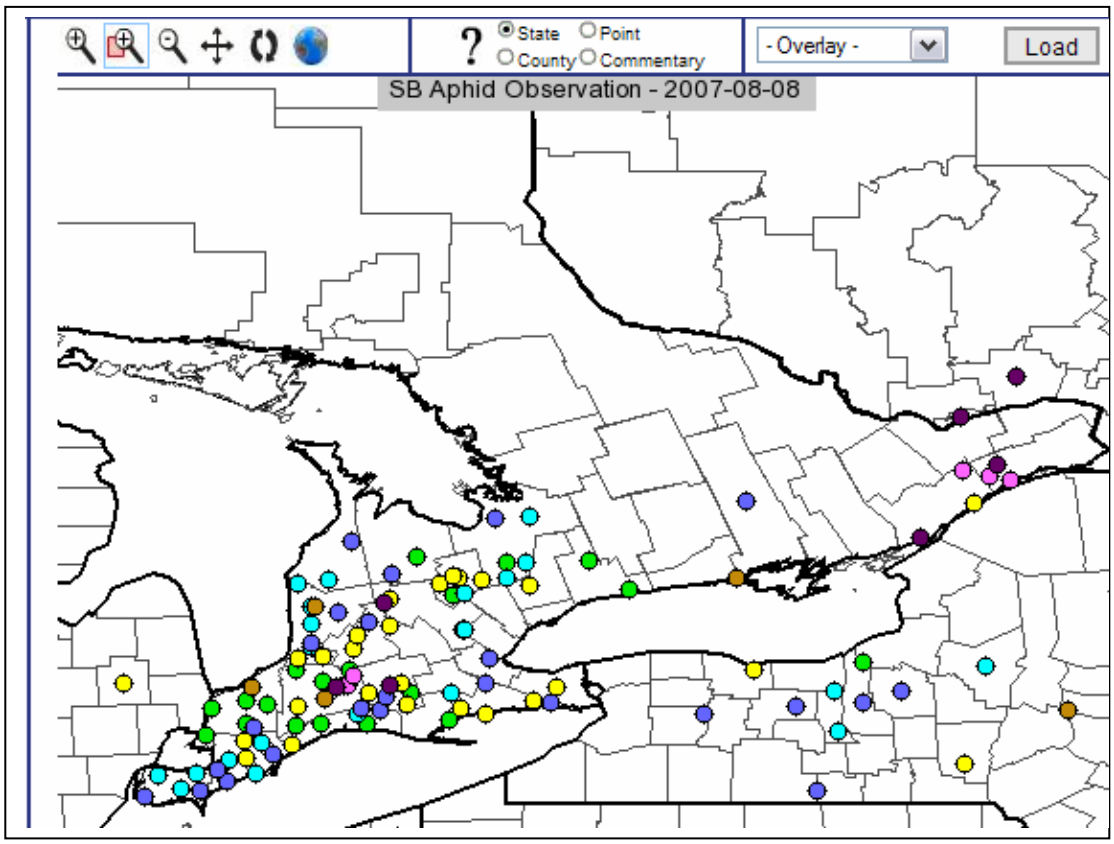

Figure 2. Map taken from the USDA PIPE website (www.sbrusa.net) indicating soybean aphid scouting results in Ontario for the week of August 8th, 2007.

Summary:

In 2007, the number of sites monitored was reduced to 64 soybean fields (30 rust sentinel plots and 34 “mobile” sites). Soybean dwarf virus was the most common virus found in our samples which was the first time this virus was found in Ontario. It was an exceptional year as soybean aphids arrived one month earlier than ever reported before and resulted in a longer scouting season for many, with some fields reaching threshold by early V stages. Though some fields required management, by the third week of

August, most infestations were below threshold, in part due to the extraordinary level of predators and parasitoids observed across the province. Although bean pod mottle virus is known to be mainly transmitted by bean leaf beetles, Japanese beetles tested in this project were found to be positive for the virus as well.

Determining the distribution and corresponding infestation levels of these pests is crucial for effective pest management which in turn, reduces the risk of yield loss for producers. In addition the development of baseline information now can assist us in determining the impacts of climatic change in the future. Without an understanding of the pest problems we presently have and at what levels they occur, it would be impossible to determine what the impact of climatic change or changing agricultural practices (bioeconomy) will have on them.

Next Steps:

Continue to evaluate the economic impact of these and other pests. In addition need to further investigate the pathogen-insect vector interaction (how do insects help spread these virus diseases).

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Location of Project Final Report:

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