2008

THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

CANADIAN PLANT DISEASE SURVEY

DISEASE HIGHLIGHTS

SOCIÉTÉ CANADIENNE DE PHYTOPATHOLOGIE

INVENTAIRE DES MALADIES DES PLANTES AU CANADA

APERÇU DES MALADIES

The Society recognizes the continuing need to publish plant disease surveys to document plant pathology in Canada and to benefit federal, provincial and other agencies in planning research and development on disease control.

La Société estime qu'il est nécessaire de publier régulièrement les résultats d'études sur l'état des maladies au Canada afin qu'ils soient disponibles aux phytopathologistes et qu'ils aident les organismes fédéraux, provinciaux et privés à planifier la recherche et le développement en lutte contre les maladies.

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Canadian Plant Disease Survey

Inventaire des maladies des plantes au Canada

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Contents: **DISEASE HIGHLIGHTS** - 2007 GROWING SEASON
(+ earlier years for historical significance)

The *Canadian Plant Disease Survey* is a periodical of information and record on the occurrence and severity of plant diseases in Canada and the estimated losses from diseases.

Authors who wish to publish articles and notes on other aspects of plant pathology are encouraged to submit this material to the scientific journal of their choice, such as the Canadian Journal of Plant Pathology or Phytoprotection

l'Inventaire des maladies des plantes au Canada est un périodique d'information sur la fréquence des maladies des plantes au Canada, leur gravité et les pertes qu'elles occasionnent.

Les auteurs qui veulent publier des articles et des notes sur d'autres aspects de la phytopathologie sont invités à soumettre leurs textes à la revue scientifique de leur choix, par exemple à la Revue canadienne de phytopathologie ou à Phytoprotection.

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CANADIAN PLANT DISEASE SURVEY INDEX - AUTHORS AND TITLES

DIAGNOSTIC LABORATORIES / LABORATOIRES DIAGNOSTIQUES

CEREALS / CÉRÉALES

Diagnostic Laboratories / Laboratoires diagnostiques

CROPS: Commercial crops – Diagnostic Laboratory Report
LOCATION: Saskatchewan

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TITLE: DISEASES DIAGNOSED ON CROP SAMPLES SUBMITTED TO THE SASKATCHEWAN MINISTRY OF AGRICULTURE CROP PROTECTION LABORATORY IN 2007

METHODS: The Crop Protection Laboratory of the Saskatchewan Ministry of Agriculture provides diagnostic services to the agricultural industry and recommendations for crop health problems. Services include disease, insect and weed identification, as well as testing of weed seeds for herbicide resistance. The Crop Protection Laboratory also provides a Dutch elm disease (DED) service to the general public, under which American elm samples are tested for DED. Samples are submitted to the Crop Protection Laboratory by personnel from the Saskatchewan Ministries of Agriculture and of Environment and by growers, crop insurance adjustors, agribusiness representatives and market/home gardeners. Disease diagnoses are accomplished by microscopic examination, culturing on artificial media, ELISA testing and BIOLOG™.

RESULTS: From April 1 to October 31, 2007, the Crop Protection Laboratory received a total of 674 samples. Seventy-two percent were for disease diagnosis, 57% of which were American elm samples submitted for DED testing. Categories and percentage of samples received (excluding DED samples) were: cereals (31%), special crops (19%), oilseeds (18%), fruit (17%), woody ornamentals (6%), vegetables (6%) and forages (3%). Summaries of diseases and causal agents diagnosed on crop samples submitted to the Crop Protection Laboratory in 2007 are presented in Tables 1-7 by crop category. There were 277 samples of American elm submitted under the DED program (Table 8).

Table 1. Summary of plant diseases diagnosed on **vegetable and greenhouse crops** submitted to the Crop Protection Laboratory in 2007.

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES
Pepper	Environmental injury	*Penicillium* sp.	1
	Chemical injury		1
Tomato	Leaf mold	*Fulvia fulva*	2
	Bacterial spot	*Xanthomonas campestris*	
	Nutrient deficiency		1
	Chemical injury		2
	Environmental injury		2
Cucumber	Leaf mold	*Fulvia fulva*	1
Potato	Early blight	*Alternaria solani*	1
	Aster yellows	Aster yellows phytoplasma	1
	Environmental injury		2
	Chemical injury		1
	Nutrient deficiency		1

Table 2: Summary of plant diseases diagnosed on **cereal crops** submitted to the Crop Protection Laboratory in 2007.

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES
Barley	Seedling blight/root rot	*Cochliobolus sativus*	2
	Net blotch	*Pyrenophora teres*	2
	Stripe rust	*Puccinia striiformis*	1
	Head blight	*Fusarium poae*	1
	Smut (true loose)	*Ustilago nuda*	1
	Black mold	*Alternaria* sp./*Cladosporium* sp.	1
	Chemical injury		4
	Environmental injury		3
	Nutrient deficiency		1
Oat	Bacterial blight	*Pseudomonas syringae*	6
	Halo blight	*P .syringae* pv. *coronafaciens*	4
	Pyrenophora leaf blotch	*Pyrenophora avenae*	2
	Crown rust	*Puccinia coronata* f.sp. *avenae*	1
	Black mold	*Alternaria* sp./*Cladosporium* sp.	1
	Environmental injury		10
	Chemical injury		2
Rye	Ergot	*Claviceps purpurea*	1
Wheat	Common root rot/ seedling blight/ prematurity blight	*Cochliobolus sativus*/*Fusarium* spp.	13
	Speckled leaf blotch	*Septoria tritici*	2
	Tan spot	*Pyrenophora tritici-repentis*	2
	Stripe rust	*Puccinia striiformis* f.sp. *tritici*	2
	Bacterial blight	*Pseudomonas syringae*	1
	Pseudoseptoria leaf spot	*Pseudoseptoria* sp.	1
	Wheat streak mosaic	Wheat streak mosaic virus	2
	Barley yellow dwarf	Barley yellow dwarf virus	1
	Head blight	*Fusarium* spp.	2
	Black mold	*Alternaria* sp./*Cladosporium* sp.	3
	Red smudge	*Pyrenophora tritici-repentis*	1
	Septoria glume blotch	*Septoria nodorum*	1
	Environmental injury		17
	Chemical injury		11
	Nutrient deficiency		10

Table 3. Summary of plant diseases diagnosed on **forage crops** submitted to the Crop Protection Laboratory in 2007.

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES
Alfalfa	Spring black stem	*Phoma medicaginis*	5
	Root/crown rot	*Fusarium* sp./*Phoma* sp. /*Pythium* sp. /*Rhizoctonia* sp.	4
	Anthracnose	*Colletotrichum* sp.	2
	Stemphylium leaf spot	*Stemphylium botryosum*	1
Clover (red)	Northern anthracnose	*Aureobasidium caulivorum*	1
	Spring black stem	*Phoma medicaginis*	1

Table 4. Summary of plant diseases diagnosed on **fruit crops** submitted to the Crop Protection Laboratory in 2007.

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES
Apple	Fireblight	*Erwinia amylovora*	3
	Environmental injury		3
	Chemical injury		1
Pear	Chemical injury		1
Saskatoon	Fireblight	*Erwinia amylovora*	1
	Environmental injury		1
Strawberry	Lesion nematode	*Pratylenchus neglectus*	12
	Spiral nematode	*Helicotylenchus* sp.	12
	Pin nematode	*Paratylenchus* sp.	8
	Stunt nematode	*Tylencorhynchus* sp.	7
	Foliar nematode (fungal feeder)	*Aphelenchoides* sp.	2

Table 5. Summary of plant diseases diagnosed on **oilseed crops** submitted to the Crop Protection Laboratory in 2007.

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES
Canola	Root/foot rot/seedling blight	*Fusarium* sp./*Pythium* sp./*Rhizoctonia* sp.	4
	Blackleg	*Leptosphaeria maculans*	3
	Aster yellows	Aster yellows phytoplasma	1
	Chemical injury		19
	Environmental injury		14
	Nutrient deficiency		3
Flax/linola	Root rot	*Fusarium equiseti*	1
	Chemical injury		3

Table 6. Summary of plant diseases diagnosed on **woody ornamentals** submitted to the Crop Protection Laboratory in 2007.

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES
Ash	Anthracnose	*Apiognomia errabunda*	2
	Ash yellows	Ash yellows phytoplasma	1
Crabapple	Apple scab	*Venturia inaequalis*	1
Maple	Chemical injury		1
	Environmental injury		1
Pine	Root rot	*Cylindrocarpon* sp./*Fusarium* sp. /*Pythium* sp.	1
Poplar	Bacterial canker	*Pantoea agglomerans*/*Brenneria salicis*	1
	Marssonina leaf spot	*Marssonina* sp.	1
	Melampsora rust	*Melampsora* sp.	1
	Chemical injury		1
Spruce	Snow mold	*Herpotrichia juniperi*	1
	Chemical injury		2
	Environmental injury		2

Table 7. Summary of plant diseases diagnosed on **special crops** submitted to the Crop Protection Laboratory in 2007.

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES
Canaryseed	Seedling blight	*Cochliobolus sativus*	1
	Environmental injury		1
Chickpea	Ascochyta blight	*Ascochyta rabiei*	2
	Chemical injury		2
Cumin	Leaf/blossom/head blight	*Alternaria* sp.	2
	Secondary stem rot	*Fusarium avenaceum*	1
	Black mold	*Cladosporium* sp.	1
Fenugreek	Alternaria blight	*Alternaria* sp.	1
	Cercospora blight.	*Cercospora* sp.	1
Lentil	Seedling blight/root rot	*Fusarium* sp. /*Rhizoctonia* sp. /*Pythium* sp.	5
	Anthracnose	*Colletotrichum truncatum*	3
	Ascochyta blight	*Ascochyta lentis*	1
	Stemphylium blight	*Stemphylium botryosum*	1
	Secondary stem rot	*Fusarium avenaceum*	1
	Chemical injury		9
Pea	Root rot/seedling blight	*Fusarium* sp. /*Pythium* sp./*Rhizoctonia* sp.	11
	Ascochyta/Mycosphaerella blight	*Ascochyta* spp./*Mycosphaerella pinodes*	6
	Septoria leaf spot	*Septoria pisi*	1
	Foot rot	*Phoma medicaginis* var. *pinodella*	1
	Chemical injury		6
	Environmental injury		5
	Nutrient deficiency		4

Table 8. Summary of plant diseases diagnosed on **American elm** by the Crop Protection Laboratory in 2007 (total of 277 submissions).

CROP	DISEASE	CAUSAL AGENT	NO. OF SAMPLES*
Elm	Dutch elm disease	*Ophiostoma nova-ulmi*	167
	Dothiorella wilt	*Dothiorella ulmi*	40
	Verticillium wilt	*Verticillium* spp.	6
	Botryodiplodia canker	*Botryodiplodia hypodermia*	2

- The remaining American elm submissions were negative for disease organisms.

CROP: Diagnostic Laboratory Report
LOCATION: Manitoba

NAMES AND AGENCIES:
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TITLE: 2007 MANITOBA CROP DIAGNOSTIC CENTRE LABORATORY SUBMISSIONS

METHODS: The Manitoba Agriculture, Food and Rural Initiatives (MAFRI) Crop Diagnostic Centre provides diagnoses and control recommendations for disease problems of agricultural crops and ornamentals. Samples are submitted by MAFRI extension staff, farmers, agri-business and the general public. Diagnosis is based on microscopy and visual examination for symptoms, culturing onto artificial media, and ELISA testing for some pathogens.

RESULTS: Summaries of diseases diagnosed on plants in different crop categories are presented in Tables 1-11 and cover the time period from January 1 to November 16, 2007.

Table 1. Summary of diseases diagnosed on **forage legume crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Alfalfa	Common leaf spot	*Pseudopeziza medicaginis*	4
	Downy mildew	*Peronospora trifoliorum*	2
	Rust	*Uromyces striatus*	1
	Sclerotinia stem rot	*Sclerotinia trifoliorum*	1
	Spring black stem and leaf spot	*Phoma medicaginis*	5
	Stemphylium leaf spot	*Stemphylium* sp.	1
	Summer black stem	*Cercospora medicaginis*	1
	Yellow leaf blotch	*Leptotrochila medicaginis*	2
	Verticillium wilt	*Verticillium albo-atrum*	1
	Environmental injury		1
	Herbicide injury		1
	Nutrient deficiency		2

Table 2. Summary of diseases diagnosed on **greenhouse crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Cucumber	Root rot	*Pythium* sp.	1
	Insect injury		1
Tomato	Chemical injury		1

Table 3. Summary of diseases diagnosed on **cereal crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Wheat	Bacterial blight	*Pseudomonas syringae*	6
	Black point	*Cochliobolus sativus*	1
	Common root rot	*Cochliobolus sativus*	22
	Fusarium head blight	*Fusarium* spp.	16
	Leaf rust	*Puccinia triticina*	30
	Powdery mildew	*Erysiphe graminis*	1
	Root rot	*Fusarium* spp.	16
	Root rot	*Rhizoctonia solani*	3
	Septoria leaf spot	*Septoria* spp.	22
	Sharp eyespot	*Rhizoctonia cerealis*	1
	Spot blotch	*Cochliobolus sativus*	3
	Tan spot	*Pyrenophora tritici-repentis*	26
	Wheat streak mosaic	Wheat Streak Mosaic Virus (WSMV)	18
	Physiological leaf spot	Undetermined	22
	Environmental injury		7
	Herbicide injury		15
	Nutrient deficiency		1
Barley	Anthracnose	*Colletotrichum graminicola*	1
	Barley Yellow Dwarf	Barley Yellow Dwarf Virus (BYDV)	2
	Common root rot	*Cochliobolus sativus*	8
	Fusarium head blight	*Fusarium* spp.	1
	Root rot	*Pythium* spp.	2
	Speckled leaf blotch	*Septoria passerinii*	2
	Spot blotch	*Cochliobolus sativus*	6
	Environmental injury		7
	Herbicide injury		4
	Nutrient deficiency		3
Oat	Bacterial blight	*Pseudomonas syringae*	11
	Crown rust	*Puccinia coronata*	3
	Common root rot	*Cochliobolus sativus*	4
	Pyrenophora leaf blotch	*Pyrenophora avenae*	5
	Stagonospora leaf spot	*Stagonospora avenae*	4
	Root rot	*Fusarium* spp, *Rhizoctonia solani*, *Pythium* sp.	4
	Environmental injury		5
	Herbicide injury		4
	Nutrient deficiency		2
Rye	Leaf rust	*Puccinia triticina*	1

Table 4. Summary of diseases diagnosed on **vegetable crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Beet, Red	Common scab	*Streptomyces scabies*	1
	Leaf spot	undetermined	3
Cabbage	Grey mould	*Botrytis cinerea*	1
Carrot	Cottony rot	*Sclerotinia sclerotiorum*	1
	Root rot	*Rhizoctonia* sp.	1
Celery	Aster Yellows	Aster yellows phytoplasma	1
Corn	Root rot	*Fusarium oxysporum*	1
	Stalk rot	*Fusarium graminearum*	1
Garlic	Aster Yellows	Aster yellows phytoplasma	4
	Fusarium basal plate rot	*Fusarium oxysporum*	4
Lettuce, Romaine	Leaf spot	*Stemphylium botryosum*	1
Onion	Bacterial soft rot	*Erwinia carotovora* subsp. *carotovora*	1
	Blue mould	*Penicillium* sp.	11
	Fusarium basal plate rot	*Fusarium oxysporum*	3
	Neck rot	*Botrytis allii*	9
Pepper, Green Bell	Dark pigment	physiological disorder	1
Pumpkin	Stem fasciation	undetermined	1
Rhubarb	Grey mould	*Botrytis cinerea*	1
Rutabaga	Aster yellows	Aster yellows phytoplasma	1
Squash, Butternut	Virus	Squash Mosaic Virus (SqMV)	1
	Virus	Potyvirus	1
Zucchini	Aster yellows	Aster yellows phytoplasma	1

Table 5. Summary of diseases diagnosed on **potato crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Aster Yellows	Aster yellows phytoplasma	1
Bacterial soft rot	*Erwinia carotovora* subsp. *carotovora*	2
Blackleg	*Erwinia carotovora* subsp. *atroseptica*	4
Black dot, on tubers	*Colletotrichum coccodes*	2
Black dot, on stems	*Colletotrichum coccodes*	6
Black scurf	*Rhizoctonia solani*	5
Early blight	*Alternaria solani*	1
Fusarium dry rot	*Fusarium sambucinum*	1
Fusarium dry rot	*Fusarium solani*	1
Fusarium wilt	*Fusarium avenaceum*	1
Grey mould	*Botrytis cinerea*	4
Leak	*Pythium ultimum*	1
Pink eye	unknown	2
Rhizoctonia stem and stolon canker	*Rhizoctonia solani*	2
Rubbery rot	*Geotrichum candidum*	2
Scab, common	*Streptomyces* spp.	3
Silver scurf	*Helminthosporium solani*	7
Verticillium wilt	*Verticillium dahliae*	10
Physiological disorders		3
Environmental injury		1

Table 6. Summary of diseases diagnosed on **oilseed crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Camelina	Root rot	*Fusarium oxysporum*, *Fusarium solani*, *Rhizoctonia solani*, *Pythium* sp.	2
Canola	Alternaria black spot	*Alternaria* spp.	1
	Aster yellows	Aster yellows phytoplasma	13
	Blackleg	*Leptosphaeria maculans*	17
	Downy mildew	*Peronospora parasitica*	3
	Fusarium wilt	*Fusarium oxysporum*	2
	Root rot	*Fusarium* spp., *Rhizoctonia solani*	3
	Stem rot	*Sclerotinia sclerotiorum*	2
	Environmental injury		7
	Herbicide injury		23
	Nutrient deficiency	sulphur deficiency	2
	Purple pigment	physiological disorder	3
Flax	Aster yellows	Aster yellows phytoplasma	1
	Root rot	*Fusarium* sp., *Pythium* sp.	1
	Environmental injury		3
	Herbicide injury		3
Sunflower	Root rot	*Fusarium* spp.	2
	Rust	*Puccinia helianthi*	1
	Herbicide injury		3

Table 7. Summary of diseases diagnosed on **shelterbelt trees** and **woody ornamentals** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Ash	Anthracnose	*Gloeosporium aridum*	2
(*Fraxinus* sp.)	Canker	unidentified	2
	Leaf spot	*Phyllosticta* sp.	1
	Environmental injury		1
	Herbicide injury		5
Basswood	Canker	unidentified	1
	Environmental injury		1
	Herbicide injury		1
Caragana	Powdery mildew	unidentified	1
	Herbicide injury		1
Chokecherry, Amur (*Prunus maackii*)	Verticillium wilt	*Verticillium dahliae*	1
Chokecherry, Schubert (*Prunus virginiana*)	Black knot	*Apiosporina morbosa*	1
Cotoneaster	Canker	*Cytospora* sp.	1
	Fireblight	*Erwinia amylovora*	1
Crabapple	Fireblight	*Erwinia amylovora*	1
Currant, Alpine (*Ribes alpinum*)	Leaf spot	*Ascochyta* sp., *Sphaceloma* sp.	1
Elm, American	Canker	*Botryodiplodia* sp.	1
(*Ulmus americana*)	Canker	*Botryosphaeria* sp.	1
	Canker	*Coniothyrium* sp.	1
	Dothiorella wilt	*Dothiorella ulmi*	2
	Dutch elm disease	*Ophiostoma ulmi*	16
	Verticillium wilt	*Verticillium albo-atrum*	1
Fir, Balsam	Twig blight	*Phomopsis* sp.	1
	Environmental injury		1
Lilac	Ascochyta blight	*Ascochyta syringae*	1
	Bacterial blight	*Pseudomonas syringae*	1
	Environmental injury		1
	Herbicide injury		2
Maple (*Acer negundo*)	Herbicide injury		5
Mountain ash	Canker	*Cytospora* sp.	1
(*Sorbus* spp.)	Leaf spot	*Phyllosticta* sp.	1
	Twig canker	*Dothichiza* sp.	1

Table 7 – cont'd

Oak (*Quercus macrocarpa*)	Anthracnose	*Discula* sp.	3
	Canker	*Coniothyrium* sp.	1
	Canker	*Phytophthora* sp.	1
	Wetwood	undetermined	1
	Herbicide injury		2
Pine	Western gall rust	*Peridermium harknessii*	1
	Environmental injury		1
Poplar (*Populus* spp.)	Canker	*Cytospora* sp.	3
	Canker	*Tubercularia* sp.	1
	Leaf spot	*Marsonnina* sp.	2
	Nutrient deficiency		1
Spruce	Brown felt blight	*Herpotrichia juniperi*	1
	Cytospora canker	*Leucostoma kunzei*	1
	Canker	unidentified	1
	Lirula needle blight	*Lirula* sp.	5
	Needle cast	unidentified	2
	Needle rust	*Chrysomyxa* sp.	1
	Stigmina needle blight	*Stigmina lautii*	16
	Twig blight	*Phomopsis* sp.	1
	Environmental injury		6
	Herbicide injury		3
Thuja sp.	Canker	*Fusarium solani*	1
	Environmental injury		3
Willow	Canker	*Cytospora* sp.	1
	Scab and black canker	*Venturia saliciperda* and *Glomerella miyabeana*	1
	Herbicide injury		1

Table 8. Summary of diseases diagnosed on **grasses** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Turf grasses	Anthracnose	*Colletotrichum graminicola*	4
	Dollar spot	*Sclerotinia homeocarpa*	1
	Fusarium blight	*Fusarium* spp.	2
	Leaf spot	*Leptosphaerulina australis*	2
	Melting out	*Drechslera* sp.	2
Pasture grass, (Orchardgrass-Brome mix)	Brown stripe	*Cercosporidium graminis*	2
Russian Wild Rye (*Elymus junceus*)	Ergot	*Claviceps purpurea*	1
	Root rot	*Fusarium avenaceum*	1

Table 9. Summary of diseases diagnosed on **fruit crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Apple	Fire blight	*Erwinia amylovora*	3
	Frogeye leaf spot	*Diplodia serriata**	1
	Nectria twig canker	*Nectria cinnabarina*	1
	Scab	*Venturia inaequalis*	2
	Environmental injury		2
	Herbicide injury		1
Chokecherry	Black knot	*Apiosporina morbosa*	3
Currant, Black	Powdery mildew	*Sphaerotheca mors-uvae*	1
Grape	Powdery mildew	*Uncinula necator*	1
	Shoot blight	*Botrytis cinerea*	1
Plum	Plum pocket	*Taphrina communis*	1
Raspberry	Anthracnose	*Elsinoë veneta*	1
	Canker	*Cytospora* sp.	1
	Fire blight	*Erwinia amylovora*	1
	Iron chlorosis	iron deficiency	1
Saskatoon	Entomosporium leaf and berry spot	*Entomosporium mespili*	2
	Fire blight	*Erwinia amylovora*	1
	Iron chlorosis	iron deficiency	1
	Powdery mildew	*Erysiphe* sp.	2
	Rust	*Gymnosporangium* sp.	2
Seabuckthorn	Fruit rot	*Botrytis cinerea*	1
Strawberry	Black root rot	*Fusarium* spp., *Pythium* sp.	1
	Leaf scorch	*Marsonnina fragariae*	1
	Leaf spot	*Mycosphaerella fragariae*	1
	Environmental injury		1

*known as *Botryosphaeria obtusa* prior to nomenclature changes.

Table 10. Summary of diseases diagnosed on **herbaceous ornamentals** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Coreopsis	Blight	*Botrytis cinerea*	1
Monk's-hood	Powdery mildew	unidentified	1
Pansy	Root rot	*Fusarium* sp.	1

Table 11. Summary of diseases diagnosed on **special field crops** submitted to the MAFRI Crop Diagnostic Centre in 2007.

CROP	SYMPTOM/ DISEASE	CAUSAL AGENT	NUMBER OF SAMPLES
Corn	Holcus spot	*Pseudomonas syringae*	1
	Root rot	*Fusarium* spp., *Rhizoctonia solani*	2
	Nutrient deficiency		1
Fababean	Anthracnose	*Colletotrichum* sp.	1
	Chocolate spot	*Botrytis fabae*	4
	Root rot	*Fusarium* spp., *Rhizoctonia solani, Pythium sp.*	8
Field bean	Anthracnose	*Colletotrichum lindemuthianum*	2
	Brown spot	*Pseudomonas syringae* pv. *syringae*	1
	Common blight	*Xanthomonas axonopodis* pv. *phaseoli*	3
	Halo blight	*Pseudomonas syringae* pv. *phaseolicola*	2
	Root rot	*Fusarium* spp*., Rhizoctonia solani*	8
	Herbicide injury		4
Field pea	Anthracnose	*Colletotrichum pisi*	1
	Aphanomyces root rot	*Aphanomyces euteiches*	1
	Downy mildew	*Peronospora viciae*	3
	Marsh spot	manganese deficiency	1
	Mycosphaerella blight	*Mycosphaerella pinodes*	7
	Root rot	*Fusarium* spp.	5
	Environmental injury		1
	Herbicide injury		4
Hemp	Leaf spot	*Alternaria* sp.	1
Millet	Leaf spot	*Bipolaris sorokiniana*	1
Soybean	Bacterial blight	undetermined	1
	Downy mildew	*Peronospora manshurica*	1
	Fusarium wilt	*Fusarium oxysporum*	1
	Root rot	*Fusarium oxysporum*, *F. solani*, *Pythium* spp*., Rhizoctonia solani*	4
	Septoria leaf spot	*Septoria glycines*	1
	Environmental injury		1
	Herbicide injury		1
	Nutrient deficiency		3

CULTURES : Cultures commerciales reçues au Laboratoire de diagnostic
RÉGION : Québec

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TITRE: MALADIES DIAGNOSTIQUÉES SUR DES ÉCHANTILLONS DE CULTURES COMMERCIALES SOUMIS AU LABORATOIRE DE DIAGNOSTIC EN PHYTOPROTECTION DU MAPAQ EN 2007

METHODES : Le Laboratoire de diagnostic en phytoprotection du MAPAQ fourni un service d'identification des maladies parasitaires et non parasitaires pour les cultures commerciales produites au Québec. Les données rapportées présentent les maladies identifiées sur les échantillons de plantes soumis par les conseillers agricoles du MAPAQ, de la Financière agricole du Québec, de l'Institut québécois du développement de l'horticulture ornementale (IQDHO) et par ceux de l'industrie. Tous les échantillons font l'objet d'un examen visuel préalable suivi d'un examen à la loupe binoculaire. Selon les symptômes, un ou plusieurs tests diagnostiques sont réalisés dans le but de détecter ou d'identifier l'agent pathogène. Les tests de diagnostic utilisés au laboratoire sont les suivants : les nématodes sont extraits par l'entonnoir de Baermann et identifiés par microscopie; les champignons sont isolés sur les milieux de cultures artificiels, identifiés par microscopie et le pouvoir pathogène de certains genres est vérifié; les bactéries sont aussi isolées sur des milieux de culture artificiels (généraux et différentiels) puis identifiées par les tests biochimiques classiques, API-20E, Biolog^{R}, ELISA ou PCR; les phytoplasmes sont détectés par PCR et les virus par le test sérologique ELISA. Les livres «Noms des maladies des plantes au Canada», 4e édition, 2003 et "Maladies des grandes cultures au Canada" 1ère édition 2004, sont les références consultées pour les noms des maladies et des microorganismes.

RÉSULTATS ET DISCUSSION : Les tableaux 1 à 12 présentent le sommaire des maladies identifiées sur les cultures commerciales et leurs origines. Depuis le 1er janvier 2007, près de 3500 maladies parasitaires et non parasitaires ont été diagnostiquées; c'est deux fois plus qu'en 2006. Les plantes maraîchères et les petits fruits constituent 70% de ce nombre. Les infections fongiques racinaires demeurent toujours importantes parmi tous les grands groupes de cultures. Une infestation de pucerons a initié des viroses parmi plusieurs cultures telles que les céréales (BYDV), les haricots et les cucurbitacées (CMV, Potyvirus). Cette année encore, plusieurs demandes de détection du virus X du Hosta (HVX) ont été traitées au laboratoire. Une grande variété d'espèces ornementales montrait surtout des problèmes non infectieux souvent reliés au pH ou à la salinité inadéquate du sol. *Gnomonia* sur tiges de framboisier et *Pseudopezicula* sur rameaux de vigne sont deux exemples d'agents pathogènes remarqués pour la première fois au laboratoire.

Les totaux ne tiennent pas compte des causes indéterminées et des diagnostics incertains. Lorsque non précisés, les agents non infectieux regroupent les déséquilibres minéraux, les pH inadéquats, les sols asphyxiants et salins, les insolations, le froid, le gel et l'excès de chaleur, les polluants atmosphériques, l'intumescence (œdème), les phytotoxicités causées par le mauvais usage des pesticides, l'excès ou le manque d'eau et les désordres génétiques.

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Tableau 1. Sommaire des maladies diagnostiquées parmi les **cultures maraîchères** de champs reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	AGENT PATHOGÈNE/CAUSE	MALADIE/SYMPTÔME	NOMBRE
Ail	*Botrytis* sp.	Pourriture du col	5
	Burkholderia gladioli	Pourriture bactérienne	1
	Embellisia sp.	Anomalie de coloration des feuilles	1
	Potyvirus		1
	Pseudomonas viridiflava	Pourriture molle bactérienne	1
	Pythium sylvaticum	Pourridié pythien	1
Asperge	*Botrytis cinerea*	Pourriture fusarienne	3
	Fusarium moniliforme	Pourriture fusarienne	1
	Fusarium oxysporum	Rouille	1
	Puccinia asparagi	Tache stemphyllienne	2
	Stemphylium sp.		2
Artichaut	*Pythium ultimum*	Pourridié pythien	1
	Pseudomonas marginalis	Pourriture molle bactérienne	1
Betterave	Agents non infectieux		2
Brocoli	*Fusarium* sp.	Pourriture des racines et de la tige	2
	Pythium sp.	Pourriture du collet et des racines	4
	Rhizoctonia solani	Rhizoctone	1
	Xanthomonas campestris pv. *armoraciae*	Tache bactérienne	2
		Nervation noire	2
	Xanthomonas campestris pv. *campestris*		11
	Agents non infectieux variés		
Cantaloup	CMV	Mosaïque du concombre	2
	Erwinia tracheiphila	Flétrissement bactérien	1
	Fusarium equiseti	Pourriture du collet	2
	Fusarium oxysporum	Fusariose vasculaire	1
	Phytophthora sp.	Pourriture des fruits	1
	Potyvirus		6
	Pseudomonas lacrymans	Tache angulaire	2
	Agents non infectieux		2
Carotte	*Agrobacterium tumefaciens*	Tumeur du collet	1
	Cercospora sp.	Tache cercosporéenne	2
	Fusarium oxysporum	Pourridié fusarien	3
	Meloidogyne sp.	Nodosité des racines	1
	Pythium sp.	Maladie de la tache	1
	Xanthomonas sp.	Tache bactérienne	1
	Agents non infectieux		4
Céleri	*Cercospora* sp.	Tache cercosporéenne	2
	Fusarium oxysporum	Pourriture du collet	1
	Pseudomonas syringae	Tache bactérienne	1
	Pythium sp.	Pourridié pythien	1
	Septoria sp.	Tache septorienne	1
	Agents non infectieux		3

Tableau 1-suite			
Chou	*Alternaria brassicae*	Tache grise	1
	Alternaria brassicicola	Tache noire	5
	Fusarium oxysporum	Jaunisse fusarienne	3
	Plasmodiophora brassicae	Hernie	1
	Pythium ultimum	Pourridié pythien	4
	Rhizoctonia solani	Rhizoctone	2
	Xanthomonas campestris pv. *armoraciae*	Tache bactérienne	4
		Nervation noire	6
	Xanthomonas campestris pv. *campestris*		4
			9
	Phytotoxicité herbicide		
	Autres agents non infectieux		
Chou chinois	*Cercospora* sp.	Tache cercosporéenne	1
	Xanthomonas campestris pv. *campestris*	Nervation noire	1
			5
	Agent non infectieux		
Chou-fleur	*Alternaria brassicae*	Tache grise	2
	Alternaria brassicicola	Tache noire sur feuille et capitule	4
	Pseudomonas syringae	Moucheture bactérienne	1
	Xanthomonas campestris pv. *armoraciae*	Tache bactérienne	7
		Nervation noire	3
	Xanthomonas campestris pv. *campestris*		8
	Agents non infectieux		
Citrouille	*Cladosporium cucumerinum*	Gale	1
	CMV	Mosaïque du concombre	8
	Erwinia tracheiphila	Flétrissement bactérien	1
	Fusarium spp.	Pourriture fusarienne des racines	13
	Phoma sp.	Pourriture noire	3
	Phytophthora capsici	Pourridié phytophthoréen	2
	Potyvirus	Anomalie de coloration des feuilles	9
	Pseudomonas syringae	Tache angulaire	2
	Pythium spp.	Pourridié pythien	3
	Rhizoctonia solani	Pourriture des racines	3
	Septoria sp.	Tache septorienne	7
	Sphaerotheca sp. (*Oïdium*)	Blanc	1
	ToRSV	Virus de la tache annulaire de la tomate	2
	WmMV2	Mosaïque de la pastèque race 2	1
	ZyMV	Mosaïque jaune de la courgette	2
	Agents non infectieux		8
Concombre	*Alternaria alternata*	Tache foliaire	3
	CMV	Mosaïque du concombre	2
	Erwinia carotovora	Pourriture molle bactérienne	1
	Erwinia tracheiphila	Flétrissement bactérien	2
	Fusarium oxysporum	Pourriture des racines / fruits	2
	Potyvirus	Anomalie de coloration du feuillage	1
	Pseudoperonospora cubensis	Mildiou	1
	Pythium spp.	Pourridié pythien	6
	Ulocladium sp.	Tache foliaire	2
	ZyMV	Mosaïque jaune de la courgette	1
	Agents non infectieux		8
Courge	*Alternaria* spp.	Tache foliaire	4
	Cladosporium spp.	Gale / pourriture des fruits	9

Tableau 1-suite			
Courge	CMV	Mosaïque du concombre	7
	Erwinia carotovora	Pourriture molle bactérienne	3
	Erwinia tracheiphila	Flétrissement bactérien	3
	Erysiphe cichoracearum	Blanc	1
	Fusarium oxysporum	Pourriture et tache sur les fruits	15
	Geotrichum sp.	Pourriture des fruits	3
	Phoma cucurbitacearum	Pourriture noire	5
	Potyvirus	Mosaïque, marbrure, malformation	13
	Phytophthora capsici	Pourriture des fruits	3
	Pseudomonas marginalis / viridiflava	Pourriture molle bactérienne	1
	Pseudomonas syringae	Tache angulaire	17
	Pythium ultimum	Pourriture des fruits	2
	Rhizoctonia solani	Pourriture des racines	1
	Sclerotinia sclerotiorum	Pourriture sclérotique	2
	Septoria sp.	Tache septorienne	4
	TRSV	Malformation foliaire	1
	Ulocladium sp.	Tache foliaire	1
	Agents non infectieux		24
Épinard	*Fusarium oxysporum*	Pourriture des racines	2
	Phytophthora sp.	Pourriture des racines	1
	Pythium spp.	Fonte des semis	3
Haricot / Pois / Gourgane	AMV	Mosaïque	1
	CMV	Mosaïque, malformation, nanisme	29
	Colletotrichum sp.	Anthracnose	1
	Fusarium oxysporum	Pourriture fusarienne des racines	7
	Potyvirus	Mosaïque, malformation, nanisme	3
	Pseudomonas syringae	Graisse bactérienne	2
	Pythium ultimum	Pourriture pythienne des racines	4
	Rhizoctonia solani	Rhizoctone commun	4
	Sclerotinia sclerotiorum	Pourriture sclérotique	1
	Agents non infectieux		5
Laitue / Scarole / Chicorée	*Alternaria cichorii*	Tache brune	2
	Botrytis cinerea	Moisissure grise	1
	Fusarium sp.	Pourriture des racines	1
	Phytophthora drechsleri	Pourriture des racines	15
	Pseudomonas fluorescens	Pourriture molle bactérienne	1
	Pseudomonas marginalis	Nécrose marginale	1
	Pythium spp.	Pourriture des racines, nanisme	7
	Rhizoctonia solani	Rhizoctone commun	1
	Septoria sp.	Tache septorienne	1
	Xanthomonas campestris	Tache bactérienne	4
	Salinité trop faible ou trop élevée		5
	Agents non infectieux		1
Maïs sucré	Carences de P / Zn	Anomalie de coloration des feuilles	2
	Phytotoxicité glyphosate	Jaunissement des jeunes feuilles	2
	Sol inadéquat		1
Melon	*Alternaria alternata*	Tache foliaire	2
	Cladosporium sp.	Tache foliaire	1
	CMV	Mosaïque	1

Tableau 1-suite			
Melon	Potyvirus	Mosaïque, dépérissement	1
	Phytophthora capsici	Pourriture des fruits et de la tige	6
	Pseudomonas syringae	Tache angulaire	2
	Rhizoctonia solani	Dépérissement	3
	Thielaviopsis basicola	Pourriture noire des racines	1
	Agents non infectieux		1
Oignon / Échalote / Poireau	*Botrytis cinerea*	Moisissure grise	4
	Botrytis allii	Pourriture du col	1
	Botrytis spp.	Tache foliaire / pourriture du bulbe	2
	Burkholderia cepaciae	Pourriture bactérienne	2
	Burkholderia gladioli	Pourriture brunâtre	5
	Erwinia carotovora	Pourriture molle bactérienne	2
	Fusarium moniliforme	Pourriture du bulbe et des racines	3
	Fusarium oxysporum	Fusariose du plateau	16
	Levures	Pourriture du bulbe	6
	Penicillium sp.	Pourriture du bulbe	8
	Peronospora destructor	Mildiou	6
	Pseudomonas marginalis	Pourriture des feuilles	1
	Pythium ultimum	Pourriture pythienne	1
	Stemphylium sp.	Moisissure noire des feuilles	1
	Acidité / salinité inadéquates du sol		5
	Blessures par le vent et la pluie		11
	Déséquilibres minéraux		3
	Phytotoxicité par les herbicides		4
	Autres agents non infectieux		11
Piment / Poivron	*Botrytis cinerea*	Moisissure grise	1
	Clavibacter michiganensis ssp. *michiganensis*	Chancre bactérien	2 2
	CMV	Mosaïque du concombre	5
	Fusarium oxysporum	Fusariose des racines et du collet	2
	Pseudomonas syringae	Moucheture bactérienne	2
	Phytophthora capsici	Chancre au collet	6
	Pythium ultimum	Pourridié pythien	1
	Rhizoctonia solani	Tige noire	4
	Sclerotinia sclerotiorum	Sclérotiniose	1
	Luminosité élevée		
Pomme de terre	*Clavibacter michiganensis* ssp. *sepedonicus*	Flétrissement bactérien	6
	Colletotrichum coccodes	Dartrose	16
	Erwinia carotovora ssp. *carotovora*	Pourriture molle bactérienne	11
	Fusarium oxysporum	Fusariose vasculaire / pourriture fusarienne	5
	Helminthosporium solani	Tache argentée	7
	Phytophthora erythroseptica	Pourriture rose	12
	Phytophthora infestans	Mildiou	1
	PLRV	Enroulement de la pomme de terre	1
	PMTV	Virus du sommet touffu	1
	Potyvirus	Mosaïque	2
	Pseudomonas fluorescens	Pourriture molle bactérienne	1
	Pythium ultimum	Pourriture pythienne	3
	Rhizoctonia solani	Rhizoctonie	6
	Spongospora sp.	Gale poudreuse	4

Tableau 1-suite			
Pomme de terre	*Streptomyces* spp.	Gales bactériennes diverses	3
	Verticillium dahliae	Verticilliose	9
	Absence de *Clavibacter michiganensis* ssp. *sepedonicus* détecté		10
	Asphyxie		3
	Blessure mécanique		6
	Carence de calcium		3
	Carences minérales diverses		4
	Sol inadéquat		4
	Autres agents non infectieux		8
Radis /Rutabaga	*Fusarium* spp.	Pourriture des racines	2
	Peronospora sp.	mildiou	2
	Pseudomonas syringae	Tache foliaire	1
	Rhizoctonia solani	Rhizoctone commun	1
	Agents non infectieux		1
Rhubarbe	*Ascochyta rhei*	Tache ascochytique	2
	ToRSV	Tache foliaire	2
	TRSV	Tache foliaire	1
	Gel hivernal	Pourriture des racines	1
Tomate	*Botrytis cinerea*	Moisissure grise	1
	Clavibacter michiganensis spp. *michiganensis*	Chancre bactérien	2
	Colletotrichum coccodes	Anthracnose	2
	Fusarium oxysporum	Fusariose des racines	1
	Phytophthora infestans	Mildiou	1
	Pseudomonas syringae	Moucheture bactérienne	6
	Pythium ultimum	Pourriture pythienne	2
	Septoria lycopersici	Tache septorienne	1
	ToMV	Mosaïque de la tomate	1
	Xanthomonas campestris	Gale bactérienne	3
	Agents non infectieux		5
Zucchini	CMV	Mosaïque du concombre	11
	Erwinia tracheiphila	Flétrissement bactérien	1
	Fusarium proliferatum	Dépérissement	1
	Potyvirus	Mosaïque, marbrure, malformation	11
	Pseudomonas syringae	Tache angulaire	3
	ZyMV	Mosaïque de la courgette	2
Total			**1591**

Tableau 2. Sommaire des maladies diagnostiquées parmi les **légumes d'entrepôt** reçus au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	AGENT PATHOGÈNE/CAUSE	MALADIE/SYMPTÔME	NOMBRE
Carotte	*Sclerotinia sclerotiorum*	Sclérotiniose	2
Chou	*Phytophthora brassicae* *Pseudomonas fluorescens* *Pseudomonas marginalis*	Pourriture de la tige et des feuilles Pourriture molle bactérienne Pourriture molle bactérienne	2 1 1
Oignon	*Botrytis* sp. *Burkholderia gladioli* *Fusarium oxysporum*	Pourriture du bulbe Pourriture brunâtre Pourriture rose	1 1 1
Pomme de terre	*Clavibacter michiganensis* ssp. *sepedonicus* *Colletotrichum coccodes* *Erwinia carotovora* ssp. *carotovora* *Fusarium* spp. *Geotrichum* sp. *Helminthosporium solani* *Phytophthora erythroseptica* Potyvirus *Pseudomonas fluorescens* *Rhizoctonia solani* *Spongospora* sp. *Verticillium dahliae* Cœur creux; cœur brun Cœur noir Gel Sol inadéquat	Flétrissement bactérien Dartrose Pourriture molle Pourriture fusarienne Pourriture du tubercule Tache argentée Pourriture rose Pourriture molle Rhizoctonie Gale poudreuse Verticilliose Pelure rugueuse	2 5 3 4 1 2 1 1 1 5 1 5 4 2 2 2
Total			**49**

Tableau 3. Sommaire des maladies diagnostiquées parmi les **plantes maraîchères de serres** reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	AGENT PATHOGÈNE/CAUSE	MALADIE/SYMPTÔME	NOMBRE
Concombre	*Alternaria* spp. *Cladosporium* spp. *Erwinia carotovora* *Fusarium oxysporum* *Fusarium solani* *Phoma cucurbitacearum* Potyvirus *Pseudoperonospora cubensis*	Alternariose Tache foliaire Pourriture molle bactérienne Fusariose vasculaire Pourriture du collet Chancre gommeux Mosaïque, marbrure Mildiou	1 2 1 1 1 2 5 2

Tableau 3-suite Concombre	*Pythium aphanidermatum*	Pourriture des tiges et du collet	2
	Pythium splendens	Pourriture des tiges et du collet	2
	Pythium ultimum	Pourriture des tiges et du collet	2
Tomate	Agents non infectieux/AMV	Mosaïque de la luzerne	31
	Botrytis cinerea	Résistance aux fongicides	17
	Clavibacter michiganensis ssp. *michiganensis*	Chancre bactérien	35
	Erysiphe orontii	Blanc	1
	Erwinia carotovora ssp. *carovotora*	Pourriture molle	1
	Fulvia fulva	Moisissure olive	1
	Fusarium oxysporum	Fusariose vasculaire	8
	Fusarium sambucinum	Chancre au collet	1
	Geotrichum candidum	Pourriture laiteuse	1
	Penicillium sp.	Pourriture de feuilles	2
	Phytophthora sp.	Pourriture des racines	3
	Plectosporium sp.	Pourriture des tiges	2
	Potyvirus	Mosaïque foliaire	1
	Pseudomonas corrugata	Moelle noire	1
	Pseudomonas syringae	Moucheture bactérienne	2
	Pythium aphanidermatum	Pourriture pythienne	1
	Pythium ultimum	Pourriture pythienne	2
	Pythium spp.	Pourriture pythienne	2
	Rhizopus sp.	Pourriture de tige	1
	Septoria lycopersici	Tache septorienne	1
	Thielaviopsis basicola	Noircissement des racines	1
	Absence de résistance aux fongicides détectée		18
	Carences minérales (P, K, Mg, B)		4
	pH du sol élevé		6
	Phytotoxicité pesticide		6
	Salinité du sol élevée		4
	Toxicité en manganèse		8
	Transpiration excessive		8
	Autres agents non infectieux		6
Total			**114**

Tableau 4. Sommaire des maladies diagnostiquées parmi les **petits fruits** reçus au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Bleuetier en corymbe / nain	*Agrobacterium tumefaciens*	Tumeur du collet	1
	Aureobasidium sp.	Brûlure des rameaux	10
	Botrytis cinerea	Moisissure grise	1
	Colletotrichum acutatum	Anthracnose	2
	Cytospora sp.	Chancre cytosporéen	1
	Fusicoccum putrefaciens	Chancre	6
	Gibbera vaccinicola (Protoventuria)	Gale de tige	3
	Microsphaera sp. (*Oïdium*)	Blanc	3
	Monilia sp.	Pourriture sclérotique	3

Tableau 4-suite			
Bleuetier en corymbe / nain	*Naohidemyces vaccinii*	Rouille de la pruche	2
	Phomopsis vaccinii	Brûlure phomopsienne	1
	Pucciniastrum goeppertianum	Rouille balai de sorcière	1
	Pseudomonas syringae	Brûlure bactérienne	1
	Ramularia sp.	Ramulariose	2
	Seimatosporium sp.	Chancre et tache de la tige	3
	Septoria sp.	Tache septorienne	3
	Désordre minéral		4
	Gel hivernal		3
	pH inadéquat		4
	Phytotoxicité glyphosate		2
	Autres agents non infectieux		8
Canneberge	*Aureobasidium* sp.	Brûlure apicale des tiges	2
	Coleophoma empetri	Pourriture des baies	1
	Colletotrichum sp.	Pourriture amère	1
	Godronia cassandrae (Fusicoccum)	Pourriture godronienne	2
	Monilia sp.	Pourriture sclérotique	1
	Phyllosticta sp.	Tache foliaire	5
	Protoventuria myrtilli	Tache foliaire	3
	Gel hivernal		3
	Agents non infectieux		2
Cassissier / Gadellier /Groseillier	*Phytophthora* sp.	Pourriture des racines	1
	Septoria sp.	Tache septorienne	1
	Sphaerotheca mors-uvae	Blanc	3
	Gel hivernal		1
Fraisier	*Botrytis cinerea*	Moisissure grise	4
	Colletotrichum acutatum	Anthracnose	3
	Diplocarpon earlianum	Tache pourpre	3
	Hainesia lythri	Pourriture bistre	3
	Marssonina fragariae	Tache commune	7
	Phytophthora cactorum	Pourriture de cuir	5
	Phytophthora spp.	Stèle rouge, pourriture des racines	27
	Phytoplasme	Balai de sorcières	2
	Pratylenchus spp.	Lésions des racines	3
	Pseudomonas viridiflava	Anomalie de coloration du feuillage	1
	Pythium/*Rhizoctonia*/*Cylindrocarpon*/*Fusarium*	Pourriture noire des racines	42
	Ramularia brunnea	Tache commune	4
	Sphaerotheca macularis (Oïdium)	Blanc	6
	Verticillium albo-atrum	Verticilliose	1
	Verticillium dahliae	Verticilliose	10
	Xanthomonas fragariae	Tache angulaire	4
	Xiphinema sp.	Pourriture des racines	1
	Zythia fragariae	Brûlure des pétioles et tache foliaire	1
	Gel hivernal		13
	pH du sol inadéquat		9
	Phytotoxicité herbicide		5
	Autres agents non infectieux		3
Framboisier rouge	*Agrobacterium* spp.	Tumeur du collet ou de la tige	13
	Botrytis cinerea	Moisissure grise	1
	Didymella applanata	Brûlure des dards	1
	Erwinia amylovora	Brûlure bactérienne	2

Tableau 4-suite Framboisier rouge	*Phomopsis* sp.	Brûlure et chancre sur tige	1
	Phytophthora spp.	Pourridié phytophthoréen	10
	Pratylenchus sp.	Détection dans le sol	8
	Pucciniastrum americanum	Rouille jaune tardive	1
	Pythium/*Rhizoctonia*/*Cylindrocarpon*/*Fusarium*	Pourriture noire des racines	11
	Septoria rubi	Tache septorienne	1
	Sphaceloma necator	Anthracnose	2
	ToRSV	Fruits grumeleux	1
	Verticillium dahliae	Verticilliose	1
	Xiphinema spp.	Détection dans le sol	1
	Drainage et sol inadéquats		8
	Gel hivernal		18
	Phytotoxicité herbicide		3
	Autres agents non infectieux		5
Framboisier noir (mûrier)	*Didymella applanata*	Brûlure des dards	1
	Gnomonia sp.	Chancre de tige	1
	Hainesia sp.	Tache foliaire	1
	Sphaceloma necator	Anthracnose	1
Vigne	*Agrobacterium tumefaciens*	Tumeur du collet	7
	Botrytis cinerea	Moisissure grise	3
	Colletotrichum sp.	Anthracnose	1
	Coniella sp.	Pourriture blanche	1
	Phoma spp.	Tache foliaire, pourriture des fruits	2
	Phomopsis viticola	Excoriose	1
	Phyllactinia sp.	Pourriture des baies	1
	Phyllosticta ampelicida	Pourriture noire des baies	9
	Plasmopara viticola	Mildiou	16
	Pseudopezicula sp.	Rougeot parasitaire	2
	Sphaceloma ampelinum	Anthracnose	5
	Uncinula necator (Oïdium)	Blanc	3
	Carence minérale		5
	Gel hivernal		7
	Phytotoxicité pesticide		6
	Autres agents non infectieux		8
Total			**858**

Tableau 5. Sommaire des maladies diagnostiquées parmi les **céréales** reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Avoine	BYDV	Feuille rouge	12
	Colletotrichum graminicola	Anthracnose	1
	Drechslera sp.	Tache brune	1
	Gaeumannomyces graminis	Piétin échaudage	1
	Pythium spp.	Piétin brun	3
	Rhizoctonia sp.	Rhizoctone commun	1

Tableau 5-suite			
Avoine	*Ustilago* sp.	Charbon	1
	Carence de manganèse		2
	Phytotoxicité linuron ou métribuzine		2
Orge	*Alternaria alternata*	Moisissure noire	1
	Bipolaris sorokiniana	Tache helminthosporienne	1
	BYDV	Jaunisse nanisante	1
	Cladosporium spp.	Moisissure noire	1
	Drechslera teres	Rayure réticulée	3
	Fusarium spp.	Piétin fusarien	3
	Fusarium poae	Fusariose de l'épi	4
	Fusarium solani	Piétin fusarien	1
	Pythium sp.	Piétin brun	2
	Ustilago sp.	Charbon	1
	Phytotoxicité herbicide		7
	Sol inadéquat		3
	Autres agents non infectieux		4
Blé	*Alternaria alternata*	Noire des céréales	3
	Bipolaris sorokiniana	Tache helminthosporienne	1
	BYDV	Jaunisse nanisante	2
	Cladosporium spp.	Moisissure noire	4
	Drechslera tritici	Tache auréolée	1
	Epicoccum spp.	Moisissure noire	2
	Fusarium graminearum	Piétin fusarien; fusariose de l'épi	3
	Gaeumannomyces graminis	Piétin échaudage	2
	Stagonospora spp.	Tache ovoïde; tache des glumes	4
	Ulocladium spp.	Noire des céréales	2
	Agents non infectieux		6
Total			**85**

Tableau 6. Sommaire des maladies diagnostiquées parmi les **cultures industrielles** reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Canola	*Alternaria* spp.	Tache sur tige	1
	Cladosporium spp.	Anomalie de coloration des tiges	1
	Ulocladium spp.	Anomalie de coloration des tiges	1
Ginseng	*Alternaria panax*	Alternariose	1
Maïs	*Aureobasidium zeae*	Kabatiellose	1
	Fusarium spp.	Piétin fusarien; fusariose de l'épi	9
	Pyrenochaeta terrestris	Pourriture des racines	1
	Pythium spp.	Piétin brun	5
	pH du sol inadéquat		5
	Phytotoxicité herbicide		6
	Autres agents non infectieux		6

Tableau 6-suite			
Moutarde	*Alternaria brassicicola*	Tache noire	1
Sarrazin	*Botrytis cinerea*	Moisissure grise	1
	Pollinisation inadéquate		1
Soya	*Ascochyta* sp.	Ascochytose	1
	Cercospora sp.	Cercosporose	1
	Colletotrichum spp.	Anthracnose	2
	Corynespora cassiicola	Pourriture des racines	3
	Fusarium spp.	Pourriture fusarienne	19
	Peronospora manshurica	Mildiou	4
	Phoma sp.	Pourriture des graines	1
	Phomopsis sp.	Brûlure phomopsienne	1
	Phytophthora sp.	Pourriture phytophthoréenne	1
	Pseudomonas syringae	Feu sauvage	3
	Pythium spp.	Pourriture pythienne	9
	Rhizoctonia solani	Rhizoctone commun	3
	Sclerotinia sclerotiorum	Sclérotiniose	2
	Septocylindium sp.	Tache foliaire	1
	Septoria glycines	Tache brune	6
	Carence minérale		4
	Phytotoxicité herbicide		8
	Sol inadéquat		5
	Autres agents non infectieux		3
Tournesol	Phytotoxicité glyphosate	Jaunissement des jeunes feuilles	1
Total			**119**

Tableau 7. Sommaire des maladies diagnostiquées parmi les **plantes fourragères** reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Luzerne	AMV	Mosaïque de la luzerne	1
	Peronospora trifoliorum	Mildiou	2
Total			**3**

Tableau 8. Sommaire des maladies diagnostiquées parmi les **arbres et arbustes fruitiers** reçus au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Argousier	*Phomopsis* sp.	Brûlure phomopsienne	1
	Gel hivernal		2
Cerisier	*Monilinia* sp.	Pourriture brune	1
	Phomopsis sp.	Chancre des rameaux	1
	Gel hivernal		1

Tableau 8-suite			
Poirier	Froid	Pourriture des fruits	1
Pommier	*Alternaria alternata*	Alternariose	2
	Cytospora leucosperma	Chancre cytosporéen	1
	Erwinia amylovora	Brûlure bactérienne	1
	Longidorus spp.	Nématode à aiguille	1
	Nectria cinnabarina	Maladie du corail	2
	Pseudomonas syringae	Chancre bactérien	1
	Phlyctema vagabunda	Anthracnose	5
	Agents non infectieux		7
Total			**27**

Tableau 9. Sommaire des maladies diagnostiquées parmi les graminées à **gazon** reçus au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Vert de golf (Agrostide / pâturin annuel)	*Colletotrichum graminicola*	Anthracnose	12
	Curvularia sp.	Tache foliaire	6
	Criconemoides sp.	Dépérissement	1
	Drechslera sp.	Tache helminthosporienne	1
	Fusarium equiseti	Tache fusarienne, pourriture fusarienne des racines	6
	Gaeumannomyces graminis	Piétin échaudage	7
	Helicotylenchus sp.	Dépérissement	1
	Leptosphaerulina sp.	Tache leptosphaérulinienne	4
	Magnaporthe sp.	Racine brune	15
	Pratylenchus spp.	Lésion racinaire	1
	Pythium graminicola	Piétin brun	3
	Pythium intermedium	Piétin brun	1
	Pythium splendens	Piétin brun	4
	Pythium sylvaticum	Piétin brun	5
	Pythium torulosum	Piétin brun	25
	Pythium ultimum	Piétin brun	2
	Rhizoctonia sp.	Rhizoctone brun, tache ocellée	6
	Tylenchorhynchus sp.	Brunissement des racines	3
Total			**103**

Tableau 10. Sommaire des maladies diagnostiquées parmi les **arbustes ornementaux** reçus au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Abies sp.	*Cylindrocarpon sp.*	Pourriture des racines	2
	Fusarium spp.	Pourriture des racines	3
	Asphyxie racinaire		3
	Gel hivernal		1
	Grêle		1

Tableau 10-suite			
Caragana	*Phloeospora* sp.	Tache foliaire	1
Eleagnus	Gel hivernal		1
Euonymus	*Pseudomonas syringae*	Brûlure bactérienne	1
Fraxinus sp.	*Discula fraxinea*	Anthracnose	1
Larix sp.	*Pestalotiopsis* sp.	Rouge	1
Magnolia	*Oïdium* sp.	Blanc	1
Picea sp.	*Sirococcus conigenus* Phytotoxicité pesticide	Brûlure des pousses	1 2
Pinus sp.	*Lophodermella* sp. Gel printanier	Rouge	1 1
Quercus sp.	*Pseudomonas* sp.	Dépérissement des rameaux	1
Taxus sp.	*Fusarium oxysporum* pH ou salinité inadéquats	Pourriture des racines	1 2
Thuja sp.	*Fusarium* spp. *Pythium* sp. Agents non infectieux	Pourriture des racines Pourriture des racines	5 1 2
Syringa	Salinité élevée du sol	Brûlure au feuillage	1
Ulmus sp.	*Ophiostoma ulmi*	Maladie hollandaise	1
Viburnum sp.	*Phomopsis* sp.	Chancre des rameaux	1
Total			**36**

Tableau 11. Sommaire des maladies diagnostiquées parmi les **plantes ornementales** produites en **serres** et reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Aeschynanthus	Agents non infectieux		5
Adohidia	*Colletotrichum* sp.	Anthracnose	1
Alternanthera	Agents non infectieux		2
Alyssum	pH élevé Phytotoxicité glyphosate		2 1
Anemone	ArMV	Mosaïque, marbrure	1

Tableau 11-suite			
Anthurium	*Phytophthora* sp.	Pourriture des racines	1
Argyranthemum	*Pseudomonas cichorii*	Jaunissement du feuillage	1
Astilbe	*Pythium intermedium* TSV	Racine brune Mosaïque	1 1
Aster	Salinité élevée du sol	Dépérissement	1
Bacopa	*Fusarium moniliforme* *Pythium ultimum*	Pourriture des tiges Pourriture des racines	1 1
Begonia	*Fusarium oxysporum* *Phytophthora* spp. *Pythium ultimum* Carences minérales Salinité élevée du sol	Pourriture des tiges Pourriture des racines, collets, tiges Pourriture des racines Racines brunes	1 3 1 2 1
Bismarckia	Transpiration élevée du feuillage	Brûlure apicale des feuilles	1
Bracteantha	*Botrytis cinerea* *Bremia* sp.	Moisissure grise Mildiou	1 1
Brugmansia	Potyvirus	Mosaïque	7
Calamagrostis	*Colletrotrichum* sp.	Anthracnose	1
Calibrachoa	*Botrytis cinerea* *Fusarium* spp. CbMV *Phytophthora drechsleri* *Pythium* spp. *Rhizoctonia solani* pH inadéquat Phytotoxicité pesticide Salinité élevée du sol Autres agents non infectieux	Moisissure grise Pourriture des racines Marbrure Pourriture des racines et du collet Pourriture des racines et du collet Racines brunes Anomalie de coloration du feuillage Malformation du feuillage Brûlure marginale des feuilles	6 4 1 14 3 1 5 4 4 2
Canna	*Fusarium graminearum* Potyvirus	Pourriture fusarienne	1 5
Centaurea	*Pseudomonas syringae* *Pythium ultimum* pH élevé	Tache foliaire Pourriture pythienne	1 1 1
Chrysanthemum	*Phytophthora* spp. *Pythium* spp. *Rhizoctonia solani* *Stemphylium lycopersici* Phytotoxicité pesticide Agents non infectieux	Pourriture des racines et du collet Pourriture des tiges et des racines Rhizoctone commun Pourriture des feuilles	2 2 2 1 2 3
Cineraria	INSV	Tache foliaire	1

Tableau 11-suite			
Coreopsis	*Alternaria* sp. pH élevé du sol	Alternariose Brûlure des nervures	1 1
Dahlia	*Pythium* spp. *Rhizoctonia solani*	Pourriture des racines Rhizoctone commun	2 1
Dendrobium	CyMV	Mosaïque	1
Dracaena	*Fusarium oxysporum* Insolation	Pourriture des racines, tache sur tiges	3 1
Dryopteris	*Rhizoctonia solani*	Rhizoctone	1
Echinacea	*Aphelenchoides* sp. *Pythium ultimum* *Rhizoctonia solani* Asphyxie Froid pH élevé	Nématode foliaire Pourriture pythienne Rhizoctone Anomalie de coloration du feuillage Anomalie de coloration du feuillage Malformation du feuillage	2 1 1 1 1 1
Euphorbia pulcherrima	*Botrytis cinerea* *Fusarium* sp. *Phytophthora* spp.	Brûlure botrytique Pourriture fusarienne Pourriture phytophthoréenne	1 1 3
Festuca	*Ustilago* sp.	Charbon	1
Ficus	Eau froide pH élevé du sol	Tache foliaire Anomalie de coloration du feuillage	1 1
Gaillardia	INSV	Taches nécrotiques	1
Hedera	*Xanthomonas hortorum* Carence de bore Phytotoxicité pesticides	Tache bactérienne Malformation du feuillage Anomalie de coloration du feuillage	1 1 1
Hibiscus	*Botrytis cinerea* *Fusarium lateritium* *Pythium irregulare* *Rhizoctonia solani* *Thielaviopsis basicola* Oedème	Moisissure grise Dépérissement fusarien Pourridié pythien Rhizoctone Pourriture noire des racines	1 1 1 2 1 1
Hosta	AMV HVX Absence de HVX détecté Carences minérales pH élevé du sol Phytotoxicité pesticides Salinité élevée du sol Autres agents non infectieux	Mosaïque Mosaïque, tache	2 7 164 2 1 3 2 2
Impatiens	INSV *Rhizoctonia solani*	Tache nécrotique Rhizoctone commun	1 1

Tableau 11-suite			
Impatiens	Carence de bore pH inadéquat du sol Agent non infectieux		3 2 3
Iris	TSWV	Anomalie de coloration du feuillage	1
Lamium	*Phytophthora* sp. *Pythium* sp. *Rhizoctonia solani*	Pourriture des tiges Pourriture des racines Pourriture du collet	1 1 1
Lilium	Agents non infectieux		2
Lupinus	*Colletotrichum* sp.	Anthracnose	1
Malva	*Cercospora*	Tache cercosporéenne	1
Molokia	*Pseudomonas syringae*	Tache foliaire	1
Osteospermum	*Colletotrichum* sp. *Pythium ultimum* Phytotoxicité pesticides	Anthracnose Pourriture des racines	1 1 2
Orchidées	CyMV	Mosaïque	2
Pelargonium	*Botrytis cinerea* *Phytophthora* sp. *Pythium* spp. *Thielaviopsis basicola* *Xanthomonas hortorum* pv. *pelargonii* Carence minérale Eau froide Œdème pH inadéquat du sol Autres agents non infectieux	Moisissure grise Dépérissement Pied noir Pourriture noire Brûlure bactérienne Jaunissement entre les nervures	8 1 4 1 1 2 4 4 3 3
Plantathera	*Rhizoctonia solani*	Pourriture des racines	1
Petunia / Surfinia / Angelonia	*Botrytis cinerea* *Fusarium* sp. *Phytophthora drechsleri* *Thielaviopsis basicola* *Rhizoctonia solani* Salinité élevée du sol Agents non infectieux	Moisissure grise Pourriture des racines Racines brunes Pourriture noire Rhizoctone	3 1 2 1 1 2 5
Pogostemon	Agents non infectieux .		2
Psidium	*Cylindrocarpon* sp.	Racine brune	1
Salvia	*Xanthomonas campestris*	Tache foliaire	1
Schlumbergera / Zygocactus	*Fusarium oxysporum* Salinité élevée du sol	Tache foliaire, pourriture des racines	2 1

Tableau 11-suite			
Sedum	*Fusarium oxysporum*	Pourriture des tiges	1
Scaevola	Potyvirus		1
	Rhizoctonia solani	Rhizoctone	1
Sorgho	Agents non infectieux		2
Spathiphyllum	Salinité du sol élevée	Malformation du feuillage	2
Tagetes	*Alternaria tagetica*	Pourriture des tiges	1
	pH élevé du sol	Malformation du feuillage	1
Theobroma	Agents non infectieux		2
Tulipa	Potyvirus	Mosaïque	3
Total			**417**

Tableau 12. Sommaire des maladies diagnostiquées parmi les **plantes ornementales extérieures** reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Bergenia	*Cercospora* sp.	Tache cercosporéenne	1
	Colletotrichum sp.	Anthracnose	1
	Agents non infectieux		2
Campanula	*Sclerotinia sclerotiorum*	Sclérotiniose	1
Carex	*Fusarium* sp.	Pourriture des racines	1
	Pythium sp.	Pourriture des racines	1
Coleus	*Peronospora* sp.	Mildiou	5
Davidia	Insolation		1
	Transpiration excessive du feuillage		1
Dianthus	*Fusarium* spp.	Pourriture fusarienne	2
	Pythium sp.	Pourriture pythienne	1
Heliopsis	Carence de manganèse	Jaunissement des jeunes feuilles	1
	Phytotoxicité pesticides		1
Hemerocallis	TRSV	Tache foliaire	1
	Agents non infectieux		3
Heuchera	*Cylindrocarpon* sp.	Pourriture des racines	1
	Phytophthora sp.	Pourriture des racines	1
	Puccinia sp.	Rouille	1
	Rhizoctonia solani	Pourriture des racines	1
Hosta	HVX	Mosaïque	16
	Agents non infectieux		4
Hydraste	*Botrytis cinerea*	Moisissure grise	1
Hyophorbe	*Pestalotiopsis* sp.	Brûlure du feuillage	1
Lychnis	INSV	Tache nécrotique	1
Tagète	Carence de bore	Malformation foliaire	1
	Phytotoxicité glyphosate	Malformation foliaire	1
Oenothera	*Botrytis cinerea*	Moisissure grise	1
Paeonia	*Botrytis cinerea*	Moisissure grise	1
	Cladosporium sp.	Tache cladosporienne	1
	ToMV	Anomalie de coloration du feuillage	1
Phlox paniculata	*Thielaviopsis basicola*	Pourriture noire des racines	1
	Potyvirus		1

Tableau 12-suite			
Rudbeckia	*Cercospora* sp.	Tache cercosporéenne	1
	Erysiphe cichoracearum	Blanc	1
	Rhizoctonia solani	Rhizoctone	1
	Agents non infectieux		3
Santolina	*Pythium* sp.	Pourriture des racines	1
	Rhizoctonia solani	Rhizoctone	1
	pH élevé du sol	Dépérissement des feuilles	2
Verbena	ArMV	Tache jaune	1
	Botrytis cinerea	Moisissure grise	1
	Pythium irregulare	Anomalies de coloration de racines	1
Vitis	*Plasmopara viticola.*	Mildiou	1
Wisteria	Potyvirus	Anomalie coloration du feuillage	1
Total			**73**

Tableau 13. Sommaire des maladies diagnostiquées parmi les **plantes aromatiques et les fines herbes** reçues au Laboratoire de diagnostic en phytoprotection du MAPAQ en 2007.

CULTURE	**AGENT PATHOGÈNE/CAUSE**	**MALADIE/SYMPTÔME**	**NOMBRE**
Basilic	*Botrytis cinerea*	Moisissure grise	3
	Fusarium oxysporum	Pourriture des racines et du collet	3
	INSV	Malformation du feuillage	1
	Pseudomonas syringae	Tache foliaire	1
	Pythium spp.	Pourriture des racines	3
	Rhizoctonia solani	Pourriture des racines	1
	Sclerotinia sclerotiorum	Sclérotiniose	2
	Agents non infectieux		2
Coriandre	*Pythium splendens*	Pourriture des racines	1
Lavande	*Septoria* sp.	Tache septorienne	1
Mélisse	Gel hivernal	Dépérissement	1
Menthe	*Fusarium* sp.	Pourriture des racines	1
	Puccinia menthae	Rouille	1
	Agents non infectieux		3
Persil	*Alternaria petroselini*	Alternariose	2
	Septoria petroselini	Tache septorienne	1
	Xanthomonas campestris	Tache foliaire	1
Romarin	pH ou salinité élevée du sol	Anomalie de coloration du feuillage	2
Thym	*Rhizoctonia solani*	Pourriture des racines	2
	Thielaviopsis basicola	Pourriture noire des racines	1
Valériane	*Verticillium* sp.	Verticilliose	1
Total			**34**

GRAND TOTAL **3071**

CROP: Diagnostic Laboratory Report – All Crops
LOCATION: Prince Edward Island

NAMES AND AGENCIES:
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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS IN PRINCE EDWARD ISLAND, 2007

METHODS: The PE Department of Agriculture's Plant Disease Laboratory (PDDL) provides diagnosis and control recommendations primarily for diseases of commercial crops produced in Prince Edward Island. The PDDL also provides a Dutch elm disease (DED) service for the provincial Department of Forestry and local cities. Samples are submitted to the laboratory by agriculture extension staff, producers, growers, agri-business, crop insurance agents and the general public. Diagnoses are based on a combination of a visual examination of symptoms, microscopic observation and culturing on artificial media. The diseases reported may not necessarily reflect the major problems encountered during the season in the field, but rather those most prevalent within the samples submitted. This season, environmental conditions were conducive for the development of such pathogens as *Sclerotinia, Rhizoctonia, Phytophthora* and *Pseudomonas*.

RESULTS AND COMMENTS: A total of 430 commercial crop and 37 DED samples were processed for the 2007 growing season. Categories of samples (excluding DED) received were: cereals (5.6%), potatoes (80.5%), small fruit (5.6%), vegetables (6.6%), greenhouse crops (1%) and other crops (0.7%). The percentage of samples received from provincial crop insurance agents was 46.4%. A total of 530 disease identifications and 31 insect identifications were completed during the period January 3rd to October 31st, 2007.

Table 1. Diseases diagnosed on commercial crop samples submitted to the Plant Disease Diagnostic Laboratory. Prince Edward Island Department of Agriculture, Prince Edward Island, 2007.

CROP	DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF TIMES AGENTS WERE IDENTIFIED
VEGETABLES:			
Brussel Sprouts	Damping-of	*Rhizoctonia* sp.	1
	Physiological disorder	Burn	1
Carrot	Cercospora blight	*Cercospora* sp.	1
Cauliflower	Bacterial leaf spot	*Pseudomonas* sp.	2
	Black rot	*Xanthomonas* sp.	1
	Botrytis grey mould	*Botrytis cinerea*	1
	Downy mildew	*Peronospora sp.*	2
	Leaf spot	*Alternaria* sp.	1
Potato	Bacterial soft rot	*Clostridium* sp.	11
		Erwinia sp.	18

Table 1 - cont'd			
Potato	Bacterial soft rot	*Pseudomonas* sp.	11
	Black dot	*Colletotrichum coccodes*	2
	Blackleg	*Erwinia* sp.	15
	Black scurf	*Rhizoctonia solani*	17
	Brown spot	*Alternaria alternata*	4
	Common scab	*Streptomyces scabies*	24
	Early blight	*Alternaria* spp.	7
	Early dying	*Colletotrichum coccodes*	7
		Erwinia sp.	1
		Fusarium solani	1
		Fusarium oxysporum	3
		Fusarium sp.	4
		Pseudomonas sp.	1
		Rhizoctonia solani	6
		Sclerotinia sclerotiorum	1
		Verticillium albo-atrum	1
		Verticillium dahliae	7
	Environmental disorder	Burn	9
		Chemical damage	6
		Chilling	1
		Enlarged lenticels	1
		Mechanical damage	1
		Wind damage	3
	Fusarium dry rot	*Fusarium coeruleum*	2
		Fusarium sambucinum	7
		Fusarium solani	6
		Fusarium spp.	3
	Fusarium wilt	*Fusarium avenaceum*	2
		Fusarium oxysporum	2
		Fusarium sp.	3
	Late blight	*Phytophthora infestans*	87

Table 1 – cont'd			
Potato	Physiological disorder	Blackheart	2
		Brown centre	2
		Bruising	3
		Cracking	5
		Elephant hide	4
		Enlarged lenticels	4
		Greening	2
		Hairy sprout	1
		Hollow heart	7
		Jelly end rot	4
		Little tuber	1
		Mechanical damage	5
		Nutritional disorder	5
		Off-type	4
		Skinning	2
		Thumbnail cracks	2
		Translucent end	2
	Pink rot	*Phytophthora erythroseptica*	30
	Pink eye	*Pseudomonas* sp.	39
	Pocket rot	*Phoma* sp.	2
	Stem canker	*Rhizoctonia solani*	2
	Seed piece decay	*Erwinia* sp.	3
	Silver scurf	*Helminthosporium solani*	6
	Verticillium wilt	*Verticillium albo-atrum*	1
		Verticillium dahliae	7
	White mould	*Sclerotinia sclerotiorum*	4
Rutabaga	Black root rot	*Aphanomyces* sp.	1
		Fusarium sp.	1
	Clubroot	*Plasmodiophora brassicae*	1
	Crater rot	*Rhizoctonia solani*	1
	Downy mildew	*Peronospora* sp.	3

Table 1 - cont'd			
Rutabaga	Physiological disorder	Growth cracks	1
	Root / crown rot	*Rhizoctonia solani*	1
	Sclerotinia rot	*Sclerotinia sclerotiorum*	3
Sugar beet	Crown and root rot	*Rhizoctonia* sp.	1
	Leaf spot	*Cercospora* sp.	1
Tomato	Crown and root rot	*Fusarium oxysporum*	1
FORAGE & FIELD CROPS:			
Alfalfa	Leaf spot	*Phoma* sp.	1
		Stemphylium sp.	1
Barley	Barley stripe	*Pyrenophora* sp.	1
	Common root rot	*Cochliobolus sativus*	3
		Fusarium graminearum	2
	Scald	*Rhynchosporium* sp.	1
	Septoria blotch	*Septoria* sp.	2
	Spot blotch	*Cochliobolus sativus*	1
Buckwheat	Root rot	*Rhizoctonia* sp.	1
Oat	Fusarium head blight	*Fusarium graminearum*	1
Soybean	Damping-off	*Pythium* sp.	1
	Seedling blight	*Fusarium oxysporum*	1
Timothy	Barley stripe	*Pyrenophora* sp.	1
	Purple eyespot	*Cladosporium* sp.	1
	Septoria leaf spot	*Septoria* sp.	1
Wheat	Black mould	*Alternaria alternata*	1
		Bipolaris sp.	3
	Common root rot	*Bipolaris* sp.	1
		Fusarium sp.	1
	Fusarium head blight	*Fusarium graminearum*	6
	Powdery mildew	*Erysiphe* sp.	1
	Rust	*Puccinia* sp.	1
	Septoria leaf spot	*Septoria* sp.	1

Table 1 - cont'd			
SMALL FRUIT:			
Apple	Dry eye rot	*Botrytis cinerea*	1
	Powdery mildew	*Podosphaera* sp.	1
Black currant	Rust	*Puccinia* sp.	1
Blueberry	Leaf spot	*Alternaria alternata*	1
		Botrytis cinerea	2
		Valdensinia heterodoxa	1
	Phomopsis canker	*Phomopsis* sp.	5
	Physiological disorder	Chemical damage	1
		Mechanical damage	1
	Red leaf	*Exobasidium* sp.	3
	Leaf rust	*Pucciniastrum vaccinii*	1
	Septoria leaf spot	*Septoria* sp.	1
Cranberry	Viscid rot	*Phomopsis* sp.	1
Grape	Angular leaf spot	*Mycosphaerella* sp.	1
Pear	Scab	*Venturia inaequalis*	1
OTHER CROPS:			
Elm	Dutch elm disease	*Ophiostoma ulmi*	25
Bells of Ireland	Leaf spot	*Ascochyta* sp.	1
			TOTAL 530

Cereals / Céréales

CROP / CULTURE: Barley
LOCATION / RÉGION: Saskatchewan

NAMES AND AGENCIES / NOMS ET ÉTABLISSEMENTS:
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TITLE / TITRE: LEAF SPOTTING DISEASES OF BARLEY IN SASKATCHEWAN IN 2007

INTRODUCTION AND METHODS: A survey of leaf spotting diseases was conducted in randomly selected barley crops located in 18 crop districts in Saskatchewan. Fifty flag leaves were collected at random from each of 48 barley crops (41 two-rowed, 7 six-rowed) at the late-milk to early-dough development stages, and air-dried at room temperature. Mean percent leaf area with lesions was calculated for each crop and for crops within each soil zone (SZ) (1: Brown, 2: Dark Brown, and 3: Black/Grey). Surface-disinfested leaf pieces from 27 fields with 2% or higher leaf spot severity were plated on water agar for fungal isolation, identification and quantification. Tillage method information was also recorded for 38 of the sampled crops.

RESULTS AND COMMENTS: All barley crops surveyed had leaf spotting diseases (Table 1). For individual crops, disease severity ranged from trace (≤0.5%) to 21% of total flag leaf area affected. Mean leaf spotting disease severities were highest in crops from SZ3 and lowest in crops from SZ1. Fungal identification and quantification revealed that *Pyrenophora teres* was the most commonly isolated pathogen from all soil zones, especially SZ1 where it represented 90% of fungal isolates. *Cochliobolus sativus* was not isolated from SZ1 but it was the second most common pathogen isolated from SZ2 and SZ3. *Septoria* spp. and *P. tritici-repentis* each accounted for less than 10% of fungal isolations in all soil zones and were isolated from fewer fields than were *P. teres* or *C. sativus*. The relative prevalence of *C. sativus* was higher in 2007 than in 2006, but prevalence was lower for *P. teres* and *Septoria* spp. in 2007 than in 2006 (Fernandez and Pearse 2007).

When barley crops were classified by tillage method, leaf spotting diseases appeared to be most severe under minimum tillage, and least severe under zero tillage (Table 2). Mean isolation frequency of *C. sativus* increased with increasing tillage intensity. Differences among tillage systems were less apparent for the other fungi.

We gratefully acknowledge the participation of Saskatchewan Crop Insurance Corporation staff and Saskatchewan Ministry of Agriculture irrigation agrologists for the collection of leaf samples for this survey.

REFERENCE:
Fernandez, M.R. and Pearse, P.G. 2007. Leaf spotting diseases of barley in Saskatchewan in 2006. Can. Plant Dis. Surv 87: 51-52 (http://www.cps-scp.ca/cpds.htm)

Table 1. Incidence and severity of leaf spotting diseases, and mean percentage isolation of leaf spotting pathogens in relation to soil zone for barley crops sampled in Saskatchewan in 2007.

Soil Zone	# Crops affected/ surveyed[1]	Mean severity[2]	*Pyrenophora teres*[3]	*Cochliobolus sativus*	*Septoria* spp.	*P. tritici-repentis*
		%				
Zone 1 (Brown)	6/6	1.7	90/3	-	3/2	-
Zone 2 (Dark Brown)	16/16	2.8	58/7	34/7	8/6	5/7
Zone 3 (Black/Grey)	26/26	6.2	49/16	43/17	8/11	7/15
Total/mean:	**48/48**	**4.4**	**56/26**	**40/24**	**7/19**	**6/22**

[1]Number of barley crops with leaf spots on flag leaves/total number of crops sampled.
[2]Mean percentage flag leaf area with lesions.
[3]Mean percentage isolation of pathogenic fungus for crops where pathogen was isolated /number of barley crops from which pathogen was isolated, based on 27 samples tested.

Table 2. Incidence and severity of leaf spotting diseases, and mean percentage isolation of leaf spotting pathogens by tillage system, for barley crops sampled in Saskatchewan in 2007.

Tillage system	# Crops affected/ surveyed[1]	Mean severity[2]	*Pyrenophora teres*[3]	*Cochliobolus sativus*	*Septoria* spp.	*P. tritici-repentis*
		%				
Conventional	7/7	4.1	51/5	51/6	3/3	6/5
Minimum	14/14	5.8	59/10	41/7	5/8	8/8
Zero	17/17	2.9	57/8	34/8	6/5	7/6

[1]Number of barley crops with leaf spots on flag leaves/total number of crops sampled (tillage information was not available for 10 of the fields sampled).
[2]Mean percentage flag leaf area with lesions.
[3]Mean percentage isolation of pathogenic fungus for crops where pathogen was isolated

CROP / CULTURE: Barley
LOCATION / RÉGION: Manitoba

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: SURVEY FOR FUSARIUM HEAD BLIGHT OF BARLEY IN 2007 IN MANITOBA

INTRODUCTION AND METHODS: A total of 52 barley fields (35 two-rowed, 17 six-rowed) in southern Manitoba were surveyed for the presence of fusarium head blight (FHB) from July 17 to August 6, 2007, when crops were at the early milk to late dough (ZGS 72-87) stage of growth. The fields were selected at random along the survey routes, depending on crop frequency. The area of southern Manitoba sampled was bounded by Highway #s 67 and 16 in the north, Hwy #3 in the south, Hwy #83 in the west and Hwy #12 to the east. FHB incidence (the percentage of heads with typical symptoms) was assessed in each crop by sampling 80-100 spikes at 3 locations and averaging the results. The average proportion of symptomatic spikes affected by FHB (SPI) was estimated visually in each field. Several affected heads were collected at each survey site and stored in paper envelopes. Subsequently, a total of 50 discoloured and putatively infected kernels, or those of normal appearance to make up the remainder, were removed from five heads per location. The kernels were surface sterilized in 0.3% NaOCl (Javex brand) and plated on potato dextrose agar to quantify, and identify *Fusarium* spp. on kernels using standard taxonomic keys.

RESULTS AND COMMENTS: Conditions in late April in 2007 were generally favourable for early planting of spring crops, but subsequent excess moisture in May delayed seeding in many regions. However, 'normal' to drier conditions followed, and these resulted in generally good crops of high quality cereals. The early-season moisture appeared favourable for the renewed growth and sporulation of overwintered fungal pathogens in straw and stubble, but the extremely low levels of FHB that developed in Manitoba in 2006 (Tekauz et al. 2007), likely reduced the amount of overwintering *Fusarium* inoculum compared to other years. This, combined with the lack of frequent rain showers at and following barley heading, resulted in lower than anticipated levels of FHB development.

Fusarium head blight symptoms were evident in 29 of the 31 fields surveyed. Average incidence of FHB in two-rowed crops was 8.4% (range 0.6 - 22.8%), while the SPI averaged 10.7% (range 4 - 25%); in six-rowed crops incidence was 11.5% (range 1 - 38%) and the SPI 8.8% (range 3 - 30%). The resulting average FHB index (%incidence X %SPI) / 100 for 2-row barley was 1.1% (range 0 - 4.7%), and that for 6-row barley 1.5% (range 0.1 - 11.4%). The mean FHB index for all barley was 1.3%. This level would have resulted in a minimal yield loss of barley to FHB in 2007.

Fusarium colonies grew out from 26% of the kernels plated on potato dextrose agar, the lowest level since 2003 (Tekauz et al. 2004). The *Fusarium* species isolated from kernels are shown in Table 1. In contrast to the anomalous results of 2006 (Tekauz et al. 2007) *F. graminearum* was again the predominant pathogenic species found on kernels, followed by *F. poae.* Levels of the other species remained low.

REFERENCES:
Tekauz, A., Gilbert, J., Mueller, E., Stulzer, M., Beyene, M., and Kaethler, R. 2007. 2006 Survey for fusarium head blight of barley in Manitoba. Can. Plant Dis. Surv. 87: 53-54. (http://www.cps-scp.ca/cpds.htm)

Tekauz, A., Gilbert, J., Mueller, E., Stulzer, M., Beyene, M., and Schultz, D. 2004. 2003 Survey for fusarium head blight of barley in Manitoba. Can. Plant Dis. Surv. 84: 45-46. (http://www.cps-scp.ca/cpds.htm)

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Table 1. *Fusarium* spp. isolated from fusarium head blight-affected kernels of barley in Manitoba in 2007.

***Fusarium* spp.**	***Percent of fields***	***Percent of kernels***
F. avenaceum	23	4.1
F. culmorum	8	5.4
F. equiseti	8	0.9
F. graminearum	83	58.4
F. poae	52	23.8
F. sporotrichioides	42	7.4

CROP / CULTURE: Barley
LOCATION / RÉGION: Manitoba

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: LEAF SPOT DISEASES IN MANITOBA BARLEY FIELDS IN 2007

INTRODUCTION AND METHODS: In 2007, leaf spot diseases of barley in Manitoba were assessed by surveying 52 farm fields (35 two-rowed, 17 six-rowed) from July 21 to 27 when most crops were at the early dough (ZGS 82) stage of growth (range ZGS 70-86). Fields were sampled at regular intervals along the survey routes, depending on availability. The area of southern Manitoba sampled was bounded by Highway #s 67 and 16 in the north, Hwy #3 in the south, Hwy #83 in the west and Hwy #12 to the east. Disease incidence and severity were recorded by averaging their occurrence on approximately 10 plants along a diamond-shaped transect of about 50 m per side, beginning near the field edge. Disease ratings were taken on both the upper (flag and penultimate leaves) and lower leaf canopies, using a six-category scale: 0 or nil (no visible symptoms); trace (<1% leaf area affected); very slight (1-5%); slight (6-15%); moderate (16-40%); and severe (41-100%). Infected leaves with typical symptoms were collected at each site, dried, and stored in paper envelopes. Subsequently, surface-sterilized pieces of infected leaf tissue were placed on filter paper in moist chambers for 3-5 days to promote fungal sporulation and identify the causal agent(s), and thereby determine the disease(s) present.

RESULTS AND COMMENTS: Conditions in spring (mid-April to early June) 2007 were generally favourable for crop growth, but in some regions wet soils caused by excessive rain in early May delayed spring seeding. Subsequently, conditions became 'normal' or drier, resulting in relatively good crops of high quality cereals. The early-season moisture appeared to favour the renewed growth and sporulation of overwintered fungal pathogens in straw and stubble, such as those that cause leaf spots. However, the very dry conditions in 2006, which resulted in minimal leaf spot development in that year, likely reduced the amount of inoculum. As well, the drier conditions that followed seeding in 2007 did not favour within-canopy disease spread. As appears to be the typical for barley, the field history, i.e., presence or absence of barley stubble from the previous year, appeared to influence the level of leaf spotting observed.

Leaf spots were observed in the upper and/or lower leaf canopies of 100% of all the barley fields surveyed. Disease levels in the upper canopy were trace, very slight or slight in 71% of fields, moderate in 15%, and severe in 14%. Respective severity categories in the lower canopy were 56%, 14%, and 27%, with 4% being senescent. Since most crops had a relatively slight amount of leaf spotting in the upper canopy, and somewhat higher level in the lower canopy, leaf spot diseases likely caused average yield losses in the range of 5% to barley in 2006. This level of damage was higher than reported for 2006 (Tekauz et al. 2007), and similar to that in 2005 (Tekauz et al. 2006).

Both *Pyrenophora teres* (causal agent of net blotch) and *Cochliobolus sativus* (spot blotch) predominated in 2007, with the latter causing a somewhat greater (53%) amount of the total foliar damage observed (Table 1). Both pathogens were detected in most (90-94%) of the barley crops sampled. *Septoria passerinii* (speckled leaf blotch) and other *Septoria* species were present in some barley crops, as occurs in most years, but appear to have caused only minimal damage.

REFERENCES:
Tekauz, A., J. Gilbert, E. Mueller, M. Stulzer, M. Beyene, R. Kaethler, and P. Gozé. 2007. Survey for leaf spot diseases of barley in Manitoba in 2006. Can. Plant Dis. Surv. 86: 55-56. (www.cps-scp.ca/cpds.htm)

Tekauz, A., J. Gilbert, E. Mueller, M. Stulzer, M. Beyene, R. Kaethler, and K. Morgan. 2006. 2005 Survey for leaf spot diseases of barley in Manitoba. Can. Plant Dis. Surv. 85: 39-40. (www.cps-scp.ca/cpds.htm)

Table 1. Incidence and isolation frequency of leaf spot pathogens of barley in Manitoba in 2007

Pathogen	Incidence (% of fields)	Frequency (% of isolations)*
Pyrenophora teres	94	41.8
Cochliobolus sativus	90	52.9
Septoria passerinii	21	3.5
Septoria/*Stagonospora* spp.	14	1.8

* indicative of the relative foliar damage caused

CROP / CULTURE: Barley
LOCATION / RÉGION: Eastern Ontario

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: DISEASES OF BARLEY IN EASTERN ONTARIO IN 2007

INTRODUCTION AND METHODS: A survey for diseases of barley was conducted in eastern Ontario in the third week of July when plants were at the soft dough stage of development. Twenty-two fields were chosen at random in regions of eastern Ontario where most of the spring barley is grown. Foliar disease severity was determined on 10 flag and penultimate leaves sampled at each of three random sites per field by using a rating scale of 0 (no disease) to 9 (severely diseased). Diseases were identified by visual symptoms. Average severity scores of <1, <3, <6, and $\geq$6 were considered trace, slight, moderate, and severe infection, respectively. Severity of leaf stripe, ergot, loose smut, or take-all was estimated as the percentage of plants infected. Fusarium head blight (FHB) was rated for both incidence (percent infected spikes) and severity (percent infected spikelets of the infected spikes), based on approximately 200 spikes sampled at each of three random sites per field. A FHB index (incidence x severity)/100 was determined for each field. Index values of <1, <10, <20, and $\geq$20 were considered slight, moderate, severe, and very severe levels of infection, respectively.

Determination of the causal species of FHB was based on 10 infected heads collected from each field. The heads were air-dried at room temperature, and subsequently threshed. Thirty discolored kernels per sample were chosen at random, surface sterilized in 1% NaOCl for 30 seconds, and plated in 9-cm diameter petri dishes on modified potato dextrose agar (10 g dextrose per liter) amended with 50 ppm streptomycin sulfate. Plates and seeds were incubated for 10-14 days at 22-25°C, with a 14-hour photoperiod using fluorescent and long wave ultraviolet illumination. *Fusarium* species isolated from the kernels were identified by microscopic examination using standard taxonomic keys.

RESULTS AND COMMENTS: The surveyed fields consisted of 2 two-row and 20 six-row barley crops. Eleven diseases or disease complexes were observed in the surveyed fields (Table 1). Net blotch (*Pyrenophora teres*) was the most common foliar disease, observed in 21 fields at a mean disease severity of 2.6 (range 0.7-5.3). Severe infection from net blotch was not observed. Yield reductions due to net blotch were estimated to average less than 5% in surveyed fields.

The septoria complex [including speckled leaf blotch (*Septoria avenae* f. sp. *triticea),* leaf blotch (*S. passerinii*), and glume blotch (*S. nodorum*)] and spot blotch (*Cochliobolus sativus*) were observed in 16 and 15 fields at mean severities of 2.4 and 4.6, respectively. Severe infection from septoria complex was not observed and from spot blotch was observed in one field only. Other foliar diseases observed were BYDV (barley yellow dwarf virus) leaf rust (*Puccinia hordei*), and scald (*Rhynchosporium secalis*). These diseases were observed in 3, 9, and 3 fields, at mean severities of 1.0, 2.8, and 0.8, respectively. Except for a moderate level of leaf rust found in 4 fields, all affected fields had only trace to slight levels of infected plants. None of these diseases would have caused significant damage.

Take-all (*Gaeumannomyces graminis*) was found in 15 fields (Table 1). Although the disease was less common in 2007 than in 2006 (Xue et al. 2007), disease severities were general higher with 7 of the 15 affected fields having greater than 1% incidence. Leaf stripe (*Pyrenophora graminea*), ergot (*Claviceps purpurea*), and loose smut (*Ustilago nuda*) were observed in 15, 18, and 12 fields, at mean incidence levels of less than 1%. These three diseases likely resulted in minimal damage.

Fusarium head blight was observed in only two fields (Table 1). The FHB index ranged from 0.01-0.03%, with a mean of 0.02%. Both affected fields had only slight levels of infection. *Fusarium poae* was the only species isolated from discolored kernels.

The relative prevalence and severity of foliar diseases and FHB in 2007 were generally lower than found in 2006 (Xue et al. 2007), while take-all and leaf rust were more severe. The relatively hot and dry conditions in June and July were likely responsible for the decrease in leaf spot and FHB severities. *Fusarium graminearum*, the major causal agent of FHB in barley, was not isolated from symptomatic kernels in 2007. In addition, powdery mildew (*Erysiphe graminis* f. sp. *hordei*) and covered smut (*Ustilago hordei*), normally common barley diseases in Ontario, were not observed in this survey.

REFERENCE:

Xue, A.G., Chen, Y. and Ho, K.M. 2007. Diseases of barley in central and eastern Ontario in 2006. Can. Plant Dis**.** Surv. 86:57-58. (http:www.cps-scp.ca/cpds.htm)

Table 1. Prevalence and severity of barley diseases in eastern Ontario in 2007.

	NO. FIELDS	DISEASE SEVERITY IN AFFECTED FIELDS*	
DISEASE	**AFFECTED (n=22)**	**Mean**	**Range**
BYDV	3	1.0	1.0-1.0
Leaf rust	9	2.8	1.0-5.0
Net blotch	21	2.6	0.7-5.3
Scald	3	0.8	0.3-1.0
Septoria complex	16	2.4	1.0-5.0
Spot blotch	15	4.6	3.0-6.0
Leaf stripe	10	0.6	0.3-1.3
Ergot	18	0.9	0.3-2.0
Loose smut	12	0.9	0.3-2.3
Take-all	15	1.4	0.3-3.0
Fusarium head blight	2		
Incidence		0.8	0.5-1.0
Severity		2.9	0.8-5.0
FHB index**		0.02	0.01-0.03

*Foliar disease severity was rated on a scale of 0 (no disease) to 9 (severely diseased) except for barley stripe, ergot, covered smut, loose smut, and take-all, where severity was rated as percent plants infected.
** FHB index = (incidence x severity)/100

CROPS / CULTURES: Barley and Wheat
LOCATION / RÉGION: Central Alberta

NAMES AND AGENCY / NOMS ET ORGANISATION:
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TITLE / TITRE: 2007 CEREAL DISEASE SURVEY IN CENTRAL ALBERTA

INTRODUCTION AND METHODS: A survey to document diseases of barley (15 fields) and wheat (16 fields) was conducted in Central Alberta from July 24 to August 2, 2007. Growers were contacted for permission to evaluate their fields. Subsequently these were traversed in a diamond pattern starting at least 25 m in from the field edge, with visual analysis made of 5 plants at each of 5 locations. Leaf diseases were scored on a 0-9 scale, with a 5 rating equal to more than one percent leaf area diseased (PLAD) in the upper leaf canopy, 10-25 PLAD in the middle canopy and 25-50 PLAD in the lower-canopy. Common root rot (CRR) was assessed from lesions on sub-crown internodes using a 0-4 scale where 1=trace and 4=severe. Other diseases, if present, were rated as a percentage of the plants affected. Following the survey, a representative sub-sample of the diseased plant tissues collected at each location was cultured in the laboratory for pathogen isolation and identification. To assess fusarium head blight (FHB) in wheat crops, counts of 300 heads were taken in each of the 16 wheat fields and the % incidence of FHB determined. Assessments were made when crops were at the late milk to dough stage, typically by following a diamond-shaped path starting at least 25 m in from the edge of the field and evaluating 60 heads at random from each of 5 sites along the path.

RESULTS AND COMMENTS: Survey results are presented in Table 1. Growing conditions in central Alberta were less favourable than normal in 2007. A cool wet May was followed by a very wet June and a cool but dry July. This led to generalized late seeding with some parcels being left fallow. Crop development was delayed and uneven, and often accompanied by considerable moisture stress. Disease development was inconsistent and variable throughout the region.

Scald (*Rhynchosporium secalis*) severity was low to moderate and there was also less net blotch (*Pyrenophora teres* f. *teres*) than usual observed throughout the survey area. However other barley leaf spots, primarily a combination of the spot form of net blotch (*P. teres* f *maculata*), physiological leaf spotting and Septoria (*Septoria* spp.) were found at significant levels in all the fields surveyed.

Septoria/stagnospora leaf blotch (*Septoria tritici, Stagonospora nodorum*) levels in the 16 fields of wheat were higher than those documented in the previous two years. Tan spot (*Pyrenophora tritici-repentis*) was found only at trace levels in 5 of the wheat fields.

Common root rot of barley (*Cochliobolus sativus* and *Fusarium* spp.) occurred at slightly lower levels than in 2006. In wheat, common root rot incidence increased in 2007, but levels remained low overall.

Stripe rust (*Puccinia striiformis)* was noted in 10 commercial wheat fields at trace to low levels.

There was no FHB found in the wheat fields surveyed.

Table 1. Disease incidence and severity in 15 barley and 16 wheat fields in central Alberta, 2007.

Disease and rating scale	% fields affected	Average disease rating and range	
		Mean	Range
Barley			
Scald (0-9)	67	2.1	1-5
Net blotch (0-9)	67	2.6	1-7
Other leaf spots (0-9)	100	3.2	1-7
Common rot (0-4)	93	1.2	0-3
Wheat			
Septoria leaf complex (0-9)	100	3.5	2-6
Common root rot (0-4)	81	1.1	0-2
Tan spot (0-9)	31	1.4	1-3

CROP / CULTURE: Barley and Oat
LOCATION / RÉGION: Saskatchewan

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TITLE / TITRE: FUSARIUM HEAD BLIGHT IN BARLEY AND OAT IN SASKATCHEWAN IN 2007

INTRODUCTION AND METHODS: Fusarium head blight (FHB) incidence and severity were assessed in a total of 49 barley crops (38 two-row; 11 six-row) and 17 oat crops in Saskatchewan between July 18 and August 30. Fields were grouped according to soil zones (Zone 1 = Brown; Zone 2 = Dark Brown; Zone 3 = Black/Grey), and fields under irrigation were grouped separately and referred to as the Irrigation Zone (located along the South Saskatchewan River in west-central and central regions of the province).

Fifty spikes or panicles (hereafter referred to as spikes) were randomly collected from each crop at the milk to dough stages. The spikes were analyzed for visual FHB symptoms at the Crop Protection Laboratory in Regina. The number of infected spikes per crop and the number of infected spikelets in each spike were recorded. A FHB disease severity rating, also know as the FHB index, was determined for each barley and oat crop (% FHB severity = (% spikes affected x proportion (%) of the spike infected) / 100). Mean FHB severity values were calculated for each soil/irrigation zone and for the whole province. Glumes and/or kernels with visible FHB symptoms were surface sterilized in 0.6% NaOCl solution for 1 min. and cultured on potato dextrose agar and carnation leaf agar for subsequent identification and quantification of *Fusarium* species.

RESULTS AND DISCUSSION: Spring conditions in 2007 were moist and ideal for abundant crop growth and *Fusarium* sporulation on crop residues. However, very dry conditions occurred during July, lowering FHB risk.

In 2007, FHB occurred in 89% of two-row and 91% of six-row barley crops surveyed (Table 1). The provincial mean FHB severities were 1.0% for two-row and 0.3% for six-row barley. The severity for two-row was slightly higher than in previous years (Pearse et al. 2007). Severities for two-row barley were highest in Zone 3. There were only three barley fields (two-row) with severities higher than 3%, and the causal pathogen was *F. poae*.

The most commonly isolated *Fusarium* species from barley was *F. poae*, accounting for 84% of total *Fusarium* isolations, followed by *F. sporotrichioides* (8%), and *F. avenaceum* (3%). *Fusarium graminearum* was isolated from only one field of irrigated six-row barley. Other fungi found infrequently on barley included *Cochliobolus, Pyrenophora* and *Septoria* spp. Secondary moulds were isolated from 86% of barley samples.

Fusarium head blight was found in 59% of the oat crops surveyed in 2007, with a mean FHB severity of 0.1% (data not shown). All oat crops positive for FHB were in Zones 2 and 3. *Fusarium poae* was the most commonly isolated species from oat, accounting for 75% of total *Fusarium* isolations, followed by *F. equiseti* (16%), *F. avenaceum* (6%), and *F. sporotrichioides* (3%). No *F. graminearum* was isolated from infected oat samples.

In summary, FHB severities remained low in barley and oat in Saskatchewan in 2007.

ACKNOWLEDGEMENTS:
We gratefully acknowledge the participation of Saskatchewan Crop Insurance Corporation staff and Saskatchewan Ministry of Agriculture irrigation agrologists for the collection of barley and oat samples for this survey.

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Table 1. Prevalence and severity of fusarium head blight (FHB) in barley crops grouped by soil or irrigation zones in Saskatchewan, 2007.

Soil Zone	No. affected crops / total crops (% of crops infected)		% FHB Severity[1] (range of severity)	
	two-row	six-row	two-row	six-row
Zone 1 Brown	6 / 6 (100%)	—	0.3% (T[2] - 0.5%)	—
Zone 2 Dark Brown	8 / 10 (80%)	2 / 2 (100%)	0.8% (0 - 3.7%)	T
Zone 3 Black/Grey	18 / 19 (95%)	7 / 7 (100%)	1.5% (0 - 5.7%)	0.5% (T - 0.9%)
Irrigation Zone	2 / 3 (67%)	1 / 2 (50%)	0.6% (0 - 1.6%)	0.1% (0 - 0.3%)
Overall Total/Mean	34 / 38 (89%)	10 / 11 (91%)	1.0%	0.3%

[1]% FHB severity = (% spikes affected x proportion (%) of the spike infected) / 100
[2]T= Trace values of FHB (<0.1%)

CROPS / CULTURES: Wheat, barley, oat
LOCATION / RÉGION: Saskatchewan

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TITLE /TITRE: SEED-BORNE FUSARIUM ON CEREALS IN SASKATCHEWAN IN 2007

INTRODUCTION AND METHODS: The results of agar plate tests on cereal seed samples from Saskatchewan provided by five companies were summarized. The tests were conducted between early September and mid-December, 2007. It was assumed that the majority of samples were from the 2007 crop. The tests were conducted either to determine the frequency of each species of *Fusarium* present or simply to detect *F. graminearum.* The data were tabulated only for all species combined (total *Fusarium*) and for *F. graminearum*. Mean percent seed infection with *F. graminearum* and with total *Fusarium* were calculated for each crop district [CD] in Saskatchewan (1). In addition, the percentage of samples in which *F. graminearum* was not detected was calculated for each CD.

The tests were performed on random seed samples, with no attempt to select fusarium-damaged kernels. Plating techniques varied between companies. All tests were done using potato dextrose agar and the petri dishes in which seed was plated were incubated for 5 to 7 days. Illumination was with either fluorescent or a mixture of fluorescent and near UV (black) light and the dishes were arranged either singly or in stacked pairs under the light source. The number of seeds tested per sample varied from 200 to 400. Thus, the probability of obtaining false negative results varied among tests and companies.

RESULTS AND COMMENTS: In Saskatchewan the 2007 growing season was marked for the second consecutive year by excellent conditions for timely spring seeding and good or excessive moisture conditions in most areas throughout June. In July and early August rainfall was generally below normal and high temperatures prevailed. Harvest started early in many areas and was 40% complete in the province by the end of August. Fusarium head blight was not a conspicuous problem in most regions in mid- to late summer (5, 6). However, rainfall was average or above average in some regions in late August and early September. This delayed ripening of cereals in central and northern-eastern regions, particularly where spring seeding had been delayed by excess moisture. Consequently conditions were conducive to saprophytic spread of *Fusarium* spp. and other fungi in the ripening floral tissues and the quality of harvested seed was adversely affected.

The data compiled are based on 675 samples (42% wheat [all classes of spring and winter combined], 35% durum, 20% barley, 3% oat). Mean levels of *F. graminearum* and of total *Fusarium* varied among CDs (Table 1). Values for total *Fusarium* were generally similar to those in 2006 (3). *Fusarium graminearum* was found in 16 of 20 districts, more than in 2006. Although it was detected in only a small percentage of samples and percent seed infection was usually low (Table 1), the overall mean percent infection was five times higher than in 2006 (3). As in previous years (2, 3), *F. graminearum* was most prevalent in CDs close to Manitoba and North Dakota, i.e. in the east and south-east.

On a provincial basis the highest total *Fusarium* levels observed were 19% for durum (from CD 2A), 24% for barley (from CD 8A), 28% for wheat (from CD 6B), and 10% for oat (from CD 8B). More than 99% of total *Fusarium* isolates from the tests were either *F. acuminatum*, *F. avenaceum*, *F. culmorum*, *F. equiseti*, *F. graminearum*, *F. poae* or *F. sporotrichioides.* In contrast to previous years (2, 3), *F. poae* was the most common species on all cereals and *F. avenaceum* was the second most common on wheat.

Mean levels of total *Fusarium* were below 5% in all CDs except 4A, 8A, 8B and 9A (Table 1). Crop districts 8A and 8B are where many crops were harvested late after rain delays. The high mean levels of both total *Fusarium* and *F. graminearum* in CD 4A are an anomaly due to the very small sample size. One highly infected sample was sent for testing from this CD; it may have come from an irrigated field or have been imported from another CD for livestock feed.

The results of the 2007 survey confirm previous studies of the prevalence and incidence of *Fusarium* spp. on harvested cereals in Saskatchewan (1, 2, 3, 4). *Fusarium graminearum* occurs over a wide area in Saskatchewan, although in most regions at a low incidence. *Fusarium* spp. are present in grain partly because of low levels of fusarium head blight in cereal crops and partly because of saprophytic invasion during wet weather in late summer and early fall. High levels of seed-borne *Fusarium* spp. undoubtedly affect emergence and seedling vigor. In 2007 and 2006 *F. poae* seems to have replaced *F. avenaceum* as the commonest species of *Fusarium* on cereal seed from Saskatchewan (3, 4).

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Table 1. Number of cereal seed samples tested from September to mid-December 2007 by five commercial companies, and levels of infection with *Fusarium graminearum* or total *Fusarium* spp. in relation to Saskatchewan Crop Districts.

Crop District	*Fusarium graminearum*			Total *Fusarium**
	No. of samples tested	Mean % infection	Samples with no infection detected	Mean % infection
1A	19	1.2	53%	2.6
1B	14	0.7	36%	3.4
2A	69	1.3	45%	2.8
2B	115	0.4	58%	3.1
3AN	10	0	100%	0.3
3AS	29	0.4	76%	1.0
3BN	14	0.1	86%	1.3
3BS	4	0	100%	0.3
4A	4	2.1	75%	10.0
4B	3	0	100%	0
5A	27	1.1	44%	5.6
5B	87	0.3	75%	5.7
6A	40	0.1	90%	3.2
6B	71	<0.1	92%	3.6
7A	44	<0.1	98%	1.2
7B	12	0	100%	4.1
8A	20	0.5	50%	8.8
8B	40	1.3	55%	7.5
9A	17	0.1	88%	5.5
9B	36	<0.1	97%	3.8
TOTAL	675	0.5	70%	3.6

*Number of samples tested for total *Fusarium* from all crop districts was only 552.

CROP / CULTURE: Barley, Oat and Wheat
LOCATION / RÉGION: Manitoba and eastern Saskatchewan

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TITLE / TITRE: STEM RUSTS OF CEREALS IN WESTERN CANADA IN 2007

INTRODUCTION AND METHODS: Surveys of producer fields and trap nurseries of barley, oat and wheat for incidence and severity of stem rust *(Puccinia graminis* Pers. f. sp. *tritici* Eriks. & E. Henn. and *P. graminis* Pers. f. sp. *avenae* Eriks. & E. Henn.) were conducted in July, August, and September 2007. Infected stem tissue samples were collected. Urediniospores were obtained from collections and evaluated for virulence specialization on appropriate sets of host differential lines (Fetch, 2005).

RESULTS AND COMMENTS: Above average temperatures in April and early May 2007 promoted early planting of cereal crops. Cool and wet conditions occurred in late May and early June and were followed by warmth and average precipitation across the eastern prairie region. While this provided favourable environmental conditions for stem rust infection, incidence and severity on susceptible lines in trap nurseries and in commercial oat and barley fields remained at trace levels across western Canada. This was most likely due to low inoculum levels blowing in from the USA.

All spring wheat cultivars recommended for production in Manitoba and Saskatchewan have excellent resistance to stem rust, and no stem rust infection was observed in any commercial wheat fields. Stem rust was detected at trace levels on susceptible wheat lines in trap nurseries, cultivated barley, and on wild barley (*Hordeum jubatum*) in 2007. The dominant race of *P. graminis* f. sp. *tritici* in 2007 was QFCS (99%).

Stem rust in cultivated and wild oat was mostly at trace levels in western Canada in 2007, but some late-planted oat fields sustained moderate (20-30% severity) infection. All oat cultivars recommended for production in Canada are susceptible to stem rust races TJG, TJJ, and TJS (Fetch and Jin, 2007). Race TGD (NA29) was dominant in 2007 (28% of total samples), followed by TJS (19%), TJJ (16%), and TGB (13%). Of note is the continued decrease in frequency of race TJJ (NA67), which has been dominant for the past several years, and the increase in frequency of race TJS. Race TJS was first identified in 2005, and is now the second most dominant race in the prairie region. Two biotypes of TJS occur, one is virulent on the *Pg-a* complex (16.5%) the other is avirulent (2.5%). These biotypes likely originated from the Louisiana area in the USA where gene *Pg-a* is deployed in local oat cultivars. One new race, a variant of race TJN (11%) with added virulence to gene *Pg-a*, was found in 2007. There continues to be mutation of races in the asexual population of *P. graminis* f. sp. *avenae* and single-step accumulation of virulence genes.

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CROP / CULTURE: Barley, Oat and Wheat
LOCATION / RÉGION: Manitoba and Saskatchewan

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TITLE / TITRE: **CEREAL VIRUS DISEASE SITUATION IN MANITOBA IN 2007**

INTRODUCTION AND METHODS: Virus diseases on cereals in Manitoba monitored in 2007 were barley yellow dwarf (BYD), wheat streak mosaic (WSM) and oat necrotic mottle (ONM).

Collaborators identified and collected samples from mid-May to early September in crops in Manitoba and parts of eastern Saskatchewan (1). The proportion of plants with (suspected) virus symptoms in surveyed fields was estimated and specimens with and without symptoms collected for testing. Infection with BYDV, WSMV and ONMV (2) was further evaluated by transmission to indicator hosts. In addition to confirming identity of causal agents, transmission to indicator host plants was used to assess virulence against historical benchmarks. For WSMV, transmission was by mechanical inoculation to a range of susceptible spring bread and durum wheats. Oat specimens with symptoms resembling ONM or WSM on oat were assayed by mechanical inoculation to a differential set of susceptible bread wheat and oat hosts. For BYDV, transmission was by cereal aphids to sets of seedlings of a susceptible oat host.

RESULTS AND COMMENTS:
Barley Yellow Dwarf (BYD) - In 2007, excess moisture delayed seeding in some of the principal cereal-producing regions of the eastern prairies. Viruliferous aphid inoculum arrived in late May on southerly winds earlier than in recent years (early to mid-June). Disease outbreaks were noted in south-central and south-western Manitoba in barley and some late-seeded wheat. Symptoms were particularly striking on wheat because of the high temperatures and bright sunlight in early August when the most vulnerable stands were at early-heading. Oat and wild oat with BYD symptoms were widely and often observed, and economic losses due to BYD appear to have been more extensive than in 2006 and 2005. All isolates from cereals were similar to the PAV strain (non-specifically transmitted by the oat bird-cherry aphid).

Wheat Streak Mosaic (WSM) - Consistent with the trend that began in the early 1990s, severe outbreaks of WSM in spring wheat in Manitoba were observed in 2007. Although overall losses were small due to the sporadic and localized nature of outbreaks, WSM is now sufficiently widespread that it can be found in almost all winter and spring wheat fields in southern Manitoba at trace levels or higher. This is in contrast to the situation that prevailed until 2001 when almost all fields were completely disease-free. Although naturally-occurring outbreaks of WSM on oat were again observed in 2007, economic losses were observed only on wheat. Virus isolates obtained from oat and assayed on susceptible wheat seedlings were not more virulent than WSMV isolates from wheat in Manitoba.

Oat Necrotic Mottle (ONM) -The mild streak mosaic symptoms of WSM and ONM on oat are difficult to distinguish so oat plants displaying such symptoms should be tested for both WSMV and ONMV. In 2007, as in 2006, oats with putative WSM or ONM symptoms were identified at a small number of sites in southeastern Manitoba that were within a few hundred metres of winter wheat. In all cases, infection with WSMV was confirmed while transmission and serological assays failed to detect ONMV.

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CROP / CULTURE: Barley, Oat and Wheat
LOCATION / RÉGION: Manitoba and Saskatchewan

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TITLE / TITRE: CEREAL SMUT SURVEYS, 2007

INTRODUCTION AND METHODS: In July 2007, cereal crops in Manitoba and Saskatchewan were surveyed for the presence of smut diseases caused by *Ustilago hordei, U. nigra, U. nuda, U. tritici, U. avenae* and *U. kolleri*. The area was covered by routes from Winnipeg - Weyburn - Moose Jaw - Saskatoon - Melfort - Wadena - Canora - Roblin - Dauphin - Neepawa - Winnipeg, as well as one-day trips in Manitoba around Winnipeg, the Red River Valley, Brandon, and the Interlake region. Fields were selected at random at approximately 10 - 15 km intervals, depending on the frequency of the crops in the area. An estimate of the percentage of infected plants (i.e., plants with sori) was made while walking an ovoid path of approximately 100 m in each field. Levels of smut greater than trace (<0.01%) were estimated by counting plants in a one m^2 area at a minimum of two sites on the path.

An isolate of smut was collected from each field with smut and compared with a carboxin-sensitive isolate, 72-66 from Canada, and with a carboxin-resistant isolate from France (Newcombe and Thomas, 1991). The teliospore germination assay of Leroux (1986) and Leroux and Berthier (1988) was used to determine if resistance to the fungicide carboxin was present. Teliospores of each isolate were streaked onto half-strength potato dextrose agar amended with 0 and 1.0 µg ml^{-1} of carboxin. The cultures were incubated at 20°C in a controlled environment chamber and examined for teliospore germination at 24 h.

RESULTS AND COMMENTS: Loose smut (*Ustilago tritici*) was found in 25 (23%) of the 110 fields of common wheat surveyed. Two fields had an incidence of 0.5% infection, one field had an incidence of 0.1% infection, while the incidence of smutted plants in the rest of the fields was at trace levels (<0.01%). In durum wheat, loose smut was found in 11 (69%) of the 16 fields surveyed. The incidence of smutted heads in two fields was 0.1% and at trace levels in the remainder.

None of 34 fields of oat surveyed was observed to have smutted plants.

Loose smut (*U. nuda*) was found in seven (39%) of 18 fields of six-rowed barley. One field had an incidence of 0.5% infection and one field had an incidence of 0.1% infection; the incidence of smutted plants in the remainder was at trace levels. Three (8%) of the 39 fields of two-rowed barley surveyed were found to have smutted plants. In these three fields plants were infected with loose smut at trace levels. False loose smut (*Ustilago nigra*) and covered smut (*U. hordei*) were not found in any barley fields in 2007.

Six isolates of *U. tritici* collected from common wheat fields were able to germinate and grow on the agar medium amended with carboxin. These data suggest that the isolates may be resistant to the fungicide carboxin; however, further study is needed to confirm these preliminary findings.

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CULTURES / CROPS: Avoine (*Avena sativa*), Orge (*Hordeum vulgare*), Blé (*Triticum aestivum*)
RÉGION / LOCATION: Québec

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TITRE: MALADIES DES CÉRÉALES PRÉSENTES AU QUÉBEC EN 2007

INTRODUCTION et MÉTHODES: Les symptômes des maladies foliaires ont été relevés dans les essais d'enregistrement et recommandation de céréale de printemps du Québec. Ces essais d'avoine, de blé et d'orge, répartis dans différentes régions du Québec (CÉROM 2007), ont été visités une fois durant la saison lorsque le stade de développement des céréales se situait entre laiteux moyen et pâteux moyen. Les notations de symptômes suivaient une échelle de 0 à 9 (0 = plante saine; 9 = feuille étendard présentant des symptômes sur plus de 50 % de sa surface). L'incidence des maladies est considérée faible pour des valeurs de 0 à 4; moyenne pour des valeurs de 4 à 6; et élevée pour des valeurs de 6 à 9.

RÉSULTATS et COMMENTAIRES: Toutes les régions ont bénéficié de bonnes conditions climatiques lors de la période des semis. Au début de l'été toutefois, de la grêle s'est abattue sur les essais réalisés à Princeville et les a endommagés à un point tel qu'aucune observation n'a pu être relevée à cet endroit. Mentionnons aussi l'abondance, tôt en saison, de populations de pucerons des céréales qui nous a fait craindre une incidence élevée du virus de la jaunisse nanisante de l'orge (VJNO), virus transmis par les pucerons. Cette crainte ne s'est toutefois pas vérifiée; l'action des prédateurs sur les pucerons a probablement limité les dommages dus au VJNO.

Chez l'avoine, la tache ovoïde (*Stagonospora avenae*), la jaunisse nanisante de l'orge de même que la rouille couronnée (*Puccinica coronata*) ont été observées en 2007. La tache ovoïde a été la maladie la plus répandue; elle s'est développée dans tous les essais avec une intensité moyenne. La rouille a été moins répandue qu'à l'habitude et a eu une incidence plutôt faible. Elle a touché les essais de la Montérégie et l'essai de La Pocatière dans le Bas-Saint-Laurent. Quant au VJNO, il a eu peu d'incidence malgré sa présence dans toutes les régions visitées.

Chez le blé, les taches foliaires (*Drechslera tritici-repentis*, *Stagonospora nodorum* et *Cochliobolus sativus*) se sont manifestées dans tous les essais et présentaient une intensité de symptôme moyenne. La rouille des feuilles (*Puccinia triticina*) a été moins répandue en 2007 qu'elle l'est habituellement. Elle a été relevée seulement en Montérégie où l'intensité des symptômes variait de faible à moyenne dépendamment des lignées/cultivars. Des symptômes de VJNO de faible intensité ont été observés à Beloeil dans la région de Montréal et à Pintendre dans la région de Québec. L'oïdium (*Blumeria graminis* f. sp*. tritici*, syn. *Erysiphe graminis*), quant à lui, a touché une fois de plus l'essai de Saint-Augustin (région de Québec), mais a eu une incidence beaucoup plus faible que celle observée les années précédentes. La fusariose de l'épi n'a pas été évaluée dans les essais d'enregistrement et recommandation. Cependant selon les résultats d'analyse de désoxynivalénol (DON) des lots de blé destinés à la consommation humaine (M. Ramzy Yelda, Fédération des producteurs de culture commerciale du Québec, communication personnelle), la fusariose a eu moins d'impact en 2007 qu'elle n'en a eu en 2006; il y a eu moins de lots qui ont dépassé le seuil de 2 ppm de DON.

Chez l'orge, seules les taches foliaires (*Drechslera teres*, *Rhynchosporium secalis* et *Cochliobolus sativus*) ont été évaluées. Elles étaient présentes dans tous les essais visités et ont eu une incidence moyenne, ce qui est plus faible qu'à l'habitude. Quant aux autres maladies couramment observées, comme la rouille des feuilles (*Puccinia hordei*), l'oïdium (*Blumeria graminis* f.sp*. hordei*, syn. *Erysiphe graminis*) et la jaunisse nanisante de l'orge, elles ne se sont pas manifestées de façon notable en 2007.

RÉFÉRENCE:

CÉROM. 2007. Recommandations de cultivars de céréales à paille 2008. *Dans* : Résultats 2007 et Recommandations du CÉROM 2008. CÉROM, pp. 21-29.

CROP / CULTURE: Corn
LOCATION / RÉGION: Ontario and Québec

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TITLE / TITRE: SURVEY OF CORN DISEASES AND PESTS IN ONTARIO AND QUÉBEC IN 2007

INTRODUCTION AND METHODS: From August 29 to September 14, 2007, a corn pest survey was conducted in Ontario and Québec. As in previous years, the emphasis of the survey was to determine the distribution and severity of the bacterial disease, Stewart's wilt (*Pantoea stewartii* = *Erwinia stewartii*). The distribution and severity of other diseases and insects, including eyespot (*Aureobasidium zeae*), common rust (*Puccinia sorghi*), northern leaf blight (*Exserohilum turcicum*), anthracnose leaf blight (*Colletotrichum graminicol*a), common smut (*Ustilago maydis*), head smut (*Sporisorium holci-sorghi* = *Sphacelotheca reiliana*), ear rot (*Fusarium spp*.), stalk rot (*Fusarium spp*., and *C. graminicol*a), European corn borer (*Ostrinia nubilalis*), corn rootworm (*Diabrotica longicornis* and/or *D. virgifera*), and corn flea beetle (*Chaetocnema pulicaria*) were also recorded. In addition, scouting for any newer pests in Canada was conducted, especially for grey leaf spot (*Cercospora zeae-maydis*) in Ontario.

At each of the 247 fields in Ontario and 103 fields in Québec surveyed, the incidence of each pest and the severity of the predominant pests were recorded. A total of 40 Stewart's wilt-like leaf samples were collected from southern Ontario during the surveys. ELISA tests for the pathogen *P. stewartii* were done at the Central Experimental Farm using reagent sets, protocols, and antibodies provided by AGDIA Inc. (Elkhart, Indiana 46514, USA).

RESULTS AND COMMENTS:
Fungal leaf diseases: Eyespot was found in 98 fields in Ontario and 97 fields in Québec (Table 1). It was rarely found in fields in southern Ontario. Thirteen fields in Québec, especially in the Drummond region, displayed plants showing intermediate disease severity. Some hybrids entered in the Ontario Corn Committee (OCC) trial at Lancaster in Stormont, Dundas and Glengarry County, ON, were rated as moderately susceptible to eyespot. In Québec, eyespot, common rust, and anthracnose leaf blight were often found on the same plants, and caused an intermediate level of damage**.** It is very rare to see eyespot and common rust together on the same leaves.

Common rust was found in 204 fields in Ontario and 73 fields in Québec (Table 1). Four sweet corn fields showed intermediate to high severity. Common rust was more abundant in eastern Ontario and Québec than in southern Ontario; however, four irrigated seed corn fields showed intermediate severity. Southern rust (*Puccinia polysora*) was not found in 2007. Typical symptoms of grey leaf spot were found in 98 fields in 14 counties of Ontario (Table 1). As from 2004 to 2006 [1, 2, 3], grey leaf spot was mostly found only on the lower leaves and symptoms were not severe. It was one of the most common leaf diseases in Essex, Chatham-Kent, Elgin, and Middlesex Counties, ON and was observed at intermediate severity in one seed corn field at Erie Beach, Chatham-Kent County. No grey leaf spot was found in Québec.

Anthracnose leaf blight (ALB) was found in most fields in Ontario (205) and Québec (97) (Table 1). Overall, ALB is one of the most common leaf diseases of corn in Canada. A few hybrids tested in the OCC trial at Wingham, Huron County, ON, were moderately ALB-susceptible. However, as in 2006 [1], heavier ALB was found in eastern Ontario. In 2007 ALB was the most important leaf disease in Québec with two outbreak areas. In Les Jardins-de-Napierville County, the ALB epidemic extended across a 15 km-wide area, affected most fields, and resulted in all plants turning yellowish and in some cases being almost dead. Another similar area was between Brome-Mississquoi and Rouville Counties, Québec, and was about 10 km wide. Because disease developed late, the estimated average yield loss from ALB in these two areas was 10-15%. This is the first report of such a severe outbreak of ALB in Canada.

Northern leaf blight (NLB) was found in 81 fields in Ontario and 38 in Québec. In Ontario, there were 12 fields with intermediate or severe levels of disease, including seven seed corn and three grain fields in southern Ontario, and two grain corn fields in eastern Ontario. In a field in Stormont Dundas and Glengarry County, ON, the plants were almost dead when surveyed. Since 2003, severe NLB has been found around Erie Beach, Chatham-Kent County, ON. In 2007, six seed corn fields surveyed about 2-5 km from Erie Beach had NLB, and plants in two of these were almost dead by August 31. In the OCC trials at Woodstock, Alma, and Lancaster, some hybrids were rated moderately susceptible to NLB. In Québec intermediate disease levels were found in only three fields. Surveys since 2004 indicate that northern leaf blight is a more serious problem in Canada than previously thought; losses are increasing and may pose a significant risk in the future. A new disease involving round or oval lesions of varying size, similar to phaeosphaeria leaf spot (*Phaeosphaeria maydis*), was found in five OCC trials only.

Fungal Ear and Stalk diseases: Gibberella/Fusarium ear rots were observed in 46 fields in Ontario and 24 in Québec (Table 1) but all of them were of limited severity at the survey time. Common smut was distributed across 122 fields in Ontario and 49 in Québec (Table 1). There were 10 fields with more than 5% common smut in Ontario, including 7 seed corn fields with a 10-40% incidence in southern Ontario. In Québec, there were only two fields with a relatively high incidence, 5 and 15% respectively. Head smut was found in one field in eastern Ontario at 22% incidence, and in six fields in Québec, one at 8%, the others all at <1% incidence. Many ears had black mold on kernels damaged by birds or insects.

Stalk rot, including anthracnose stalk rot/top-die back (*Colletotrichum graminicola*), fusarium stalk rot (*Fusarium* spp.), and pythium stalk rot (*Pythium* spp.) was found in 170 fields in Ontario and 93 fields in Québec (Table 1). Because the 2007 survey was completed 7-14 days later than in previous years, possibly more stalk rot symptoms than normal were observed. Pythium stalk rot, also known as early death, was detected more often in irrigated seed corn fields and in 10 of these incidence ranged from 5 to 60%. Nineteen fields in Ontario and five fields in Québec had a 20-100% incidence of top-die back. At the time of the surveys, only four fields in Ontario and five in Québec were diagnosed with fusarium stalk rot at incidences of 5-50%.

Bacterial diseases: In 2007, Stewart's wilt was detected in 35 fields in the traditional areas of southern and south-western Ontario where the disease is typically detected. This is in contrast to 2006 when the disease was found in eastern Ontario. Of the 40 Stewart's wilt samples taken, 35 were positive for *P. stewartii* by the ELISA test. These 35 fields were in the following seven counties: Chatham-Kent, Elgin, Essex, Huron, Lambton, Middlesex, and Oxford in southern Ontario (Table 1). It was noted that insect populations of the Corn flea beetle (CFB) remained very low in southern Ontario in 2007, as they have been for the last four years [1, 2, 3].

In a separate survey of seedling diseases on seed corn in the early season, from 10 wilt-like samples collected and tested for *P. stewartii*, one crop tested positive, based on multiple samples. This same crop also tested positive for Stewart's wilt in the fall. In contrast to 2006, no Stewart's wilt was found in eastern Ontario or Québec in 2007. The results from this and other corn/seed corn pest surveys over the past 10 years support our conclusion that overwintering CFB populations are found only in southern Ontario, and Stewart's wilt is predominantly a problem in south-western Ontario. However, Stewart's wilt does periodically occur in eastern Ontario, where it may be spread by bacteria carried on seed, or by other unknown mechanisms. No holcus leaf spot (*Pseudomonas syringae*) was found in 2007.

Viral diseases: Maize dwarf mosaic symptoms were observed in one seed corn field in Chatham-Kent County, ON, in 2007. No other viral disease was observed; this was also the case for seven sweet corn fields sampled during the surveys.

Insects: European corn borer (ECB) damage was observed at 179 fields in Ontario and 70 fields in Québec (Table 1). Unusually, only five fields in southern Ontario and six fields in eastern Ontario and Québec had incidences greater than 5%. A field in Middlesex County, ON, had an incidence up to 20% ECB damage. ECB damage incidences ranging from 5-10% were observed in commercial corn hybrids in the OCC trials in Winchester, Stormont, Dundas & Glengary Counties, ON. Corn rootworm (CRW) damage was observed at 192 fields in Ontario and 98 fields in Québec (Table 1). As in other years, the

main damage from CRW in most fields was from leaf feeding and silk pruning; however, CRW was found to have damaged kernels in two fields in the very dry area of Frontenac and Leeds and Grenville Counties, ON. In these fields, 90-95% of the ear- tips and 5-10 kernels per cob were damaged by CRW.

Grasshoppers, most likely the red-legged grasshopper (*Melanoplus femur-rubrum*), showed slightly increased populations in 2007 in both Ontario and Québec compared to 2006. No aphid damage was observed in either Ontario or Québec in 2007. Corn blotch leaf miner (*Agramyza parvicornis*), was not as common as in other years in either Ontario or Québec, likely because of the dry season in 2007. As found previously, Brown stink bug (*Euschistus servus*) occurred in a few fields in both Ontario and Québec, but populations were very low. Picnic beetle (*Glischrochilus quadrisignatus*) was found in three fields in southern Ontario and one in Québec.

Mites: Two-spotted spider mite (*Tetranychus urticae* = *T. bimaculatus*) populations was extremely high in Ontario. In areas of the province (Chatham-Kent, Perth, Norfork, Waterloo, York, Durham, Frontenac, and Leeds and Grenville Counties) which sustained a prolonged dry period, spider mite injury resulted in many of the corn plants senescing (yellowing) or dying (drying down) at the time of the survey. For example, in one field in Chatham-Kent County, seed corn plants in a 200 × 50 m^2 area (on top of a sandy knoll), all died from the top down and were dry, while in other lower parts of the field, plants were still green. High mite populations very likely were promoted by the severe moisture stress. Of the 20 OCC trial sites in 2007, seven had an intermediate level of mite damage, while three others had higher injury levels. Mites were less problematic in Québec.

Others: As found in previous years, bird and other vertebrate damage was severe in many fields in both Ontario and Québec.

Summary: Dry conditions were a major problem in southern Ontario in 2007 and as expected, had a significant impact on pest levels. Corn leaf diseases, including northern leaf blight, anthracnose leaf blight, common rust, eyespot, and Stewart's wilt were all less severe than usual in 2007, but stalk rot and pests, such as European corn borer, corn rootworm, and especially mites were more prevalent and damaging. Northern leaf blight and pythium stalk rot were relatively severe in seed corn fields especially in those that were irrigated. In common with other corn production areas of North America, grey leaf spot has become the most common leaf disease in southern Ontario. In eastern Ontario and Québec, anthracnose leaf blight, eyespot, and rust were important corn diseases. The first significant outbreak of anthracnose leaf blight in Québec occurred in 2007. Ear rot, aphids, European corn borer, and grasshoppers were less problematic in 2007 than in 2006 in both Ontario and Québec.

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Table 1: Distribution of pests in corn fields in Ontario and Québec in 2007

County/ Regional Municipality	# of Fields	Eyespot	Rust	GLS	ALB	NLB	Wilt	Smut	Head smut	Ear rot	Stalk rot	ECB	CRW	GH	Mites
Ontario															
Chatham-Kent	40	5	32	35	33	24	10	32		9	14	30	21	17	26
Dufferin	6	5	6		6			2		2	5	4	5	1	2
Durham	7	3	6		5	1		3			4	7	5	5	3
Elgin	14	3	14	14	13	6	4	9		5	13	13	13	13	13
Essex	12	1	3	5	9	1	7	6		1	3	5	6	3	7
Frontenac	7	1	6		6			1		1	6	6	6	3	2
Hastings	3	3	3		1			2			3	3	3	3	2
Huron	9	3	5	2	9	3	1	4		1	6	4	4	4	2
Lambton	9		4	3	5	2	6	2			4	4	7	8	4
Lanark	4	3	4		4			3		2	4	2	4	2	2
Leeds and Grenville	12	10	10		12	2		2		2	9	8	11	9	5
Lennox and Addington	3		3		2					1	3	3	2		1
Middlesex	15	3	15	9	10	7	6	8		3	10	12	11	2	6
Norfork	5	3	4	3	3	2		3			3	5		3	5
Northumberland	7	4	7		5			3		1	6	7	7	4	3
Ottawa-Carleton	12	10	10		11	3		5		2	10	6	12	5	6
Oxford	11	3	11	10	8	8	1	7		2	11	10	10	4	5
Perth	8	2	7	3	7	5		3		1	7	6	7	5	
Peterborough	4	3	4	1	4			1		1	4	4	4	2	2
Prescott & Russell	7	5	4		6	3		5			7	4	6	5	
Renfrew	13	10	13		13	3		6		4	8	6	13	3	3
Simcoe	2		2	1	2						2	1	2	1	2
Stormont, Dundas & Glengarry	12	10	9	1	12	6		5	1	4	9	12	12	4	2
Victoria	2	1	1		2					1	1	1	2	2	1
Waterloo	9		8	6	7	2		6		2	9	8	9	4	5
Wellington	9	6	8	5	6	3		3			4	5	6	3	3
York	5	1	5		4			1		1	5	3	4	3	4
Total	**247**	**98**	**204**	**98**	**205**	**81**	**35**	**122**	**1**	**46**	**170**	**179**	**192**	**118**	**116**
Québec															
Argenteuil	3	3	3		3	2		3			3	2	1	2	
Bécancour	5	5	2		4	1		2	1	2	4	3	5	5	4
Brome-Mississquoi	7	7	6		6	3		4			7	6	7	3	1
D'Autray	6	6	5		6			1	2	2	5	6	6	2	3
Deux-Montagnes	3	3	2		3	2		1			2		3		1
Drummond	5	5	2		4	2		4		2	5	3	4	3	4
Haut-Richelieu	6	5	6		6	2		2			5	3	6	3	3
Joliette	1	1	1		1			1	1	1	1	1	1		1
La Haute-Yamaska	5	5	3		5	2		3			4	1	5	2	
La Vallee-du-Richelieu	7	7	6		6	1		2			7	6	7	5	1
Le Bas-Richelieu	4	4	2		3	1		3		4	3	4	4	4	2
Les Jardins-de-Napierville	6	6	4		6	2		2		1	6	2	6	2	2
Les Maskoutains	8	8	6		8	3		4		1	9	4	8	3	7
Maskinongé	5	5	3		5	1		1	1	2	5	5	5	5	2
Mirabel	5	5	5		5			4	1	2	4	4	5	2	1
Montcalm	2	2	1		2	1		1		1	2	1	1	2	1
Nicolet-Yamaska	6	6	3		5	4		4		2	5	5	6	6	2
Roussillon	5	4	5		5	2				1	4	4	4	4	1
Rouville	4	3	1		4	4		2		1	4	3	4	3	1
Trois-Rivières	2	2	1		2	1					1	1	2	2	
Vaudreuil-Soulanges	8	5	6		8	4		5		2	7	6	8	6	3
Total	**103**	**97**	**73**	**0**	**97**	**38**	**0**	**49**	**6**	**24**	**93**	**70**	**98**	**64**	**40**

Rust = common rust; GLS = grey leaf spot; ALB = anthracnose leaf blight; NLB = northern leaf blight; Wilt = Stewart's wilt; Smut = common smut; Ear rot: includes gibberella ear rot and fusarium ear rot; Stalk rot: includes fusarium stalk rot, anthracnose stalk rot, and top-die back; ECB = European corn borer; CRW = Corn rootworm, including both western and northern corn rootworm; GH = Grasshoppers.

CROP / CULTURE: Corn

LOCATION / RÉGION: Ontario

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TITLE / TITRE: OBSERVATION OF RED ROOT ROT OF CORN IN ONTARIO IN 2007

INTRODUCTION AND METHODS: Red root rot (RRR) of corn is caused by a complex of fungi of which *Phoma terrestris* (syn. *Pyrenochaeta terrestris*) is the most important (3). The disease causes destruction of roots leading to yield losses up to 15 to 20% (1, 4). In onion this disease is known as pink root rot (6). The occurrence of *P. terrestris* on corn was first reported in 1961 in southern Ontario (11). As RRR of corn was observed in some samples during disease surveys in Ontario in 2004 (12) and 2005 (13), the objective of the present work was to conduct a more comprehensive survey for the disease at other locations in Ontario.

During the 2007 season, collaborators collected the root systems and adhering soil from three corn plants per field, and sent these to the AAFC laboratory in Québec for analysis. Roots were washed carefully and examined for symptoms. Severity of root diseases was determined using a root rot index of 0 to 9. Each root was assessed and a mean calculated for each field. To confirm the presence of *P. terrestris,* pieces of symptomatic root tissue were plated on potato dextrose agar (PDA) medium amended with benomyl and on Spezieller-Nährstoffarmer agar (SNA) medium in petri dishes. Roots on modified PDA were incubated in the dark and those on SNA under a mixture of fluorescent and NUV tubes. Growth of the pathogen was checked after 7 to 10 days. A second approach consisted of checking for the presence of microsclerotia of *P. terrestris* inside root cells by direct observation under a compound microscope.

RESULTS AND COMMENTS: In June 2007, 13 samples of young corn plants were collected in the area of Chatham-Kent. Red root rot was not detected in any of the samples, but *Fusarium* was isolated from 12 of them (results not shown). We concluded that *P. terrestris* had not yet invaded the roots at this time of the year. Another 14 samples (one per location) were collected from the beginning of September to the beginning of October. In most samples, symptoms of root diseases appeared as a dark brown or black discolouration rather than the typical red or pink discolouration normally associated with RRR. Severity of symptoms ranged from 0.7 to 6.7, but, in general, root disease levels were low and only three samples had a root rot index greater than 4.0 (Table 1). The low levels of disease observed could be due to the fact that corn had not been the previous crop in any of the fields sampled. Root rot, and RRR in particular, is increased by monoculture (8). Microsclerotia of *P. terrestris* were detected in two of the three highly diseased samples (Table 1). The pathogen could not be detected in these samples using PDA as the isolation medium, but was found in two of the three, when using SNA. *P. terrestris* was also detected on SNA in some samples with low levels of root rot, without the concomitant detection of microsclerotia. It is quite normal for disease levels not to be correlated with the presence of *P. terrestris* microsclerotia or isolation of the pathogen on culture media, because the tests are performed only on diseased portions of roots. In Table 1, "+" indicates increasing evidence of microsclerotia in roots, or of fungal growth from root pieces plated on agar media. This explains why, in some cases, there was a low root rot index combined with high level of detection. Confirmation of *P. terrestris* on SNA agar medium was based on the presence of a red or pink colouration in the agar medium around the piece of root and on the presence of typical pycnidia of *P. terrestris*. Employing SNA as the isolation medium appears to be a more sensitive method for pathogen verification than using PDA. Since this was a new protocol tested for the first time, we plan to conduct additional comparisons to evaluate the enhanced sensitivity of using SNA for detection of *P. terrestris* in corn.

Exserohilum pedicellatum was isolated from two of the three samples with a high root rot index. An index of 5.7 combined with the abundance of this fungus on both PDA and SNA in the sample from Kent Bridge, indicates that this is probably a severe case of helminthosporium pedicellatum root rot. This pathogen is considered a weak parasite by McGee (7), but others have shown that it can cause root rot in corn (10, 5). *Exserohilum pedicellatum* was reported from roots of corn in Ontario and Quebec in 2005 (9, 13), but was not know to a cause a disease of corn in Canada beforehand (2). Since this is the second time that *E. pedicellatum* has been isolated from diseased roots of corn in Ontario, it should be considered as a corn pathogen in Canada. A third pathogen, *Bipolaris sorokiniana,* was isolated from two field samples with a low level of root rot.

This limited survey confirms that *P. terrestris* is present in roots of corn in Ontario, but only at low levels in the samples analysed in 2007. The fact that all samples were from corn crops in rotation, could explain the low level of root diseases observed. We suggest that RRR and other root diseases could become more prevalent and severe if monoculture of corn increases. Future surveys, to include fields under corn monoculture for at least 2 years, should help to obtain a more complete picture of RRR in corn in Ontario.

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Table 1. Observations on root diseases of corn and their casual agents in Ontario in 2007.

			Isolation on culture media		
			Phoma terrestris	***Exserohilum pedicellatum***	***Bipolaris sorokiniana***
Field location	**Root rot index (0-9)**	**Microsclerotia of *P. terrestris***	**PDA / SNA**	**PDA / SNA**	**PDA / SNA**
Kent Bridge	5.7	–	– / +	+++ / ++	– / –
Ridgetown	3.7	+	– / +	– / –	– / –
Florence	0.7	+	– / +	– / –	– / –
Chatham	6.3	++	– / –	– / –	– / –
Jeanette's Creek	2.3	++	– / +	– / –	+ / –
Grande Pointe	6.7	++	– / +++	+ / –	– / –
St. Thomas	3.3	–	– / +++	– / –	– / –
Leamington	2.3	–	– / –	– / –	– / –
Rodney	4.0	Trace	– / –	– / –	– / –
Bornholm	2.0	Trace	– / –	– / –	– / –
Elora (field no 1)	3.3	Trace	+ / ++	– / –	– / –
Elora (field no 2)	2.3	–	– / +	– / –	– / –
West Montrose	2.3	–	– / +	– / –	++ / –
Moorefield	2.3	+	– / –	– / –	– / –

'-' no microslerotia or evidence of other diagnostic fungal structures
'+' to '+++' increasing evidence of microsclerotia or other diagnostic fungal structures

CULTURE / CROP: Maïs (*Zea mays*)
RÉGION / LOCATION : Québec

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TITRE / TITLE: OBSERVATION DE LA MALADIE DES RACINES ROSES DU MAÏS AU QUÉBEC EN 2007

INTRODUCTION ET MÉTHODES: La maladie des racines roses du maïs est causée par un complexe de champignons dont le plus important est le *Phoma terrestris* (syn. *Pyrenochaeta terrestris*) (2). Elle cause une détérioration des racines qui entraîne des pertes de rendement pouvant atteindre 15 à 20 % (1, 3). Cette maladie a été rapportée à plusieurs reprises et à plusieurs endroits au Québec depuis 1999 (5, 6, 7, 8). À l'automne 2007, dans le but de vérifier la possibilité d'observer la maladie sur des racines de plantes à pleine maturité et d'en isoler le champignon, nous avons demandé à des collaborateurs de nous envoyer des racines prélevées dans des champs qui étaient au moins en deuxième année de monoculture de maïs de façon à augmenter nos chances d'observer la maladie (4). À la fin d'octobre ou au début de novembre, les racines de trois ou quatre plantes ont été prélevées dans chacun des champs échantillonnés. Chaque racine a été déterrée en préservant une motte de sol de 10 à 20 cm de diamètre et envoyée au laboratoire. Les racines ont été lavées délicatement et les symptômes de pourriture ont été évalués sur une échelle de 0 à 9. On a recherché la présence du *Phoma terrestris* dans les racines nécrosées par deux méthodes. La première consistait à rechercher, au microscope, des microsclérotes du champignon dans les cellules des racines montrant des symptômes de la maladie. La deuxième approche consistait à prélever des morceaux de racines montrant des symptômes de la maladie et à les déposer sur une gélose à la pomme de terre (PDA modifié avec du bénomyl) placée à 25°C pendant 7 jours et sur une gélose SNA (Spezieller-Nährstoffarmer agar) placée sous un éclairage contenant du ultra violet proche pendant 7 à 10 jours. La présence du *P. terrestris* ainsi que d'autres champignons pathogènes a alors été déterminée.

RÉSULTATS ET COMMENTAIRES: La gravité des symptômes de pourriture de racines a varié de élevée à très élevée pour l'ensemble des racines des deux champs échantillonnés (Tableau 1). Bien que les racines étaient passablement pourries, étant donné la maturité avancée des plantes, les symptômes de la maladie des racines roses étaient encore visibles. Les parties atteintes présentaient très peu de coloration rouge foncé, mais beaucoup de brun foncé et même de noir. Dans le champ de Saint-Thomas d'Aquin où des échantillons ont été prélevés à deux dates différentes, les échantillons prélevés plus tard présentaient des indices de pourriture de racines plus élevés que les premiers. Les microsclérotes du *P. terrestris* ont été très faciles à détecter dans les racines montrant des symptômes de la maladie. Ce champignon a aussi été isolé en abondance sur les deux milieux de culture utilisés. Le *Exserohilum pedicellatum* et le *Bipolaris sorokiniana*, autres agents de pourritures de racines du maïs, n'ont pas été détectés. Ces analyses montrent que la maladie des racines roses était présente à une intensité élevée dans ces deux champs en 2007.

Cet échantillonnage, bien que très limité, a permis de démontrer qu'il est possible d'observer et d'isoler facilement le *P. terrestris* très tard en saison, dans des racines de maïs dans un état de détérioration avancée. De plus, il confirme la présence de la maladie des racines roses du maïs dans des localités qui n'avaient pas été inventoriées auparavant, à savoir Coteau-du-Lac et Saint-Thomas d'Aquin (près de Saint-Hyacinthe). L'intensité élevée de la maladie dans ces deux champs en deuxième année consécutive en maïs, est une manifestation que la monoculture favorise la maladie des racines roses (4). De plus, elle indique que cette maladie s'est bien développée en 2007 même si la saison a été relativement fraîche au Québec, alors qu'il est reconnu qu'elle est favorisée par les températures élevées (1). Malheureusement, aucune donnée sur les baisses de rendement que pourraient avoir causé la maladie dans ces champs n'est disponible. Toutefois, à Saint-Thomas d'Aquin, le déracinement des plantes à la main était anormalement facile, laissant soupçonner un système radiculaire en mauvais état.

REMERCIEMENTS: Nous remercions Lucie Lévesque, technicienne, Nancy Larocque, étudiante et Laurence Galarneau, stagiaire pour leur aide technique ainsi que Benoît Côté pour la récolte d'échantillons.

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Tableau 1. Observation et incidence des maladies des racines du maïs au Québec en 2007.

			Isolement sur milieu de culture		
			Phoma terrestris	***Exserohilum pedicellatum***	***Bipolaris sorokiniana***
Localité (date)	**Indice moyen (0 - 9)**	**Microsclérotes de *P. terrestris***	**PDA / SNA**	**PDA / SNA**	**PDA / SNA**
Coteau-du-Lac (1er nov.)	8,3	+++	+++ / ++	– / –	– / –
Saint-Thomas d'Aquin (25 oct.)	5,3	++	+++ / ++	– / –	– / –
Saint-Thomas d'Aquin (2 nov.)	7,7	+++	+++ / ++	– / –	– / –

« – » absence de microsclérotes ou d'autres structures typiques du champignon
« + » à « +++ » abondance relative de microslérotes ou d'autres structures typiques du champignon

CROP / CULTURE: Oat
LOCATION / RÉGION: Manitoba and eastern Saskatchewan

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TITLE / TITRE: CROWN RUST OF OAT IN THE EASTERN PRAIRIE REGION OF CANADA IN 2007

INTRODUCTION AND METHODS: Surveys for oat crown rust (caused by *Puccinia coronata* Cda f. sp. *avenae* Eriks.) incidence and severity were conducted in Manitoba from June 28 to August 23 in 2008. Surveys for the rust in Saskatchewan were conducted on July 18 and 25, and August 7, 8, 10, 21 and 22. Most locations surveyed in 2007 were recorded on a handheld global-positioning device (Garmin GPS map 60C) to facilitate returning to the same locations to monitor progress of the rust at a later date, if needed. For virulence studies, crown rust collections were obtained from susceptible wild oat (*Avena fatua* L.) plants, commercially grown oat (*A. sativa* L.) in farm fields, and susceptible and resistant oat lines and cultivars grown in uniform rust nurseries. The nurseries were located at Brandon, Emerson, and Morden, MB, and at Indian Head and Regina, SK. Single-pustule isolates were established from the rust collections. Races were identified using 16 standard oat crown rust differentials (Table 1) as described by Chong et al. (2000). In addition, eight oat lines, each carrying a different gene for crown rust resistance *Pc91, Pc94*, *Pc96, temp_pc97, temp_Pc98,* and *temp_Pc100* to *temp_Pc102,* were used as supplemental differentials. The cultivar 'HiFi' has *Pc91*. It was released for commercial production in North Dakota and Minnesota in 2001 and in the eastern prairies in 2006. 'Leggett' has *Pc68* and *Pc94*.

RESULTS AND COMMENTS: Aecia were commonly observed on buckthorn (Rhamnus cathartica L.), the alternate host, in Manitoba on June 18. Trace levels of crown rust infection were first observed on wild oat on July 6 in southern Manitoba where buckthorn is not found. These early infections most likely resulted from urediniospores carried in by southerly winds from the United States. By mid August, the rust was found on wild oat and in many commercial oat fields across Manitoba and eastern Saskatchewan, but mostly at trace levels due to prolonged hot, dry weather. Fields with trace-40% crown rust severities occasionally were found, but these fields were at or near-maturity, too late a stage for the rust to cause significant damage. Very late-planted fields (at heading or early milk stage) with up to 40% or 60% crown rust severities were also found during surveys in western Manitoba and eastern Saskatchewan on August 22. These crops most likely would have been damaged by the rust if grown to maturity.

Approximately 350 single-pustule isolates were established from the rust collections. Frequencies of virulence of these isolates to the 24 oat crown rust differentials are shown in Table 1. In 2007, cultivars with *Pc68* (such as 'AC Assiniboia', 'AC Pinnacle', 'Ronald', and 'Furlong') occupied over 80% of the area planted to oat in Manitoba (Manitoba Crop Insurance Report - 2007). The frequencies of virulence to *Pc68* in isolates from commercial oat fields and wild oat were 70.8% and 45.6%, respectively. Frequencies of virulence to *Pc38* and *Pc39* were over 90% because these two genes are also present in all the cultivars with *Pc68*. Thus, the extensive use of *Pc38* and *Pc39* continued to exert strong selection on *P. coronata* f. sp. *avenae* for virulence to these two genes. Frequency of virulence to *Pc48*, a gene in 'Triple Crown', was 8.2% in isolates from wild oat, and 11.5% in isolates from cultivated oat in commercial farm fields. A decline in the area of 'Triple Crown' could account for the gradual decrease in frequency of virulence to this gene since 2003 (Chong et al. 2008).

In 2006, an isolate with virulence to the *Pc68* and *Pc94* gene combination was identified in Manitoba. Virulence to this gene combination was identified in four isolates from wild oat and cultivated oat in 2007 (Table 1). This is of concern, as 'Leggett', which has *Pc68* and *Pc94* and was released in 2004, has not yet been widely grown. Frequency of virulence to *Pc96 ,* a gene that has not been deployed in oat cultivars, *was* unusually high (18.1%) in 2007. Virulence to this gene typically occurred at less than 2.0% in the eastern prairie region in previous years (Chong et al. 2008). None of the isolates in 2007 were virulent on the cultivar 'HiFi' (*Pc91*). However, virulence to this gene has been detected in the eastern

prairie region since 2002. *Temp_pc97, temp_Pc98,* and *temp_Pc100* to *temp_Pc102* are crown rust resistance genes recently introgressed from the wild relative, *A. sterilis* L. (J. Chong, unpublished). Frequency of virulence to *temp_pc97* and *temp_Pc98* was below 3.0% (Table 1). Genes *temp_Pc100, temp_101,* and *temp_102* were resistant to all the isolates from the eastern prairie region in 2007, showing potential value for deployment in oat breeding programs.

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Table 1. Frequencies (%) of virulence of *Puccinia coronata* f. sp. *avenae* isolates from western Canada in 2007 on 16 standard oat crown rust differentials and eight supplemental differentials.

	Wild Oat		**Commercial oat field**		**Uniform rust nursery**	
Pc gene in differential[a]	No. of isolates	%	No. of isolates	%	No. of isolates	%
Pc38	160	93.6	127	97.7	39	78.0
Pc39	158	92.4	126	96.9	41	82.0
Pc40	96	56.1	68	52.3	35	70.0
Pc45	1	0.6	0	0	0	0
Pc46	51	29.8	49	37.7	21	42.0
Pc48	14	8.2	15	11.5	9	18.0
Pc50	9	5.3	12	9.2	1	2.0
Pc51	64	37.4	53	40.8	19	38.0
Pc52	14	8.2	15	11.5	10	20.0
Pc54	0	0	5	3.9	6	12.0
Pc56	99	57.9	70	53.9	23	46.0
Pc58	4	2.3	2	1.5	4	8.0
Pc59	26	15.2	12	9.2	14	28.0
Pc62	34	19.9	15	11.5	2	4.0
Pc64	51	29.8	25	19.2	12	24.0
Pc68	78	45.6	92	70.8	13	26.0
Pc91	0	0	0	0	0	0
Pc94	3	1.8	1	.8	0	0
Pc96	31	18.1	10	7.7	3	6.0
Temp_pc97	3	1.8	4	3.1	0	0
Temp_Pc98	2	1.2	0	0	1	2.0
Temp_Pc100	0	0	0	0	0	0
Temp_Pc101	0	0	0	0	0	0
Temp_Pc102	0	0	0	0	0	0
Total no. of isolates	171		130		50	

[a]Resistance of the *Pc58*-differential was shown to be conditioned by three linked genes, and resistance of the *Pc59*-differential by three unlinked genes. (see Chong et al. 2008). *Temp_pc97, temp_Pc98, temp_Pc100, temp_Pc101,* and *temp_Pc102* are temporary designations for genes recently obtained from *Avena sterilis* (J. Chong, unpublished).

CROP / CULTURE: Oat
LOCATION / RÉGION: Manitoba

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TITLE / TITRE: FUSARIUM HEAD BLIGHT OF OAT IN MANITOBA IN 2007

INTRODUCTION AND METHODS: The presence of fusarium head blight (FHB) in oat in southern Manitoba was assessed by surveying 55 commercial fields from July 16 to August 2, 2007 when crops were at the late milk to soft dough (ZGS 77-85) stage of growth. Fields were sampled at regular intervals along the survey routes, depending on availability. The surveyed area was bounded by Highway #s 17 and 16 in the north, Hwys #3 in the south, #83 in the west and #12 to the east. Fusarium head blight in each field was assessed by sampling a minimum of 80-100 plants at each of 3 locations to determine the percentage of infected panicles (disease incidence) and the average panicle proportion infected (SPI) among the panicles putatively affected by FHB. Fusarium head blight severity was calculated as the 'FHB Index' (% incidence x % SPI) / 100. Several affected panicles closest to each of the 3 plant clumps sampled were collected from each field, placed in plastic bags and frozen. Subsequently, 50 putatively infected seeds per field were surface-sterilized in 0.3% NaOCl for 3 min., air-dried, and plated on potato dextrose agar to identify and quantify the *Fusarium* spp. present using standard taxonomic keys.

RESULTS AND COMMENTS: Conditions in late April in 2007 were generally favourable for early planting of spring crops, but subsequent excess moisture in May delayed seeding in many regions. However, 'normal' to drier conditions followed, and these resulted in generally good crops of high quality cereals. The early-season moisture appeared favourable for the renewed growth and sporulation of overwintered fungal pathogens in straw and stubble, but the extremely low levels of FHB that developed in Manitoba in 2006 (Tekauz et al. 2007a, c) likely reduced the amount of overwintering *Fusarium* inoculum compared to other years. This, combined with the lack of frequent rain showers at and following oat heading, may have resulted in lower than anticipated levels of FHB development.

Forty-eight of the 55 oat fields surveyed had visible symptoms of FHB. However, because of the open head type (panicle) in oat and the generally lack of visually-distinguishable disease, FHB was difficult to assess in the crop, as has always been the case. Overall, incidence of FHB was estimated as 0.5% (range 0 - 3.8%), SPI as 5.4% (range 0 - 6%) and the FHB Index as 0.03% (range 0 - 0.23%). As such, FHB was estimated to have caused no yield loss in Manitoba oat crops. The low level of disease is typical for oat, and FHB levels based on visual in-field symptoms are always much lower in oat than those in wheat or barley.

Fusarium colonies developed from 13% of the oat kernels plated on potato dextrose agar. This is the highest level in recent years, with the exception of 2006 (Tekauz et al. 2007b). The *Fusarium* spp. isolated and their relative occurrence in fields and on kernels are listed in Table 1. As has most often been the case since 2002, when surveys for FHB in oat were initiated in Manitoba, *F. graminearum* was the most commonly isolated species from kernels. Other species, such as *F. poae* and *F. sporotrichioides* were found at lower levels than usual.

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Table 1. *Fusarium* spp. isolated from fusarium head blight affected oat kernels from Manitoba in 2007.

***Fusarium* spp.**	**Percent of fields**	**Percent of kernels**
F. avenaceum	20	5.8
F. culmorum	4	4.4
F. equiseti	4	0.6
F. graminearum	53	61.4
F. poae	47	18.3
F. sporotrichioides	41	9.4

CROP / CULTURE: Oat
LOCATION / RÉGION: Manitoba and East-Central Saskatchewan

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TITLE / TITRE: FOLIAR DISEASES IN MANITOBA AND SASKATCHEWAN OAT FIELDS IN 2007

INTRODUCTION AND METHODS: Leaf spot diseases of oat were surveyed in 55 commercial fields of oat in Manitoba, and in 15 fields in Saskatchewan. The surveys were done from July 16 to August 2, 2007 (MB) and August 13 to 20, 2007 (SK) when crops were at the mid-milk to soft dough (ZGS 70-85) stage of growth. Fields were sampled at regular intervals along the survey routes, depending on availability. The area of southern Manitoba sampled was bounded by Highway #s 67 and 16 in the north, Hwy #3 in the south, Hwy #83 in the west and Hwy #12 to the east. In Manitoba, disease incidence and severity were recorded by averaging their occurrence on approximately 10 plants along a diamond-shaped transect of about 50 m per side, beginning near the field edge. Disease ratings were taken on both the upper (flag and penultimate leaves) and lower leaf canopies, using a six-category scale: 0 or nil (no visible symptoms); trace (<1% leaf area affected); very slight (1-5%); slight (6-15%); moderate (16-40%); and severe (41-100%). Infected leaves with typical symptoms were collected at each site and dried and stored in paper envelopes. In Saskatchewan, the area surveyed was in the central region extending from Saskatoon to the Manitoba border, and only the upper canopies were sampled for leaf spot severity. Foliar tissue with typical lesions was collected at each site, placed in paper envelopes and dried. Surface-sterilized pieces of infected leaf tissue were subsequently placed in moist chambers for 3-5 days to promote fungal sporulation and identify the causal agent(s), and thereby determine the disease(s) present and their relative importance.

RESULTS AND COMMENTS: Conditions in spring (mid-April to early June) 2007 in Manitoba were generally favourable for crop growth, but in some regions wet soils in early May caused by excessive rain delayed spring seeding. Subsequently, conditions became 'normal' or drier, resulting in relatively good crops of high quality cereals. The early-season moisture appeared to favour the renewed growth and sporulation of overwintered fungal pathogens in straw and stubble, including those causing leaf spots in cereals. However, the very dry conditions in 2006, which resulted in minimal leaf spot development in that year, likely reduced the amount of inoculum available in 2007. As well, the drier conditions that followed seeding in 2007 probably reduced within-canopy disease spread. In Saskatchewan, conditions in spring were ideal for crop establishment and pathogen revival in overwintered straw, but July brought very dry conditions that were unfavourable for infection and disease development.

Leaf spots were observed in the upper and/or lower leaf canopies in 87% and 93% of the Manitoba and Saskatchewan oat fields surveyed, respectively. In Manitoba, disease levels in the upper canopy were trace to slight in 98% of fields and moderate in 2%. Respective severity categories in the lower canopy were 76% and 7%, with 16% being senescent. In Saskatchewan, all fields had only trace to slight levels of leaf spotting in the upper leaf canopy. As most crops had minimal disease levels in the upper canopy, leaf spot diseases likely caused no yield losses in commercial oat crops in the surveyed region in 2007.

Pyrenophora avenae, causal agent of pyrenophora leaf blotch (PLB), occurred in most fields surveyed and was the pathogen isolated most frequently from infected leaf tissue, indicating that it caused most, albeit minimal, damage (Table 1). *Stagonospora avenae* f. sp. *avenae*, causal agent of stagonospora leaf blotch (SLB) was implicated in about 25% of damage observed, while *Cochliobolus sativus* was relatively unimportant as a leaf spot pathogen of oat in 2007, particularly in Saskatchewan. Compared to 2006, in Manitoba PLB was a somewhat smaller component of the leaf spot complex on oat in 2007, while SLB was somewhat more prominent (Tekauz et al. 2007). In Saskatchewan, SLB in 2007 was much more prominent than in 2005, the last time survey data from that province were available (Tekauz et al. 2006).

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Tekauz, A., H.R. Kutcher, E. Mueller, M. Beyene, and M. Stulzer. 2006. Leaf spots of oat in Manitoba and eastern Saskatchewan in 2005. Can. Plant Dis. Surv. 86: 70-71. (www.cps-scp.ca/cpds.htm)

Table 1. Incidence and isolation frequency of leaf spot pathogens of oat in Manitoba and east-central Saskatchewan in 2007

Pathogen	Incidence (% of fields)		Frequency (% of isolations)*	
	MB	SK	MB	SK
Pyrenophora avenae	76	80	66.8	63.6
Stagonospora avenae f. sp. *avenae*	46	80	25.1	35.1
Cochliobolus sativus	36	7	8.1	1.3

*indicative of the relative amount of foliar damage observed

CROP / CULTURE: Oat
LOCATION / RÉGION: Ontario

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TITLE/ TITRE: 2007 SURVEY FOR FUSARIUM HEAD BLIGHT OF OAT IN ONTARIO

INTRODUCTION AND METHODS: Eighteen oat fields were randomly selected at harvest on farms in southern Ontario to assess fusarium head blight (FHB) levels. Mature oat spikes were hand-harvested and threshed with an Almaco stationary plot thresher (model VPT-OSC). The objective was to determine the percent of seed infected by *Fusarium* species. Sixty kernels per field were surface-sterilized in 0.16% NaOCl (diluted commercial bleach) for 3 minutes, air dried and placed on acidified potato dextrose agar in four replications of 15 seeds per replicate. The kernels and agar plates were then incubated for seven days under a 12:12 hr light/dark cycle at room temperature. *Fusarium* species were identified according to Nelson et al. (1983).

RESULTS AND COMMENTS: *Fusarium sporotrichioides, F. poae* and *F. graminearum* were the predominant species identified on oat kernels in 2007 (Table 1). The same species were isolated from oat in Ontario in 2005 (Tamburic-Ilincic and Schaafsma, 2006) and 2006 (Tamburic-Ilincic, 2007). The highest percentages of seed infected by *Fusarium poae* (16.7%), *Fusarium sporotrichioides* (14.3%), and *F. graminearum* (4.1%), were found in Huron, Wellington and Perth Counties, respectively.

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Tamburic-Ilincic, L. and Schaafsma, A. W. 2006. 2005 survey for fusarium head blight of oat in Ontario. Can. Plant Dis. Surv. 86:72. (http://www.cps-scp.ca/cpds.htm)

Table 1. Percent of oat kernels infected with *Fusarium* species in southern Ontario in 2007.

County	No. of fields	% *F. graminearum*	% *F. sporotrichioides*	% *F. poae*
Wellington	5	3.3	14.3	5.3
Waterloo	2	1.7	4.2	3.3
Perth	7	4.1	5.5	2.9
Huron	1	0.0	3.3	16.7
Halton	2	0.0	9.2	3.3
Middlesex	1	0.0	3.3	0.0
Mean		1.5	6.6	5.3

CROP / CULTURE: Wheat and Corn
LOCATION / RÉGION: Saskatchewan

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TITLE / TITRE: FUSARIUM HEAD BLIGHT IN COMMON AND DURUM WHEAT IN SASKATCHEWAN IN 2007, WITH COMMENTS ON IRRIGATED CORN

INTRODUCTION AND METHODS: Fusarium head blight (FHB) incidence and severity were assessed in 149 wheat crops in Saskatchewan in 2007: 109 common wheat (Canada Western Red Spring, Canada Prairie Spring and Soft White Spring classes) and 40 durum wheat (Canada Western Amber Durum class). Wheat crops were surveyed between July 18 and August 30. Fields were grouped according to soil zones (Zone 1 = Brown; Zone 2 = Dark Brown; Zone 3 = Black/Grey), and fields under irrigation were grouped separately and referred to as the Irrigation Zone (fields located along the South Saskatchewan River in west-central and central regions of the province). In addition to common and durum wheat samples, 10 corn samples were collected from fields in the Irrigation Zone on September 5.

Crop adjustors with Saskatchewan Crop Insurance Corporation and irrigation agrologists with Saskatchewan Ministry of Agriculture randomly collected 50 spikes from each crop at the milk to dough stages. The spikes were analyzed for visual FHB symptoms at the Crop Protection Laboratory in Regina. The number of infected spikes per crop and the number of infected spikelets in each spike were recorded. A FHB disease severity rating, also known as the FHB index, was determined for each wheat crop (% FHB severity = % spikes affected x mean proportion (%) of the spike infected / 100). Mean FHB severity values were calculated for each soil/irrigation zone and for the whole province. Glumes or kernels with visible FHB symptoms were surface sterilized in 0.6% NaOCl solution for 1 min. and cultured on potato dextrose agar and carnation leaf agar for subsequent identification and quantification of *Fusarium* species.

RESULTS AND DISCUSSION: Spring conditions in 2007 were moist and ideal for abundant crop growth and *Fusarium* sporulation on crop residues. However, very dry conditions occurred during July, lowering FHB risk.

In 2007, FHB occurred in 58% of the common wheat and 48% of the durum wheat crops surveyed (Table 1). The provincial mean FHB severity for common wheat was 0.7% and for durum wheat was 0.3%. These values are slightly higher than for previous years, but are still considered very low, i.e. not economically significant (Pearse et al. 2007). FHB severities have not been greater than 1% since 2001.

In 2007, the highest mean FHB severities were in the Irrigation Zone for both common wheat (2.6%) and durum wheat (1.3%). Individual fields in both the Irrigation Zone and Zone 3 had high levels that increased the overall mean severities for these regions. For example, the highest individual severity (16%) was found in a field of soft white spring wheat in the Irrigation Zone. This field had been sown to corn two years previously and had a history of fusarium infections. Two other fields of soft white spring wheat produced under irrigation had FHB severities ≥ 4%. The affected fields in the Irrigation Zone were the result of *F. graminearum* infection. There were two infested fields in Zone 3 with severities greater than 4%, but no *F. graminearum* was isolated from these.

Overall, the most commonly isolated *Fusarium* species from common and durum wheat in 2007 was *F. poae*, accounting for 52% of all isolations, followed by *F. graminearum* (24%), and *F. avenaceum* (15%). *Fusarium graminearum* was isolated from 8 common and 6 durum wheat crops, all within the south-east, east-central or irrigated regions.

Other fungi were also observed infrequently on wheat spikes collected in 2007, including *Septoria, Pyrenophora* and *Cochliobolus* spp. Secondary moulds were isolated from 86% of wheat samples and wheat midge damage was observed on 42% of samples.

Samples from 10 corn crops were collected from the Irrigation Zone in 2007. This is only the second year in which corn has been included in the survey. Sixty percent of corn samples were infected by *Fusarium* spp, with a mean FHB severity of 0.6%. *Fusarium moniliforme* was the most commonly isolated species (74% of all isolations), followed by *F. graminearum* (12%) and *F. sporotrichioides* (7%).

In summary, FHB severities remained low in common wheat, durum wheat, and corn in Saskatchewan in 2007. However, an increase in FHB severity may be expected in future years with the recent interest in producing soft white spring wheat in south-east and irrigated regions.

ACKNOWLEDGEMENTS:
We gratefully acknowledge the participation of Saskatchewan Crop Insurance Corporation staff and Saskatchewan Ministry of Agriculture irrigation agrologists for the collection of cereal samples for this survey.

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Pearse, P.G., Holzgang, G., Weitzel, C.N. and Fernandez, M.R. 2007. Fusarium head blight in common and durum wheat in Saskatchewan in 2006, with comments on irrigated corn. Can. Plant Dis. Surv. 87: 92-93. (www.cps-scp.ca/cpds.htm)

Table 1. Prevalence and severity of fusarium head blight (FHB) in common and durum wheat crops grouped by soil or irrigation zones in Saskatchewan, 2007.

	Common Wheat		Durum Wheat	
Soil Zone	**No. crops affected / total crops (% of crops infested)**	**Mean FHB Severity[1] (range of severity)**	**No. crops affected / total crops (% of crops infested)**	**Mean FHB Severity[1] (range of severity)**
Zone 1 Brown	2 / 18 (11%)	T[2] (0 - 0.1%)	6 / 20 (30%)	T (0 - 0.1%)
Zone 2 Dark Brown	16 / 29 (55%)	T (0 - 0.4%)	10 / 17 (59%)	0.4% (0 - 3.2%)
Zone 3 Black/Grey	36 / 50 (72%)	0.8% (0 - 8.7%)	—	—
Irrigation Zone	9 / 12 (75%)	2.6% (0 - 16.1%)	3 / 3 (100%)	1.3% (T - 2.4%)
Overall Total/Mean	63 / 109 (58%)	0.7%	19 / 40 (48%)	0.3%

[1]% FHB severity = (% spikes affected x mean proportion (%) of the spike infected) / 100
[2]T = Trace values of FHB (<0.1%).

CROP / CULTURE: Common and durum wheat
LOCATION / RÉGION: Saskatchewan

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TITLE / TITRE: **LEAF SPOTTING DISEASES OF COMMON AND DURUM WHEAT IN SASKATCHEWAN IN 2007**

INTRODUCTION AND METHODS: A survey for leaf spotting diseases of common and durum wheat grown under dryland or irrigation was conducted between the milk and dough growth stages in 2007. There were 114 common wheat and 42 durum wheat crops sampled in 19 crop districts (CD). In each field, 50 flag leaves were collected at random and air-dried at room temperature. Percent leaf area affected by leaf spots (severity) was recorded for each leaf, and a mean percent flag leaf area with spots was calculated for each crop and CD. For crops with 2% or higher leaf spot severity, 1 cm^2 surface-disinfested leaf tissue pieces were plated on water agar for isolation, identification and quantification of leaf spotting pathogens.

Information on the previous crop and tillage method was obtained for most of the fields. Comparison of disease and fungal levels among tillage systems (conventional, minimum, and zero) was done for dryland crops grouped by soil zone (SZ) (1: Brown, 2: Dark Brown, and 3: Black/Grey). The previous crop was a non-cereal (canola, lentil, pea, or flax) in 54 fields and a cereal (wheat, barley, or oat) in 29 fields; 22 of the surveyed fields had been summerfallowed in the previous year.

RESULTS AND COMMENTS: Leaf spots were observed in all crops surveyed (Table 1). For individual crops, percent flag leaf area infected ranged from trace (≤0.5%) to 20%. Overall leaf spot severity (3.5%) was similar to that in 2005 (2.6%) and 2006 (4.0%) (Fernandez and Pearse 2007). Mean leaf spot ratings were higher in 2007 than in 2005 and 2006 in eastern (CDs 1A, 1B, 5A, 5B) and central (CD 8B) regions.

As found in previous years**,** *Pyrenophora tritici-repentis* (tan spot) was the most prevalent leaf spotting pathogen (Table 1). This was followed by *Septoria tritici* and *S. nodorum* (septoria leaf complex) and *Cochliobolus sativus* (spot blotch). *S. avenae* f. sp. *triticea* was less common both in the percentage of crops in which it was found and in its mean percent isolation. *Pyrenophora teres* was isolated from a few crops.

Classification of the crops according to tillage system revealed that leaf spotting diseases were more prevalent in the Black/Grey Zone (SZ3) than in the other soil zones (Table 2). In SZ1 and SZ2, wheat crops under zero tillage had higher mean leaf spotting severities, but there was no apparent difference among tillage systems for SZ3. In SZ1 and SZ2, *P. tritici-repentis* was isolated more frequently with minimum tillage whereas *Septoria* spp. were isolated more frequently with conventional tillage.

We gratefully acknowledge the participation of Saskatchewan Crop Insurance Corporation staff and Saskatchewan Ministry of Agriculture irrigation agrologists for the collection of leaf samples for this survey.

REFERENCE:
Fernandez, M.R. and Pearse, P. G. 2007. Leaf spotting diseases of common and durum wheat in Saskatchewan in 2005 and 2006. Can. Plant Dis. Surv 87: 85-89 (http://www.cps-scp.ca/cpds.htm)

Table 1. Incidence and severity of leaf spotting diseases, and mean percentage isolation of the most common leaf spotting pathogens, in common and durum wheat crops grown under dryland or irrigation in Saskatchewan in 2007.

Crop District	No. crops affected/ surveyed[1]	Mean severity[2]	*Pyrenophora tritici-repentis*[3]	*Septoria nodorum*	*S. tritici*	*S. avenae* f. sp. *triticea*	*Cochliobolus sativus*	*P. teres*
			%					
1A	8/8	4.3	99/2	-	-	-	1/1	-
1B	7/7	6.0	65/4	13/3	6/4	-	19/4	-
2A	2/2	3.5	83/2	8/1	24/1	-	-	-
2B	11/11	2.3	75/7	2/3	5/6	2/4	25/5	1/1
3A-N	2/2	3.0	41/1	37/1	22/1	-	-	-
3A-S	9/9	1.0	92/1	-	8/1	-	-	-
3B-N	20/21	1.6	58/5	30/4	19/4	-	7/2	-
3B-S	4/5	0.8	-	-	-	-	-	-
4A	6/7	0.8	50/1	4/1	46/1	-	-	-
4B	8/9	4.7	92/3	6/2	3/3	2/2	2/2	-
5A	6/6	7.0	73/6	7/3	10/5	6/2	12/6	5/1
5B	7/7	10.0	46/5	7/5	20/5	11/1	15/4	20/3
6A	23/23	3.2	75/16	17/9	10/10	3/6	10/14	-
6B	4/4	3.0	52/2	17/2	20/2	-	10/2	2/1
7A	8/8	0.9	96/1	2/1	2/1	-	-	-
8A	2/2	6.5	81/1	8/2	8/1	-	-	13/1
8B	3/3	5.0	60/3	19/3	16/3	2/2	5/2	-
9A	13/13	7.7	62/8	18/7	19/8	2/3	3/6	1/1
9B	11/11	3.8	81/7	17/6	5/6	2/1	2/4	-
Mean/total:	**154/158**	**3.5**	**71/75**	**15/53**	**12/62**	**3/21**	**11/52**	**10/8**

[1]Number of crops with leaf spotting lesions on the flag leaf/total number of crops surveyed. Fifteen fields were under irrigation in various CDs: 1 in 2A, 2 in 2B, 2 in 3AN, 6 in 3BN, 2 in 4A, 1 in 6A, and 1 in 6B.
[2]Mean percent flag leaf area with leaf spots could not be estimated in some samples from various CDs: 5 in 1A, 2 in 1B, 1 in 3BN, 1 in 3BS, 1 in 4A, 6 in 4B, 2 in 5B, 4 in 9A, and 1 in 9B.
[3]Mean percentage of pathogen isolation for crops where pathogen was isolated/number of crops in which the pathogen occurred.

Table 2. Incidence and severity of leaf spotting diseases, and mean percentage isolation of the most common leaf spotting pathogens, in relation to tillage system within each soil zone for common and durum wheat crops in Saskatchewan in 2007.

Soil Zone/ Tillage system	No. crops affected/ surveyed[1]	Mean severity[2]	*Pyrenophora tritici-repentis*[3]	*Septoria nodorum*	*S. tritici*	*S. avenae* f. sp. *triticea*	*Cohliobolus sativus*
			%				
Zone 1 (Brown)							
Conventional	8/8	0.9	34/1	46/1	20/1	-	-
Minimum	14/16	0.9	94/2	2/1	5/2	-	-
Zero	17/18	1.9	73/7	11/6	17/7	2/2	2/3
Zone 2 (Dark Brown)							
Conventional	6/6	1.0	47/2	31/2	18/2	-	7/1
Minimum	17/17	1.8	91/3	14/1	4/2	1/1	2/2
Zero	20/20	2.7	88/4	2/4	5/5	3/4	11/11
Zone 3 (Black/Grey)							
Conventional	3/3	5.0	64/1	-	1/1	-	34/1
Minimum	19/19	6.4	62/14	16/11	13/13	3/3	10/9
Zero	25/25	6.3	70/18	17/15	15/15	4/5	4/11

[1]Number of wheat crops with leaf spot lesions on the flag leaf/total number of surveyed crops excluding fields under irrigation.
[2]Mean percent flag leaf area infected estimated on leaf samples that were still green when sampled.
[3]Mean percentage of pathogen isolation for crops where pathogen was isolated/number of wheat crops in which the pathogen occurred.

CROP / CULTURE: Common Wheat
LOCATION / RÉGION: Saskatchewan

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TITLE / TITRE: LEAF AND STRIPE RUST DISEASES OF COMMON WHEAT IN SASKATCHEWAN IN 2007

INTRODUCTION AND METHODS: A survey for rust diseases in common wheat was conducted in 18 crop districts (CD) in 2007. In each of the 116 common wheat crops surveyed, 50 flag leaves were collected at random at the milk to dough growth stage. Percent leaf area affected by each rust was recorded for each leaf, and a mean percentage leaf area affected was calculated for each CD.

RESULTS AND COMMENTS: Leaf rust (*Puccinia triticina*) was found in 75% of the crops surveyed (Table 1). This incidence was higher than in 2006 and 2005 (Fernandez et al. 2007). For individual crops, percent flag leaf area covered by leaf rust ranged from trace (≤0.5%) to 20%. The highest mean severity (8.3%) was observed in CD 5A (east-central). Mean severities in CDs 1B (south-east) and 6A (central) were also higher than the overall mean of 3.4%.

Stripe rust (*Puccinia striiformis* f.sp. *tritici*) was observed in a single wheat sample from CD 1B, affecting 3% of flag leaf area.

We gratefully acknowledge the participation of Saskatchewan Crop Insurance Corporation staff and Saskatchewan Ministry of Agriculture irrigation agrologists for collection of leaf samples for this survey.

REFERENCE:
Fernandez, M.R., Pearse, P.G. and Holzgang, G. 2007. Leaf rust and stripe rust of common wheat in Saskatchewan in 2005 and 2006. Can. Plant Dis. Surv 87: 90-91 (http://www.cps-scp.ca/cpds.htm)

Table 1. Distribution and severity of leaf rust in common wheat crops sampled in Saskatchewan in 2007.

Crop District	No. crops affected/ surveyed[1]	Mean severity[2]
1A	4/5	3.0
1B	6/7	4.8
2B	7/8	2.7
3A-N	2/2	1.8
3A-S	3/5	1.3
3B-N	6/10	2.0
3B-S	0/3	-
4A	1/4	0.5
4B	1/3	0.5
5A	6/6	8.3
5B	7/7	2.9
6A	19/20	4.6
6B	3/3	3.0
7A	0/4	-
8A	2/2	1.8
8B	3/3	2.7
9A	11/13	1.6
9B	6/11	1.8
Mean/Total	**87/116**	**3.4**

[1]Number of common wheat crops with leaf rust pustules on the flag leaf / number of crops surveyed.
[2]Mean percent flag leaf area affected, estimated on leaf samples that were still green when sampled (total of 76 crops).

CROP / CULTURE: Spring Wheat
LOCATION /RÉGION: Manitoba

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TITLE / TITRE: 2007 SURVEY OF FUSARIUM HEAD BLIGHT OF SPRING WHEAT IN MANITOBA

INTRODUCTION AND METHODS: The annual survey for fusarium head blight (FHB) in spring wheat in southern Manitoba was conducted in 76 fields between July 16 and August 3, 2007 when crops were at ZGS 72-84. The incidence and severity of FHB in each field were assessed by sampling 50 to 100 spikes at three locations and additional spikes were collected for subsequent pathogen identification. At least 10 spikes were threshed from each field collection, from which 10 putatively infected kernels were selected. These were surface-sterilized and incubated on potato dextrose agar for 4-5 days under continuous cool white light to isolate and identify *Fusarium* species present. When the *Fusarium* species was unknown, single spores were grown on carrot agar or water agar to facilitate identification. The FHB-index was calculated as follows: Average % incidence X Average % severity /100.

RESULTS AND COMMENTS: The disease was present in all fields at index levels that ranged from trace (<0.1) to 35%. The average FHB index in 2007 was 7.2% compared with 0.3% in 2006. The disease was most severe in the southwest and north-central regions, with FHB index levels of 12.6 and 11.1%, respectively. In the northwest and Interlake regions levels were lower, with FHB indexes of 3.8 and 3.5%, respectively, while in the south-central and southeast regions the indexes were 6.1 and 6.3%, respectively.

Fusarium species were isolated from 73.3% (557/760) of the kernels examined. *Fusarium graminearum* was the predominant species, but its levels were lower than for any year since 1993. By contrast, *F. sporotrichioides* was found at higher levels than previously. This is a disturbing finding and if the trend continues, it will be advisable to test wheat crops not only for deoxynivalenol (DON), but also for other mycotoxins. *Fusarium sporotrichioides* can produces T2 toxin, which has a much lower LD_{50} than DON. In general, levels of *F. graminearum* increased from west to east while levels of *F. sporotrichioides* increased from east to west. Three other *Fusarium* species were found at low levels in a few fields in the northwest (*F. poae*) or south-central (*F. equiseti* and *F. culmorum)* regions (Table 1).

Table 1. Frequency of *Fusarium* species isolated from infected kernels of spring wheat in southern Manitoba in 2007.

***Fusarium* spp.**	**No. of isolations (n=557)**	**Percentage (%)**
F. graminearum	394	70.7
F. sporotrichioides	157	28.2
F. equiseti	1	0.2
F. poae	1	0.2
F. culmorum	4	0.7

CROP / CULTURE: Spring Wheat
LOCATION / RÉGION: Manitoba

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: SURVEY FOR LEAF SPOT DISEASES OF SPRING WHEAT IN MANITOBA IN 2007

INTRODUCTION AND METHODS: A survey of 83 southern Manitoba spring wheat fields was conducted between 16 July and 3 August, 2007 to assess prevalence and severity of foliar diseases. Crops were surveyed and affected leaves collected between the heading and soft dough stages of development. Severity of disease (amount of necrosis) on the flag and lower leaves was categorized as 0, trace, 1, 2, 3 or 4, with 4 describing dead leaves and 1 lightly affected. Samples of diseased leaf tissue were surface-sterilized and placed in moisture chambers for 5-7 days to promote pathogen sporulation for disease identification.

RESULTS AND COMMENTS: The average levels of necrosis caused by leaf spots on the flag leaves and lower leaves were 2.4 and 3.1, respectively. North-central and southeastern areas of the surveyed region had the highest levels of flag leaf necrosis, while in the Interlake these were lowest (Table 1). The weather was extremely wet in the early part of the growing season and became hot and humid in July providing favourable conditions for leaf spot disease development. *Pyrenophora tritici-repentis* and *Stagonospora nodorum* were the predominant pathogens accounting for 49% and 32%, respectively of 621 isolations. As has been observed in recent years, levels of *Cochliobolus sativus* were low. Tan spot and stagonospora nodorum blotch were found in 70 and 58 of the 83 fields, respectively (Table 2). This continues a trend observed for the past several years of *S. nodorum* isolations increasing and those of *S. tritici* decreasing. *Septoria tritici*, cause of septoria tritici blotch, was not isolated from all areas surveyed and accounted for only 4% of isolations, similar to levels found since 2003. Spot blotch, caused by *Cochliobolus sativus,* which was the predominant leaf spot disease in southern Manitoba from 2001 to 2003, has since then accounted for less than 20% of isolations annually. In 2007, 15% of the fungal isolations were *C. sativus* (Table 2). Tan spot was the predominant disease in fields in the northwest and central areas of the surveyed region (Fig. 1). Stagonospora blotch was commonly found throughout, while spot blotch was more predominant in the southeast (Fig. 1).

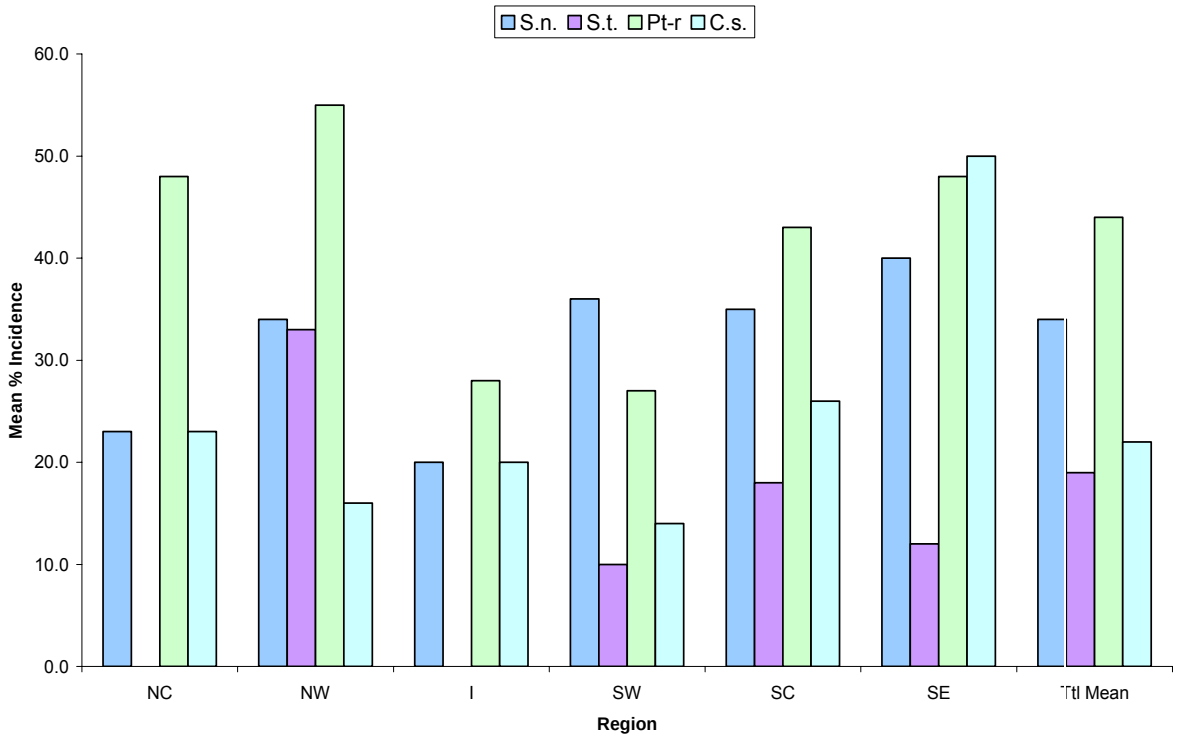
Table 1. Levels of necrosis (Scale 0-4) on flag and lower leaves of spring wheat in various areas of southern Manitoba in 2007.

Survey area	Flag leaf	Lower Leaves
North-central	3.4	3.5
North-west	2.2	3.2
Interlake	1.9	2.8
South-west	2.1	3.1
South-central	2.4	2.9
South-east	2.8	senesced
Mean	**2.4**	**3.1**

Table 2. Prevalence and isolation frequency of leaf spot pathogens and of the diseases they cause in 83 fields of hard red spring wheat in Manitoba in 2007.

	Disease/Pathogen			
	Septoria nodorum blotch *(Stagonospora nodorum*)	**Septoria tritici blotch *(Septoria tritici)***	**Tan spot *(Pyrenophora tritici-repentis*)**	**Spot blotch *(Cochliobolus sativus)***
Wheat crops affected (n = 83)	58	14	70	41
Isolations (%) (n= 621)	32	4	49	15

Figure 1. Isolations of foliar pathogens of wheat by survey area in southern Manitoba in 2007.



NC – north-central NW – north-west I – Interlake
SC – south-central SW – south-west SE – south-east

CROP / CULTURE: Spring Wheat
LOCATION / RÉGION: Manitoba and eastern Saskatchewan

NAMES AND AGENCIES / NOMS ET ORGANISATIONS:
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TITLE / TITRE: LEAF RUST AND STRIPE RUST OF WHEAT IN MANITOBA AND EASTERN SASKATCHEWAN IN 2007

INTRODUCTION AND METHODS: Trap nurseries and commercial fields of spring wheat in Manitoba and eastern Saskatchewan were surveyed for the incidence and severity of leaf rust (*Puccinia triticina* Eriks.) and stripe rust (*Puccinia striiformis* Westend. f.sp. *tritici*) during July and August 2007.

RESULTS AND COMMENTS: Wheat leaf rust (caused by *Puccinia triticina*) was first observed on winter wheat in Manitoba during late May in 2007. Spring wheat fields were surveyed for the presence of leaf rust and stripe rust (caused by *Puccinia striiformis*). Many fields in southern Manitoba were sprayed with fungicides due to the presence of leaf rust and the threat of fusarium head blight infection. However, none of the 84 fields surveyed in Manitoba for this report were sprayed with fungicide.

The level of leaf rust ranged from 0% to 75% of the flag leaf covered with leaf rust pustules with an average of 15.7%. Leaf rust was generally heavy throughout south-central and southwestern Manitoba. This represented a higher than average infection level for Manitoba for the period 2001-2007 (Table 1). There were 37 fields surveyed in Saskatchewan and the level of leaf rust ranged from 0% to 40% with an average of 4.9% of the flag leaf infected.

Stripe rust was found in only a few fields at trace levels in both Manitoba and Saskatchewan. Stripe rust levels were very low in 2007 compared to 2006, in which relatively high levels of stripe rust were observed in southeastern Saskatchewan.

Table 1. Average percentage (%) of the flag leaf infected with leaf rust in surveys from 2001 to 2007 in Manitoba and Saskatchewan

	Percentage (%) of flag leaf infected with leaf rust	
Year	**Manitoba**	**Saskatchewan**
2001	10.0	3.0
2002	18.0	5.0
2003	2.5	2.0
2004	7.0	2.0
2005	20.0	22.0
2006	10.2	5.3
2007	15.7	4.9
Average	11.9	6.6

CROP / CULTURE: Winter Wheat
LOCATION / RÉGION: Manitoba

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: FUSARIUM HEAD BLIGHT IN WINTER WHEAT IN MANITOBA IN 2007

INTRODUCTION AND METHODS: The prevalence of fusarium head blight (FHB) in winter wheat in Manitoba in 2007 was assessed by surveying 44 farm fields from July 9 to 16 when most crops were at the late milk to soft-dough stage of growth (ZGS 79-84). Because winter wheat is not widely grown in Manitoba (in 2007 it was grown on about 15% of the total wheat acreage in the province - Statistics Canada, Field Crop Reporting Series #8, December 2006) the fields were not surveyed at random; rather, information on their location was obtained by contacting Manitoba Agriculture extension personnel, and producers who normally grow the crop. The fields were located in southern Manitoba, in an area bounded by Highway #s 67, 16 and 24 in the north, the US border in the south, Hwy #83 in the west and Hwy #12 to the east. In each field FHB was assessed by sampling a minimum of 80-100 plants at each of 3 locations to determine the percentage of infected spikes (disease incidence), and the average proportion of the spike infected (SPI). The overall severity was expressed as the 'FHB Index' (% incidence x % SPI / 100). Several affected heads were collected at each site and stored in paper envelopes. A total of 50 discoloured, putatively infected kernels, or those of normal appearance to make up the remainder, were later removed from five heads per location. The kernels were surface- sterilized in 0.3% NaOCl for 3 min., air-dried, and plated onto potato dextrose agar (PDA) to quantify and identify *Fusarium* spp. present using standard taxonomic keys.

RESULTS AND COMMENTS: Conditions from mid-April to early June 2007 were generally favourable for growth of fall-sown crops, as soils were wet in many regions in May. Subsequently, conditions became 'normal' or drier, resulting in relatively good crops of high quality cereals. The early-season moisture appeared favourable to renewed growth and sporulation of overwintered fungal pathogens in straw and stubble, and winter wheat flowered when soil moisture and rainfall were seemingly conducive to *Fusarium* infection of florets. However, the extremely low levels of FHB that developed in cereal crops in Manitoba in 2006 (Tekauz et al. 2007), likely reduced overwintering inoculum levels compared with other years. 'CDC Falcon' was the predominant cultivar planted, and was grown on 29 of the 31 fields for which cultivar information was available. 'CDC Harrier' and 'McClintock' were grown on one field each. Foliar fungicides are applied routinely to many winter wheat crops in Manitoba, and for the 21 crops for which information was available in 2007, most had been sprayed with Tilt (13) or a Tilt/Folicur (4) combination.

Visible symptoms of FHB were observed in all 44 winter wheat fields sampled. Overall, incidence of FHB was 5.9% (range 0.3 - 18.1%), SPI 56.1% (range 25 - 90%) and the FHB Index 3.3% (range 0.2 - 14.2%). As such, FHB was estimated to have caused only light yield losses in commercial winter wheat in 2007. The severity of FHB in 2007 can be regarded as 'typical' for winter wheat in Manitoba, as the value of 3.3% for the FHB index is close to the mean computed from surveys published in CPDS since 1998. Greater severity of FHB in winter wheat was anticipated in 2007, based on abundant moisture up to crop flowering, but subsequent drier conditions and (or) lack of inoculum likely curtailed disease development.

Fusarium colonies developed from 88.4% of the kernels plated on PDA. Unusually, *F. graminearum* was the sole *Fusarium* species isolated and was found in 100% of fields and 100% of infected kernels. This species normally is the predominant pathogen causing FHB in wheat, but was totally dominant in winter wheat in 2007. However, this was not the case for spring wheat (Gilbert et al. 2008).

REFERENCES:

Gilbert, J., Tekauz, A., Kaethler, R., Slusarenko, K., Hamilton, J., Unrau, T., Mueller, E., Stulzer, M. and Beyene, M. 2008. 2007 Survey of fusarium head blight of spring wheat in Manitoba. Can. Plant Dis. Surv. 88: 85. (www.cps-scp.ca/cpds.htm)

Tekauz, A., Stulzer, M., Mueller, E., Beyene, M. and Gozé, P. 2007. Fusarium head blight in winter wheat farm fields in Manitoba in 2006. Can. Plant Dis. Surv. 87: 98-99. (www.cps-scp.ca/cpds.htm)

CROP / CULTURE: Winter Wheat
LOCATION / RÉGION: Manitoba

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: SURVEY FOR LEAF SPOT DISEASES OF WINTER WHEAT IN MANITOBA IN 2007

INTRODUCTION AND METHODS: The occurrence and severity of leaf spotting diseases of winter wheat in Manitoba in 2007 was assessed by surveying 44 farm fields from July 9 to 16 when most crops were at the late milk to soft-dough stage of growth (ZGS 79-84). Because winter wheat is not widely grown in Manitoba (in 2007 it was planted on about 15% of the total wheat acreage in the province - Statistics Canada, Field Crop Reporting Series #8, December 2007) the fields were not surveyed at random; rather, information on their location was obtained by contacting Manitoba Agriculture extension personnel, and producers who normally grow the crop. The fields surveyed were located in southern Manitoba, in an area bounded by Highway #s 67, 16 and 24 to the north, the US border to the south, Hwy #83 to the west and Hwy #12 to the east. Leaf spots were rated on approximately 10 plants along a diamond-shaped transect of about 50 m per side, beginning near the field edge. Severity of symptoms was recorded for both the upper (flag leaf) and lower leaf canopies using a six-category scale: 0 or nil (no visible symptoms); trace (< 1% leaf area affected); very slight (1-5%); slight (6-15%); moderate (16-40%); and severe (41-100%). Infected leaves with symptoms were collected from each site, placed inside paper envelopes and allowed to dry. Subsequently, surface-sterilized pieces of infected leaf tissue were placed in moist chambers for 3-5 days to promote fungal sporulation and allow for identification of the causal pathogens, so as to determine the specific diseases present.

RESULTS AND COMMENTS: Conditions in spring (mid-April to early June) 2007 were generally favourable for crop growth, particularly for fall-sown crops, as wet soils in many regions in May delayed spring seeding. Subsequently, conditions became 'normal' or drier, resulting in relatively good crops of high quality cereals. The early-season moisture appeared to favour the renewed growth and sporulation of overwintered fungal pathogens in straw and stubble, such as those that cause leaf spots. However, the drier conditions that followed likely reduced within-canopy spread. 'CDC Falcon' was again the predominant cultivar planted, and was grown in 29 of the 31 fields for which cultivar information was available. 'CDC Harrier' and 'McClintock' were each grown in one field.

Leaf spot symptoms were observed in the upper and (or) lower leaf canopies in most fields (90%) surveyed. Disease levels in the upper canopy were nil to slight in 70% of fields, moderate in 25% and severe in 5%. In the lower canopy, respective categories occurred in 7, 2 and 0% of fields, and in 91% of fields the lower canopy leaves were senesced and could not be rated. The upper canopy severity levels suggest that leaf spots caused relatively little damage to winter wheat in 2007, likely a yield loss of less than 3%. The widespread use of foliar fungicides in winter wheat production in Manitoba is probably influencing the level of leaf spot development. For the 23 fields for which the information was known, 13 fields had been sprayed with propiconazole and 4 with both propiconazole and tebuconazole.

Pyrenophora tritici-repentis, causal agent of tan spot, was the predominant leaf spot pathogen (Table 1.), as has been the case in winter wheat in Manitoba every year since 2001 (Tekauz et al. 2002). It was detected in 75% of fields and was estimated to have caused nearly 80% of the foliar damage observed. *Cochliobolus sativus* was the second most prevalent pathogen, also a typical situation in most years.

REFERENCE:
Tekauz, A., Mueller, E., Beyene, M., Stulzer, M. Schultz, D. and Reverchon, F. 2002. Leaf spot diseases of winter wheat in Manitoba in 2002. Can. Plant Dis. Surv. 82: 73-73. (www.cps-scp.ca/cpds.htm)

Table 1. Incidence and isolation frequency of leaf spot pathogens of winter wheat in Manitoba in 2007.

Pathogen	Incidence (% of fields)	Frequency (% of isolations)*
Pyrenophora tritici-repentis	75	79.1
Cochliobolus sativus	34	14.7
Stagonospora nodorum	7	2.5
Septoria avenae f.sp. *triticea*	11	3.7

* indicative of the relative foliar damage caused

CROP / CULTURE: Wheat
LOCATION / RÉGION: Ontario

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: 2007 SURVEY FOR FUSARIUM HEAD BLIGHT OF WHEAT IN ONTARIO

INTRODUCTION AND METHODS: Fifty two wheat fields were randomly selected at harvest on farms in southern Ontario to assess the presence of fusarium head blight by determining levels of deoxynivalenol (DON) and *Fusarium*-infected kernels. Forty two were winter wheat and ten were spring wheat fields (counties of Haldimand, Lanark/Carlton, Leeds and Grenville, Simcoe, and Waterloo). Grain was obtained from each field after harvest. DON content was assessed on a 20g sub-sample of harvested seed using a quantitative fluorometric test, FluoroQuan (Romer Labs Inc, Union MO). To determine the percent seed infected by *Fusarium*, 60 kernels per field were surface-sterilized in 0.16% NaOCl (diluted commercial bleach) for 3 minutes, air dried, and placed on acidified potato dextrose agar in four replications of 15 seeds per replicate. The kernels and agar plates were then incubated for 7 days under a 12:12 hr light:dark cycle at room temperature. The Fusarium species were identified using standard taxonomic keys.

RESULTS AND COMMENTS: The highest levels of DON (averaging 0.3 ppm) were found in Haldimand and Renfrew Counties, followed by Bruce, Dufferin, Halton, Simcoe and Kent Counties (0.2 ppm) (Table 1). The highest percentage of *Fusarium*-infected kernels (10.4%) was found in Lanark/Carlton County. This level was similar to that found in winter wheat in SW Ontario in 2006 (Tamburic-Ilincic and Schaafsma, 2007) and 2005 (Tamburic-Ilincic et al., 2006), but lower than in 2004 when significant losses occurred (Tamburic-Ilincic et al., 2005).

REFERENCES:
Tamburic-Ilincic, L. and Schaafsma, A.W. 2007. 2006 survey for fusarium head blight of winter wheat in S.W. Ontario. Can. Plant Dis. Surv. 87:100. (http://www.cps-scp.ca/cpds.htm)

Tamburic-Ilincic, L., Schaafsma, A. W. and Falk, D.E. 2006. 2005 Survey for fusarium head blight of winter wheat in Ontario. Can. Plant Dis. Surv. 86:87. (http://www.cps-scp.ca/cpds.htm)

Tamburic-Ilincic, L., Paul. D. and Schaafsma, A. W. 2005. Fusarium head blight survey of winter wheat in 2004 in Ontario. Can. Plant Dis. Surv. 85:53. (http://www.cps-scp.ca/cpds.htm)

Table 1. Mean levels of deoxynivalenol (DON) and *Fusarium*-infected kernels for wheat in Ontario in 2007.

County	**No. of fields**	**DON (ppm)**	**% *Fusarium* spp.**
Brant	3	0.1	0.0
Bruce	3	0.2	0.0
Dufferin	3	0.2	0.6
Durham	2	0.0	0.8
Essex	1	0.0	0.0
Grey	4	0.1	2.5
Haldimand	3	0.3	1.1
Halton	2	0.2	1.7
Hamilton-Wentworth	3	0.1	0.0
Huron	1	0.0	0.0
Kent	1	0.2	1.7
Lambton	1	0.0	0.0
Lanark/Carlton	4	0.1	10.4
Leeds and Grenville	1	0.0	3.3
Lennox and Addington	1	0.0	1.7
Middlesex	1	0.0	1.7
Niagara	2	0.1	0.0
Northumberland	1	0.0	6.7
Oxford	1	0.0	0.0
Peel	2	0.1	0.8
Perth	1	0.0	3.3
Peterborough	1	0.0	1.7
Prince Edward	1	0.0	1.7
Renfrew	1	0.3	6.7
Simcoe	1	0.2	5.0
Waterloo	1	0.0	0.0
Wellington	5	0.1	1.0
York	1	0.0	0.0

CROP / CULTURE: Spring Wheat
LOCATION / RÉGION: Eastern Ontario

NAMES AND AGENCY / NOMS ET ÉTABLISSEMENT:
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TITLE / TITRE: DISEASES OF SPRING WHEAT IN EASTERN ONTARIO IN 2007

INTRODUCTION AND METHODS: A survey for diseases of spring wheat was conducted in eastern Ontario in the third week of July when plants were at the soft dough stage of development. Twenty-six fields were chosen at random in regions of eastern Ontario where most of the spring wheat is grown. Foliar disease severity was determined on 10 flag and penultimate leaves sampled at each of three random sites per field by using a rating scale of 0 (no disease) to 9 (severely diseased). Diseases were identified by visual symptoms. Average severity scores of <1, <3, <6, and $\geq$6 were considered trace, slight, moderate, and severe infection, respectively. Severity of ergot, loose smut, or take-all was estimated as the percentage of plants infected. Fusarium head blight (FHB) was rated for both incidence (percent infected spikes) and severity (percent infected spikelets of the infected spikes), based on approximately 200 spikes sampled at each of three random sites per field. A FHB index (incidence x severity)/100 was determined for each field. Index values of <1, <10, <20, and $\geq$20 were considered slight, moderate, severe, and very severe levels of infection, respectively.

Determination of FHB causal species was based on 10 infected heads collected from each field. The heads were air-dried at room temperature, and subsequently threshed. Ten random discolored kernels per sample were surface sterilized in 1% NaOCl for 30 seconds, and plated in 9-cm diameter petri dishes on modified potato dextrose agar (10 g dextrose per liter) amended with 50 ppm streptomycin sulfate. Plates and seed were incubated for 10-14 days at 22-25°C, with a 14-hour photoperiod using fluorescent and long wave ultraviolet illumination. *Fusarium* species isolated from the kernels were identified by microscopic examination using standard taxonomic keys.

RESULTS AND COMMENTS: Ten individual diseases were observed in the 26 fields surveyed (Table 1). Leaf rust (*Puccinia triticina*) and septoria/stagonospora leaf blotch (normally associated with infection by *Septoria tritici* and *Stagonospora* spp.) were the most prevalent foliar diseases, observed in 18 and 22 fields at mean severities of 4.3 and 3.9, respectively. Severe infections of these diseases were observed on plants in 6 and 3 fields, respectively. Yield reductions due to leaf rust and septoria/stagonospora leaf blotch were estimated to average at least 10% in the surveyed fields.

Tan spot (*Pyrenophora tritici-repentis*) was observed in 19 fields with a mean severity of 1.6. Although the disease was commonly observed, no severely infected crop was found. Other foliar diseases observed included bacterial leaf blight (*Pseudomonas syringae* pv. *syringae*), septoria glume blotch (*Septoria nodorum*), and spot blotch (*Cochliobolus sativus*). These three diseases were found in 5, 6, and 7 fields, respectively, and all affected crops had only trace to slight severities.

Take-all (*Gaeumannomyces graminis* var. *tritici*) was found in 21 fields (Table 1). The disease was more common and generally more severe in 2007 than in 2006 (Xue et al. 2007). Thirteen of the 21 affected fields had incidence levels greater than 1%. One affected field was estimated to contain 30% diseased plants. Ergot (*Claviceps purpurea*) and loose smut (*Ustilago tritici*) were observed in 13 and 7 fields, at mean severities of 1.4 and 1.0%, respectively. These two diseases did not appear to have caused significant damage.

Fusarium head blight was observed in all fields surveyed at a mean incidence of 9.5% (range 0.3-30.0%) (Table 1). Infected spikes had a mean severity of 11.2%, with a range of 0.7-33.3%. The FHB index ranged from 0.01-10.0%, with a mean of 1.1%. Severe and very severe FHB levels were not observed in 2007. Compared to previous years (Xue et al. 2007), FHB had a lower impact on yield and grain quality in 2007.

Five *Fusarium* species were isolated from infected kernels (Table 2). *Fusarium graminearum* predominated, occurring in 92% of fields and 65% of infected kernels. Other species found included *F. avenaceum, F.equiseti, F. poae*, and *F. sporotrichioides*, all at less than 1% of the kernels.

The disease profile of spring wheat diseases in eastern Ontario in 2007 was similar to that found in 2006 (Xue et al. 2007), except that powdery mildew (*Erysiphe graminis* f. sp. *tritici*), which commonly occurs in Ontario was not observed in 2007. It is also worthy of note that severities of leaf rust and take-all were greater and severity of FHB was lower in 2007 than in 2006. Fusarium head blight did not cause significant yield and quality reductions to Ontario wheat in 2007. Compared to 2006, total precipitation was lower and mean temperatures higher across eastern Ontario in June and July of 2007. The relatively hot and dry weather in June and July were likely responsible for decreased FHB severity in Ontario spring wheat in 2007.

REFERENCE:

Xue, A.G., Chen, Y. and Voldeng, H.D. 2007. Diseases of spring wheat in eastern Ontario in 2006. Can. Plant Dis. Surv. 86:101-102. (http:www.cps-scp.ca/cpds.htm)

Table 1. Prevalence and severity of spring wheat diseases in eastern Ontario in 2007.

DISEASE	NO. FIELDS AFFECTED (n=26)	DISEASE SEVERITY IN AFFECTED FIELDS*	
		Mean	Range
Bacterial blight	5	1.8	1.0-2.7
Leaf rust	18	4.3	1.0-7.3
Septoria glume blotch	6	1.3	1.0-2.7
Septoria/stagonospora leaf blotch	22	3.9	1.0-6.7
Spot blotch	7	1.8	1.0-4.3
Tan spot	19	1.6	1.0-3.0
Ergot (%)	13	1.4	0.3-6.7
Loose smut (%)	7	1.0	1.0-2.3
Take-all (%)	21	3.6	1.0-30.0
Fusarium head blight	26		
Incidence		9.5	0.3-30.0
Severity		11.2	0.7-30.0
FHB index**		1.1	0.01-9.0

*Foliar disease severity was rated on a scale of 0 (no disease) to 9 (severely diseased) except for ergot, loose smut, and take-all, where it was rated as percent plants infected.
** FHB index = (incidence x severity)/100

Table 2. Frequency of *Fusarium* species isolated from fusarium damaged kernels of spring wheat in eastern Ontario in 2007.

***FUSARIUM* SPP.**	**% FIELDS**	**% KERNELS**
F. avenaceum	3.8	0.5
F. equiseti	7.7	0.9
F. graminearum	92.3	64.7
F. poae	3.8	0.5
F. sporotrichioides	3.8	0.5

Oilseeds and Special Crops / Oléagineux et Cultures Spéciales

CROP: Field bean
LOCATION: Manitoba

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TITLE: DISEASES OF FIELD BEAN IN MANITOBA IN 2007

METHODS: Crops of field bean were surveyed for root diseases at 32 different locations and for foliar diseases at 42 locations in Manitoba. During the root disease survey, the severity of halo blight (*Pseudomonas syringae* pv. *phaseolicola*) also was assessed as a percentage of leaf tissue with symptoms. The survey for root diseases and halo blight was conducted in the first and second week of July when plants were at the early bloom stage and the survey of foliar diseases was carried out during the third week of August when the plants were starting to mature. The crops surveyed were selected at random from regions in southern Manitoba, where most field bean crops are grown. For the root diseases, 10 plants were sampled at each of three random sites in each crop surveyed. Root diseases were rated on a scale of 0 (no disease) to 9 (death of plant, seedling did not emerge or died back soon after emergence). Five to ten roots with disease symptoms per crop were collected for isolation of the causal organism in the laboratory in order to confirm the visual assessment. Foliar diseases were identified by symptoms. Levels of common bacterial blight were estimated based on the percent incidence of leaf infection and a severity scale of 0 (no disease) to 5 (50-100% of the leaf area covered by lesions). Anthracnose, rust and white mould severity were assessed as a percentage of infected plant tissue. In each crop with anthracnose symptoms, pod samples were collected for isolation of the causal organism to confirm that the symptoms were caused by *Colletotrichum lindemuthianum*.

RESULTS AND COMMENTS: Frequent showers occurred throughout June and this was followed by generally hot and dry conditions in July and August, which were not conducive for foliar disease development. Two root diseases were observed (Table 1). Fusarium root rot (*Fusarium solani*) was observed in 28 of the 32 crops surveyed for root disease, making it the most prevalent root disease of dry bean. Fields in which *F. solani* was isolated had root rot severity ratings that ranged from 0.7 to 4.8 with an average of 2.3. Rhizoctonia root rot (*Rhizoctonia solani*) was detected in 15 of the 32 crops surveyed with severity ratings of 1.8 to 4.8 and an average severity of 2.6. Five crops had average root rot ratings above a severity value of 3 (i.e., symptoms were present on 25-50% of the root system). Halo blight was observed in 20 of the 32 crops with severity values ranging from 1 to 25%.

Three diseases were observed during the foliar disease survey (Table 2). Common bacterial blight (CBB) (*Xanthomonas axonopodis* pv. *phaseoli*) was the most prevalent foliar disease and symptoms were observed in all 42 crops surveyed. The incidence of CBB leaf infection ranged from 9.7 to 46.7%, while severity ranged from 1.0 to 3.0 with an average of 2.0. Incidences above 20% with severity values of 3.0 were seen in only three crops. Anthracnose was detected in three field bean crops with severity values ranging from 1.7 to 10.0%. White mould (*Sclerotinia sclerotiorum*) symptoms were detected in 5 crops, but only at low severity. Bean rust (*Uromyces appendiculatus*) was not observed in any of the 42 dry bean crops.

Table 1. Prevalence and severity of root diseases and halo blight in 32 crops of bean in Manitoba in 2007.

Disease	No. crops affected	Disease Severity Mean[1]	Range
Fusarium root rot[2]	28	2.3	0.7-4.8
Rhizoctonia root rot[2]	15	2.6	1.8-4.8
Pythium root rot	0	0	0
Halo blight[3]	20	4.8%	1.0-25.0%

[1]Means are based on an average of the crops in which the diseases were observed.
[2]Root diseases were rated on a scale of 0 (no disease) to 9 (death of plant, seedlings did not emerge or died back soon after emergence).
[3]Halo blight severity was assessed as a percentage of leaf tissue displaying symptoms.

Table 2. Prevalence and severity of foliar diseases in 42 crops of field bean in Manitoba in 2007.

Disease	No. crops affected	Disease Severity[1] Mean[2]	Range	Incidence of Leaf Infection Mean[2]	Range
Common bacterial blight	42	2.0	1.0-3.0	21.7%	9.7-46.7%
Anthracnose	3	4.6%	1.7-10%		
Rust	0	0%	0%		
White mould	5	0.4%	0.3-0.5%		

[1]Anthracnose, rust and white mould severity were rated as the percentage of infected plant tissue; common bacterial blight severity was rated on a scale of 0 (no disease) to 5 (whole plant severely diseased) and % leaf area covered by lesions.
[2]Means are based on an average of the crops in which the diseases were observed.

CROP: Dry Bean
LOCATION: Alberta

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TITLE: SURVEY OF DISEASES OF DRY BEAN IN SOUTHERN ALBERTA IN 2007

METHODS: Twenty-eight irrigated dry bean crops were surveyed for diseases during the last week of August, 2007 in the bean production areas surrounding Bow Island and Taber, Alberta. Each crop was sampled by selecting ten sites approximately 20 m apart and in a U-shaped pattern, with each site consisting of a 3 m long section of row (Howard and Huang, 1983). Percent disease incidence of white mold, grey mold, bacterial blights and bacterial wilt were calculated for each crop by averaging the results from the ten sites. The incidence of each disease was categorized for each crop according to the following scale: (1) none (0% of plants infected), (2) trace (<1%), (3) light (1-10%), (4) moderate (11-25%), (5) high (26-50%), (6) very high (>50%).

RESULTS: White mold (*Sclerotinia sclerotiorum*), grey mold (*Botrytis cinerea*), bacterial blights (*Xanthomonas axonopodis* pv. *phaseoli*, *Pseudomonas savastanoi* pv. *phaseolicola*) and bacterial wilt (*Curtobacterium flaccumfaciens* pv. *flaccumfaciens*) were all observed in 2007. White mold was found in 27 of the 28 crops surveyed (Table 1), with disease incidence ranging from 0 to 49%. Most of the crops surveyed had trace or light incidence of white mold. Gray mold was found in only 3 of the crops surveyed, at trace levels.

Bacterial blights were found in 24 of the 28 crops (Table 1) with incidence ranging from 0 to 68%. The frequencies of crops with trace, light and moderate incidence of bacterial blights were 32, 29 and 18%, respectively. The crops with high and very high incidence of bacterial blights had been damaged by hail storms. Although both common blight (*X. axonopodis* pv. *phaseoli*) and halo blight (*P. savastanoi* pv. *phaseolicola*) were observed in the surveyed area, halo blight was observed only occasionally.

Bacterial wilt was observed in 15 of the crops surveyed with incidences of 0 to 9%. The frequency of crops with trace and light incidence of bacterial wilt was 32 and 21%, respectively.

DISCUSSION: Previous surveys of dry bean have reported the occurrence of fungal diseases such as white mold and grey mold and bacterial diseases such as bacterial blights (Huang and Erickson, 2000) and bacterial wilt (Huang et al., 2007). The current survey shows that these diseases persist in the dry bean production areas of southern Alberta. White mold and bacterial blights were the most prevalent in 2007.

In this survey, a high proportion of the dry bean crops examined had low (<10%) incidence of white mold. This observation is atypical and may be related to the very high temperatures and low precipitation that occurred in southern Alberta during July, the critical time for initiation of white mold in the field. The high temperatures may also have favored the development of bacterial blights and bacterial wilt, which were more prevalent in 2007 than in previous years, and whose causal agents have higher optimal growth temperatures compared to those of white mold and grey mold.

The repeated occurrence of these pathogens in the dry bean production areas of southern Alberta suggests the need for continued disease surveillance.

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Table 1. Incidence of dry bean diseases in southern Alberta in 2007.

	Number of crops[1] with disease incidence of					
Disease	**None 0%**	**Trace (<1%)**	**Light (1-10%)**	**Moderate (11-25%)**	**High (26-50%)**	**Very High (>50%)**
White mold	1	11	11	4	1	0
Grey mold	25	3	0	0	0	0
Bacterial blights	4	9	8	5	1	1
Bacterial wilt	13	9	6	0	0	0

[1]out of a total of 28 crops surveyed.

CROP: Canola
LOCATION: Alberta

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TITLE: INCIDENCE OF CLUBROOT ON CANOLA IN ALBERTA IN 2007

METHODS: In August and September 2007, a total of 325 commercial canola (*Brassica napus* L.) fields were surveyed in 11 counties in central Alberta and one county in southern Alberta (Table 1) for the incidence of clubroot, caused by the obligate parasite *Plasmodiophora brassicae* Woronin. The fields were surveyed after swathing by inspecting the roots of all plants within a 1 m^2 area at each of 10 locations along the arms of a 'W' sampling pattern. The presence of conspicuous galls on the roots was taken as an indication of clubroot infection. As infections tended to occur in patches, disease incidence in individual fields was calculated as the percentage of points (out of the 10 sampling points within each field) that were positive for clubroot. The severity of root infection was assessed on a 0 to 3 scale, adapted from Kuginuki et al. (1), where 0 = no galling, 1 = a few small galls, 2 = moderate galling and 3 = severe galling. Representative soil and root samples were collected from each infested field for further analysis. The majority of surveyed fields were randomly selected, although some were visited because of reports of clubroot or clubroot-like symptoms.

RESULTS AND COMMENTS:
A total of 58 clubroot-infested canola fields were identified in 2007. The disease was found in 10 of 11 counties surveyed in central Alberta and in Newell County in southern Alberta (Table 1). The infestations in Newell, Barrhead, Lac St. Anne, Camrose and Westlock represent the first documented cases of clubroot in these counties. However, no clubroot was found in 27 canola fields surveyed in Thorhild County. In Wetaskiwin and Flagstaff counties, multiple cases of the disease were found, whereas previously only one infested field had been reported in each county. A total of 171 infested fields have been identified in Alberta since the clubroot outbreak began in 2003. In addition, further surveying by agricultural fieldmen in Leduc, Sturgeon, Parkland and Barrhead counties revealed another 79 cases of the disease, for a grand total of 250 affected fields (C. Henkelmann, T. Prefontaine, E. Brock and M. Flock, personal communication). Within the 58 clubroot-infested fields identified as part of this year's main survey, five had a very high incidence of disease (>70%), 26 exhibited intermediate disease incidences (30-70%), and 27 fields had a low incidence of disease (<30%).

The percentage of infested fields in the 2007 survey (17.8%) was lower than in previous clubroot surveys conducted in Alberta (2, 3). This probably reflects the fact that this year's survey was not focused on areas where clubroot is known to be prevalent, but rather included a large number of randomly selected fields distributed throughout a much larger area. Indeed, in counties where clubroot was already known to occur, the proportion of infested fields tended to be quite high. For instance, in Sturgeon County, where the outbreak was first detected, 8 of 12 fields surveyed were clubroot positive.

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Industry Development Fund, the Alberta Canola Producers Commission and the Saskatchewan Canola Development Commission is also gratefully acknowledged.

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Table 1. Distribution of clubroot-infested canola fields identified in Alberta in 2007.

County	Total fields surveyed	Number of clubroot infested fields[a]
Barrhead	19	2 (2)
Camrose	22	3 (3)
Flagstaff	20	2 (3)
Lac Ste. Anne	15	1 (1)
Leduc	34	12 (34)
Newell	21	2 (2)
Parkland	40	14 (29)
Strathcona	26	4 (8)
Sturgeon	12	8 (63)
Thorhild	27	0 (0)
Westlock	39	3 (3)
Wetaskiwin	50	7 (8)

[a]The total number of infested fields identified from 2004 to 2007 is indicated in brackets for each county; an additional 15 infested fields were identified in a rural area of northeast Edmonton in 2005-2006, but this region was not surveyed in 2007.

CROP: Canola
LOCATION: Saskatchewan

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TITLE: SURVEY OF CANOLA DISEASES IN SASKATCHEWAN, 2007

METHODS: A total of 99 fields of *Brassica napus* were surveyed between August 8 and 22 in the major canola production regions of Saskatchewan including the north-west (21 fields), north-central (20), north-east (20), east-central (10), south-east (16) and central (12) regions. Canola fields were surveyed before swathing and while the crop was between growth stages 5.2 and 5.3 (Canola Council of Canada). Disease assessments were made in each field by collecting 20 plants from each of five sites at least 20 m from the edge of the field and separated from each other by at least 20 m. The presence or absence of lesions on each plant was determined to give percent disease incidence for sclerotinia stem rot (*Sclerotinia sclerotiorum*), blackleg (*Leptosphaeria maculans*), aster yellows (AY phytoplasma), foot rot (*Rhizoctonia* spp.*, Fusarium* spp.) and fusarium wilt (*F. oxysporum* f. sp. *conglutinans*). For sclerotinia stem rot, each plant was scored for both main stem and upper branch/pod lesions. For blackleg, plants were scored for either severe basal stem cankers or any other type of blackleg stem lesion. For alternaria black spot (*Alternaria brassicae*, *A. raphani*), the percent severity of lesions on the pods of each plant was assessed. If alternaria black spot was present in a field, but at a level estimated to be below 1%, the disease was recorded as "trace". Similarly, when the other diseases were observed in a field, but not in the sample of 100 plants, the disease was recorded as "trace". When calculating means, all trace values were counted as 0.1%. Field results were combined for each region and mean disease incidence or severity values were determined.

RESULTS AND COMMENTS: The 2007 growing season was highly variable in the province, resulting in unique disease pressures depending on location and crop maturity. Early spring moisture was adequate in most of the province and excessive in the north-east and east-central regions. In June favourable growing conditions were seen. Hot, dry weather occurred in July, decreasing the risk of diseases such as sclerotinia stem rot in most regions. Cool, wet weather occurred in August and increased the risk of sclerotinia stem rot in late maturing crops in the north-east and east-central regions. Canola was harvested earlier than normal in central and south-east regions and later than normal in east-central and northern regions. Although canola yields and quality were highly variable in 2007, the average yield (1390 kg/ha = 24.8 bu/acre) was slightly higher than the 10-year average (1335 kg/ha = 23.8 bu/acre) (Saskatchewan Agriculture, 2007).

Sclerotinia stem rot was observed in 65 of the 99 fields surveyed. Incidence ranged from 0 to 40% for main stem lesions and from 0 to 27% for upper branch/pod lesions. Mean total incidence was highest in the east-central region and lowest in the south-east region (Table 1). The overall total incidence for the province in 2007 (5%) was intermediate between incidences observed in dry seasons (2001–2003, 2005, 2006) and those observed during seasons with rainfall during the bloom period (1999, 2000, 2004) (Pearse et al. 2007).

Blackleg was observed in 44 of the 99 fields surveyed. Incidence ranged from 0 to 25% for basal stem cankers and from 0 to 50% for lesions occurring elsewhere on the stem. Mean total incidence was highest in the central region (Table 1). The overall total blackleg incidence for the province in 2007 (3%) was similar or slightly lower than in previous years (Pearse et al. 2007).

Aster yellows was observed in 82 of the 99 fields surveyed, with incidence ranging from 0 to 15%. Mean values were highest in the north-east and east-central regions, but the disease was observed in all regions. The overall incidence for the province was 2%, which was the highest since 2000.

Foot rot was observed in 14 of the 99 fields, with incidence ranging from 0 to 3%. The overall incidence for the province was less than 1% (Table 1), similar to previous years. Alternaria black spot was reported in 78 of the 99 fields surveyed, but most regions had only trace levels. No fusarium wilt or clubroot (*Plasmodiophora brassicae)* was observed in the surveyed fields. Staghead (*Albugo candida*) was found at trace levels in one field.

Sixty-five percent of the canola crops surveyed were reported as being in good to excellent condition with main crop stresses being heat blasting, dry soils and insect damage. Insect damage (e.g., diamondback moth, Bertha armyworm, flea beetles) was more prevalent than disease damage in many fields.

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Table 1. Canola diseases in Saskatchewan, 2007.

REGION[1] (NO. OF FIELDS)	MEAN % DISEASE INCIDENCE						MEAN % SEVERITY
	Sclerotina[2]		Blackleg[3]		Aster yellows	Foot rot	Alternaria black spot
	Main	Upper	Basal	Other			
North-west (21)	1	2	T[4]	2	T	T	T
North-central (20)	3	2	4	1	T	0	1
North-east (20)	2	2	0	T	3	T	T
East-central (10)	8	3	T	3	3	T	T
South-east (16)	T	T	0	1	1	T	T
Central (12)	4	3	T	7	2	T	T
Overall Mean (99)	3	2	1	2	2	T	T

[1] The Rural Municipalities (RM) in the major canola production regions where fields were surveyed include:
North-west = RM 347, 350, 351, 379, 381, 406, 409, 437, 438, 468, 470–472, 498, 499, 501, 502
North-central = RM 399, 401, 428–431, 459–461
North-east = RM 395, 426–428, 457, 486, 487
East-central = RM 244, 271, 274, 305, 308, 335–338
South-east = RM 35, 36, 65, 66, 67, 96, 126, 127, 156, 157, 159
Central = RM 279, 285, 309, 310, 315, 341, 342, 344–346, 369

[2] Sclerotinia stem rot lesions were scored as either main stem lesion or as upper branch/pod lesions.

[3] Blackleg lesions were scored as either severe basal stem cankers or as any other type of stem lesion.

[4] T = trace amounts of disease (<1%); see text.

CROP: Canola
LOCATION: Manitoba

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TITLE: DISTRIBUTION, PREVALENCE AND INCIDENCE OF CANOLA DISEASES IN MANITOBA (2007)

METHODS: In August 2007, 40 canola crops were surveyed in the southwest (20), northwest (10) and central (10) regions. No crops were surveyed in the eastern/interlake region. All crops were *Brassica napus*. They were assessed for the prevalence (percent crops infested) and incidence (percent plants infected per crop) of sclerotinia stem rot (*Sclerotinia sclerotiorum*), aster yellows (phytoplasma), foot rot (*Fusarium* spp. and *Rhizoctonia* sp.), blackleg (*Leptosphaeria maculans*) and fusarium wilt (*Fusarium* spp.). Blackleg lesions that occurred on the upper portions of the stem were assessed separately from basal stem cankers. The prevalence and percent severity of alternaria pod spot (*Alternaria* spp.) were determined.

In each canola crop, one hundred plants were selected in a regular pattern starting at a corner of the field or at a convenient access point. The edges of the fields were avoided. Twenty plants were removed from each of five points of a "W" pattern in the field. Points of the "W" were at least 20 paces apart. All plants were pulled up, removed from the field and examined for the presence of diseases.

RESULTS: A number of diseases were present in each of the three regions of Manitoba. Sclerotinia stem rot and aster yellows were the most prevalent diseases throughout these regions (Table 1). The prevalence of sclerotinia-infested crops ranged from a high of 100% in the central region to 50% in the northwest region, with a provincial mean of 80%. This was higher than the prevalence of 39% in 2006 (4). Mean disease incidence ranged from 6% in the southwest and central regions to 1% in the northwest region with a provincial mean of 5.2%.

The prevalence of aster yellows in the crops surveyed in 2007 ranged from a high of 90% in the central region to 75% in the southwest region, with a provincial mean of 80%. This represents a significant increase from 2006 when aster yellows was found in the southwest region only and with a prevalence of 4% (4). Mean disease incidence ranged from 9% in the northwest region to 4% in the southwest and central regions.

Blackleg basal cankers occurred in 52% of the crops surveyed in 2007 with disease incidence ranging from 3% in the southwest and northwest regions to 2% in the central region, with a provincial mean of 2.4%. In 2006, blackleg basal cankers were found in 39% of surveyed crops with a mean disease incidence of 6.7% (4) for the province.

The mean prevalence of blackleg stem lesions was 65%. Prior to 2007, 41%, 35%, 65%, and 61% of crops were infested with stem lesions in 2003 (1), 2004 (2), 2005 (3) and 2006 (4), respectively. The mean incidence in 2007 was 7%, which was similar to that observed in 2006.

The severity of alternaria pod spot was low (Table 2) at <1% in the southwest, northwest and central regions. Unfortunately, prevalence data were not available for 2007 but the disease was noted as present at a severity level of <1% in the three regions of Manitoba. The mean severity was also low in 2006 (4). Of the 40 canola crops examined in Manitoba, fusarium wilt was observed in 15%, with a mean incidence of <1%. No fusarium wilt was observed in the northwest region (Table 1). This disease was found in 2.3%, 0%, 21% and 18% of fields in 2003, 2004, 2005 and 2006, respectively. Foot rot was not observed in any of the surveyed crops.

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Table 1. Number of canola crops surveyed and disease prevalence in Manitoba in 2007.

Crop Region	No. of Crops	Sclerotinia stem rot		Blackleg basal cankers		Blackleg stem lesions		Alternaria pod spot		Aster yellows		Fusarium wilt	
		P[1]	DI[2]	P	DI	P	DI	P	Sev.[2]	P	DI	P	DI
Central	10	100	6	60	2	60	9	n/a	<1	90	4	20	1.2
Northwest	10	50	1	60	3	90	14	n/a	<1	80	9	0	0
Southwest	20	85	6	45	3	55	3	n/a	<1	75	4	20	0.4

[1] Mean percent prevalence.
[2] Mean percent disease incidence.
[3] Mean percent severity.

Table 2. Distribution of incidence (sclerotinia, blackleg, aster yellows, and fusarium wilt) classes in 40 crops of *Brassica napus* in Manitoba in 2007.

	Number of crops (%) with				
	Sclerotinia stem rot	Blackleg basal cankers	Blackleg stem lesions	Aster Yellows	Fusarium wilt
0%	20	48	35	20	85
1-5%	42	32	30	48	12
6-10%	28	18	15	18	3
11-20%	8	2	12	12	0
21-50%	2	0	5	2	0
>50%	0	0	3	0	0

CROP/CULTURE: Chickpea
LOCATION/REGION: Southern Alberta

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TITLE: SURVEY OF ASCOCHYTA BLIGHT ON CHICKPEA IN SOUTHERN ALBERTA IN 2007

METHODS: A survey was conducted in 26 chickpea fields in the Foremost, Milk River, Skiff, Taber and Wrentham regions of southern Alberta (Fig.1) during July, 2007 to determine the occurrence of ascochyta blight [*Ascochyta rabiei* (Pass.) Labr.]. The sampling pattern and scoring of disease incidence and severity were as described in an earlier report (1). Data on disease management strategies were also noted when available.

RESULTS AND COMMENTS: CDC Diva and CDC Frontier were the predominant chickpea cultivars grown in the surveyed area. Ascochyta blight was widespread and all crops surveyed were infested with the disease, although there were variations in percent disease incidence (0.05- 100) and in severity (0.2-3.0) among the regions (Table 1). Severe disease was observed early in July in the Foremost region. Regions near Skiff, Taber, Wrentham and Milk River had less disease. Hot, dry weather followed and disease progress was arrested in all regions. As a result, producers reported that yields were in the normal range of 2 – 3.5 t/ha, so disease did not have a great effect on yield. Disease was more severe on unifoliolate than on fern-leaf chickpea cultivars. Similar results have been reported earlier (2). Based on surveillance over the past years, ascochyta blight is endemic (1, 4, 5, 6) in the surveyed area, and disease prevalence and severity depend on the occurrence of favourable weather, particularly precipitation (4, 5, 6). Similar outbreaks to that in 2007 were observed in 2001 and 2004 in some fields (1, 4). Farmers reported that the chickpea crops were sprayed with Headline (a.i. pyraclostrobin) 3-4 wk after seeding followed by Headline Duo (a.i. pyraclostrobin + boscalid) and lastly with Bravo (a.i. chlorothalonil) as recommended to avoid development of strobilurin resistance. Earlier reports indicated that resistance to both chlorothalonil and pyraclostrobin is present in the population of *A. rabiei* in chickpea growing areas of Alberta (3). These survey data reinforce that finding. Since fern-leaf chickpea types had better field resistance to ascochyta blight, farmers need to be encouraged to select these cultivars. However, a combination of strategies including cultivar selection, 4-year crop rotation, seed treatment and foliar fungicide applications is required for the effective management of ascochyta blight.

ACKNOWLEDGEMENTS: We are grateful to Qixing Zhou, Field Crop Development Centre, Lacombe and Jie Feng, Crop Diversification Centre North for technical assistance in conducting this survey. Parker Gordon, Parker Crop Consulting Ltd. and Don Pittman, Pittman Agronomy Ltd. contacted individual growers and helped locate chickpea fields for the survey.

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Table 1. Occurrence of ascochyta blight in chickpea fields in southern Alberta in 2007.

Region	No. of fields surveyed	Mean disease incidence (%)	Mean disease severity (0-3)[a]
Foremost	13	100	2.6 (2.0 -3.0)[b]
Milk River	2	6.0 (5.2-6.8)	0.9 (0.8-1.0)
Skiff	2	53.3 (6.6-100)	2.2 (1.4 –3.0)
Taber	5	32.7 (0.05 -72.2)	1.6 (0.2- 2.8)
Wrentham	4	22.9 (.81-43.6)	1.2 (0.6-2.2)
Overall mean		42.9 (0.05-100)	1.7 (0.2-3.0)
Total fields	26		

[a]0 = no infection, 1 = 1 - 10%, 2 = 11 – 50% and 3 = 51-100% of plant area infected.
[b]Data in parentheses indicate the range.

Fig. 1. Map showing the locations of the chickpea fields surveyed in southern Alberta in 2007.

CROP: Chickpea
LOCATION: Saskatchewan

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TITLE: SEED-BORNE PATHOGENS OF CHICKPEA IN SASKATCHEWAN IN 2007

METHODS: The results of agar plate tests conducted by four Saskatchewan companies on seed samples mainly from the 2007 crop were summarized. The tests were conducted to detect the pathogens causing ascochyta blight (*Ascochyta rabiei*), botrytis blight [grey mould] (*Botrytis cinerea*) and sclerotinia stem and pod rot (*Sclerotinia sclerotiorum*). Not all samples were tested for *Botrytis* and *Sclerotinia* but all were tested for *Ascochyta*. Because of the small number of desi chickpea samples, kabuli and desi data were combined; over 85% of the samples were kabuli chickpea. For *Ascochyta,* mean % seed infection and % samples free of infection were calculated for each crop district [CD] in Saskatchewan (1). Similar values were not calculated for *Botrytis* and *Sclerotinia*. Most samples came from crops sprayed once or more with chlorothalonil, pyraclostrobin, boscalid or azoxystrobin to control ascochyta blight.

RESULTS AND COMMENTS: In Saskatchewan the 2007 growing season was marked for the second consecutive year by excellent conditions for timely spring seeding and good or excessive rainfall in most areas throughout June. In July and early August rainfall was generally below normal and high temperatures prevailed, especially in the major chickpea growing area in the southwest. Harvest occurred under dry conditions and was completed very early. The quality of chickpea seed was high. Despite late-season drought stress, the overall mean yield per acre of chickpea crops in Saskatchewan was 4% higher than that in 2006 and 4% above the 10-year average (3).

Data on seed infection were compiled on samples tested between early September and mid-December 2007. In that period only 165 samples were tested by the five companies. This is 34% less than those reported by four companies in 2006 (2) despite a 36% increase in acreage of chickpea in Saskatchewan in 2007 (3). There is no doubt that seed samples from the major chickpea-growing region of CDs 3B and 4 are underrepresented in the data reported here.

The mean % *Ascochyta* infection for the province was 0.8%, identical to the figure reported for 2006 (2). Similarly, the percentage of samples free of infection was 48% (cf. 52% in 2006). These values reflect the similarity of favourable growing conditions for chickpea in Saskatchewan in 2006 and 2007 and the fact that most chickpea growers are now experienced crop managers. The wider variations in some CDs from the provincial means (Table 1) are mostly anomalies caused by small sample sizes. Levels of *Botrytis* and *Sclerotinia* in all CDs were negligible because of the hot dry weather and early harvest (2).

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Table 1. Number of chickpea seed samples (kabuli and desi combined*) tested from September to mid-December, 2007 by five commercial companies, and levels of infection with *Ascochyta* in relation to Saskatchewan Crop Districts.

Crop District	No. of samples tested	Mean % infection	% samples with no infection detected
1A	6	0.5	67
1B	0	-	-
2A	21	0.7	38
2B	23	1.3	39
3AN	9	0.2	67
3AS	48	0.4	60
3BN	14	0.4	64
3BS	3	0.3	67
4A	4	0.1	75
4B	6	3.0	17
5A	1	0	100
5B	1	2.0	0
6A	3	0	100
6B	23	1.2	57
7A	2	1.7	0
7B	0	-	-
8A	1	0	100
8B	0	-	-
9A	0	-	-
9B	0	-	-
TOTAL	165	0.8	48

*Ratio of kabuli to desi samples = 7.4:1

CROP: Flax
LOCATION: Manitoba

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TITLE: DISEASES OF FLAX IN MANITOBA AND SASKATCHEWAN IN 2007

METHODS: A total of 49 flax crops were surveyed in 2006, 22 in southern Manitoba, and 27 in southern and eastern Saskatchewan. Four crops were surveyed during the second week of August, eight in the third week, and 37 in the last week of August. Ninety one percent of the crops were the brown seed-colour linseed flax, and only 4 % were yellow seed-colour flax. Crops surveyed were selected at random along pre-planned routes in the major areas of flax production. Each crop was sampled by two persons walking ~100 m in opposite directions in the field following an "M" pattern. Diseases were identified by symptoms and the incidence and severity of fusarium wilt (*Fusarium oxysporum lini*), pasmo (*Septoria linicola*), powdery mildew (*Oidium lini*), and rust (*Melampsora lini*) were recorded. Stand establishment, vigour, and maturity were rated on a scale of 1 to 5 (I = very good/early, and 5 = very poor/very late).

In addition, five samples of flax plants were submitted for analysis to the Crop Diagnostic Centre of Manitoba Agriculture, Food and Rural Initiatives by agricultural representatives and growers.

RESULTS AND COMMENTS: Seventy eight percent of the flax crops surveyed in 2007 were rated excellent for stand and the remaining 22% were good. Fifty five percent of the crops surveyed were maturing early with excellent to good vigour. Only 10% of the crops were late-seeded and were expected to mature and be harvested late, thereby reducing yield and seed quality. The 2007 growing season started early with abundant moisture and good growing conditions during the first part of the growing season. Dry and above normal temperature conditions in July and August created various stresses on flax crops in different regions, thus hastening maturity and resulting in low yields in most crops.

Pasmo, the most prevalent disease in 2007, was observed in 90% of all crops surveyed (Table 1). The prevalence and severity on stems were similar to those of 2006 but lower than in previous years (1, 2, 3, 4), due perhaps to the abnormal dry conditions in July and August which resulted in slow disease development. In most infested crops, pasmo severity ranged from trace to 20% of the stem area affected, and severity was >30% in only 12% of the crops (Table 1).

Some root infections and fusarium wilt were observed in 47% of flax crops. The incidence was very low (trace to 5%) in most of the crops, and only 8% of the flax crops had over 5% infected plants (Table 1). The prevalence of root infections and fusarium wilt in 2007 were lower than those in 2006 but similar to those in previous years (1, 2, 3).

Powdery mildew was observed in 45% of flax crops surveyed with a severity range from trace to 30% leaf area affected (Table 1). The incidence and severity in 2007 were higher than in 2006 (1,2,3), and higher in Saskatchewan, where 22% of crops had 20-30% leaf area infected, than in Manitoba where 4% of crops had 20-30% leaf area infected.

Rust was not observed in any of the crops surveyed in 2007, nor in the flax rust trap nurseries planted at Morden and Portage la Prairie in Manitoba, and at Saskatoon and Indian Head in Saskatchewan. Aster yellows (phytoplasma) was observed in 20% of flax crops with severity range from trace to 1% affected plants. Alternaria blight was observed in 65% the crops surveyed with a severity range from trace to 10% leaf area affected. Stem infection by *Sclerotinia sclerotiorum* was not observed in this

survey. Lodging was found in only a few crops and was the lowest observed in the last 10 years (1,2, 3,4). Low aphid infestations were observed in several flax crops and very low grasshopper infestations in a few fields.

Of the five flax samples submitted to the Crop Diagnostic Centre, one was identified with aster yellows, one with root rot caused by *Pythium* spp. and *F. oxysporum*, and three with chemical injuries.

ACKNOWLEDGEMENTS: The assistance of T. Walske, and M. Penner, is gratefully acknowledged.

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Table 1. Incidence and severity of fusarium wilt, pasmo, and powdery mildew in 49 crops of flax in Manitoba and Saskatchewan in 2007.

Fusarium Wilt				**Pasmo**				**Powdery Mildew**			
Disease Class		**Crops**		**Disease Class**		**Crops**		**Disease Class**		**Crops**	
Incid.[1]	**Sever.[2]**	**No**	**%**	**Incid.[1]**	**Sever.[2]**	**No**	**%**	**Incid.[1]**	**Sever.[2]**	**No**	**%**
0%	0%	26	53	0%	0%	5	10	0%	0%	27	55
1-5%	1-5%	19	39	1-10%	1-5%	26	53	1-10%	1-5%	9	19
5-20%	5-10%	4	8	10-30%	5-10%	13	27	10-30%	5-10%	6	12
2-40%	10-20%	0	0	30-60%	10-20%	4	8	30-60%	10-20%	7	14
>40%	10-40%	0	0	>60%	20-50%	1	2	>60%	20-50%	0	0

[1] Disease Incidence = Percentage of infected plants in each crop.
[2] Disease severity = Percentage of roots affected by fusarium wilt, of stems affected by pasmo, and of leaves affected by powdery mildew.

CROP: Lentil
LOCATION: Saskatchewan

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TITLE: SEED-BORNE PATHOGENS OF LENTIL IN SASKATCHEWAN IN 2007

METHODS: The results of agar plate tests conducted by five companies on seed samples from Saskatchewan were summarized. The tests were conducted to detect the pathogens causing ascochyta blight (*Didymella* [*Ascochyta*] *lentis*), anthracnose (*Colletotrichum truncatum*), botrytis stem and pod rot (grey mould) and seedling blight (*Botrytis* spp.), and sclerotinia stem and pod rot (*Sclerotinia sclerotiorum*). All samples were tested for *Ascochyta* and slightly fewer for *Colletotrichum*, *Botrytis* and *Sclerotinia*. For *Ascochyta* mean % seed infection and % samples free of infection were calculated for the province. For *Colletotrichum* the % samples infected were calculated. As with samples in 2006 (5), mean % infections with *Ascochyta* or *Botrytis* were not calculated for each provincial crop district [CD] (2) because levels of both pathogens were very low and comparisons between CDs would be valueless. Seed infection with *Colletotrichum* and *Sclerotinia* was also at its usual very low levels (4, 5).

The seed samples could not be classified according to cultivar or whether the crops had been treated with seed treatments or foliar fungicides. However, using ascochyta-resistant lentil cultivars and spraying with foliar fungicides to control ascochyta blight and anthracnose are common practices in Saskatchewan.

RESULTS AND COMMENTS: In Saskatchewan the 2007 growing season was marked for the second consecutive year by excellent conditions for timely spring seeding and good or excessive moisture conditions in most areas throughout June. In July and early August rainfall was generally below normal and high temperatures prevailed, especially in the major lentil-growing areas. Harvest occurred under dry conditions and was completed very early. The quality of lentil seed was high but seed size was often small. The overall mean yield per acre of lentil crops in Saskatchewan was 1% higher than that in 2006 and 5% above the 10-year average (7).

The data summarized were from seed samples tested between early September and mid-December 2007, which were assumed to be mainly from the 2007 crop. During this time 365 samples were tested by the five companies, slightly more than reported by four companies in 2006 (5) but only 30% of the number reported for a wet year like 2004 (3). Low numbers reflect obvious high quality of lentil seed harvested and sometimes factors such as overproduction and low commodity prices.

Levels of seed-borne *Ascochyta* in individual samples ranged from 0% to 12% with a provincial mean of 0.2%. This value is close to the provincial mean of 0.1% in 2003 (6), also a year with hot dry weather and ideal conditions for early harvest. The similarity between *Ascochyta* levels in 2003 and 2007 is also shown by the fact that the % samples free of *Ascochyta* infection was 91% in 2003 (6) and 89% in 2007.

Mean provincial levels of *Colletotrichum*, *Botrytis* and *Sclerotinia* were all well below 1%. The percentage of samples in which *C. truncatum* was found was less than 5%. Anthracnose mainly affects lentil stems and spreads to the upper leaves and pods only when wet weather in late summer prolongs growth and delays harvest. In addition to the seed-borne pathogens which laboratories normally evaluate in lentil, tests in 2007 also commonly revealed low levels of *Stemphylium* sp., the cause of stemphylium blight (1).

The low levels were despite the fact that the senior author observed high levels of stemphylium blight on many lentil crops in Saskatchewan in late July.

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CROP/CULTURE: Lupin (*Lupinus angustifolius* L.)
LOCATION/RÉGION: Alberta

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TITLE/TITRE: OCCURRENCE OF LUPIN DISEASES IN CENTRAL ALBERTA IN 2007

METHODS: Lupin (*Lupinus angustifolius* L.) crops were surveyed for diseases at Barrhead, Lacombe, Namao, Rowley, Three Hills, and Viking in mid-June to early July, and again in mid-August. The survey method for field sites was the same as described by Chang et al. (2005, 2006). At the small-plot sites near Barrhead and Namao, every plant was checked for disease. Roots and stems of diseased plants were collected from each field. At Lacombe root rot samples were collected only from plots without fungal pathogen inoculum. Microorganisms were isolated from infected roots and basal stems using the method described by Chang et al. (2005).

RESULTS AND COMMENTS: Powdery mildew (*Erysiphe cichoracearum* DC.) occurred only in the experimental field near Lacombe. The disease appeared in early August. It became severe and covered whole plants in late August, but did not cause yield reduction. The disease was much less prevalent than reported in 2003, 2004 and 2005 by Chang et al. (2005, 2006).

Root rot and wilt were unevenly distributed in the fields. Seedling blight occurred in a field near Rowley where excessive rains (30 cm) had fallen between April 20 and June 25. The seeds had been treated with Apron Maxx (fludioxonil + metalaxyl-M) before seeding. Infected seedlings showed wilting, stunting and yellowing of the cotyledons and top leaves. The stem bases showed lesions, some of which girdled the stem, as well as symptoms of reddening. Average disease incidence was 6.5% and ranged from 0 to 14%. High temperatures (>26ºC) occurred through most of July and early August and caused severely stunted plants. A heavy hailstorm occurred in the region during mid-July. This removed many flowers and caused various sizes of lesions on the main stems. Crops near Viking and Lacombe were mostly healthy in the early growing season. At the blooming stage, a few plants became stunted, and bore only one or two pods per plant at Viking. In the field near Lacombe many plants showed root rot symptoms. Root rot incidence at Three Hills was 5.6% and ranged from 0 to 25%. Plants at Barrhead and Namao were stunted due to dry soil conditions, with root rot incidences of 2.6% and 1.8%, respectively.

Fusarium spp. were isolated from very high percentages of root samples from all fields (Table 1). *Pythium* spp. and *Alternaria* spp. were present at much lower levels, but higher than in previous years (Chang et al. 2005, 2006). Approximately 15% of plant samples from Rowley and Barrhead were infected with *Rhizoctonia solani*. At Barrhead, 22.0% of samples were infected by combinations of *Fusarium* spp. and *Pythium* spp. A high frequency of *Pythium* spp. was isolated from diseased root samples at Lacombe and Three Hills, probably due to excessive rain. At Three Hills, 39.2% of plants were infected with a combination of *Fusarium* spp. and *Pythium* spp. Occasionally, *Fusarium* spp., *R. solani* and *Pythium* spp. were all isolated from the same diseased plants in Barrhead (2%) and Lacombe (5%). Very minor incidences of sclerotinia blight (*S. sclerotiorum*) were observed in lupin at Lacombe and Barrhead. However, the pathogen was also isolated from basal stem and taproot samples from Namao and Viking.

As in previous years, root rot caused by *Fusarium* was still the most prevalent disease of lupin in Alberta. However, root rot was also caused by *Rhizoctonia solani* and *Pythium* spp. Sclerotinia blight was much less prevalent than in previous years (Chang et al. 2005 and 2006).

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Table 1. Frequency of fungi isolated from basal stem and root samples of lupin in Alberta in 2007.

Field Location	No. of roots sampled	% Isolation							
		***Fusarium* spp.**	***Sclerotinia sclerotiorum***	***Pythium* spp.**	***Rhizoctonia solani***	***Alternaria* spp.**	***Trichoderma* spp.**	***Rhizopus* spp.**	***Aspergillus* spp.**
Barrhead	91	89	11.0	36.3	16.5	29.7	22.0	6.6	2.2
Lacombe	38	100	0	50.0	5.3	2.6	5.3	13.2	0
Namao	65	100	6.2	15.4	1.5	30.8	1.5	23.1	0
Rowley	98	86.7	0	12.2	15.3	11.2	5.1	8.2	2.0
Three Hills	97	98.2	0	39.2	1.0	11.3	1.0	1.0	0
Viking	52	94.2	2.0	3.8	5.8	7.7	0	3.8	2.0
Total /Avg	441	94.7	3.2	33.1	7.2	15.1	5.6	11.3	1.0

CROP: Pea
LOCATION: Saskatchewan

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TITLE: SEED-BORNE PATHOGENS OF PEA IN SASKATCHEWAN IN 2007

METHODS: The results of agar plate tests conducted by four Saskatchewan companies on seed samples mainly from the 2007 crop were summarized. The tests were conducted to detect the pathogens causing ascochyta blights (*Mycosphaerella* [*Ascochyta*] *pinodes*, *A. pisi* and *Phoma medicaginis* var. *pinodella* = *A. pinodella*), botrytis blight (*Botrytis cinerea*) and sclerotinia stem and pod rot (*Sclerotinia sclerotiorum*). All samples were not tested for *Botrytis* and *Sclerotinia* but all were for the ascochyta blight pathogens. For *Ascochyta* mean % seed infection and % samples free of infection were calculated for each crop district [CD] in Saskatchewan (1). However, in contrast to some previous years (2) this was not done for *Botrytis* and *Sclerotinia* because low infection levels would make comparisons meaningless.

It is unknown which of the seed samples came from pea crops that had been treated with registered fungicides used as seed treatments or foliar protectants against one or more seed- or soil-borne diseases. Use of foliar fungicides on pea has been uncommon in Saskatchewan, except on seed crops, because of economic factors.

RESULTS AND COMMENTS: In Saskatchewan the 2007 growing season was marked for the second consecutive year by excellent conditions for timely spring seeding and good or excessive moisture conditions in most areas throughout June. In July and early August rainfall was generally below normal and high temperatures prevailed. Harvest started early in many areas and was completed under dry conditions. However, late-season rains delayed harvesting of some pea crops in CDs 6, 8 and 9 and provided additional opportunities for foliar pathogens to colonize pods and infect the seed. The overall mean yield per acre of pea crops in Saskatchewan was 3% higher than that in 2006 and 0.5% above the 10-year average (5).

Data on seed infection were compiled on samples tested between early September and mid-December 2006. By this time 472 samples had been tested by the five companies, about 38% more than reported by four companies for 2006 (4). The increase probably reflects the increase in provincial pea acreage of 20% in 2007, plus a more optimistic outlook for pea prices. While samples were received from every CD in Saskatchewan, the majority originated in the traditional pea growing areas of CDs 5-9.

Levels of seed-borne ascochyta in individual samples varied from 0% to 26.5% (in a sample from CD 8B) and mean levels for crop districts varied from 0 to 4.1% (Table 1). Some mean values for CDs were based on too few samples to be meaningful, but generally levels were lower in the south and central areas (CDs 1-7) than in the north (CDs 8-9). This pattern is similar to that observed in 2006 (4) and correlates with harvest dates, as reported above. The overall provincial mean level of infection of 1.5% was similar to 2006 (4) but considerably lower than in 2005 (3) and 2004 (2). The percentage of samples in which no *Ascochyta* was detected was 39% in contrast to 27% in 2006 and 17-19% in the two previous years. For the seventh consecutive year (4) *A. pisi* was more commonly isolated from samples from southern Saskatchewan than from central or northern areas, but overall, *A. pinodes* was by far the dominant species in seed.

As in previous years, *Botrytis* and *Sclerotinia* were detected in only a small percentage of seed samples and always at low levels. *Botrytis* was not a problem on pea crops in Saskatchewan in 2007. *Sclerotinia sclerotiorum* is not highly internally seed-borne in pea, even in crops where sclerotia contaminate the harvested seed.

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Table 1. Number of pea seed samples tested from September to mid-December, 2007 by five commercial companies, and levels of infection with *Ascochyta* in relation to Saskatchewan Crop Districts.

Crop District	No. of samples tested	Mean % infection	% samples with 0% infection
1A	8	0.7	50
1B	6	1.3	67
2A	7	0.7	71
2B	27	0.3	63
3AN	7	0.2	71
3AS	19	1.1	53
3BN	22	0.8	45
3BS	11	0.5	55
4A	5	0	100
4B	4	0.1	75
5A	17	1.7	41
5B	33	2.5	9
6A	30	1.1	37
6B	70	1.4	34
7A	21	0.3	76
7B	38	1.0	34
8A	29	2.3	34
8B	38	4.1	13
9A	39	2.3	31
9B	42	1.4	33
TOTAL	472	1.5	39

CROP: Field pea
LOCATION: Manitoba

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TITLE: FIELD PEA DISEASES IN MANITOBA IN 2007

METHODS: Field pea crops were surveyed for root and foliar diseases at 33 and 40 different locations in Manitoba, respectively. The crops surveyed were randomly chosen from regions in southwest and south-central Manitoba, where field pea is commonly grown. The survey for root diseases was conducted during the last week of June and the first two weeks of July when most plants were in full flower. Foliar diseases were assessed in the last week of July when the plants were at the round pod stage. A minimum of 30 plants (10 plants at 3 sites/field) was assessed for each field. Diseases were identified by symptoms. Root diseases were rated on a scale of 0 (no disease) to 9 (death of plant, the seedling could not emerge or died back quickly after emergence). Five to ten symptomatic roots were collected per field for isolation of fungi in the laboratory in order to confirm the visual disease identification. The severity of foliar diseases observed was estimated using a scale of 0 (no disease) to 9 (whole roots/plants severely diseased). Powdery mildew was rated as the percentage of leaf area infected.

RESULTS AND COMMENTS: Three root diseases were observed (Table 1). Fusarium root rot *(Fusarium solani* f. sp. *pisi and F. avenaceum*) was the most prevalent and was observed in 29 (88%) of fields surveyed. Prior to 2007, 88% and 67% of crops had symptoms of fusarium root rot in 2005 and 2006, respectively (McLaren et al. 2006; 2007). Fusarium wilt (*F. oxysporum*) and rhizoctonia root rot (*Rhizoctonia solani*) were detected in 20 and 5 fields, respectively. Severity means for all root diseases were higher in 2007 than 2006. In one field, 90% of the roots examined showed extensive necrosis and this would have had a significant impact on yield.

Four foliar diseases were observed (Table 2). Mycosphaerella blight (*Mycosphaerella pinodes*) was the most prevalent, as in 2006 (McLaren et al. 2007), and was present in all 40 fields surveyed. Sclerotinia stem rot (*Sclerotinia sclerotiorum*) was detected in 11 fields. The prevalence of sclerotinia-infested crops was 27.5%, higher than the 8% reported in 2006 (McLaren et al. 2007). Dry, warm environmental conditions prevailed in 2006 and sclerotinia was not commonly observed in pea fields. In 2007, conditions were more favourable for disease development, but severity was low. Powdery mildew (*Erysiphe pisi*) was observed in one field only. Low prevalence of powdery mildew can likely be attributed, in part, to the adoption of new cultivars by growers as all newly registered pea cultivars are required to have resistance to this disease. With fusarium wilt, the plants were mostly at early maturity at the time of rating, making it difficult to distinguish the symptoms. Foliar diseases, such as septoria blotch (*Septoria pisi*), downy mildew (*Peronospora viciae*) and bacterial blight (*Pseudomonas syringae* pv. *pisi*) were not observed in the surveyed fields. Anthracnose (*Colletotrichum pisi.*) was observed in two fields (Table 2).

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Table 1. Prevalence and severity of root diseases in 33 crops of field pea in Manitoba in 2007.

		Disease severity (0-9)[1]	
Disease	**No. crops affected**	**Mean**	**Range**
Fusarium root rot	29	2.7	0.1-7.2
Fusarium wilt	20	2.4	0.4-3.8
Rhizoctonia root rot	5	4.1	1.7-7.2

[1]All diseases were rated on a scale of 0 (no disease) to 9 (whole roots severely diseased).

Table 2. Prevalence and severity of foliar diseases in 40 crops of field pea in Manitoba in 2007.

		Disease severity (0-9)[1]	
Disease	**No. crops affected**	**Mean**	**Range**
Mycosphaerella blight	40	4.3	1.0-7.7
Sclerotinia stem rot	11	0.6	0.3-1.5
Powdery mildew	1	4.3	4.3
Anthracnose	2	0.5	0.3-0.7

[1]Powdery mildew was rated as the percentage of leaf area infected; other diseases were rated on a scale of 0 (no disease) to 9 (whole plant severely diseased).

CULTURES : Soya (*Glycine max*)
RÉGION : Québec

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TITRE : **DÉPISTAGE DE MALADIES VIRALES DANS LES CHAMPS DE SOYA DU QUÉBEC : BILAN 2003-2007**

INTRODUCTION ET MÉTHODOLOGIE : En 2002 avec l'avènement du puceron du soya (*Aphis glycines*) dans la culture du soya au Québec, une modeste enquête visant le dépistage de quatre virus avait révélé la présence de deux de ces virus (Michelutti et Rioux, 2003). L'enquête s'est poursuivie les saisons suivantes pour détecter la présence de ces mêmes virus : le virus de la mosaïque de la luzerne (AMV : *Alfalfa mosaic virus*), le virus de la marbrure des gousses du haricot (BPMV : *Bean pod mottle virus*), le virus de la mosaïque du soya (SMV : *Soybean mosaic virus*) et le virus de la nécrose annulaire du tabac (TRSV : *Tobacco ringspot virus*). Le AMV et le SMV se conservent dans les graines et peuvent être transmis d'une plante à l'autre par les pucerons (Hill et al. 2001); le BPMV est surtout transmis par la chrysomèle du haricot (*Cerotoma trifurcata*), alors que le TRSV est un virus presqu'essentiellement transmis par la semence (Hartman et al. 1999).

Grâce à la collaboration des équipes de différentes institutions qui étaient dédiées au dépistage du puceron du soya, plus d'une quarantaine de champs ont pu être échantillonnés à chaque année. Les champs étaient répartis dans neuf régions de production de soya du Québec. Le dépistage des quatre virus a couvert 61 champs en 2003, 42 champs en 2004, 58 champs en 2005 et 93 champs en 2006. En 2007, étant donné la réduction des ressources, seul le SMV a fait l'objet d'un suivi dans 77 champs. Le SMV qui cause des taches (marbrures) brun foncé sur les fèves rend les lots ayant de tels symptômes invendables sur les marchés d'exportation. Le SMV est, par conséquent, un virus menaçant pour la production de soya du Québec dont la moitié est dirigée vers l'exportation.

En 2003 et 2007, un seul échantillonnage a été effectué à la fin du mois d'août, alors qu'en 2004, 2005 et 2006, deux échantillonnages étaient réalisés : un à la fin juillet et l'autre à la fin août. Pour chaque champ visité, la plus jeune feuille trifoliée a été prélevée sur 30 plantes réparties à six emplacements différents dans le champ. L'échantillon d'un champ était donc constitué de 30 feuilles de soya. Pour chaque champ un test sérologique en DAS-ELISA (Double Antibody Sandwich- Enzyme-Linked Immunosorbent Assay) (Agdia, Inc. antibodies) a été effectué sur le broyat des jeunes feuilles pour détecter la présence des virus.

RÉSULTATS et COMMENTAIRES : Le sommaire des résultats par année est présenté au tableau 1. Le SMV a été détecté dans le plus grand nombre de champs, soit 28, suivi du TRSV détecté dans 14 champs. Viennent par la suite, le AMV présent dans 7 champs et le BPMV dans 3 champs. L'année 2004 a été l'année où la fréquence de champs détectés positifs a été la plus élevée, notamment pour le SMV et aussi pour le TRSV, alors qu'en 2005 aucun virus n'a été détecté. En 2004, les populations du puceron du soya ont été élevées au Québec (Brodeur et Roy 2007), ce qui peut expliquer la plus forte fréquence de champs dans lesquels le SMV a été détecté. Par contre en 2007, aussi une année de fortes infestations du puceron du soya (Brodeur et Roy 2007), aucun champ n'a révélé la présence du SMV.

L'absence de source locale de SMV peut être une explication à ce résultat étant donné la non-persistance du SMV dans le puceron. Il semble qu'au cours des dernières années, les entreprises semencières se sont efforcées de retirer du marché les lots de semences présentant les symptômes de tégument marbré caractéristiques de la présence du SMV ou du BPMV, afin d'éliminer ou, à tout le moins, de réduire la source primaire de SMV que constitue la semence infectée (John Hill, communication personnelle). Nous espérons poursuivre le dépistage du SMV pendant encore quelques années.

REMERCIEMENTS : Nous remercions le Fonds québécois sur la nature et les technologies (FQRNT), La Stratégie Phytosanitaire du MAPAQ et la Fédération des producteurs de cultures commerciales du Québec (FPCCQ) pour leur contribution financière. Nos remerciements vont aussi aux responsables du dépistage du puceron du soya dans les différentes régions du Québec et à leur équipe pour le prélèvement et l'envoi d'échantillons à nos laboratoires.

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Tableau 1. Détection de virus dans les champs de soya du Québec de 2002 à 2006

Année	Nb. champs à l'étude	Virus détecté (nb. champs)			
		AMV	BPMV	SMV	TRSV
2003	61	3	1	9	2
2004	42	2	2	19	9
2005	58	0	0	0	0
2006	93	2	0	0	3
2007	77	n.d.	n.d.	0	n.d.
Total :	331	7	3	28	14

n.d. = non déterminé.

CROP: Sunflower
LOCATION: Manitoba

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TITLE: DISEASES OF SUNFLOWER IN MANITOBA IN 2007

METHODS: A total of 68 sunflower crops were surveyed in 2007 in Manitoba. Sixty four percent were confectionery hybrids and 36% were oilseed hybrids, showing a significant increase in the oilseed acreage over the past few years (1, 2). Twenty six crops were surveyed in the third week of July primarily for downy mildew, nine crops in the second week of August, 14 crops in the third week of August, and 19 crops in the second week of September. Crops were surveyed along pre-planned routes in the major areas of sunflower production. Each crop was sampled by two persons walking ~100 m in opposite directions in the field following an "M" pattern. Diseases were identified by symptoms and the percent incidences of downy mildew (*Plasmopara halstedii*), sclerotinia wilt or head and stem infections (*Sclerotinia sclerotiorum*), rhizopus head rot (*Rhizopus* spp.), and verticillium wilt (*Verticillium dahliae*) were estimated. Disease severity for rust (*Puccinia helianthi*), leaf spots (*Septoria helianthi* and *Alternaria* spp.), powdery mildew (*Erysiphe cichoracearum*) and stem diseases (*Phoma* spp. *& Phomopsis* spp.) were estimated as percent leaf or stem area infected. A disease index was calculated for each disease in every crop based on disease incidence or disease severity (Table 1). Stand establishment, vigour, and maturity were rated on a scale of 1 to 5 (I = very good/early, and 5 = very poor/very late).

In addition, seven samples of sunflower plants were submitted for analysis to the Crop Diagnostic Centre of Manitoba Agriculture, Food and Rural Initiatives by agricultural representatives and growers.

RESULTS AND COMMENTS: Ninety four percent of the sunflower crops surveyed in 2007 had excellent to good stands while the rest had fair to poor stands. Seventy one percent of the crops were maturing early, and only 3% were maturing late. Eighty percent of the crops had good to excellent vigour, and only 4% had poor vigour (Table 1). The 2007 growing season started early with abundant moisture and good growing conditions which favour early infection by downy mildew. Dry and above normal temperature conditions in July, August, and September were ideal for sunflower growth but not for most diseases such as sclerotinia head rot. Trace infestations with aphids and sunflower beetle (*Zygogramma exclamationis*) were observed in 10% of the crops. However, damage was low in comparison to previous years (1, 2, 3). Low infestations off grasshoppers were observed in a few crops. Infestations with stem and bud borers were very common and more prevalent than in previous years (1, 2, 3), causing some damage and reduction in yield.

Sclerotinia wilt was present in 46% of the crops surveyed, with incidence ranging from trace to 5% (Table 1). Sclerotinia head rot and mid-stem infection, both caused by ascospore infections, were present in only 9% of crops surveyed with incidence ranging from trace to 5%. The prevalence and incidence of head rot were the lowest observed in recent years (1, 2, 3) probably due to the hot and dry conditions in July and August being unfavourable for ascospore production.

Rust was present in 57% of the crops surveyed, with severity ranging from trace to 30% leaf area affected (Table 1). Although rust infections started early, the incidence and severity were similar to those in 2006 but lower than in previous years probably due to the hot dry conditions in July-September (1, 2, 3). Verticillium wilt was present in 50% of the crops surveyed, with incidence ranging from trace to 20% (Table 1). Incidence was lower in 2007 than in previous years, due perhaps to the increased acreage of oilseed sunflower hybrids which are more resistant to verticillium wilt than confection hybrids (1, 2, 3).

Downy mildew was observed in 81% of crops with incidence from trace to 20% infected plants (Table 1). The prevalence and incidence of downy mildew in 2007 were higher than in 2006 but similar to previous years (1, 2, 3) due perhaps to the abundance of soil moisture at the seedling stage.

Traces to 5% leaf area infected by *Septoria helianthi* and *Alternaria* spp. were observed in 9% of the crops surveyed (Table 1). These are lower severity and prevalence values than in previous years (1,2, 3). Stem lesions caused by *Phoma* and *Phomopsis* were present in a few crops with trace to 5% stem area affected. Traces to 5% leaf area affected by powdery mildew were observed in a few crops.

Of the seven samples submitted to the Crop Diagnostic Centre, one was identified with rust, two with root rot caused by *Fusarium* spp., and four with chemical injury.

ACKNOWLEDGMENTS: The assistance of T. Walske and M. Penner is gratefully acknowledged.

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Table 1. Prevalence and intensity of diseases in 68 crops of sunflower in Manitoba in 2007.

Disease	Crops Affected		Disease Index[1]	
	No. of crops	% of crops	Mean	Range
Sclerotinia wilt	31	46%	0.8	T – 1
Sclerotinia head rot/stem rot	6	9%	0.9	T – 1
Verticillium wilt	34	50%	1.2	T – 3
Downy mildew	55	81%	1.3	T – 3
Rust	39	57%	1.5	T – 4
Leaf spots (Septoria & Alternaria)	6	9%	0.5	T – 1
Lateness[2]	2	3%	2.0	1 – 3
Poor stand	4	6%	1.6	1 – 2
Poor vigour	3	4%	2.0	1 – 3

[1] Disease index on a scale of T to 5: Trace (T) = < 1%, 1= 1-5%, 2= 5-20%, 3= 20-40%, 4= 40-60%, and 5= > 60% disease levels. Index is for disease incidence with downy mildew, verticillium wilt and sclerotinia; and for disease severity measured as percent leaf and stem area affected with rust and leaf spots.

[2] Indexes for lateness, stand, and vigour are based on a 1-5 scale (1= early/very good and 5= very late/very poor).

Vegetables / Légumes

CROP: Cruciferous vegetables
LOCATION: Central Alberta

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TITLE: INCIDENCE OF CLUBROOT ON CRUCIFEROUS VEGETABLES IN ALBERTA IN 2007

METHODS: Ten commercial vegetable farms and market gardens in Alberta were surveyed for symptoms of clubroot caused by *Plasmodiophora brassicae* Woronin in 2007. Eight of the ten farms/gardens were located near Edmonton with one farm near Lethbridge and one near Medicine Hat (Fig. 1). The ten farms/gardens contained a total of 114 different vegetable plots at 14 different field sites. Two vegetable farms at locations 1-2 (54 plots) were sampled on August 17. Five market gardens at locations 3-7(24 plots) were sampled on August 18. The vegetable farms at location 8 (18 plots) was sampled on September 17, at location 10 (6 plots) on September 19 and at location 9 (12 plots) on October 19. Ten types of cruciferous vegetables were examined across the 114 plots. These included: bok choy [*Brassica rapa* L. subsp. *chinensis* (Lour.) Hanelt]; broccoli [*Brassica oleracea* L. var. *italica* Plenck]; Brussels sprouts [*Brassica oleracea* L. var. *gemmifera* DC.]; cabbage, white, red and savoy [*Brassica oleracea* L. var. *capitata* L.]; cauliflower [*Brassica oleracea* L. var. *botrytis* L.]; kale [*Brassica oleracea* L. var. *acephala* DC.], kohlrabi [*Brassica oleracea* L. var. *gongylodes L.*] and su choy [*Brassica rapa* L. subsp. *pekinensis* (Lour.) Hanelt. Conspicuous galls or tumors visible on root tissues were assumed to be positive signs of the disease. Three random sampling sites were chosen in small plots (< ¼ ha) and five random samplings sites were chosen in larger plots (> ¼ ha). The sample sites were selected along a diagonal transect within each plot. Five plants were dug up and examined at each sampling site for a total of 15 plants per small plot or 25 for plots larger than ¼ ha.

RESULTS AND COMMENTS: All of the vegetable crops surveyed were mature or nearing maturity, with some already harvested. The most commonly encountered vegetable was cabbage, which was sampled at all ten farms/gardens. Broccoli, cauliflower, kohlrabi, bok choy, su choy and Brussels sprouts were sampled at six, six, four, one, one and one of the ten farms/gardens respectively. Clubroot symptoms were observed in green cabbage, kale, su choy and cauliflower. The prevalence of clubroot in green cabbage was extremely low as it was found in only a single plot at one sampling site at location #1 in Edmonton. Although the infestation was highly localized to an area of approximately $10m^2$, the plot of cabbage had a disease incidence of 20%. The infected plants showed high disease severity with large root galls (Fig. 2) and above-ground symptoms such as stunting, yellowing and wilting. A complete yield loss was predicted for the$10m^2$ infested area.

The only other location where clubroot was confirmed was #10 where it has been confirmed each year since 2004. Symptoms in 2007 at location 10 were seen on kale, su choy and cauliflower. Over the past five years, clubroot (pathotype 5) infection has been observed in crops such as canola in 2003, 2004, and 2005 (4,6,7) and mixed cruciferous vegetables in 2004, 2005, and 2006 (1,2,3) in the Edmonton area. The disease has been reported sporadically on vegetables at only two locations in each of the past four years (Fig. 1; locations 1 and 10).

The absence of disease outbreaks at new locations may indicate that clubroot has not been rapidly moving between fields where cruciferous vegetables are grown. In fact, the clubroot infestation at Location #1 described in this report occurred in the same field where a single clubbed root was found in 2005 (no cole crops were planted in that field in 2006). In 2005 it was reported that only one gall on one cabbage root was found at sampling site five of Location #1 whereas in 2007 there was still only a 10 m^2 infested area. Therefore either the disease is spreading very slowly, or the environment in 2007 was more conducive to disease development and spread compared with 2005. It is also of interest to note that the clubroot infestation at location #1 occurred adjacent to two clubroot-infested canola fields on the north and west sides (V. Manolii, personal communication). The results of clubroot disease surveys in canola fields are presented in a separate report (5).

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ACKNOWLEDGEMENTS: We are grateful to the growers who allowed us to survey their fields for clubroot and to the Alberta Farm Fresh Producers Association and the Agriculture Funding Consortium for their financial support of this work.

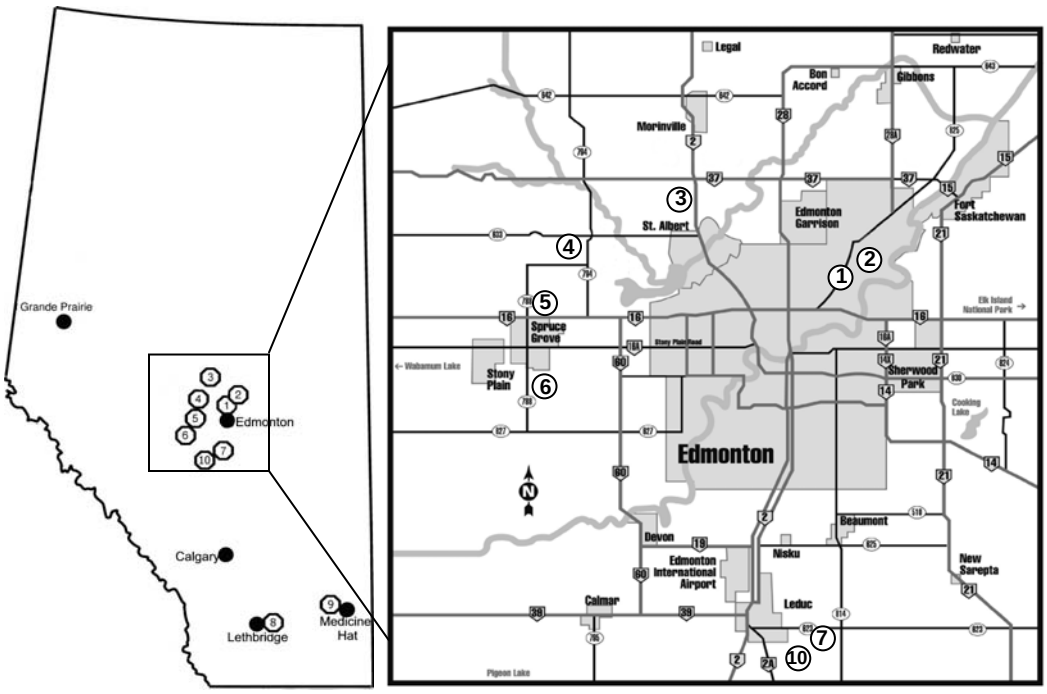

Figure 1. Locations of ten cruciferous vegetable farms and market gardens surveyed for clubroot in Alberta in 2007.

Figure 2. Clubroot galls on cabbage roots collected near Edmonton, Alberta in 2007.

Forest Trees / Arbres Forestiers

CROP: Elm
LOCATION: Alberta

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TITLE: INCIDENCE OF ELM WILT PATHOGENS IN ALBERTA IN 2007

METHODS: Annual surveys to detect symptoms of Dutch elm disease (DED) are conducted throughout Edmonton by members of the City of Edmonton Pest Management Lab, as well as by communities throughout Alberta. In 2007, samples of elm shoots with wilted or discolored leaves (which may be caused by a number of fungi) were sent to the University of Alberta Plant Pathology Lab for identification. The three most diseased twigs (based on degree of vascular staining) received from an individual tree were selected for further processing. Three 1 cm^3 pieces were cut from each twig (generating 9 test pieces per tree), surface sterilized, and plated onto potato dextrose agar (PDA) containing streptomycin sulfate (0.2 g/L), at a density of three pieces per Petri dish. The samples were incubated at room temperature in darkness for 3 weeks, and then examined microscopically to confirm identification.

RESULTS AND COMMENTS: A total of 57 samples, each representing one elm tree, were received by the Plant Pathology Lab. Fifty three samples came from Edmonton, three from Medicine Hat and one from Lethbridge. Fungi were isolated from all samples received, but no *Ophiostoma* was found. Some trees had multiple infections and a total of 10 different fungal genera were identified in the Edmonton samples. As in previous years (2, J.P. Tewari, personal communication), the majority of trees from Edmonton (96%) were infected with *Dothiorella ulmi*. Seven genera of fungi were isolated from the four samples received from Medicine Hat and Lethbridge. Unidentified species of Moniliales were identified in two trees, but all other fungi were found only in single samples. *Dothiorella ulmi* was not recovered outside of Edmonton. The fungi isolated from the Edmonton and provincial samples are summarized in Tables 1 and 2, respectively.

Based on the samples tested by the Plant Pathology Lab, Edmonton appears to be DED-free in 2007. However, as only four samples were received from other parts of Alberta, it is difficult to make general statements regarding DED in the rest of the province. The predominant elm pathogen in Edmonton, *D. ulmi*, causes Dothiorella wilt which is associated with a die-back of shoots and branches but does not kill the trees outright. As in 2006 (1), *Cytospora* was the second most common fungus identified in the Edmonton samples, and was always found in association with *D. ulmi*. Rather than being the primary cause of death, *Cytospora* has been suggested to be a colonizer of recently killed stem tissue (1). A variety of fungi were identified in the samples from Medicine Hat and Peace River, most of which were also secondary invaders or incidentals. The inclusion of an antibiotic in the PDA precluded the detection of bacterial pathogens.

ACKNOWLEDGEMENTS: We would like to thank Mark Wartenbe and Mike Jenkins (City of Edmonton Pest Management Lab) and other pest management staff in Edmonton and throughout the province for supplying elm samples.

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Table 1. Fungi isolated from elm samples from Edmonton, Alberta.

Fungus	Number of Trees Infected*
Dothiorella ulmi	51
Cytospora spp.	6
Phyllosticta-like spp.	5
Pencillium spp.	3
Aureobasidium spp.	3
Coniothyrium spp.	2
Cladosporium spp.	1
Alternaria alternata	1
Unidentified species of Moniliales	1
Botrytis spp.	1

*A total of 53 samples, each representing one elm tree, were received. Some trees had multiple infections.

Table 2. Fungi isolated from elm samples received from Medicine Hat and Lethbridge, Alberta.

Fungus	Number of Trees Infected*
Unidentified species of Moniliales	2
Cytospora spp.	1
Phyllosticta-like spp.	1
Verticillium dahliae	1
Fusarium spp.	1
Alternaria alternata	1
Aureobasidium pullulans	1

*A total of 4 samples, each representing one elm tree, were received. Three trees had multiple infections.

CROP: Butternut
LOCATION: New Brunswick

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TITLE: FURTHER EXPANSION OF KNOWN DISTRIBUTION OF BUTTERNUT CANKER (*SIROCOCCUS CLAVIGIGNENTI-JUGLANDACEARUM*) IN NEW BRUNSWICK - 2007

INTRODUCTION: As discussed previously (2), butternut (*Juglans cinerea* L.) reaches the northeastern limit of its natural distribution in New Brunswick. The tree occurs as scattered individuals or in small groups in mixed hardwood stands on alluvial soils and higher ground along the Saint John and Miramichi River watersheds. Planted specimens of butternut do occur at other locations in New Brunswick and in the neighbouring provinces of Nova Scotia and Prince Edward Island.

Butternut is now legally recognized as “endangered” under Schedule 1 of the Canadian Species at Risk Act (1). Butternut canker (*Sirococcus clavigignenti-juglandacearum* Nair, Kostichka & Kuntz) is a fungal disease that is causing extensive mortality throughout the native range of the tree in eastern North America. This disease is the sole reason why butternut is listed as “endangered”.

Butternut canker is now widespread, and tree mortality is common throughout both Ontario and Quebec. Butternut trees are widely scattered and difficult to find in New Brunswick because they make up a small proportion of the forest cover. In Canada, New Brunswick remains the only province where the disease has not yet expanded to infect butternut throughout the host’s entire natural range.

Construction of the Mactaquac Hydroelectric Dam on the Saint John River began in 1965. When it became operational in 1968, the dam had raised the water level in the Saint John River by about 40 m at Mactaquac and created the 100-km-long Mactaquac Lake, which currently extends upriver beyond Woodstock in Carleton County. This lake submerged many stands of butternut that had existed on the alluvial soils along the former banks of the Saint John River above the dam.

METHODS, RESULTS AND COMMENTS: Butternut trees were assessed from the ground by inspecting the stems, root flares and lower branches for the characteristic elliptical, oozing, black cankers. Branch samples were taken from dead or dying branches in the lower crown of suspect trees, using pole pruners or long-handled pruners. All sampling tools were sterilized with 70% ethanol between trees and locations in the field. In the laboratory, the branch samples were examined under the microscope for fruiting bodies of the butternut canker fungus. We found mature fruiting bodies of the fungus on some of the dead twig tips of recently dead or dying branches. Branches with suspect cankers, but without fruiting bodies, were cultured in an attempt to isolate the fungus. Many of the older dead branches from the lower crown of most trees had the prominent, distinctive fruiting bodies of the common secondary fungus, *Melanconis juglandis* (Ellis & Everhart) Graves (3). This *Melanconis* sp. fruited readily in culture.

In 2007, the surveyed areas were primarily located below the Mactaquac Hydroelectric Dam on the Saint John River watershed and along the river’s tributaries in York, Sunbury and Queens Counties. The trees assessed ranged from scattered individuals in natural forest stands to butternut trees in hedgerows between agricultural fields to scattered trees in urban areas along walking trails. Of the 18 locations assessed in York County, two were located above the Mactaquac Dam on Mactaquac Lake, with the remaining 16 locations extending downstream through the City of Fredericton. Six locations were assessed in Sunbury County below Fredericton.

Butternut canker was found at Lower Line Queensbury, Upper Shores Island, Sugar Island, Savage Island and Hartts Island, York County (Table 1). These represent a significant southerly expansion of the

known distribution of butternut canker in New Brunswick. The nearest New Brunswick finds in 1997 and 2004 were located about 60 km northwest, near Woodstock, Carleton County.

Table 1 lists positive locations by geographical place name with their Universal Transverse Mercator (UTM) grid references and the year when butternut canker was first found. Map 1 shows the natural distribution of butternut, the previously known distribution of butternut canker in New Brunswick and the most recent finds of the disease.

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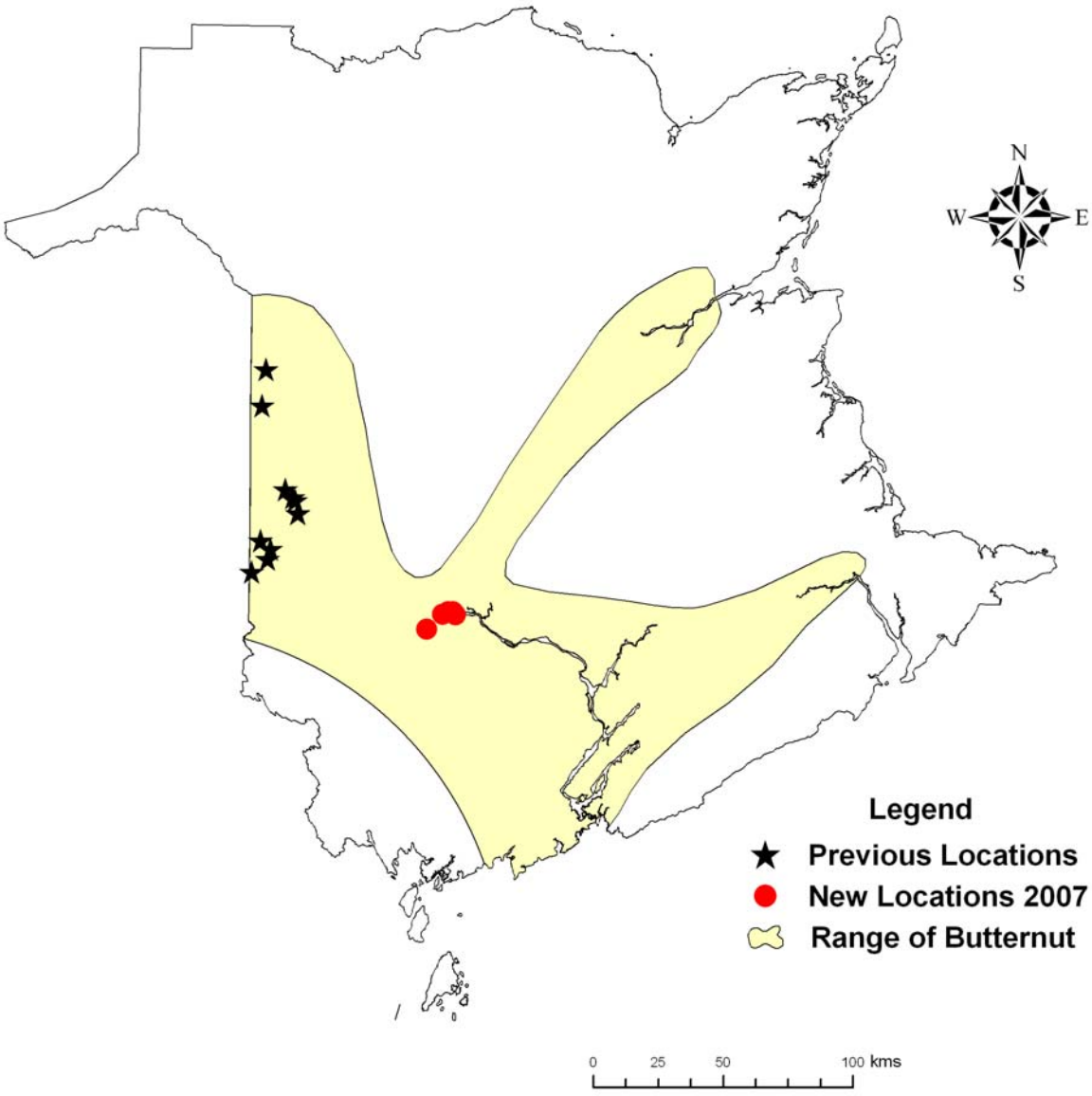
Table 1: List of New Brunswick locations found to be positive for butternut canker.

Location	UTM Grid *	Year Found
Carleton County		
Riverbank	19-607-5139	1997
Stickney	19-610-5136	1997
Peel	19-611-5135	1997
Upper Brighton	19-612-5130	1997
Jackson Falls	19-598-5119	1997
Simonds	19-612-5130	2004
Meduxnekeag Valley Nature Preserve	19-602-5116	2004
Near Plymouth	19-601-5112	2004
Irish Settlement	19-595-5107	2004
Victoria County		
Aroostook	19-598-5185	2004
North of Bairdsville	19-597-5171	2004
York County		
Lower Line Queensbury	19-663-5087	2007
Upper Shores Island	19-669-5093	2007
Sugar Island	19-671-5094	2007
Savage Island	19-673-5094	2007
Hartts Island	19-674-5093	2007

* UTM - Universal Transverse Mercator grid, North American Datum 83

Map 1: Distribution of Butternut Canker in New Brunswick - 2007



Knowledge Synthesis Group - CFS Atlantic

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LIST OF FIGURES