

Eastern Ontario Soybean Disease Survey

Purpose:

During the past 15 years, soybean production has expanded dramatically in eastern Ontario and Quebec. Few soybean disease surveys have been reported from these new production areas. A comprehensive disease survey would provide information to producers and ag-business regarding the production problems in the area and could provide basic information for research planning and variety development. The purpose of this survey was to obtain basic information on the incidence and severity of soybean diseases in eastern Ontario and Quebec over a 3 year period to advise agronomists, breeders and growers on diseases that may impact soybean production.

Methods:

Early Season Disease Survey: Soil was collected at 10 random locations at each field in July-August (Ontario) or September-October (Quebec) at a depth of 0-10 cm. Soil samples were stored under cool conditions until processed. Large debris and stones were removed and sufficient soil was crumbled by hand to a uniform texture and soybean seeds were planted into the soil. Soil was maintained in a moist condition for two weeks in the greenhouse prior to planting.

Midseason Stem and Leaf Diseases: Soybean fields were surveyed for mid-season diseases in late July and August depending on year and location. Three soybean plants were collected from each of 10 locations in each field. Plants were cut approximately 15-20 cm from the soil line and placed in plastic bags. Samples were maintained under cool conditions until examined in the laboratory. Ontario samples were evaluated visually for foliar disease and insects. Stem sections from 10 randomly selected plants were removed from the lower half of each stem.

Diseases of Seed: One hundred seed from harvested sample fields were surface sterilized in 1.25% sodium hypochlorite for 3-4 min, plated on selective media at the rate of 5 seed/petri dish. After 7-10 d incubation, fungi were identified. A seed was considered germinated if the radicle length exceeded the length of the seed.

Results:

P. sojae was isolated from eastern Ontario soil samples in 2001 and 2002. In 2001, 13 isolates were obtained whereas 59 isolates were isolated in 2002 from the soil samples. For a list of these isolates and the resistance genes that they can infect refer to Table 1 in the section "Limiting Losses to Phytophthora in Ontario and the U.S. North Central Region". *Phytophthora sojae* was found in 43 and 47% of Quebec soil samples in 2001 and 2002, respectively and 15 and 42% of Ontario samples in 2001 and 2002, respectively. The percentage of plants that died after emergence (% dead plants) in samples from which *P. sojae* was isolated was slightly higher in Ontario samples than Quebec samples although *P. sojae* was not isolated from all plants. This suggests that Ontario soils may have higher populations of other unidentified pathogens for example *Fusarium* spp. And *Pythium* spp. Mid Season foliar and stem disease incidence can be found in Table 1 and 2. Pathogens isolated from seed can be found in Table 3.

Table 1. Incidence of foliar disease on soybeans in eastern Ontario, 2001-2002.

Year	Disease / Insect	Plants infected %	Range %	Fields infested %	Leaf area %	Range %
2001	Bacterial blight ^a	12	0-100	46	3	0-70
	Brown spot ^b	47	0-100	85	12	0-63
	Downy mildew ^c	17	0-100	35	3	0-33
2002	Bacterial blight ^a	67	0-100	79	5	0-15
	Brown spot ^b	33	0-100	42	1	0-10
	Downy mildew ^c	3	0-100	3	0.1	0-2
	White mold ^f	0.1	0-0.2	9	-	-

Table 2. Incidence of fungi isolated from soybean stems from eastern Ontario, 2001.

Fungi	Distribution (% of fields)		Frequency (% of plants)
	2001	2002	
<i>Alternaria</i> spp.	100	100	93 (52-100)
<i>Phomopsis</i> / <i>Diaporthe</i> spp.	96	100	28 (0-72)
<i>Fusarium oxysporum</i>	46	42	2 (0-14)
<i>Fusarium</i> Ared@	46	76	5 (0-63)
<i>Fusarium</i> spp.	92	89	40 (0-68)
<i>Gloeosporium</i> sp.	88	94	20 (0-73)
<i>Colletotrichum</i> sp.	23	48	0.3 (0-2)
<i>Trichoderma</i> sp.	58	36	1 (0-8)
Other fungi	42	27	1 (0-14)

Summary:

Soybean Cyst Nematode was not found in these Eastern Ontario or Quebec samples. In 2001, *Alternaria* spp. were isolated from 93% of all stems and these fungi were present in 100% of fields sampled. *Phomopsis* / *Diaporthe* spp. were found in 28% of stems and 96% of all fields sampled. *Fusarium* spp. and *Gloeosporium* sp. were common on soybean stems. In 2002, *Alternaria* spp. was isolated from 53% of stems

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and 100% of fields. As in 2001, *Phomopsis / Diaporthe* spp., *Fusarium* spp. and *Gloeosporium* sp. were most commonly isolated.

Table 3. Incidence of fungi and bacteria on soybean seed samples harvest from eastern Ontario, 2001-2002.

Fungus/ bacteria	2001			2002		
	Seed infection (%)	Range (%)	Fields infested (%)	Seed infection (%)	Range (%)	Fields infested (%)
Phomopsis / Diaporthe sp.	1.59	0-7	50	0.48	0-3	33.33
Alternaria spp.	23.81	0-82	95.46	5.15	0-28	88.89
Fusarium sp.	11.38	0-50	77.27	0.59	0-3	40.74
Cladosporium sp.	13.62	0-56	72.73	5.44	0-22	85.19
Other fungi	6.43	0-41	95.46	1.30	0-7	40.74
Bacteria	1.43	0-26	36.36	0.81	0-7	44.44

The incidence of fungi isolated from all seed samples in eastern Ontario and Quebec in 2001 and 2002 were similar (Table 3). *Alternaria* spp. were the most prevalent in seed samples from both locations and each year. *Phomopsis / Diaporthe* spp. were prevalent in sample fields but the incidence of these pathogens was relatively low.

Early season soil borne diseases, midseason foliar and stem diseases are increasing in Eastern Ontario. As is often the case, new areas of production often go through a Cinderella period of little disease infection. The longer soybeans are in production and as acres increase diseases will become more frequent.

Next Steps:

This survey is now completed. The information will be conveyed to producers in the region and the seed and seed protection industries.

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