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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 for publication of plant disease surveys which benefit both federal and provincial agencies in planning appropriate research for the control of plant diseases. The reports you contribute are important to document plant pathology in Canada.

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Contents: DISEASE HIGHLIGHTS OF THE 1997 GROWING SEASON

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

Authors who have traditionally published scientific notes in the *Canadian Plant Disease Survey* are encouraged to submit this material in the future to the scientific journal of their choice, such as the *Canadian Journal of Plant Pathology* and *Phytoprotection.*

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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.

On encourage les auteurs, qui traditionnellement publiaient des articles scientifiques dans l'Inventaire des maladies des plantes au Canada, à soumettre dorénavant leurs textes au journal scientifique de leur choix, par exemple, la *Revue canadienne de phytopathologie* et *Phytoprotection.*

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Diagnostic Laboratories / Labatoires diagnostiques

CROP: Commercial crops - Diagnostic Laboratory Report

LOCATION: British Columbia

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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS IN BRITISH COLUMBIA, 1997

METHODS: The B.C.M.A.F. Plant Diagnostic Laboratory provides diagnosis and control recommendations for diseases and disorders of commercial agricultural crops. The following data reflects samples submitted to the laboratory by ministry extension staff, growers, agribusiness, parks, and Master Gardeners. Diagnoses were accomplished by microscope examination, culturing onto artificial media, ELISA, BIOLOG® and Dot Blot Assay. A few specimens were also identified using PCR technique (canola survey) and electron microscope examination. Some specimens were referred to other laboratories for identification or confirmation of the diagnosis.

RESULTS AND COMMENTS: Summaries of the diseases and/or causal agents diagnosed on commercial crops are presented in Tables 1-9 by crop category. The total number of submissions for each crop category is listed at the bottom of each table. Problems not listed include: nutritional stress; pH imbalance; water stress; poor sample; physiological responses to growing conditions; environmental and chemical damage; insect related injury; and damage where no conclusive disease-causing organism was identified.

Table 1. Summary of diseases diagnosed on **greenhouse vegetable** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Cucumber	*Pythium* sp. crown and root rot	3
	Pythium aphanidermatum root rot	3
	Fusarium oxysporum f.sp. *cucurbitacearum* wilt	1
	Fusarium oxysporum wilt & stem rot	2
	Botrytis cinerea stem canker	1
	Sclerotinia sclerotiorum stem rot	1
	Penicillium oxalicum stem rot	1
Lettuce	*Pythium* sp. root rot	1
Pepper	*Erwinia carotovora* bacterial soft rot	1
	Botrytis cinerea stem rot	2
	PMMV leaf and fruit mottling	2
	Fusarium solani fruit rot	1
	Chromelosporium fulvum brown mold	1
	Nectria haematococca stem and fruit rot	1
Tomato	*Pythium* spp. root rot	8
	Erwinia carotovora bacterial soft rot	2
	Botrytis cinerea fruit rot	1
	Pseudomonas corrugata pith necrosis*	1
	Didymella lycopersici leaf spot*	1
	Fusarium oxysporum f. sp. *radicis-lycopersici* (**cv. Trust**)crown and root rot	1
	Phytophthora infestans late blight (not confirmed)	1
TOTAL DISEASES		36
TOTAL SUBMISSIONS		73

* on fresh-market plants in the greenhouse.

Table 2. Summary of diseases diagnosed on **floriculture** (including herbaceous perennial) samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Acanitum sp.	Pythium/Phytophthora crown and root rot	1
Alcea sp.	*Colletotrichum malvarum* anthracnose	1
	Sclerotinia sclerotiorum stem rot	1
	Puccinia malvacearum rust	1
Antirrhinum majus	*Peronospora antirrhini* downy mildew	2
Aster	Pythium/Phytophthora crown and root rot	1
Astilbe	*Rhizoctonia solani* crown and stem blight	1
Begonia	*Rhizoctonia solani* foliar blight	1
Calibracoa	*Thielaviopsis basicola* black root rot	1
Clematis	*Ascochyta aquilegiae* stem rot	1
Cyclamen	*Botrytis cinerea* foliar blight	1
	INSV	1
Cymbidium sp.	Pythium/Phytophthora root rot	1
Dahlia	*Rhizoctonia solani* foliar blight	1
Euphorbia pulcherrima	Pythium/Phytophthora crown and root rot	4
	Rhizoctonia solani crown & root rot	4
	Botrytis cinerea foliar blight & stem canker	4
	Thielaviopsis basicola black root rot	1
Freesia	*Botrytis* sp. stem canker	1
Fuchsia	*Pucciniastrum* sp. rust	1
	Rhizoctonia sp. wirestem	1
Gerbera jamesonii	*Phytophthora & Thielaviopsis* spp. root rot	2
Gerbera	Pythium/Phytophthora crown & root rot	1
Iberis sp.	*Colletotrichum malvarum* anthracnose	1
Impatiens	INSV	2
	Rhizoctonia solani foliar blight	1
Iris	*Botrytis cinerea* bulb rot	1
	Rhizoctonia solani crown rot	1
	Erwinia carotovora bacterial soft rot	1
	Cladosporium iridis leaf spot	1
Ixora sp.	*Pythium* sp. root rot	1
Lilium sp.	*Botrytis* sp. foliar blight	1
	Pythium/Phytophthora root and bulb rot	1
Limonium sp.	*Botrytis cinerea* foliar blight	1
	Pythium sp. root rot	1
Lobelia	Pythium/Phytophthora crown & root rot	1
Lupinus sp.	*Glomerella cingulata* leaf & stem spot	1
	Pythium & Fusarium spp. crown & root rot	1
Mentha sp.	*Puccinia menthae* rust	1
Nierembergia	*Fusarium* & *Pythium* spp. damping off	1
Nymphaea sp.	Pythium/Phytophthora crown & root rot	1
Paeonia x hortorum	*Botrytis paeoniae* early blight	1

cont'd....

Table 2. Summary of diseases diagnosed on **floriculture** (including herbaceous perennial) samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997. Cont'd ...

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Pelargonium x *hortorum*	*Xanthomonas campestris* pv. *pelargonii* bacterial blight	35
	Pythium sp. root rot	4
P. peltatum	*Xanthomonas campestris pv. pelargonii* bacterial blight	2
Petunia x *hybrida*	*Thielaviopsis basicola* black root rot	1
Phalaenopsis	Pythium/Phytophthora root rot	4
	Myxomycete slime mold	1
	Botrytis cinerea leaf spot	1
	Rhizoctonia sp. root rot	1
	Cymbidium Mosiac Virus (CMV) leaf spot and mottling	1
Primula	Pythium/Phytophthora root rot	1
	Thielaviopsis basicola black root rot	1
	Ramularia primulae leaf spot	1
Ranunculus	INSV	1
Rosa sp.	Pythium/Phytophthora root rot	1
Schlumbergera sp.	*Erwinia carotovora* bacterial soft rot	1
Tagetes erecta	*Alternaria* sp. foliar blight	1
Veronica sp.	*Peronospora* sp. downy mildew	1
	Septoria sp. leaf spot	1
Viola sp.	*Pythium* sp. root rot	2
	Thielaviopsis basicola root rot	2
	Botrytis cinerea foliar blight	1
	Ramularia sp. leaf spot	
Zantedeschia sp.	Pythium/Phytophthora root rot	1
TOTAL DISEASES		120
TOTAL SUBMISSIONS		207

Table 3. Summary of diseases diagnosed on **small fruit** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Blackberry	*Botrytis cinerea* fruit rot	1
Blueberry	*Botrytis cinerea* fruit rot	2
	Colletotrichum gloeosporioides fruit anthracnose	1
	Phomopsis vaccinii stem canker	4
	Godronia cassandrae stem canker	13
	Monilinia vaccinii-corymbosi mummy berry	5
	Pseudomonas syringae bacterial blight	41
	Phytophthora spp. crown and root rot	3
	Agrobacterium tumefasciens crown gall	2
Cranberry	*Phomopsis vaccinii* upright dieback	3
	Godronia cassandrae twig blight	1
	Exobasidium rostrupii red leaf spot	2
	Allantophomopsis sp. black tip rot	2
Gooseberry	*Drepanopeziza* sp. anthracnose	1
	Phytophthora sp. crown & root rot	1
Raspberry	*Didymella applanata* spur blight	4
	Leptosphaeria coniothyrium cane blight	2
	Elsinoe veneta anthracnose	1
	Phytophthora fragariae crown & root rot	16
	Phytophthora sp. root rot	7
	Phragmidium sp. rust	1
	Agrobacterium tumefasciens crown gall	1
Strawberry	*Phytophthora* sp. crown & root rot	4
	Mycosphaerella fragariae leaf spot	3
	Phytophthora fragariae red stele	1
	Diachea leucopodia slime mold	1
TOTAL DISEASES		123
TOTAL SUBMISSIONS		207

Table 4. Summary of diseases diagnosed on **specialty and minor crop** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Arugula	*Colletotrichum higginsianum* anthracnose	1
Basil	*Pythium* sp. crown & root rot	1
	Colletotrichum gloeosporioides anthracnose	1
Chickpea	*Ascochyta rabiei* leaf spot and foliar blight	1
Chinese spinach	*Pythium* sp. root rot	1
Ginseng	*Alternaria panax* leaf & stem blight	11
	Cylindrocarpon destructans rusty root lesions	5
	Pythium/Phytophthora root rot	9
	Phytophthora cactorum foliar blight	6
	Botrytis cinerea leaf spot and foliar blight	11
Mizuna	*Colletotrichum higginsianum* anthracnose	1
Parsley	*Septoria petroselini* leaf spot	1
Rosemary	*Sphaerotheca* sp. powdery mildew	1
Tatsol	*Colletotrichum higginsianum* anthracnose/leaf spot	1
Specialty horseradish	*Albugo candida* white rust	1
	Rhizoctonia sp. root rot	2
	Phoma lingam leaf spot	2
TOTAL DISEASES		56
TOTAL SUBMISSIONS		89

Table 5. Summary of diseases diagnosed on **tree fruit** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Apple	*Venturia inaequalis* scab	1
	Nectria galligena European canker	4
	Cytospora sp. (Valsa) canker	5
	Phytophthora sp. crown & root rot	5
	Cylindrocarpon didymum twig canker	1
	Phoma sp. leaf spot	3
	Agrobacterium rhizogenes crown gall	2
	Agrobacterium sp. crown gall	*4*
	Botrytis sp. fruit rot	*1*
	Nectria cinnabarina twig blight	1
Gala/Fuji/Johnagold	*Erwinia amylovora* fireblight	8
Ottawa 3 rootstock	*Erwinia amylovora* fireblight	1
M9 rootstock	*Erwinia amylovora* fireblight	1
Apricot	*Alternaria alternata* fruit rot	2
	Pseudomonas syringae bacterial blight	2
	Phytophthora sp. root rot	1
Cherry	*Monilinia* sp. brown rot	4
	Phomopsis sp. canker	1
	Pseudomonas syringae bacterial blight	6
	Phytophthora sp. crown and root rot	2
	Agrobacterium tumefasciens crown gall	1
	Coryneum sp. coryneum blight	1
	Thielaviopsis sp. fine root necrosis	1
Sour Cherry	*Coccomyces* sp. leaf spot	1
Peach	*Coryneum beyerinckii* blight	1
	Alternaria alternata twig blight & fruit rot	2
Pear	*Valsa* sp. canker	1
	Nectria galligena European canker	1
TOTAL DISEASES		64
TOTAL SUBMISSIONS		115

Table 6. Summary of diseases diagnosed on **field vegetable** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Asparagus	*Fusarium oxysporum* f. sp. *asparagi* crown rot	1
Beet	*Cercospora beticola* leaf spot	1
Broccoli	*Rhizoctonia* sp. wirestem	1
Brussels sprout	*Mycosphaerella brassicicola* ring spot	1
Carrot	*Pythium* sp. lateral root die back	1
Celery	*Phoma apiicola* crown rot	1
Cucumber	*Pseudomonas syringae* leaf spot	1
Eggplant	*Alternaria* sp. leaf spot	1
Garlic	*Rhizopus* sp. mushy neck rot	1
Lettuce	*Bremia lactucae* downy mildew	2
	Microdochium panattonianum anthracnose	2
	Sclerotinia sclerotiorum lettuce drop	1
Melon	*Alternaria* sp.leaf spot & fruit rot	1
Muskmelon	*Alternaria* sp. leaf spot	1
Onion	*Botrytis aclada* leaf spot	3
	Sclerotium cepivorum white rot	1
	Erwinia carotovora bacterial soft rot	1
Pea	Aphanomyces/Pythium root rot	1
Pepper	*Rhizoctonia solani* wirestem	1
	Fusarium sp. crown rot	1
	Xanthomonas campestris pv. *vesicatoria* bacterial spot	1
Potato	*Phytophthora infestans* late blight	5
	Fusarium sp. dry rot	2
	Sclerotinia sclerotiorum white mold	1
	Alternaria solani early blight	2
	Spongospora subterranea powdery scab	1
	Erwinia carotovora bacterial soft rot	3
	Pythium sp. leak	1
Rutabaga	*Pseudomonas fluorescens & P.viridiflava* head rot	1
Spinach	*Pythium* sp. root rot	1
Squash	*Pythium* sp. root rot	1
Tomato	*Phytophthora infestans* late blight	2
Watermelon	*Erysiphe/Sphaerotheca* sp. powdery mildew	1
TOTAL DISEASES		46
TOTAL SUBMISSIONS		89

Table 7. Summary of diseases diagnosed on **woody ornamental** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Abies sp.	Pythium/Phytophthora root rot	2
	Rhizosphaera pini needle blight	1
Acer sp.	*Phytophthora* sp. crown & root rot	1
	Kabatiella apocrypta anthracnose	4
	Pseudomonas syringae bacterial blight	1
	Verticillium dahliae wilt	1
	Nectria cinnabarina canker	1
Aesculus hippocastanum	*Mycosphaerella aesculi* twig canker	1
Alnus sp.	*Melampsoridium hiratsukanum* rust	1
	Phyllosticta alnea leaf spot	1
Arbutus sp.	*Coniothyrium* sp. leaf spot	1
Aucuba japonica	*Phytophthora* sp. foliar blight	1
Azalea	Pythium/Phytophthora root rot	2
	Microsphaera sp. powdery mildew	1
Buxus sp.	Pythium/Phytophthora root rot	1
Calluna sp.	*Phytophthora* sp. crown and root rot	1
Caryopteris sp.	Pythium/Phytophthora root rot	1
Cedrus sp.	*Kabatina* sp. kabatina blight	1
Cercidophyllum japonicum	*Kabatiella* sp. anthracnose	1
Cornus alba	*Septoria sp.* leaf spot	2
Cornus sp.	*Cylindrocarpon* sp. leaf spot	1
	Discula destructiva anthracnose	1
Crateagus sp.	*Diplocarpon mespili* leaf spot	1
Cyperus sp.	*Phytophthora sp.* root rot	1
Fraxinus sp.	*Verticillium dahliae* wilt	1
	Erwinia amylovora fire blight	1
Gaultheria shallonia	*Phytophthora* sp. root rot	1
Hippophae rhamnoides	*Verticillium dahliae* wilt	1
Howea forsterana	Pythium/Phytophthora root rot	1
Hydrangea sp.	*Erysiphe polygoni* powdery mildew	1
Juniperus sp.	*Phytophthora* sp. crown & root rot	2
	Kabatina juniperi foliar blight	1
	Lophodermium juniperi foliar blight	1
Magnolia soulangiana	*Phyllosticta* sp. leaf spot	1
Magnolia sp.	*Pseudomonas syringae* bacterial blight	2
Malus sp.	*Phytophthora* sp. crown & root rot	1
	Erwinia amylovora fire blight	1
Picea pungens	*Sclerophoma* sp. Sydowia tip dieback	1
Picea sp.	*Chrysomyxa* sp. rust	1
Pieris sp.	*Phytophthora* sp. crown and root rot	2
Pinus strobus	*Cronartium ribicola* white pine blister rust	1
Pinus sp.	*Phytophthora* sp. root rot	1
Populus sp.	*Venturia populina* shoot blight	1
	Colletotrichum gloeosporioides anthracnose	1

cont'd...

Table 7. Summary of diseases diagnosed on **woody ornamental** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997. Cont'd ...

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Prunus laurocerasus	*Pseudomonas syringae* bacterial blight	1
Prunus virginiana	*Monilinia laxa* brown rot canker	1
	Monilinia spp. brown rot	2
Prunus sp.	*Monilinia* spp. brown rot	2
	Pseudomonas syringae bacterial blight	5
Pseudotsuga menziesii	Pythium/Phytophthora root rot	4
Pyracantha sp.	*Venturia pyracantha* scab	1
Pyrus sp.	*Gymnosporangium fuscum* pear trellis rust	1
Quercus sp.	*Discula quercina* anthracnose	1
Rhododendron	*Phytophthora* sp. crown & root rot	6
	Phomopsis sp. stem canker	1
	Phytophthora sp. foliar blight	1
	Chrysomyxa sp. rust	2
	Exobasidium sp. leaf gall	1
	Briosia sp. bud blight	1
	Pestalotia sp. grey blight	1
Rosa sp.	Pythium/Phytophthora crown & root rot	1
Rubus spectabilis	*Septoria rubi* leaf spot	1
Sequoia sempervirens	*Phyllosticta* sp. leaf spot	1
Skimmia sp.	*Phytophthora sp.* root rot	1
Sorbus americana	*Erwinia amylovora* fire blight	1
Sorbus sp.	*Cytospora* sp. canker	1
	Venturia inaequalis scab	1
Spirea	*Cylindrosporium* sp. leaf spot	1
Syringa vulgaris	*Pseudomonas syringae* bacterial blight	2
	Phytophthora syringae root rot & foliar blight	1
Taxus sp.	*Phytophthora* sp. crown & root rot	1
Thuja sp.	*Kabatina thujae* twig blight	2
	Armillaria mellea root rot	1
	Seiridium cardinale twig blight	1
	Didymascella thujina (Keithia) blight	1
Ulmus sp.	N*ectria cinnabarina* canker	1
Vaccinium sp.	*Phytophthora* sp. root rot	1
	Ramularia sp. leaf spot	1
Wisteria	*Phoma* sp. leaf spot	1
Yucca	*Coniothyrium concentrichum* brown leaf spot	1
TOTAL DISEASES		106
TOTAL SUBMISSIONS		243

Table 8. Summary of diseases diagnosed on **turfgrass** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997*.

	TYPE OF SAMPLE		
CAUSAL AGENT/DISEASE	**Green**	**Sod**	**Lawn**
Pythium spp. root rot	51		1
Gaeumannomyces graminis take-all patch	10	2	1
Ascochyta spp. foliar blight	3	1	2
Microdochium nivale fusarium patch	10	4	3
Typhula incarnata grey snow mold	1	1	0
Colletotrichum graminicola anthracnose	4		
Colletotrichum sp. winter anthracnose	1		
Rhizoctonia solani brown patch	1		
Rhizoctonia cerealis yellow patch	2		
Fusarium sp. crown/root rot	2		
Laetisaria fuciformis red thread	2		
Drechslera sp.melting out	2	2	
Basidiomycete fairy ring	1	1	
Algae	5		1
Typhula ishikariensis grey snow mold	1		
Sclerophthora macrospora downy mildew	3		
TOTAL DISEASES	97	14	9
TOTAL SUBMISSIONS	129	21	13

* Greens and sod are primarily creeping bentgrass and/or annual bluegrass. Lawn refers to mixtures of fescues, ryegrass, Kentucky bluegrass and annual bluegrass.

Table 9. Summary of diseases diagnosed on **field crop** samples submitted to the B.C.M.A.F. Plant Diagnostic Laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Barley	*Erysiphe graminis* f.sp.*hordei* powdery mildew	1
	Ustilago hordei covered smut	1
Canola	*Leptosphaeria maculans* virulent blackleg	2
Clover (Red)	*Cymadothea trifolii* sooty blotch	1
Forage (grass)	Basidiomycete localised dry spot	1
Orchardgrass	*Ascochyta* sp. leaf blight	1
	Puccinia sp. rust	1
Wheat	*Typhula incarnata* typhula blight	1
	Tilletia controversa dwarf bunt	1
	Pythium sp. root rot	1
TOTAL DISEASES		9
TOTAL SUBMISSIONS		13

[x] A total of 115 canola samples were submitted for testing from Peace River district, Alberta. Virulent blackleg was confirmed on 2 by PCR at the BCMAF Plant Diagnostic Laboratory, Abbotsford, B.C.

CROP: Commercial Crops - Diagnostic Laboratory Report

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: CROP DISEASE SUMMARY FOR SAMPLES SUBMITTED TO BROOKS DIAGNOSTICS LTD. FROM ALBERTA IN 1997.

METHODS: Brooks Diagnostics Limited (BDL), a private plant health clinic, assumed responsibility for operating the plant diagnostic laboratory at the Alberta Crop Diversification Centre - South in Brooks on July 1, 1993. BDL offers a full range of services in diagnosing plant health problems in fields, greenhouses, nurseries, golf courses, yards, gardens, acreages, parks and interiorscapes. The clinic applies state-of-the-art technologies such as Enzyme-Linked Immunosorbent Assay (ELISA), Immunofluorescence (IMF), and others for specialized diagnostic requirements, as well as using conventional diagnostic procedures such as visual examination of symptoms, microscopic observation and culturing on artificial media for general diagnostic requirements. BDL provided diagnosis of, and control recommendations for, disease problems on commercial crops and other plants submitted by farmers, extension specialists, scientists, agribusinesses, market gardeners, florists, greenhouse growers, landscaping companies, municipal parks staff, nurseries, golf course supervisors, and the general public from January 1 to December 31, 1997.

RESULTS: Disease identifications from various crop categories are summarized in Tables 1-12, and are organized according to the region of submission. BDL also received samples associated with insect damage and from regions other than Alberta. These data are not included in this report.

Table 1: Summary of diseases diagnosed on **cereal crop** samples submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Barley	Spot blotch	*Cochliobolus sativus*
	Barley stripe	*Pyrenophora graminea*
	Common root rot	*Fusarium* spp.
Wheat	Foot rot/crown rot	*Fusarium* spp.
	Sooty mould	*Cladosporium* spp.
		Alternaria alternata
	Spot blotch/	*Fusarium* spp.
	seedling blight	*Cochliobolus sativus*
	Root rot	*Rhizoctonia solani*
	Leaf and glume blotch	*Phaeosphaeria nodorum*
	Silver top	*Fusarium poae*
	Twisting and leaf rolling	Drought
	South Central Alberta	
Wheat	Browning root rot	*Pythium* sp.
	Fusarium crown and root rot	*Fusarium* spp.
	North Central Alberta	
Barley	Dieback	Drought
	Root rot	*Fusarium* spp.
		Rhizoctonia solani
	Scald	*Rhynchosporium secalis*
	Tan spot	*Pyrenophora tritici-repentis*
	Spot blotch	*Cochliobolus sativus*
Wheat	Root rot/foot rot	*Fusarium* sp.
		Rhizoctonia solani
	Leaf and glume blotch	*Phaeosphaeria nodorum*
	Browning root rot	*Rhizoctonia solani*
	Seedling blight/damping-off	*Pythium* spp.
		Fusarium spp.
		Cochliobolus sativus
	North Eastern Alberta	
Barley	Sooty mold	*Cladosporium* spp.
	Spot blotch	*Cochliobolus sativus*
Wheat	Silver top	*Fusarium poae*

Table 2: Summary of diseases diagnosed on **field crops** submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Field peas	Root rot	*Fusarium* sp.
	South Central Alberta	
Field peas	Downy mildew	*Perenospora viciae*
	Root rot	*Fusarium* sp.

Table 3: Summary of diseases diagnosed on forage crop samples submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Alfalfa	Leaf spot	*Stemphylium botryosum*
	Crown/root rot	*Fusarium roseum*
		Rhizoctonia solani
	Spring blackstem and Leaf spot	*Phoma medicaginis*
	Fusarium root rot	*Fusarium* sp.
	Brown root rot	*Plenodomus meliloti*
	Pythium root rot	*Pythium* spp.
	Leaf burn	Environmental stress
	South Central Alberta	
Timothy grass	Purple leaf spot	*Heterosporum phlei*
	Leaf tip burn	Heat stress

Table 4: Summary of diseases diagnosed on **fruit crops** submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Apple	Fire blight	*Erwinia amylovora*
Saskatoon	Rust	*Gymnosporangium* spp.
	North Eastern Alberta	
Apple	Fire blight	*Erwinia amylovora*
Chokecherry	Fire blight	*Erwinia amylovora*

Table 5: Summary of diseases diagnosed on **greenhouse crop** samples submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Begonia	Root/stem rot	*Fusarium* spp.
		Rhizoctonia solani
		Pythium spp.
Cucumber	Crown & root rot/	*Pythium* spp.
	damping-off	*Rhizoctonia solani*
Geranium	Gray mold	*Botrytis cinerea*
	Leaf malformation	Suspect herbicide damage
	Verticilium wilt	*Verticilium dahliae*
	Damping off/root rot	*Pythium* sp.
		Rhizoctonia solani
Petunia	Unnatural colouring	Nitrogen & iron deficiency
Tomato	Stem/root rot	*Pythium* sp.
		Fusarium sp.
	South Central Alberta	
Chrysanthemum	Bloom blight/ray speck	*Alternaria* spp.
	Wilt/root rot	*Fusarium oxysporum*
Christmas cactus	Root & stem rot	*Erwinia* spp.
		Fusarium spp.
Cineraria	Leaf mottling & ring spots	TSWV/INSV*
Cyclamen	Leaf malformation	TSWV/INSV*
	mottling and twisting	
	Wilt/dieback tuber rot	*Erwinia carotovora*
Geranium	Bacterial blight	*Xanthomonas campestris*
		f. sp. *pelargonii*
	Stem/root rot	*Pythium* spp.
		Fusarium spp.
Kalanchöe	Ring spots	TSWV/INSV*
	North Central Alberta	
Geranium	Oedema	Moisture stress
	Root rots	*Fusarium* spp.
		Pythium spp.
	Pseudomonas leaf spot	*Pseudomonas cichorii*
	Stem & root rot	*Fusarium* spp.
		Pythium sp.

cont'd ...

Table 5: Summary of diseases diagnosed on **greenhouse crop** samples submitted to Brooks Diagnostics Limited in 1997. Cont'd.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	North Central Alberta	
Tomato	Necrotic patches/chlorosis	Environmental stress
	Dieback	Physiological stress
	Root discolouration	*Pythium* spp.
	Root rots	*Fusarium* spp.
	North Western Alberta	
Begonia	Root & stem rot	*Fusarium* sp.
		Pythium sp.
		Rhizoctonia solani
	Mottling, yellowing leaf malformation	TSWV/INSV*
Geranium	Bacterial blight	*Xanthomonas campestris* f.sp. *pelargonii*
	Root rot	*Pythium* spp.
		Rhizoctonia spp.
	North Eastern Alberta	
Geranium	Blackleg	*Pythium* spp.
	Stem/root rot	*Fusarium* spp.
		Pythium sp.
	Peace River Region	
Tomato	Fiddleheading, fruit & leaf malformation, and shoe stringing	TMV*

* Disease confirmed by serological methods using the ELISA technique.

Table 6: Summary of diseases diagnosed on **vegetable crops** submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Celery	Late blight	*Septoria apiicola*
Potato	Bacterial ring rot	*Clavibacter michiganensis* subsp. *sepedonicus*[*]
	Pink rot	*Phytophthora erythroseptica*
	Early blight	*Alternaria solani*
	Powdery scab	*Spongospora subterranea*
	Common scab	*Streptomyces scabies*
	Black scurf	*Rhizoctonia solani*
	Soft rot	*Erwinia carotovora* subsp. *carotovora*
	Dry rot	*Fusarium* spp.
	Leak	*Pythium ultimum*
	Vascular discoloration	Frost injury
	Stem end browning	Physiological
	Vascular rot	*Fusarium solani*
	South Central Alberta	
Potato	Leaf mottling, deformation & mosaic	PVY^{o}[**]
	North Central Alberta	
Potato	Dry rot	*Fusarium* spp.
	Soft rot	*Erwinia carotovora* subsp. *carotovora*
	Fusarium storage rot	*Fusarium* spp.
	Black scurf	*Rhizoctonia solani*
	Brown rot	*Pseudomonas solanacearum*
	Stem end rot	Reglone overdose
	North Western Alberta	
Potato	Late blight	*Phytophthora infestans*
	Dry rot	*Fusarium* spp.

[*] Disease confirmed by ELISA and IMF techniques.

[**] Disease confirmed by the ELISA technique.

Table 7: Summary of diseases diagnosed on **woody ornamental plants** submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Birch	Dieback and chlorosis	Heat stress
Chokecherry	Fire blight	*Erwinia amylovora*
	Dieback and chlorosis	Nutrient deficiencies
Lilac	Blight and cankering,	*Pseudomonas syringae*
Mountain Ash	Fire blight	*Erwinia amylovora*
Poplar	Leaf and shoot blight	*Venturia populina*
	Leaf twisting, rolling, yellowing, tip burning & malformation	Herbicide damage/viral
Rose	Leaf twisting, rolling, yellowing, tip burning & malformation	Suspect herbicide injury
Spruce	Dieback/needle browning	Poor drainage
	South Central Alberta	
Apple	Fire blight	*Erwinia amylovora*
Mountain ash	Fire blight	*Erwinia amylovora*
Cherry	Bacterial blight	*Pseudomonas syringae*
Chokecherry	Cytospora canker	*Cytospora* spp.
	Fire blight	*Erwinia amylovora*
Poplar	Leaf cupping, twisting & malformation	Suspect herbicide damage
	North Western Alberta	
Mayday	Black knot	*Apiosporina morbosa*
	Nectria canker	*Nectria cinnabarina*
	Fire blight	*Erwinia amylovora*

Table 8: Summary of diseases diagnosed on **oilseed crops** submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Canola	Root rot/damping-off	*Fusarium solani*
	Wire stem	*Rhizoctonia solani*
	Blackleg	*Leptosphaeria maculans*
	South Central Alberta	
Canola	Wire stem	*Rhizoctonia solani*
	Leaf purpling	Sulfur deficiency
	Blackleg	*Leptosphaeria maculans*
	Leaf & stem spot	Hail damage
	North Central Alberta	
Canola	Leaf purpling	Suspect hebicide damage
Mustard	Crown & root rot	*Fusarium* spp.
	North Eastern Alberta	
Canola	Yellowing, crinkling & leaf malformation	Herbicide injury
	Black spot	*Alternaria* spp.
	Leaf spotting	Herbicide damage
	Downy mildew	*Peronospora parasitica*
	North Western Alberta	
Canola	Blackleg	*Leptosphaeria maculans* (weakly virulent strain)

Table 9: Summary of diseases diagnosed on **turfgrass** samples submitted to Brooks Diagnostics Limited in 1997.

PLANT/SOURCE	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Fairway	Pink snow mold	*Microdochium nivale*
	Pythium blight	*Pythium* spp.
Green	Pink snow mold	*Microdochium nivale*
	Pythium blight	*Pythium* spp.
	Melting out/leaf blight	*Drechslera poae*
	Fusarium patch	*Fusarium poae*
		Fusarium graminearum
		Fusarium equiseti
	Brown patch	*Rhizoctonia solani*
	South Central Alberta	
Green	Pink snow mold	*Microdochium nivale*
	Pythium blight	*Pythium* spp.
	Brown patch	*Rhizoctonia* spp.
	Anthracnose	*Colletotrichium graminicola*
	Cottony snow mold	*Coprinus psychromorbidus*
	Melting out/leaf blight	*Drechslera poae*
	Fusarium patch	*Fusarium poae*
		Fusarium graminearum
		Fusarium culmorum
		Fusarium avenaceum
	North Central Alberta	
Green	Pink snow mold	*Microdochium nivale*
	Pythium blight.	*Pythium* spp.
	Downy mildew	*Sclerophthora macrospora*
	Brown patch	*Rhizoctonia solani*
	Cottony snow mold	*Coprinus psychromorbidus*
Fairway	Fusarium patch	*Fusarium graminearum*
		Fusarium culmorum
	Brown patch	*Rhizoctonia solani*
Soil	Brown patch	*Rhizoctonia solani*
	Pink snow mold	*Microdochium nivale*
	Red thread	*Laetisaria fuciformis*
Sod farm	Pink snow mold	*Microdochium nivale*
	Leaf & crown rot	*Bipolaris sorokiniana*

Table 9: Summary of diseases diagnosed on **turfgrass** samples submitted to Brooks Diagnostics Limited in 1997 (cont'd.).

PLANT/SOURCE	DISEASE/SYMPTOM	CAUSAL AGENT/PLANTPATHOGEN
	North Eastern Alberta	
Green	Pink snow mold	*Microdochium nivale*
	Pythium blight	*Pythium* spp.
	Gray snow mold	*Typhula* spp.
	North Western Alberta	
Fairway	Pythium blight	*Pythium* sp.
Green	Pink snow mold	*Microdochium nivale*
	Pythium blight	*Pythium* spp.
	Red thread	*Laetisaria fuciformis*
	Peace River	
Meadow fescue	Pink snow mold	*Microdochium nivale*

Table 10: Summary of diseases diagnosed on **specialty crop** samples submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Peace River	
Caraway	Stem spot	Hail damage
	White mold	*Sclerotinia sclerotorium*
	Soft rot	*Erwinia carotovora*

Table 11: Summary of diseases diagnosed on samples from **shelterbelt trees** submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Cotoneaster	Fire blight	*Erwinia amylovora*
Elm	Botryodiplodia canker	*Botryodiplodia hypodermia*
Pine	Brown spot needle blight	*Mycosphaerella dearnessii*
Spruce	Needle browning	Environmental stress/ nutrient imbalance
	South Central Alberta	
Ash	Leaf wilt, cupping, twisting & malformation	Suspect herbicide damage
Birch	Dieback	Heat stress
Juniper	Twig blight	*Phomopsis juniperovora*
Lodgepole pine	Red band needle blight	*Dothistroma septospora*
Poplar	Stem cankering, leaf damage & twig dieback	Bacterial wet wood
Spruce	Needle drop and chlorosis	Nutrient imbalnce/winter damage
	Canker	*Leucostoma kunzei*
Scots Pine	Needle blight	*Dothistroma septospora*
	North Central Alberta	
Elm	Twig blight	*Fusarium* sp.
Spruce	Needle browning/yellowing	Winter kill, sooty mold, lichens nutrient imbalance/soil problem
	Elytroderma needle cast	*Elytroderma deformans*
	North Western Alberta	
Elm	Wilt/dieback/canker	*Dothiorella ulmi*
Maple	Anthracnose	*Gloeosporium apocryptum*
Spruce	Needle browning	Environmental stress
Willows	Dieback	*Cytospora chrysosperma*
	North Eastern Alberta	
Spruce	Needle browning	Environmental stress
	Peace River District	
Mountain ash	Fire blight	*Erwinia amylovora*
Poplar	Venturia leaf and shoot blight	*Venturia populina*

Table 12: Summary of diseases diagnosed on **herbaceous and woody ornamental plants** submitted to Brooks Diagnostics Limited in 1997.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	Southern Alberta	
Peony	Anthracnose	*Gloeosporium* sp.
	Leaf blotch & stem spot	*Cladosporium paeoniae*
Lilac	Leaf distortion, cupping & malformation	Suspect herbicide (Roundup) damage
Poppy	Bacterial blight	*Xanthomonas papavericola*
	North Central Alberta	
Lily	Leaf spot	*Fusarium* spp. Nutritional imbalance

CROP: Commercial crops - Diagnostic Laboratory Report

LOCATION: Saskatchewan

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON CROP SAMPLES SUBMITTED TO THE SASKATCHEWAN AGRICULTURE AND FOOD CROP PROTECTION LABORATORY IN 1997

METHODS: The Saskatchewan Agriculture and Food (SAF) Crop Protection Laboratory provides diagnostic services and recommendations for crop health problems to the agriculture industry. Services include disease, insect and weed identification and herbicide resistant weed testing. Samples are submitted to the Crop Protection Laboratory by SAF Extension Agrologists, growers, agribusiness and home gardeners. Disease diagnosis is accomplished by microscope examination, culturing onto artificial media and ELISA testing.

RESULTS: Summaries of the diseases/causal agents diagnosed on crop samples submitted to the Crop Protection Laboratory in 1997 are presented in Tables 1-10 by crop category.

Table 1. Summary of plant diseases diagnosed on **oilseed crops** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Canola	Heat canker, wind whipping	1
	Herbicide injury	13
	Sulphur deficiency	1
	Root rot/*Fusarium* spp.	2
	Root rot/*Rhizoctonia solani*	1
	Downy mildew/*Peronospora parasitica*	1
	Blasting	4
	Hail injury	1
	Sclerotinia stem rot/*Sclerotinia sclerotiorum*	1
	Black spots/*Alternaria brassicae*	2
Flax	Seedling blight/root rot/*Fusarium oxysporum*, *Phytothphora* spp., *Sclerotinia* spp.	4
	Herbicide injury	3
	Nutrient deficiency	1
	Boll blight/environmental stress	1
Sunflower	Head rot/*Rhizopus stolinifer*	1
	Head rot/*Botrytis cinerea*	1
	Seed discolouration/*Alternaria* spp.	1
TOTAL		39

Table 2. Summary of plant diseases diagnosed on **cereal crops** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Barley	Net blotch/*Pyrenophora teres*	7
	Common root rot/*Cochliobolus sativus*, *Fusarium* spp.	8
	Scald/*Rhynchosporium secalis*	1
	Herbicide injury	4
	Sharp eye spot/*Rhizoctonia solani*	1
	Spot blotch/*Cochliobolus sativus*	1
	Prematurity blight/*Cochliobolus sativus*, *Fusarium* spp.	2
	Head blight/*Fusarium poae*	1
	Nutrient deficiency	1
Oat	Leaf blotch/*Pyrenophora avenae*	4
	Crown rust/*Puccinia coronata*	1
Triticale	Nutrient deficiency	1
	Root rot/*Fusarium* spp.	2
Wheat	Wheat Streak Mosaic Virus	1
	Seedling blight/*Fusarium* spp.	2
	Tan spot/*Pyrenophora tritici-repentis*	8
	Nutrient deficiency	1
	Herbicide injury	8
	Common root rot/*Cochliobolus sativus*, *Fusarium* spp.	16
	Speckled leaf blotch/*Septoria tritici*	6
	Fusarium head blight/*Fusarium graminearum*	2
	Sooty mould/*Alternaria* spp., Cladosporium spp.	3
	Take-all/*Gaeumannomyces graminis* var. *tritici*	1
TOTAL		82

Table 3. Summary of plant diseases diagnosed on **pulse crops** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Broadbean	Herbicide injury	1
Chickpea	Seed rot/*Penicillium* spp.	1
	Dieback/*Botrytis cinerea*	1
	Root rot/*Rhizoctonia solani*	1
Pea	Leaf spot/*Mycosphaerella pinodes*	4
	Root rot/*Fusarium* spp., *Rhizoctonia solani*	3
	Herbicide injury	1
	Hail injury	1
Soybean	Leaf spots/*Ascochyta* spp.	1
	Leaf spots/ *Septoria glycines*	1
	Root rot/*Fusarium solani*	1
	Wilt /*Verticillium albo-atrum*	1
	Anthracnose/*Colletotrichum lindemuthianum*	1
Lentil	Seed rot and seedling blight/*Penicillium* spp., *Botrytis cinerea* and *Fusarium* spp.	2
	Stem rot/*Botrytis cinerea*	1
	Herbicide injury	6
	Lower leaf dieback/*Stemphylium botryosum*	2
	Root rot/*Fusarium graminearum*	1
Mung bean	Seedling rot/*Erwini*a spp.,*Curtobacterium* spp., and *Penicillium* spp.	1
TOTAL		31

Table 4. Summary of plant diseases diagnosed on **special crops** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Buckwheat	Root rot/*Fusarium* spp., *Rhizoctonia solani* and *Pythium* spp.	1
Caraway	Root rot/*Fusarium* spp., *Rhizoctonia solani* and *Pythium* spp.	2
	Leaf spots/*Alternaria* spp.	1
Coriander	Leaf spots/*Alternaria* spp.	1
	Root rot/*Fusarium* spp.	1
Echinacea	Root rot/*Rhizoctonia solani* and *Fusarium* spp.	1
Mustard	Stag head/Albugo candida	1
	Downy mildew/*Peronospora parasitica*	1
TOTAL		9

Table 5. Summary of plant diseases diagnosed on **woody ornamental plants** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Alder	Leaf lesion/*Glomus* spp.	1
Ash	Herbicide injury	1
Aspen	Discoloured leaves/undetermined	1
Birch	Herbicide injury	1
American elm	Herbicide injury	1
	Dutch elm disease/*Ophiostoma ulmi*	108
	Dothiorella wilt/*Dothiorella ulmi*	68
	Verticillium wilt/*Verticillium dahliae*	4
Siberian elm	Dutch elm disease/*Ophiostoma ulmi*	1
Honeysuckle	Dieback/abiotic	1
Lilac	Herbicide injury	1
Mountain ash	Iron chlorosis	1
	Fire blight/*Erwinia amylovora*	1
	Heart rot/*Polyporus* spp.	1
Pine	Yellowish-red needles/environmental stress	1
	Seedling dieback (greenhouse)/cultural	1
	Needlecast/*Dothistroma septospora*	1
Poplar	Cankers/*Cytospora* spp.	1
	Pale new growth/physiological	1
	Herbicide injury	1
Red dogwood	Twig dieback/*Phoma* spp.	1
Spruce	Discoloured needles/environmental stress	6
	Herbicide injury	7
	Brown needles/winter injury	1
TOTAL		212

Table 6. Summary of plant diseases diagnosed on **herbaceous ornamental plants** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Gloxinia	Root rot/*Pythium* spp.	1
Oxytropis	Root rot/*Fusarium* spp., *Verticillium* spp., *Pythium* spp.	1
Peony	Root rot/*Rhizoctonia solani*	1
Astilbe	Root rot/*Cylindrocarpon* spp.	1
Petunia	*Rhizoctonia solani*, Root rot/*Fusarium* spp.	1
TOTAL		5

Table 7. Summary of plant diseases diagnosed on **vegetable crops** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Cabbage	Poor growth/environmental stress	2
Onion	Smut/*Urocystis cepulae*	1
Potato	Dry rot/*Fusarium solani*	1
	Leak/*Pythium* spp.	1
	Early blight/*Alternaria solani*	2
	Late blight/*Phytophthora infestans*	1
	Soft rot/*Erwinia carotovora*	1
	Abnormal growth/environmental stress	1
	Powdery scab/*Spongospora subterranea*	1
TOTAL		11

Table 8. Summary of plant diseases diagnosed on **fruit crops** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Apple	Fire blight/*Erwinia amylovora*	5
	Environmental stress	1
Crabapple	Scab/*Venturia inaequalis*	1
Apricot	Mechanical injury	1
Chokecherry (greenhouse)	Powdery mildew/*Podosphaeria* spp.	1
Sea buckthorn (greenhouse)	Poor growth/physiological	1
	Root rot/*Fusarium* spp.	1
	Bracket fungus/*Schizophyllum commune*	1
Saskatoon berry	Leaf spot/*Entomosporium mespili*	1
	Leaf spots/fungicide injury	1
Strawberry	Wilt/*Verticillium albo-atrum*	1
TOTAL		15

Table 9. Summary of plant diseases diagnosed on **turf grass** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Turf	Root rot/*Rhizoctonia solani*,	1
	Pythium spp.	1
	Snow mould/*Typhula* spp.	1
	Fusarium patch/*Fusarium* spp.	1
TOTAL		4

Table 10. Summary of plant diseases diagnosed on **forage crops** submitted to the SAF Crop Protection Laboratory in 1997.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Alfalfa	Crown rot/*Fusarium* spp., *Rhizoctonia solani*	6
	Dead plants/winter injury	1
	Herbicide injury	2
	Black stem/*Phoma medicaginis* var. *medicaginis*	1
	Common leaf spot/*Pseudopeziza trifolii*	1
Sweet clover	Winter injury	1
	Crowns rot/*Fusarium* spp.	1
TOTAL		13

CROP: Commercial crops - Diagnostic Laboratory Report

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: 1997 MANITOBA CROP DIAGNOSTIC CENTRE LABORATORY SUBMISSIONS

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

RESULTS: Summaries of diseases diagnosed on cereals are presented in Table 1.The major disease problems in 1997 on wheat were fusarium head blight, septoria, tan spot and leaf rust. Generally oat yields were good in southern Manitoba, and disease loss (except in late planted fields) was low to moderate. Environmental stress of high temperatures in late July caused blasting of florets and light seed weight in many fields in southern Manitoba.

Summaries of diseases diagnosed on conifer trees and woody ornamental trees are presented in Table 2. A major proportion of the spruce submitted show non-specific needle browning which was categorized as being caused by environmental factors such a winter injury, excess or deficiency of soil moisture and inter-tree competition. The majority of green ash samples were from shelterbelts affected by glyphosate and group 4 herbicide injury.

Summaries of diseases diagnosed on oilseed crop samples are presented in Table 5. Flax generally escaped serious disease injury. Pasmo was very widespread on flax throughout Manitoba by September but did not appear to cause significant losses. The major disease problems affecting canola were stem rot and blackleg. Very favourable weather conditions in July resulted in widespread damage due to stem rot in the central crop region. Blackleg was also prominent mainly in the southwest and central regions. The major cause of damage in samples submitted to the Crop Diagnostic Centre was herbicide injury mainly from herbicide drift.

Summaries of diseases diagnosed on potato crops are presented in Table 6. Late blight was again a problem in Manitoba in 1997. It occurred in the Winkler, Carman, Carberry, Portage and Steinbach production areas. It was most severe in the Winkler area where the disease began in the third week of July. In the other production areas late blight did not start until mid to late August and losses were generally low. Early blight was not as prominent as late blight in 1997. More of the early dying complex involving verticillium, fusarium and colletotrichum was observed especially in the central region.

Summaries of diseases diagnosed on pulse crop samples are presented in Table 7. A regular weekly monitoring program was carried out on field beans in southern Manitoba. Excess moisture in August resulted in flooding of fields in the Central region causing extensive crop loss. In July the major problem was bacterial blight. By mid August severe levels of white mould were found in several fields in the Carman area. Unfavourable growing conditions, excess soil moisture and a high incidence of mycosphaerella blight combined, caused severe losses in peas particularly in the eastern and central crop regions. Root rot caused by *Fusarium* spp. resulted in complete loss of several fields in the Carman area.

Table 1. Summary of diseases diagnosed on **cereal crops and forage grasses** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO. OF SAMPLES
Wheat	Septoria leaf blotch	*Septoria* sp.	26
	Head blight	*Fusarium graminearum*	9
	Glume blotch	*Septoria* sp.	2
	Tan spot	Pyrenophora tritici-repentis	7
	Common root rot	*Fusarium* spp. *Cochliobolus sativus*	9
	Seedling blight	*Fusarium* spp. *Cochliobolus sativus*	1
	Leaf rust	*Pucinia recondita*	2
	Take all root rot	*Gaeumannomyes graminis var tritici*	2
	Bacterial leaf blight	*Pseudomonas syringae pv. syringae*	3
	Wheat streak mosaic	wheat streak mosaic virus	2
	Herbicide injury		15
	Environmental stress	deep seeding, nutrient deficiency, frost	42
Barley	Barley yellow dwarf	Barley yellow dwarf virus	1
	Fusarium head blight	*Fusarium graminearum*	4
	Septoria leaf blotch	*Septoria* sp.	1
	Common root rot	*Fusarium* spp. *Cochliobolus sativus*	6
	Net blotch	*Pyrenophora teres*	8
	Spot blotch	*Cochliobolus sativus*	1
	Head moulds	*Alternaria* sp.	2
	Bacterial leaf blight		4
	Seedling blight	*Fusarium* spp. *Cochliobolus sativus*	1
	Ergot	*Claviceps purpurea*	1
	Herbicide injury		6
	Environmental stress	frost, deep seeding, nutrient deficiency, excess water	24
Oats	Seedling blight	*Fusarium* spp. *Cochliobolus sativus*	1
	Crown rust	Puccinia coronata	2
	Bacterial blight	*Pseudomonas syringae*	4
	Herbicide injury		3
	Environmental stress		2
Timothy	Purple spot	*Heterosporium phlei*	1
	Environmental stress	frost damage	1
Brome	Leaf spot	*Selenophoma* sp.	2

Table 2. Summary of diseases diagnosed on **conifers and woody ornamental trees** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO. OF SAMPLES
Spruce	Cytospora canker	*Leucostoma kunzei*	8
	Needle cast	*Rhizosphaera kalkhoffi*	2
	Environmental stress	winter injury, frost, excess moisture	14
	Nutrient deficiency		1
	Herbicide Injury		4
Pine	Needle cast	*Cyclaneusma niveum*	2
	Environmental stress	winter injury	2
Elm	Dutch elm disease	*Ophiostoma ulmi*	21
	Dothiorella wilt	*Dothiorella ulmi*	1
	Canker	*Cytospora* sp.	6
	Black spot	*Stegophora ulmea*	1
	Slime flux		2
	Environmental stress		1
	Herbicide injury		3
Willow	Cytospora canker	*Cytospora* sp.	1
	Environmental stress		1
	Herbicide injury		3
Poplar	Canker	*Cytospora* sp.	4
	Ink spot	*Ciborinia* sp.	1
	Shoot blight	*Pollaccia* sp.	2
	Herbicide injury		2
	Environmental stress	spring frost damage	1
	Nutrient deficiency		2
Birch	Birch decline	environmental stress	1
	Herbicide injury		1
Ash	Canker	*Cytospora* sp.	1
	Anthracnose	*Gloeosporium aridum*	1
	Herbicide injury		28
	Environmental stress		5
Lilac	Canker		2
	Environmental stress	spring frost	5
	Herbicide injury		8

Table 3. Summary of diseases diagnosed on **forage crops** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENTS/ PLANT PATHOGENS	NO. OF SAMPLES
Alfalfa	Root rot	*Fusarium* spp. *Rhizoctonia solani*	3
	Spring black stem	*Phoma medicaginis*	3
	Common leaf spot	*Pseudopeziza medicaginis*	3
	Downy mildew	*Peronospora trifoliorum*	1
	Physiological	winter injury, white spot	6
	Nutrient deficiency		4

Table 4. Summary of diseases diagnosed on **fruit crops** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENTS/ PLANT PATHOGENS	NO. OF SAMPLES
Apple	Fire blight	*Erwinia amylovora*	6
	Canker	*Cytospora* spp.	15
	Crown Gall	*Agrobacterium tumefasciens*	1
	Frogeye leaf spot	*Botryosphaeria obtusa*	4
	Environmental stress		19
	Nutrient deficiency	iron chlorosis	5
	Herbicide injury		1
Strawberry	Crown rot, root rot	*Fusarium* spp.	6
	Gray mould	*Botrytis cinerea*	1
	Nutrient deficiency		3
	Herbicide injury		1
	Environmental injury		1
Raspberry	Rust	*Pucciniastrum* sp.	1
	Anthracnose	*Elsinoe veneta*	2
	Cane blight	*Leptosphaeria coniothyrium*	2
	Bacterial blight	Unidentified	1
Saskatoon	Rust	*Gymnosporangium* sp.	1
	Cankers	*Valsa* sp.	4
	Leaf spot	*Entomosporium mespili*	5
	Powdery mildew	*Podosphaera clandestina*	2
	Environmental stress	winter injury	7
	Herbicide injury		3

Table 5. Summary of diseases diagnosed on **oilseed crops** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO. OF SAMPLES
Flax	Herbicide Injury		4
	Pasmo	*Septoria linicola*	4
	Root rot	*Fusarium* spp.	9
	Environmental	heat canker, excess moisture	13
	Nutrient Deficiency		2
Sunflower	Sclerotinia head rot	*Sclerotinia sclerotiorum*	1
	Root rot	*Fusarium* spp.	1
	Herbicide injury		6
	Environmental injury		2
Canola	Sclerotinia stem rot	*Sclerotinia sclerotiorum*	5
	Root rot	*Rhizoctonia solani* *Fusarium* spp.	8
	Downy mildew	*Peronospora parasitica*	4
	Blackleg	*Leptosphaeria maculans*	20
	Black spot	*Alternaria* sp.	6
	Herbicide injury		84
	Nutrient deficiency	sulphur deficiency	24
	Environmental stress	excess moisture, frost	10

Table 6. Summary of diseases diagnosed on **potato crops** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO. OF SAMPLES
Potato	Early blight	*Alternaria solani*	2
	Fusarium root rot	*Fusarium* spp.	3
	Late blight	*Phytophthora infestans*	22
	Verticillium wilt	*Verticillium dahliae*	3
	Blackleg	*Erwinia carotovora* subsp. *atroseptica*	1
	Bacterial ring rot	*Clavibacter michiganensis* subsp. *sepedonicus*	2
	Soft rot	*Erwinia carotovora* subsp. *carotovora*	1
	Scab	*Streptomyces scabies*	1
	Herbicide injury		10
	Environmental stress		3

Table 7. Summary of diseases diagnosed on **pulse crops** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO. OF SAMPLES
Field Beans	Bacterial blight	*Xanthomonas campestris pv. phaseoli*	18
	Halo blight	*Pseudomonas syringae pv. phaseolicola*	
	Brown spot	*Pseudomonas syringae pv. syringae*	
	Rust	*Uromyces phaseoli*	3
	Root rot	*Fusarium* spp.	6
	White mould	*Sclerotinia sclerotiorum*	3
	Environmental	low temperature, excess moisture	2
	Herbicide injury		3
Field Peas	Mycosphaerella blight	*Mycosphaerella pinodes*	2
	Downy mildew	*Peronospora viciae*	1
	Root rot	*Fusarium* spp*., Rhizoctonia solani*	5
	Powdery mildew	*Erysiphe communis*	3
	Sclerotinia stem rot	*Sclerotinia sclerotiorum*	1
	Environmental stress	excess moisture	2
	Herbicide injury		2
Lentils	Ascochyta blight	*Ascochyta fabae pv. lentis*	1
	Anthracnose	*Colletotrichum truncatum*	2

Table 8. Summary of diseases diagnosed on **turf grass** samples submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO. OF SAMPLES
Turf	Melting out	*Drechslera* spp.	1
	Fairy ring	*Marasmius oreades*	3
	Pink snow mould	*Microdochium nivale*	1
	Environmental stress		2

Table 9. Summary of diseases diagnosed on **vegetable crops** submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1997.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO. OF SAMPLES
Tomato	Late blight	*Phytophthora infestans*	2
	Early blight	*Alternaria solani*	1
	Herbicide injury		2
	Environmental stress		1
Carrot	Crown Rot	*Rhizoctonia* sp.	1
	Aster yellows	*Aster yellows phytoplasm*	2
	Cavity spot	*Pythium* spp.	1
Onion	Blast	*Botrytis* sp.	2
	Fusarium basal rot	*Fusarium* spp.	2
Garlic	Root rot	*Pythium* spp., *Fusarium* spp.	1

CROP: Commercial Crops - Diagnostic Laboratory Report

LOCATION: Ontario

NAMES AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON CROP SAMPLES SUBMITTED TO THE UNIVERSITY OF GUELPH PEST DIAGNOSTIC CLINIC IN 1997

METHODS: The Pest Diagnostic Clinic provides diagnosis and identification of plant diseases, nematodes, insects, weeds, and other pest problems. The service is offered to OMAFRA crop advisors, to employees of other public agencies, to growers and agricultural businesses and to the general public. Diagnoses were made by visual and microscopic examination of the samples. Isolation on selective media, the Biolog® bacterial identification system, pathogenicity tests and ELISA were used to assist in the diagnosis of some of the samples.

RESULTS AND COMMENTS: In 1997 the Pest Diagnostic Clinic received 1556 samples including nematodes. About 43% of the samples submitted were for disease diagnosis. Of these, 65% were ornamentals, including both woody and herbaceous plants growing outdoors, in atria and in greenhouses. The remainder of the disease samples were categorized as follows; turf (11%), vegetables (10%), fruit (8%) legumes (3%) and forages (3%). OMAFRA with other public agencies, and horticultural businesses including growers, each submitted about one third of the samples received for disease diagnosis by the clinic in 1997. The remaining disease samples were submitted by homeowners. A summary of the disease diagnoses is presented in the following tables (1-6).

Table 1. Summary of diseases diagnosed on **field, forage and special crop** samples submitted to the University of Guelph Pest Diagnostic Clinic in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Alfalfa	*Phoma medicaginis*	2
	Fusarium sp. 1	
	Boron deficiency	2
	Other physiological disorders	2
Basil	*Fusarium* sp. 2	
Barley	*Xanthomonas campestris* pv. *translucens*	1
	Cochliobolus sativus	1
	Michrodochium bolleyi	1
Corn	*Pantoea stewartii*	1
	Puccinia sorghi	1
	Herbicide injury	2
	Other physiological disorders	2
Sunflower	*Fusarium* sp. 1	
Tobacco	Physiological disorder	1
Wheat	*Ascochyta tritici*	*2*
	Sooty molds *3*	
	Physiological disorder	1

Table 2. Summary of diseases diagnosed on **legume** samples submitted to the University of Guelph Pest Diagnostic Clinic in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Soybean	*Sclerotinia sclerotiorum*	1
	Septoria glycines	1
	Phoma sp.	1
	Rhizoctonia sp.	1
	Verticillium sp.	1
	Alternaria leaf spot	1
	Fusarium crown and root rot	2
	Virus	1
	Herbicide injury	1
	Other physiological disorders	7

Table 3. Summary of diseases diagnosed on **vegetable** samples submitted to the University of Guelph Pest Diagnostic Clinic in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Asparagus	*Pseudomonas syringae* pv *aptata*	1
	Cold injury	1
Beets	Alternaria leafspot	1
Brussels sprouts	Physiological disorder	1
Carrot	*Alternaria dauci*	1
	Physiological disorder	1
Cucumber	Verticillium wilt	1
	Ditylenchus sp.	1
	Zuchini Yellow Mosaic Virus (ZYMV)	1
	Other viral diseases	2
	Physiological disorder	1
Garlic	Viral disease	1
Pepper	*Botrytis* sp.	1
	Fusarium root rot	1
	INSV	1
	Herbicide injury	1
Potato	*Erwinia carotovora* pv.*carotovora*	1
	Fusarium sp.	1
	Rhizoctonia root rot	1
	Leak	3
	Pink eye	3
	Herbicide injury	1
	Other physiological disorder	1
Rutabaga	Fusarium wilt	1
Spinach	Fusarium root rot	1
Tomato	*Clavibacter michiganensis* subsp. *michiganensis*	2
	Pseudomonas syringae pv. *tomato*	1
	Phytophthora infestans	1
	Pyrenochaeta lycopersici	6
	Pythium sp.	2
	Septoria leaf spot	1
	Fusarium wilt	1
	Viral disease	3
	Cat face	1
	Oedema	2
	Herbicide injury	1
	Other physiological disorders	5

Table 4. Summary of diseases diagnosed on **fruit** samples submitted to the University of Guelph Pest Diagnostic Clinic in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Apple	*Erwinia amylovora*	1
	Venturia inaequalis	1
	Alternaria sp.	2
	Sooty mold	1
	Winter injury	2
	Other physiological disorders	2
Blueberry	*Fusicoccum putrefaciens*	1
	Other physiological disorders	3
Chokecherry	Physiological disorder	1
Kiwi	Physiological disorder	1
Pear	*Erwinia amylovora*	1
	Frost injury	1
Prunus sp.	*Tubercularia* sp.	1
	Fusarium sp.	1
Raspberry	*Botrytis cinerea*	2
	Rhizoctonia sp.	1
	Viral disease	1
	Herbicide injury	1
	Other physiological disorder	1
Strawberry	*Colletotrichum dematium*	1
	Phytophthora cactorum	1
	Fusarium sp.	1
	Gloeosporium sp. (fruit anthracnose)	2
	Physiological disorders	3

Table 5: Summary of diseases diagnosed on **turf** samples submitted to the University of Guelph Pest Diagnostic Clinic in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Turf	*Colletotrichum graminicola*	4
	Leptosphaeria korrae	11
	Rhizoctonia solani	1
	Rhizoctonia cerealis	1
	Laetisaria fuciformis	1
	Microdochium nivale	3
	Sclerotinia homeocarpa	1
	Drechslera sp.	8
	Pythium sp.	4
	Fairy ring	1
	Physiological disorders	32

Table 6: Summary of diseases diagnosed on **ornamentals** submitted to the University of Guelph Pest Diagnostic Clinic in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Adonidia palm	Physiological disorder	1
Aloe	Physiological disorders	2
Alstroemeria lily	Tomato Spotted Wilt Virus (TSWV)	1
Angelonia	INSV	1
Argyranthemum	Physiological disorder	1
Ash	*Apiognomonia errabunda*	1
	Nectria galligena	1
Asiatic lily	Rhizoctonia dry rot	1
Asplenium	Viral disease	1
Begonia	INSV	3
	Other viral disease	1
	Physiological disorder	1
Birch	Iron/manganese deficiency	1
	Other physiological disorders	4

cont'd ...

Table 6: Summary of diseases diagnosed on **ornamentals** submitted to the University of Guelph Pest Diagnostic Clinic in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Boston ivy	*Guignardia bidwelli*	1
	Physiological disorders	2
Boxwood	Physiological disorders	2
Cactus	Fusarium /Pythium crown rot	1
	Physiological disorder	1
Calla lily	*Erwinia carotovora* pv. *carotovora*	15
	Physiological disorder	1
Celosia	Physiological disorder	1
Chrysanthemum	Fusarium rot	2
	Pythium root rot	1
	Rhizoctonia stem rot	1
	TSWV	1
	Herbicide injury	1
	Other physiological disorder	1
Clematis	Phyllosticta leaf spot	1
	Physiological disorders	3
Cottoneaster	*Erwinia amylovora*	1
	Physiological disorder	1
Corkscrew hazel	*Phyllactinia guttata*	1
Crabapple	*Agrobacterium tumefaciens*	1
	Venturia inaequalis	3
	Podosphaera leucotricha	1
	Physiological disorder	1
Crocosmia	*Botrytis* sp.	1
Cyclamen	Fusarium crown rot	2
	Physiological disorder	1
Daffodil	Fusarium bulb rot	1
Dahlia	*Fusarium crown rot*	1
	Physiological disorder	2
Delphinium	Rhizoctonia root rot	1
	Physiological disorders	2

cont'd ...

Table 6: Summary of diseases diagnosed on **ornamentals** submitted to the University of Guelph Pest Diagnostic Clinic in 1997. Cont'd

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Dieffenbachia	TSWV	1
Dogwood	Physiological disorder	1
Draceana	Viral disease	1
	Physiological disorder	1
Easter lily	Lily symptomless virus (LySV)	1
Eastern white cedar	Physiological disorders	7
Echinacea	Septoria leaf spot	1
Elm	*Stegophora ulmea*	1
	Physiological disorders	2
Euonymous	*Pseudomonas syringae*	2
	Gloeosporium sp.	1
	Physiological disorders	2
Fig	Physiological disorders	2
Fir	Physiological disorders	3
Flowering almond	Physiological disorder	1
Freesia	Fusarium/Pythium root rot	1
Fuchsia	Rust	1
	Physiological disorder	1
Geranium	*Xanthomonas campestris* pv. *pelargonii*	27
	Botrytis cinerea	2
	Pythium sp.	3
	Oedema	7
	Viral disease	1
	Other bacterial diseases	2
	Other physiological disorders	5
Gerbera	*Fusarium* sp.	1
Gladiola	Physiological disorder	1
Gloxinia	INSV	1
Haworthia	*Erwinia* sp.	1

cont'd ...

Table 6: Summary of diseases diagnosed on **ornamentals** submitted to the University of Guelph Pest Diagnostic Clinic in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Hemlock	Physiological disorders	2
Hickory	*Microstroma juglandis*	1
Hyacinth	Physiological disorder	1
Hydrangea	Physiological disorder	1
Impatiens	*Plasmopara obducens*	1
	Pythium sp.	2
	Botrytis sp.	1
	Fusarium root rot	1
	INSV	3
	TSWV	1
	Frost injury	1
	Other viral disease	1
	Other physiological disorders	3
Ivy	*Xanthomonas campestris* pv. *hederae*	2
	Physiological disorder	1
Ivy geranium	Physiological disorder	1
Japanese maple	Physiological disorders	4
Juniper	*Kabatina juniperi*	6
	Physiological disorder	1
Kalanchoe	*Botrytis cinerea*	4
	Fusarium rot	1
	INSV	1
Larkspur	Fusarium root rot	1
Lilac	Physiological disorder	1
Linden	Physiological disorder	1
London plane tree	Physiological disorder	1
Magnolia	Iron/manganese deficiency	1
Mandevilla	oedema	1

cont'd ...

Table 6: Summary of diseases diagnosed on **ornamentals** submitted to the University of Guelph Pest Diagnostic Clinic in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Maple	*Microsphaera penicillata*	2
	Verticillium wilt	1
	Anthracnose	3
	Herbicide injury	1
	Other physiological disorders	14
Maranta	Physiological disorder	1
Marigold	Physiological disorder	1
Mountain ash	Physiological disorder	1
Mulberry	*Nectria cinnabarina*	1
	Physiological disorders	2
Oak	*Taphrina caerulescens*	1
	Anthracnose	1
	Iron/manganese deficiency	3
	Other physiological disorders	10
Orchid	Odontoglossum ring spot virus (ORSV)	4
	Cymbidium mosaic virus (CMV)	5
	Physiological disorders	2
Peony	*Sclerotinia sclerotiorum*	1
	Physiological disorders	2
Persian violet	*Rhizoctonia solani*	1
	INSV	1
Pine	*Sphaeropsis sapinea*	10
	Dothistroma septospora	1
	Cenangium ferruginosum	1
	Physiological disorders	4
Poinsettia	*Sclerotinia sclerotiorum*	1
	Botrytis cinerea	1
	Pythuim sp.	1
	Fusarium sp.	1
Poplar	Physiological disorder	1
Primula	INSV	3
Ranunculus	INSV	2

cont'd ...

Table 6: Summary of diseases diagnosed on **ornamentals** submitted to the University of Guelph Pest Diagnostic Clinic in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Redwood	Winter injury	1
Rose	*Peronospora sparsa*	1
	Botrytis cinerea	1
	Pythium sp.	1
	Apple mosaic virus (AMV)	1
	Calcium deposit	1
	Other physiological disorders	4
Sandcherry	Iron/manganese deficiency	1
Scaevola	Physiological disorder	1
Scobilia	Physiological disorder	1
Smokebush	Physiological disorder	1
Snapdragon	*Phyllosticta* sp.	1
Spruce	*Rhizosphaera kalkhoffiI*	2
	Winter injury	5
	Herbicide injury	2
	Other physiological disorders	16
Strobilanthes	*Pythium* sp.	1
Trillium	Physiological disorder	1
Tulip	*Penicillium* sp.	1
	Physiological disorder	1
Veronica	INSV	1
Vinca	*Sclerotinia sclerotiorum*	1
Willow	*Botryosphaeria* sp./*Fusarium* sp.	1
Yew	Physiological disorders	4

CROP: Commercial Crops - Diagnostic Laboratory Report

LOCATION: Québec

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS SUBMITTED TO THE MAPAQ DIAGNOSTIC LABORATORY IN 1997

METHODS: The objective of the MAPAQ diagnostic laboratory is to provide diagnosis and control recommendations for disease problems of commercial crops. The following data reflects diagnoses of samples submitted to the laboratory by extension staff of MAPAQ, the "Régie des assurances agricoles du Québec", the "Institut québécois du développement de l'horticulture ornementale" and by the agricultural industry. Diagnosis is based on visual examination of symptoms and on the use of various laboratory tests to detect and to identify pathogens. The following tests are used in the laboratory; for nematodes, isolation with the Baermann pan and microscope examination; for fungi, isolation on artificial media, microscope examination and pathogenicity testing; for bacteria, isolation on artificial media, classical biochemical tests including API-20E and Biolog^{R}, ELISA and PCR tests; for phytoplasma, PCR test and for virus, ELISA test.

RESULTS AND COMMENTS: The crop distribution of samples was: vegetable crops (field and greenhouse) 42%, small fruits 26%, herbaceous and woody ornamentals 18%, cereal crops 2%, field crops 2%, fruit trees 2% and other samples 7%. Tables 1-7 show a summary of the main parasitic and nonparasitic diseases diagnosed by the laboratory for the most representative vegetable crops, greenhouse vegetables, small fruits, herbaceous and woody ornamentals, apple trees, cereals and other crops.

ACKNOWLEDGEMENT: The authors gratefully thank Chantal Malenfant, Mario Tésolin and Lise Vézina for technical assistance.

Table 1. Summary of **vegetable crop** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Asparagus	*Botrytis cinerea*	1
	Fusarium wilt	1
	Stemphylium blight	1
Bean	Alternaria leaf spot	1
	Ascochyta leaf spot	1
	Bipolaris sorokiniana	1
	Colletotrichum lindemuthianum	3
	Fusarium oxysporum	1
	Fusarium solani	2
	Pythium root rot	1
	Rhizoctonia stem and root canker	2
	Sclerotinia rot	1
	Cold injury	1
	Dicamba injury	1
	Salt injury	1
Broccoli	Wind injury	1
Cabbage	*Botrytis cinerea*	1
	Fusarium oxysporum	1
	Pythium crown rot	1
	Rhizoctonia solani	1
	Xanthomonas campestris pv. *campestris*	1
	Black speck	2
	Chilling injury	2
	Linuron injury	1
	Phosphorus deficiency	1
Cantaloup	*Botrytis cinerea*	1
	Ascochyta fruit rot	1
	Fusarium oxysporum	1
	Water stress	1
Carrot	*Cercospora carotae*	1
	Fusarium root rot	2
	Pythium sp. (cavity spot)	2
	Rhizoctonia solani	4
	Xanthomonas campestris pv. *carotae*	6
	Meloidogyne sp.	2
	Aster yellows	1
	Calcium deficiency	1
	Mechanical injury	1
Cauliflower	Pythium stem and crown rot	3
	Xanthomonas campestris pv. *campestris*	8
	Pseudomonas syringae	2

cont'd ...

Table 1. Summary of **vegetable crop** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Celery	*Cercospora apii*	1
	Fusarium oxysporum	2
	Pythium root rot	2
	Aster yellows	1
	Boron deficiency	1
	Excessive water	2
	Genetic disorder	1
	Mechanical disorder	1
	Sun burn	1
Chinese cabbage	Pythium crown and root rot	2
	Rhizoctonia solani	3
	Xanthomonas campestris pv. *campestris*	3
	Potyvirus	2
	Cold injury	1
Corn	Fusarium root rot	1
	Pyrenochaeta root rot	2
	Pythium root rot	1
	Ustilago zeae	1
	Tylenchorhynchus sp.	1
	Nicosulfuron injury	1
	Sun burn	1
Cucumber	Alternaria leaf spot	1
	Cladosporium fruit rot	1
	Pythium crown rot	2
	Rhizoctonia fruit rot	1
	Pseudomonas syringae	1
	CMV	1
	Cold injury	1
	Salt injury	1
	Wind injury	1
Garlic	Aspergillus bulb rot	1
	Fusarium bulb rot	1
	Rhizopus bulb rot	1
	Potyvirus	1
Leek	*Fusarium oxysporum*	1
	Pseudomonas marginalis	1
	Pseudomonas syringae	1

cont'd ...

Table 1. Summary of **vegetable crop** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Lettuce	*Botrytis cinerea*	1
	Pythium root rot	1
	Septoria lactucae	1
	Pseudomonas cichorii	2
	Ammonia toxicity	3
	Cold injury	1
	Corky root	2
	Overmature	1
	Mechanical injury	1
Onion	Botrytis neck rot	6
	Fusarium basal rot	5
	Peronospora destructor	1
	Pyrenochaeta sp.	1
	Sclerotium cepivorum	1
	Stemphylium botryosum	1
	Pseudomonas marginalis	1
	Growth cracks	3
	Overmature	3
	Water stress	1
Pea	*Fusarium oxysporum*	1
	Fusarium solani	6
Pea	*Rhizoctonia solani*	1
	Uromyces fabae	1
Pepper	*Botrytis cinerea*	3
	Colletotrichum sp.	1
	Rhizoctonia solani	2
	Sclerotinia sclerotiorum	1
	Erwinia carotovora subsp. *carotovora*	1
	Pseudomonas syringae	7
	Xanthomonas campestris pv. *vesicatoria*	18
	Cold injury	4
	Glyphosate injury	1
	Heat stress	1
	Mechanical injury	1
	Oedema	3
	Phosphorus deficiency	1
	Water stress	2
	Wind injury	3

cont'd ...

Table 1. Summary of **vegetable crop** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Potato	*Alternaria solani*	2
	Botrytis cinerea	2
	Colletotrichum coccodes	7
	Fusarium tuber rot	10
	Helminthosporium solani	1
	Phytophthora erythroseptica	8
	Phytophthora infestans	2
	Rhizoctonia solani	8
	Verticillium sp.	13
	Clavibacter michiganensis subsp. *sepedonicus*	6
	Erwinia carotovora subsp. *carotovora*	17
	Pseudomonas fluorescens	12
	Pseudomonas marginalis	1
	Streptomyces spp.	3
	PLRV	2
	Pratylenchus sp.	3
	Black heart	1
	Blue spotting	3
	Calcium deficiency	2
	Genetic disorder	2
	Growth cracks	1
	Hollow heart	4
	Internal crown spot	1
	Mechanical injury	2
	Ozone injury	1
	Potassium deficiency	1
	Water stress	4
Pumpkin	*Erysiphe cichoracearum*	1
	Phoma cucurbitacearum	1
	Septoria cucurbitacearum	1
	Sphaerotheca fuliginea	1
	Pseudomonas syringae	1
	Atrazine injury	1
Radish	*Peronospora parasitica*	1
Rhubarb	Water stress	1
Rutabaga	*Peronospora parasitica*	1
	Plasmodiophora brassicae	1
	Rhizoctonia solani	2
	Sclerotium rolsfii	1
	Erwinia carotovora subsp. *carotovora*	2
	Pseudomonas viridiflava	1
	Boron deficiency	2
	Mechanical injury	1

cont'd ...

Table 1. Summary of **vegetable crop** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Squash	*Erwinia carotovora* subsp. *carotovora*	1
	Growth cracks	1
Tomato	Alternaria fruit rot	1
	Alternaria solani	1
	Botrytis cinerea	1
	Fusarium crown rot	1
	Geotrichum fruit rot	2
	Phytophthora infestans	1
	Septoria lycopersici	2
	Clavibacter michiganensis subsp. *michiganensis*	8
	Pseudomonas syringae pv. *tomato*	3
	TSWV	2
	Blotchy ripening	1
	Calcium deficiency	1
	Cold injury	1
	Manganese toxicity	1
	Oedema	1
	Potassium deficiency	1
	Wind injury	2
Watermelon	Fusarium oxysporum (wilt)	1
	Pythium fruit rot	1

Table 2. Summary of **greenhouse vegetable** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Cucumber	Alternaria leaf spot	1
	Botrytis cinerea	1
	Cladosporium cucumerinum	1
	Didymella bryoniae	1
	Fusarium wilt	1
	Phomopsis sp.	1
	Pythium root rot	8
	Rhizoctonia solani	1
	Ulocladium leaf spot	1
	Verticillium sp.	1
	Erwinia carotovora subps. *carotovora*	1
	CMV	1
	Mechanical injury	1
	Salinity excess	1
	Sudden wilt	1
Lettuce	*Botrytis cinerea*	1
	Septoria lactucae	1
Lettuce	Phytophthora root rot	2
	Pythium root rot	8
Tomato	*Botrytis cinerea*	12
	Colletotrichum coccodes	4
	Fulvia fulva	1
	Fusarium oxysporum f. sp. *radicis-lycopersici*	14
	Humicola root rot	4
	Phytophthora root rot	2
	Phytophthora infestans	2
	Plectosporium canker	1
	Pyrenochaeta lycopersici	10
	Pythium root rot	30
	Rhizoctonia solani	1
	Thielaviopsis basicola	1
	Clavibacter michiganensis subsp. *michiganensis*	10
	Erwinia carotovora subps. *carotovora*	3
	Pseudomonas corrugata	1
	Pseudomonas syringae	1
	ToMV	1
	Helicotylenchus sp.	1
	Meloidogyne sp.	4
	Pratylenchus sp.	2
	Xiphinema sp.	1
	Blotchy ripening	7
	Calcium deficiency	1

cont'd ...

Table 2. Summary of **greenhouse vegetable** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Tomato cont'd...	Genetic disorder	2
	Gold speck	3
	Manganese toxicity	6
	Mechanical injury	1
	Russeting	3
	Salt injury	9
	Water excess	1

Table 3. Summary of **small fruit** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Blueberry	*Aureobasidium pullulans*	1
	Botryosphaeria canker	1
	Botrytis cinerea	1
	Cytospora canker	1
	Godronia cassandrae	4
	Gibbera vaccinicola	1
	Winter injury	2
Cranberry	Botryosphaeria canker	2
	Diaporthe vaccinii	2
	Godronia cassandrae	2
	Monilinia sp.	1
	Phyllosticta sp.	1
	Potyvirus	1
	Sun burn	1
	Water excess	1
Gooseberry	*Colletotrichum gloeosporioides*	1
	Gloeosporidiella ribis	1
	Septoria ribis	3
	Sphaerotheca mors-uvae	1
	ToRSV	1
	Wind injury	1
	Winter injury	1
Grape	Cylindrocarpon crown rot	1
	Phoma sp.	1
	Agrobacterium tumefaciens	1
	Winter injury	1

cont'd ...

Table 3. Summary of **small fruit** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Strawberry	*Botrytis cinerea*	7
	Fusarium wilt	1
	Phytophthora fragariae	13
	Pyrenochaeta root rot	1
	Pythium root rot	4
	Rhizoctonia solani	8
	Sphaerotheca macularis	2
	Verticillium sp.	3
	Zythia fragariae	1
	Phytoplasma	1
	Pratylenchus sp.	3
	Black root rot	7
	Genetic disorder	2
	Linuron injury	1
	Poor pollination	1
	Salt injury	2
	Sinbar injury	1
	Terbacil injury	2
	Water excess	3
	Water stress	1
	Winter damage	10
Raspberry	*Armillaria mellea*	1
	Botrytis cinerea	2
	Coniothyrium fuckelii	2
	Cylindrocarpon root rot	2
	Fusarium wilt	2
	Phoma canker	1
	Phytophthora root rot	14
	Pyrenochaeta root rot	1
	Rhizoctonia root rot	5
	Verticillium spp.	3
	Yeast fruit rot	1
	Agrobacterium rubi	3
	Agrobacterium tumefaciens	1
	RMV	1
	Pratylenchus sp.	1
	Casoron injury	2
	Cold injury	1
	Winter damage	9

Table 4. Summary of **herbaceous and woody ornamental** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Acer sp.	*Aureobasidium apocryptum*	1
	Kabatiella leaf spot	1
	Phytophthora root rot	1
	Verticillium sp.	1
	Winter injury	1
Aeschynanthus sp.	Cold water injury	1
Amelanchier	*Drepanopeziza ribis*	1
	Microsphaera penicillata	1
Anthofinia	TMV	1
Astilbe	Rhizoctonia root rot	1
	Thielaviopsis root rot	1
	Water excess	1
Begonia sp.	*Botrytis cinerea*	1
Calla sp.	*Erwinia carotovora* subsp. *carotovora*	1
Carya sp.	*Microstoma juglandis*	1
Celosia sp.	Phytophthora root rot	1
	Pythium root rot	1
Cleome spinosa	*Alternaria saperda*	1
Cotoneaster sp.	Cytospora canker	1
Delphinium	Ascochyta leaf spot	1
	Erysiphe sp.	1
	Pseudomonas leaf spot	1
	Rhizoctonia crown rot	1
Dicentra sp.	Nitrogen deficiency	1
	Potassium deficiency	1
Dracaena sp.	Fusarium root rot	2
	Phytophthora root rot	1
	Pythium root rot	2
	Oedema	1
	Salt injury	1

cont'd ...

Table 4. Summary of **herbaceous and woody ornamental** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Euphorbia pulcherrima	Pythium root rot	2
	Rhizoctonia crown rot	1
Fraxinus sp.	Wind injury	1
Gerbera jamesonii	Fusarium crown rot	2
Hamelia patens	Pythium root rot	1
Hibiscus sp.	Phytophthora root rot	2
Impatiens sp.	Alternaria leaf spot	1
	Botrytis cinerea	1
	Pythium root rot	2
	Rhizoctonia root rot	2
	INSV	1
Iris germanica	*Erwinia carotovora* subsp. *carotovora*	1
Juniperus sp.	*Kabatina* sp.	1
	Snow damage	1
Kalanchoe sp.	INSV	1
Liatris spicata	Oedema	1
Lisianthus sp.	Fusarium wilt	1
Lupinus sp.	Rhizoctonia crown rot	1
	Septoria leaf spot	1
Malus sp.	*Cylindrocarpon* sp.	1
	Phytophthora root rot	2
Palm	Drechslera leaf spot	1
Pachysandra	Volutella leaf spot	1
	Sun burn	1
Pelargonium sp.	*Botrytis cinerea*	2
	Xanthomonas campestris pv. *pelargonii*	1
	PFBV	22
	TRSV	2
	TSWV	1

cont'd ...

Table 4. Summary of **herbaceous and woody ornamental** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Pelargonium sp. cont'd ...	Oedema	1
	Salt injury	2
	SO_2 injury	1
Pentas	Pythium root rot	1
	Salt injury	1
Petunia	Rhizoctonia stem rot	1
	TMV	3
	Oedema	1
Physocarpus	Water stress	1
Picea sp.	*Rhizosphaera* sp.	2
Pinus sp.	*Diplodia* sp.	2
	Endocronartium harknessii	2
	Sphaeropsis sp.	1
	Snow injury	1
Prunus virginiana	Cylindrocarpon crown rot	1
Quercus macrocarpa	*Taphrina caerulescens*	1
	Nitrogen deficiency	1
Pulmonaria angustifolia	Rhizoctonia root rot	1
Rhododendron sp.	Botrytis flower blight	1
Rhus typhina	*Sphaeropsis* sp.	1
Rosa sp.	*Botrytis cinerea*	1
	Coniothyrium canker	1
	Sphaerotheca sp.	1
	Agrobacterium tumefaciens	3
	Calcium deficiency	1
	Sun burn	1
Rudbeckia sp.	Alternaria leaf blight	1
	Pythium stem rot	1
	Pseudomonas leaf spot	1
Salix sp.	Glomerella canker	1

cont'd ...

Table 4. Summary of **herbaceous and woody ornamental** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997. Cont'd.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Salvia sp.	Pythium root rot	1
	Salt injury	1
Schefflera sp.	Pythium root rot	1
	Rhizoctonia root rot	1
	Helicotylenchus sp.	1
Sedum spectabile	Phytophthora root rot	1
Senecio cruentus	INSV	1
Sinningia speciosa	Phytophthora crown rot	1
Solanum sp.	PLRV	1
	PVX	1
Spiraea sp.	*Botrytis cinerea*	1
	Water excess	2
Syringae vulgaris	2,4-D injury	1
Thuya occidentalis	*Pseudomonas syringae*	1
	Water excess	1
	Winter injury	1
Turfgrass	Curvularia leaf spot	1
	Fusarium crown rot	1
Ulmus sp.	*Gloesporium* sp.	1
	Ophiostoma ulmi	1
	Rhizoctonia root rot	1
	Water excess	1
	Winter damage	1
Verbena sp.	Pseudomonas leaf spot	1
	Potyvirus	1
Viburnum	Cercospora leaf spot	1
Vinca major	Phoma canker	1

Table 5. Summary of **apple tree** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Apple	Alternaria fruit spot	1
	Nectria cinnabarina	2
	Erwinia amylovora	8
	Bitter pit	1
	Potassium deficiency	1
	Spring frost damage	1

Table 6. Summary of cereal crop diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Barley	*Bipolaris sorokiniana*	5
	Fusarium graminearum	2
	Pyrenophora teres	2
	BYDV	1
Oat	Alternaria seed spot	2
	Bipolaris sorokiniana	1
	Cladosporium seed spot	1
	Epicoccum seed spot	3
	Puccinia coronata	1
	Septoria avenae	1
Wheat	Alternaria seed spot	1
	Bipolaris sorokiniana	3
	Cladosporium seed spot	1
	Fusarium graminearum	2
	Pyrenophora sp.	1
	Septoria sp.	1
Rye	*Claviceps purpurea*	1

Table 7. Summary of **other crop** diseases diagnosed by the MAPAQ diagnostic laboratory in 1997.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Alfalfa	*Peronospora trifoliorum*	1
	Phytophthora root rot	1
	Pseudopeziza medicaginis	1
	AMV	1
Basil	Fusarium wilt	2
	Pythium root rot	3
	Oedema	1
Canola	Alternaria pod spot	1
	Cladosporium pod spot	1
	Colletotrichum crown rot	1
	Plasmodiophora brassicae	1
	Rhizoctonia solani	1
	Sclerotinia sclerotiorum	1
Soybean	Ascochyta seed spot	1
	Colletotrichum destructivum	7
	Fusarium root rot	6
	Peronospora manshurica	2
	Phomopsis sp.	5
	Phytophthora root and crown rot	2
	Rhizoctonia solani	1
	Sclerotinia sclerotiorum	3
	Septoria glycines	1
	Pseudomonas syringae	1
	Xanthomonas campestris pv. *glycines*	1
	Herbicide injury	2
Tobacco	*Rhizoctonia solani*	1
	Thielaviopsis basicola	3

CROP: Commercial crops - Diagnostic Laboratory Report

LOCATION: Prince Edward Island

NAME AND AGENCY:
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P.E.I. Department of Agriculture and Forestry
Research and Laboratories
Plant Health Services
P.O. Box 1600
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C1A 7N3

TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS IN PRINCE EDWARD ISLAND,1997

METHODS: The P.E.I. Department of Agriculture and Forestry's Plant Health Services group provides diagnosis of, and control recommendations primarily for disease problems of commercial crops produced on P.E.I. Samples are submitted to the laboratory by agriculture extension staff, producers, agri-business and the general public. Diagnoses are based on visual examination of symptoms, microscopic observation and culturing on artificial media.

RESULTS AND COMMENTS: A total of 310 samples were processed during the period June - November 1997. Results are summarized in Table 1.

Table 1. Diseases diagnosed on **commercial crop** samples submitted to Plant Health Services, Prince Edward Island Department of Agriculture and Forestry, Prince Edward Island, 1997.

CROP	DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO.OF TIMES AGENTS WERE IDENTIFIED	
VEGETABLES				
Bean	White mold	*Sclerotinia* sp.	1	
Brussel Sprouts	Leaf spot	*Alternaria* sp.	1	
Cabbage	Leaf spot	*Alternaria* sp.	1	
	Mosaic virus		1	
Cucumber	Angular leaf spot	*Alternaria* sp.	2	
	Insect damage	Looper	1	
Potato	Bacterial soft rot	*Erwinia* sp.	11	
		Clostridium sp.	5	
		Pseudomonas sp.	3	
	Black dot	*Colletotrichum coccodes*	2	
	Blackleg	*Erwinia* sp.	15	
	Black scurf	Rhizoctonia solani	16	
	Dry rot	*Fusarium avenaceum*	2	
		Fusarium oxysporum	1	
		Fusarium solani	2	
		Fusarium sp.	9	
	Early blight	*Alternaria solani*	8	
	Early dying syndrome	*Rhizoctonia solani*	3	
		Fusarium spp.	1	
		Verticillium spp.	2	
	Gray mold	*Botrytis cinerea*	3	
	Insect damage	European corn borer	2	
		Flea Beetle	3	
		Looper	1	
		Nematode	2	
	Late blight	*Phytophthora infestans*	60	
	Leak	*Pythium* sp.	4	
	Pink eye	*Pseudomonas* spp.	4	
	Pink rot	*Phytophthora erythroseptica*	18	
	Seed piece decay	*Fusarium* spp.	9	
		Erwinia spp.	12	
	Scab	*Streptomyces scabies*	17	
	Silver scurf	*Helminthosporium solani*	5	
	Stem canker	*Rhizoctonia solani*	53	
	Virus	Mosaic	4	
	White mold	*Sclerotinia sclerotiorum*	16	
	Wilt	*Fusarium* spp.	2	
		Verticillium spp.	19	
		Colletotrichum sp.	1	cont'd ...

Table 1. Diseases diagnosed on **commercial crop** samples submitted to Plant Health Services, Prince Edward Island Department of Agriculture and Forestry, Prince Edward Island, 1997.

CROP	DISEASE	CAUSAL AGENT/ PLANT PATHOGEN	NO.OF TIMES AGENTS WERE IDENTIFIED
Potato cont'd ...	Physiological disorders	Chemical burn	9
		Low temperature injury	2
		Chilling injury	2
		Lightening damage	3
		Nutritional disorder	5
		Blackheart	1
		Enlarged lenticels	1
		Little tuber	2
		Greening	1
		Growth cracks	4
		Elephant hide	5
		Bruising	5
		Skinning	3
		Tip burn	2
		Wind damage	
Tomato	Late blight	*Phytophthora infestans*	1
	Botrytis vine rot	*Botrytis cinerea*	1
	Crown rot	*Fusarium oxysporum*	1
CEREALS			
Barley	Net blotch	*Pyrenophora terres*	2
	Root rot	*Bipolaris* sp.	1
		Pythium sp.	1
	Scald	*Rhynchosporium secalis*	1
	Nutritional disorder		1
SMALL FRUITS			
Blueberry	Monilinia blight	*Monilinia sp.*	1
	Wasp galls		1
Strawberry	Root rot	*Fusarium oxysporum*	1
		Gliocladium sp.	1
		Rhizoctonia sp.	1
SPECIALITY CROPS:			
Ginseng	Rusty root	*Fusarium* sp.	1
		Cylindrocarpon sp.	*2*
TOTAL:			**385**

Cereals / Céréales

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Peace River Region of Alberta

NAME AND AGENCY:
L.M. Harrison
Alberta Agriculture, Food and Rural Development
Fairview Regional Office, P.O. Box 159
Fairview, AB T0H 1L0
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TITLE: BARLEY LEAF STRIPE SURVEY, 1996 (note year of survey)

METHODS: In early August 1996, 24 barley crops were surveyed for barley leaf stripe, *Pyrenophora graminea*. In the crops where the disease was found, disease levels (percent of plants infected) were estimated using a scale as follows: trace (<1%), low (1-5%), moderate (6-10%), high (11-40%) and severe (41-100%). There were 9 crops surveyed in the Valhalla, La Glace and Sexsmith region, and 15 crops surveyed in the Fairview, Berwyn and Grimshaw region.

RESULTS AND COMMENTS: The weather was generally cool, wet and cloudy throughout the growing season. Barley leaf stripe (*P. graminea*) was found in 8 of the 24 barley crops surveyed (Table 1). Five crops had disease incidence at trace levels and 3 crops had moderate disease severity. Other diseases observed included net blotch, scald and common root rot. Generally, net blotch appeared to be more severe than scald. Barley thrips and aphids were also observed in some crops.

Table 1. Barley leaf stripe in the Peace River region of Alberta in 1996.

DISEASE INCIDENCE	NUMBER OF CROPS AFFECTED
zero	16
trace	5
low	0
moderate	3
high	0
severe	0
Total	24

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Manitoba

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TITLE: FUSARIUM HEAD BLIGHT OF BARLEY IN MANITOBA IN 1997

METHODS: Seventy-two barley fields in southern Manitoba were surveyed for the presence of fusarium head blight (FHB) between July 30 and August 12, 1997. The 64 six-row and 8 two-row barley fields were selected randomly along the survey routes. The incidence and severity of FHB in each field was assessed by sampling 50 to 100 barley heads at three locations for disease. Infected heads were collected from each site. Ten discoloured kernels from five heads per field were surface sterilized in 0.3% NaOCl and plated onto potato dextrose agar to determine the *Fusarium* species on the seed.

RESULTS AND COMMENTS: Conditions generally were favourable for the development of FHB in Manitoba in 1997. Fusarium head blight was as severe in the region south of Brandon, as in the Red River Valley region, a new development in 1997. Fusarium head blight was found in 71 of the 72 fields surveyed. Positive fields had an average 31% affected heads (range 1 - 75%); individual heads had an average of 12% blighted kernels (range 3 - 40%). Based on these levels of incidence and severity, FHB was estimated to have caused yield losses of 2-3% in barley in 1997. The *Fusarium* species isolated from infected kernels are listed in Table 1. As in previous years, *F. poae* continued to be a significant component of FHB in barley; F. sporotrichioides was present in almost half of the fields.

Table 1. *Fusarium* species in Manitoba barley in 1997.

***Fusarium* spp.**	**Frequency of fields (%)**	**Frequency from kernels (%)**
F. graminearum	79.2	66.6
F. poae	61.1	22.8
F. sporotrichioides	44.4	7.7
F. equiseti	9.7	1.4
F. avenaceum	6.9	0.6
F. culmorum	2.8	0.8

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Manitoba

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TITLE: LEAF SPOT DISEASES OF BARLEY IN MANITOBA IN 1997

METHODS: Leaf spot diseases of barley, i.e., net blotch, scald, speckled leaf blotch and spot blotch, were assessed in southern Manitoba in 1997 by surveying 72 (64 six-rowed, 7 two-rowed, 1 mixed) farm fields between July 30 and August 14, when the corp was at the milky-ripe to hard-dough stage. At each site, a diamond-shaped transect about 50 m per side was followed, and plants at several locations were sampled for leaf spot severity, based on the amount of necrosis and chlorosis on upper (flag and flag -1 leaves) and lower leaf canopies. A five-category scale was used: zero (no visible symptoms, trace (<5% leaf area affected, slight (5-15%), moderate (16-40%) and severe (41-100%). Infected leaves were collected at each location and subsequently used (10 leaf tissue pieces per site) to identify the pathogenic species and their frequency.

RESULTS AND COMMENTS: Conditions generally were favourable for the development of leaf spots in Manitoba in 1997 as temperatures were warm, and precipitation levels while 'normal', were supplemented by abnormally high humidity for much of the growing season. Severity of leaf spotting (all symptom types combined) in the lower leaf canopy was rated as trace to slight in 26% of fields, and moderate to severe in 66% (8% were senescent); in the upper canopy, 78% of fields were rated trace or slight and 21% as moderate or severe. The most severely affected fields had remnants of barley stubble evident at the soil surface suggesting barley had been grown the year previously. On the basis of the severity levels found, leaf spots were estimated to have caused average yield losses of 3-5%. In 1997 the total barley crop in Manitoba was estimated at 66 million bushels, based on 1.2 million acres sown and an average yield of 55 bushels per acre. Results of pathogen isolations from sampled tissue indicated *Pyrenophora teres* (net blotch) and *Cochliobolus sativus* (spot blotch) each to be present in virtually all (96%) fields and many leaf tissue pieces. Net blotch appeared to be more common in 38% of fields and spot blotch in 18%; in the remainder, the pathogens causing the diseases were detected equally. Septoria passerinii (speckled leaf blotch) was found infrequently in 28% of fields. *Rhynchosporium secalis* (scald) was not observed in 1997. The warm temperatures during the growing season particularly favoured development of spot blotch and the disease was very severe on certain barley cultivars at crop evaluation sites in southern Manitoba.

CROP: Barley, Common Wheat and Durum Wheat

LOCATION: Saskatchewan

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TITLE: LEAF DISEASES OF WHEAT AND BARLEY IN SASKATCHEWAN IN 1997

METHODS: A survey for leaf diseases of wheat and barley was conducted between the milk and dough stages of growth in farm fields randomly selected from each crop district (CD) in Saskatchewan. Fields sampled totalled 125 for common wheat (CWRS and CPS) in CDs 1 to 9, 50 for durum wheat in CDs 1 to 4, 6 and 7, and 20 for barley in CDs 1 to 4, 6 and 7. In each of the CDs, 20 flag and 20 penultimate leaves were collected randomly from each field, and stored in plastic bags in the cold until analyzed. Diseases/pathogens were identified by their characteristic visual symptoms on leaves, and/or by plating surface disinfested leaf pieces on water agar (Fernandez et al., 1997). For leaf spots, the severity of infection was assessed either from collected leaves or in the field, using a 0-11 rating scale (McFadden, 1991).

RESULTS AND COMMENTS: Leaf spot severity varied among crop districts (Tables 1 and 2). For durum wheat (Table 1), leaf spot scores were highest in the south-east (CDs 1 and 2), and lowest in south-western and central-western districts (CDs 3, 4 and 7). The most prevalent leaf spotting diseases were septoria leaf blotches (both nodurum and tritici) in CDs 1, 2 and 6, and tan spot in CDs 3, 4 and 7. Leaf rust was observed in all fields sampled in CD 1, in 4% of fields in CD 3, and 20% of fields in CD 6. In all cases, the severity of the leaf rust infection was low (trace to light).

For CWRS and CPS wheat (Table 2), the highest severity of leaf spots was observed in central, central-eastern and south-eastern districts (CDs 1, 2, 5 and 6), and the lowest in south-western and central-western districts (CDs 3, 4 and 7). The most prevalent leaf spotting diseases in CDs 1, 2, 5, 6, 8 and 9 were the septoria leaf blotches, with tan spot being present at lower levels. Tan spot prevailed in CDs 3 and 7, and both tan spot and septoria nodorum blotch were common in CD 4. Leaf rust was present in all districts, except CD 4, at trace to light levels. The percentage of fields affected by leaf rust was highest in the east: 29% in CD 1, 60% in CD 2, 10% in CD 3, 83% in CD 5, 33% in CD 6, 14% in CD 7, 57% in CD 8 and 17% in CD 9.

For barley, the severity of leaf diseases followed a pattern similar to that in wheat, with high severities in CDs 2 and 5, and low severities in CDs 3 and 7. Overall, the most common disease was net blotch, followed by septoria leaf blotch (speckled leaf blotch) and spot blotch. Scald was found only in one field in CD 7.

We gratefully acknowledge the participation of Saskatchewan Agriculture and Food extension agrologists in this survey.

REFERENCES:

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Table 1. Severity (0-11 scale) of leaf spots in durum wheat fields sampled in Saskatchewan in 1997.

	CROP DISTRICT [A]					
	1	**2**	**3**	**4**	**6**	**7**
No. fields sampled	4	2	3	5	6	5
Leaf spot severity	10.8	11.0	6.0	7.2	8.2	5.0

[a] no leaf spot severity scores available for CDs 8 and 9.

Table 2. Severity (0-11 scale) of leaf spots in CWRS (Canada Western Red Spring) and CPS (Canada Prairie Spring) wheat fields sampled in Saskatchewan in 1997.

	CROP DISTRICT[A]						
	1	**2**	**3**	**4**	**5**	**6**	**7**
No fields sampled	7	10	20	4	24	15	12
Leaf spot severity	10.9	10.6	4.5	5.3	11.4	9.7	3.7

[a] no leaf spot severity scores available for CDs 8 and 9.

CROP: Barley, Durum and Spring Wheat

LOCATION: Saskatchewan

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TITLE: THE INCIDENCE OF FUSARIUM HEAD BLIGHT IN SPRING WHEAT, DURUM AND BARLEY GROWN IN SASKATCHEWAN DURING 1997.

METHODS: In 1997, the incidence of Fusarium head blight (FHB) was assessed in 12 barley, 69 spring wheat (CWRS and CPS) and 21 durum wheat fields covering 12 crop districts across southern and central Saskatchewan. Heads from 50 tillers were sampled from the cereal fields during the first 2 weeks of August and sent to the Crop Protection Lab, Regina; the Semiarid Agriculture Research Station, Agriculture and Agri-Food Canada, Swift Current, or the University of Saskatchewan, Saskatoon, for disease assessment, pathogen isolation and identification. Kernels from heads with bleached or discoloured glumes and spikelets were surface sterilized in 0.5% ethanol for 1 minute and plated on potato dextrose agar to determine the presence and identification of *Fusarium* spp.

RESULTS AND COMMENTS: Showers during anthesis followed by warm humid conditions in the eastern region of Saskatchewan were favourable for the development of FHB. The central, southwestern and western regions of the province were extremely dry during July and August, which was unfavourable for FHB development. Low levels of FHB (<2% of glumes or spikelets bleached or discoloured/head) were found in spring wheat, durum and barley fields of the eastern crop districts bordering Manitoba (CDs 1A, 1B, 5A and 5B) (Table 1). One field of spring wheat in each of the southwest (4A) and central (6A) regions of the province was also found to have low levels of FHB.

Fusarium graminearum was the most frequently isolated species from spring wheat heads, however, *F. poae* also was isolated at similar levels (Table 2). *Fusarium poae* was isolated from all affected barley fields and over 72% of diseased barley heads. *Fusarium graminearum* was isolated from all diseased heads in the one affected durum field.

The incidence of FHB in cereals in Saskatchewan appears to be highest in the south-east near the Manitoba and North Dakota borders. Both Manitoba and North Dakota have experienced severe FHB in recent years (1).

We gratefully acknowledge the participation in the survey of Saskatchewan Agriculture and Food extension agrologists.

REFERENCES:
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Table 1. Incidence of Fusarium Head Blight in spring wheat, durum and barley fields sampled in 1997.

CROP	SPRING WHEAT		DURUM		BARLEY	
District	**No. of Fields Infected (No. of fields sampled)**	**Mean % Heads Infected**	**No. of Fields Infected (No. of fields sampled)**	**Mean % Heads Infected**	**No. of Fields Infected (No. of fields sampled)**	**Mean Heads Infected**
1A	5 (5)	26.2	0 (0)	0.0	0 (0)	0.0
1B	0 (2)	0.0	1 (4)	18.5	2 (2)	22.0
2A	0 (6)	0.0	0 (0)	0.0	0 (0)	0.0
2B	0 (4)	0.0	0 (2)	0.0	0 (1)	0.0
3AS	2 (3)	14.3	0 (2)	0.0	0 (1)	0.0
3BN	0 (3)	0.0	0 (4)	0.0	0 (0)	0.0
4A	1 (2)	2.0	0 (3)	0.0	0 (0)	0.0
5A	2 (4)	6.0	0 (0)	0.0	3 (3)	20.0
5B	5 (20)	3.5	0 (0)	0.0	0 (0)	0.0
6A	0 (10)	0.0	0 (2)	0.0	0 (2)	0.0
6B	1 (5)	3.4	0 (2)	0.0	0 (0)	0.0
7A	0 (5)	0.0	0 (2)	0.0	0 (2)	0.0

Table 2. Frequency of *Fusarium* species isolated from kernels of diseased spring wheat, durum and barley heads.

***FUSARIUM* SPP.**	**FREQUENCY OF FIELDS (%)**			**FREQUENCY IN DISEASED HEADS (%)**		
	Wheat	**Durum**	**Barley**	**Wheat**	**Durum**	**Barley**
F. graminearum	53.3	100	20*	54.9	100	27.9
F. poae	46.7	0	100*	45.1	0	72.1

* both *F.poae* and *F. graminearum* were isolated from the same fields.

CROP: Barley, Oat and Wheat

LOCATION: Manitoba and Eastern Saskatchewan

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TITLE: STEM RUSTS OF CEREALS IN WESTERN CANADA IN 1997

METHODS: Surveys of fields and nurseries of barley, oat and wheat for incidence and severity of stem rust (*Puccinia graminis* Pers. f. sp. *tritici* Eriks. & Henn. and *P. graminis* f. sp. *avenae* Eriks. & Henn. were conducted in Manitoba in July and August, 1997. Samples for race identification were obtained from fields and trap nurseries in Manitoba.

RESULTS AND COMMENTS: Conditions generally were warm and humid during the 1997 growing season in Manitoba, providing good conditions for rust development. Drought conditions in the southern plains of the USA, however, prevented inoculum build-up, thus only very small amounts of stem rust inoculum arrived in Manitoba, late in the season. As a result only traces of stem rust were detected in any commercial fields of barley. All oat and spring wheat cultivars recommended for Manitoba and Saskatchewan are resistant to stem rust, and no infections were expected. Susceptible lines of wheat or oat in nurseries showed only traces of infection near maturity. On susceptible wild barley (*Hordeum jubatum* L.) or wild oat (*Avena fatua* L.), low levels of infection developed during late summer-early fall.

For *P. graminis* f. sp. *tritici*, somewhat larger numbers of races than usual were identified, probably because the low levels of stem rust occurrence allowed the detection of lesser common races. The predominant race was TPMKR, followed by smaller amounts of TMRTH, TPMJR, RCRSK, RKQQR, and QCCJN. Race QCCJN, virulent to barley cultivars with the *Rpg1* resistance, has declined in prevalence during the past two years. For *P. graminis* f. sp. *avenae*, the most common races were NA27, NA29, and NA30.

CROP: Barley, Oat and Wheat

LOCATION: Central Alberta

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TITLE: CEREAL DISEASE SURVEY - CENTRAL ALBERTA 1997

METHODS: Cereal crops were randomly selected approximately every 10 km in Alberta Census District (CD) 8 (north central Alberta). This area encompasses Sylvan Lake on the west and Bashaw on the east and is bordered north and south by Ponoka and Innisfail, respectively. Fields were traversed in an inverted V, with analysis of 5 plants taking place at 3 locations. Leaf diseases were scored on % leaf area diseased (PLAD). Common root rot (CRR) was assessed on a 0-4 scale where 1=trace and 4=severe. Other diseases were rated as a percent of the field affected.

RESULTS AND COMMENTS: Central Alberta had a relatively dry summer that reduced both yields and quality. Twenty-eight barley fields were examined, 7 of which were 2-row and 21 6-row barley. Scald (*Rhynchosporium secalis*) and net blotch (*Pyrenophora teres*) were scored higher in the 2-row fields. This is likely due to the prevalence in CD 8 of the cultivars Harrington (susceptible to scald and net blotch) and Manley (susceptible to scald and intermediate to net blotch). Loose smut (*Ustilago nuda*) was only noted in 6-row fields, with one field rating 20% infection. Common root rot (*Cochliobolus sativus* and *Fusarium* spp.) was rarely encountered. This is mainly because the shallow seeding practised by producers does not allow for the formation of extensive sub-crown internodes on which the disease is rated. Barley leaf stripe (*P. graminea*), bacterial blight (*Xanthomonas campestris*), and covered smut (*U. hordei*) were not detected in 1997.

Eight oat fields were examined, 7 of which had average scores of 13 PLAD for halo blight (*Pseudomonas coronafaciens*). Barley yellow dwarf was rated at trace levels in 3 fields while trace levels of loose smut (*U. avenae*) were noted in one field. This is the first notation of loose smut in a commercial oat field for the authors.

Of eleven wheat fields examined, 10 had low levels of tan spot (*P. tritici-repentis*) and 6 had low levels of Septoria leaf spot (*Septoria* spp.). Take-all (*Gaeumannomyces graminis*) was rated at about the same levels as 1996, while loose smut (*U. tritici*) was less frequently encountered than in 1996. Leaf rust (*Puccinia recondita*) was not found in 1997.

Table 1. Disease incidence and severity in central Alberta cereal fields in 1997.

CROP	AVERAGE DISEASE RATING (PLAD) / NUMBER OF AFFECTED FIELDS				
	No. Fields	**Scald PLAD**	**Net Blotch PLAD**	**CRR 0-4**	**Loose Smut %**
Barley					
2-row	7	15/4	14/7	0	0
6-row	21	9/16	7/20	1/2	tr*/6
	No. Fields	**Tan Spot PLAD**	**Septoria PLAD**	**Take-all %**	**Smut %**
Wheat	11	5/10	5/6	tr/2	tr/2

* tr=trace amounts (<1%)

CROP: Barley, Oat and Wheat

LOCATION: Manitoba, Saskatchewan and Alberta

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TITLE: **CEREAL SMUT SURVEY-1997**

METHODS: In July 1997, cereal crops were surveyed for *Ustilago hordei, U. nigra, U. nuda, U. tritici, U. avenae* and *U. kolleri* in Manitoba, Saskatchewan and Alberta. The area was covered by routes from Winnipeg - Estevan - Moose Jaw - Saskatoon - Melfort - Yorkton - Brandon - Winnipeg, as well as one day trips around Winnipeg, MB, Swift Current, SK, and Lacombe, AB. 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 were estimated by counting affected heads in a one m^2 area at a minimum two sites on the path. *Ustilago nuda* and *U. nigra* were differentiated by observing germinating teliospores with a light microscope.

RESULTS AND COMMENTS: Loose smut (*Ustilago tritici*) of bread wheats was found in 33% of the 164 fields surveyed. In most infected fields only trace levels occurred; the highest level found was 1%. In durum wheats, loose smut was found in 65% of the 63 fields surveyed. Most fields had trace levels of infection, with 1.3% the highest found. In awned wheats loose smut was common and found in 64% of the 36 fields surveyed. However, average infection in awned wheats (0.9%) was higher than in durum wheats and fields with infection severities as high as 2, 2.5, 5 and 10% were found. As has been the case for several years, very few oat fields (9.6% of 52 fields surveyed) had smut. The levels in the five positive fields surveyed were trace, trace, trace, 0.1 and 1%. Covered smut of oat (*Ustilago kolleri*) was found in one field (1% infection) and wasn't associated with loose smut. A higher incidence of smut was found in barley with 54% of the 142 fields surveyed having infected plants. Incidence was particularly high in 6-rowed barley (66% of the fields) with most fields having levels of 0.1 to 0.2% smutted plants, but 1 to 5% smutted plants per field was not uncommon. The highest level of smut found in 6-rowed barley was 20%. In 2-rowed barley, 20% of 39 fields were affected with about half of these having trace levels; the remainder had levels of 0.1 to 1%. False loose smut (*Ustilago nigra*) and covered smut (*Ustilago hordei*) were found in fields of 6-row barley only. Plants in three fields were infected with false loose smut (trace, 0.5 and 1.7%) and fields with plants infected with covered smut had incidences of trace, 0.1, 0.1, 0.2 and 0.3%. False loose smut-infected plants were always associated with loose smut infected plants except in one barley field where only false loose smut infection occurred.

CROP: Oat

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: CROWN RUST OF OAT IN WESTERN CANADA IN 1997

METHODS: Surveys for oat crown rust (caused by *Puccinia coronata* Cda f. sp. *avenae* Eriks.) incidence and severity were conducted in southern Manitoba from early July to mid-August, and in eastern Saskatchewan in mid-August. Crown rust collections were obtained from wild oat (*Avena fatua* L.) and commercially grown oat in farm fields, and from susceptible and resistant oat lines grown in uniform rust nurseries. The nurseries were located at Brandon, Emerson, Morden, and Rosebank, MB, and at Indian Head, SK. The resistant materials in the nurseries included the newly released oat cultivars, AC Assiniboia and AC Medallion (both have crown rust resistant genes *Pc38, Pc39,* and *Pc68* combined), and lines with genes *Pc48* and *Pc68* singly or with genes *Pc38, Pc39,* and *Pc48* combined. Single-pustule isolates, established from the rust collections, were evaluated for virulence combination, using 16 backcross lines, each carrying a different crown rust resistance gene (*Pc38, Pc39, Pc40, Pc45, Pc46, Pc48, Pc50, Pc51, Pc52, Pc54, Pc56, Pc58, Pc59, Pc62, Pc64, Pc68*), as differential hosts.

RESULTS AND COMMENTS: Traces of crown rust infections were found on wild oat in the Red River Valley in mid-July. Infections remained light on wild oat and in most commercial farm fields in the Red River Valley during the remainder of the growing season. However, in areas near Carman and Portage la Prairie, where European buckthorn (*Rhamnus cathartica* L.), the alternate host of *P. coronata* f. sp. *avenae*, is present, susceptible oat plots and wild oat showed heavy crown rust infections by early August, with severities ranging from 60% to 100%. Infected buckthorn growing in proximity of these plots provided the initial inoculum to start an early crown rust epidemic. In eastern Saskatchewan, only trace levels of crown rust infections were found on wild oat and in the oat crop in 1997.

To date, 255 single-pustule isolates of *P. coronata* f. sp. *avenae* have been established from the collections obtained in Manitoba and Saskatchewan in 1997, and have been evaluated for their virulence combinations using 16 differentials. Over 65% of the isolates were virulent to genes *Pc38, Pc39*, singly or combined. All the cultivars currently grown in Manitoba, such as Dumont, Robert, Riel, Belmont, AC Marie and AC Preakness, were susceptible to these isolates, because these cultivars have only these two genes. The resistance of the two newly released cultivars, AC Assiniboia and AC Medallion, which have genes *Pc38, Pc39*, and *Pc68* combined, ia effective against these isolates, since virulence frequency to *Pc68* is still occurring only at trace levels. Genes *Pc48, Pc94,* and *Pc96* are currently being used in the breeding program at Winnipeg to enhance crown rust resistance. Several isolates were found to have virulences to *Pc48* or *Pc96*. The newly derived gene, *Pc94*, from *A. strigosa*, continues to be highly effective to crown rust as it has since 1992. *Pc94* is highly resistant to all isolates from Canada in 1997, and should prove to be a valuable component in developing cultivars with complex resistance to crown rust.

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba

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TITLE/TITRE: 1997 SURVEY OF LEAF SPOT DISEASES OF WHEAT IN MANITOBA

METHODS: Surveys for foliar diseases of spring wheats were conducted in southern Manitoba between 19 July and 9 August 1997. Leaves were collected from 167 fields (136 common, 10 durum, 14 semi-dwarf, 6 extra strong, and 1 winter wheat) between heading and soft dough stages of development. Severity of disease on upper and lower leaves was categorized as 0, trace (TR), 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 and disease identification.

RESULTS AND COMMENTS: Weather conditions in 1997 favoured leaf spot disease development. Severity levels for leaf spot diseases on the upper leaves of wheat were moderate to severe (2-3) in July, and often dried and senesced by August. On lower leaves levels were severe to senesced (3-4) throughout the survey period. Prevalence of all diseases was high in each wheat class except levels of *Septoria* diseases which were low on durum cultivars (Table 1). *Cochliobolus sativus* (spot blotch), and *Pyrenophora tritici-repentis* (tan spot) were more prevalent than in recent years especially in central and eastern parts of the province. In southern and western areas of Manitoba, *Septoria tritici* was the dominant leaf spot pathogen superseding *S. nodorum* for a third consecutive year. Highest prevalence of *S. avenae* was found on semi-dwarf varieties. *Septoria* species accounted for 44% of the pathogenic fungi isolated. Both prevalence and frequency of isolations of tan spot and spot blotch pathogens were high on all wheat classes.

Table 1. Prevalence of leaf spot diseases/pathogens identified in 167 wheat fields in Manitoba in 1997

	DISEASE/PATHOGEN				
Wheat type	**Septoria leaf blotches**			**Spot blotch**	**Tan spot**
	S. nodorum	***S. tritici***	***S. avenae***	***C. sativus***	***P. tritici-repentis***
Common	50	79	7	75	63
Semi-dwarf	71	50	21	79	64
Durum	30	30	10	80	90
Winter	0	100 (1 field)	0	0	0
Total Fields	85	124	14	126	108
Field (%)	51	74	8	75	65
Isolations (%)	12	31	1	31	25

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba

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TITLE: 1997 SURVEY OF FUSARIUM HEAD BLIGHT IN SPRING WHEAT IN MANITOBA

METHODS: A survey for fusarium head blight (FHB) in spring wheat fields was conducted in southern Manitoba between 30 July and 9 August 1997. Heads were examined in 99 fields between watery-ripe and medium dough stages of development. The percentage of heads affected with FHB was estimated in each field. Kernels from sampled heads were surface sterilized and incubated on potato dextrose agar under continuous cool white light for 4-5 days to confirm and identify the *Fusarium* species present . When more than one *Fusarium* species was present on the kernel single spores were grown on carnation leaf agar or synthetic nutrient agar to facilitate identification.

RESULTS AND COMMENTS: The disease was present in 95 fields and incidence ranged from 0.1 to 75%. with the most infested fields showing a mean severity of 75% (3/4 of the head affected). Based on incidence and severity, the FHB index (a measure of the total damage) ranged from >1 to 51%, with averages varying depending on the region. Losses averaged 7% or $39 M, based on projected yield losses. Of note is that FHB was more severe in western regions of Manitoba, especially south of Brandon, than has been reported to date. As in past years the predominant species was *Fusarium graminearum,* one of the main DON producers, and this accounted for over 95% of the isolations (Table 1). Other species found included *F.culmorum, F.sporotrichioides, F.poae, and F.equiseti.* As FHB was the principal head disease present in 1997, the clear differentiation between sound and FDK kernels enabled producers to minimize the occurrence of the latter in harvested grain. As such, the FHB situation in Manitoba in 1997 was similar to that found here in 1996, and quality/grade losses were generally small.

Table 1. Percent *Fusarium* species isolated from spring wheat in southern Manitobain 1997.

***FUSARIUM* SPP.**	**% SEED INFESTED**
graminearum	95.4
sporotrichioides	1.9
equiseti	1.1
culmorum	1.4
poae	0.1

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba and Eastern Saskatchewan

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TITLE: WHEAT STREAK MOSAIC IN SASKATCHEWAN AND MANITOBA IN 1997

METHODS: Wheat streak mosaic (WSM), caused by wheat streak mosaic virus (WSMV) and vectored by the wheat curl mite, *Aceria tulipae* Keifer can cause serious losses in spring wheat in the eastern Prairies (1,2). Field experiments and monitoring of the disease have shown that the current CPS and CWRS cultivars are at high risk of severe losses from WSM if they are grown near stands of winter wheat, the over-wintering host of the mite vector. In the most susceptible CWRS cultivars, losses as high as 100% have been observed (2).

Collaborators identified and collected samples from mid-June to mid-July on spring and winter wheat fields in southeastern Saskatchewan and southwestern Manitoba and some samples were collected in other parts of Manitoba in the course of surveys for other diseases. The proportion of plants with WSM symptoms in surveyed fields was estimated and specimens with and without symptoms collected for testing. Infection with WSMV was confirmed by transmission (by mechanical inoculation) to test plants, and serologically by enzyme-linked immunosorbent assay (ELISA).

RESULTS AND COMMENTS: WSM appeared less extensive than in 1996 in southeastern SK and southwestern MB. WSMV was positively identified in samples of both winter and spring wheat. There was a serious, localized outbreak of WSM near Kindersley SK, an area with no previous recent history of the disease. Extensive losses were noted on a winter wheat crop in late May, and by late June nearby spring wheat crops were showing symptoms of sufficient severity to indicate likely losses.

As winter wheat cultivation is extended into new areas in response to needs for crop diversification and improved sustainability, the extent and intensity of WSM can be expected to increase.

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1) Haber, S. 1996. Cereal virus disease situation in Manitoba in 1995. Can. Pl. Dis. Surv. 76(1):78.

2) Haber, S. and Townley-Smith, T.F. 1993. Developing tolerance to wheat streak mosaic virus in spring wheats for western Canada. Wheat Newsl. 39:121-123.

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba, Saskatchewan and Alberta

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TITLE: VIRULENCE OF *PUCCINIA TRITICINA*, THE WHEAT LEAF RUST FUNGUS IN 1997

METHODS: Wheat fields in southern Manitoba and eastern Saskatchewan were surveyed for the presence of leaf rust in the first week of August 1997. Leaf rust severities on known cultivars were determined from special rust nurseries that were grown in Manitoba, Saskatchewan, and Alberta. Leaf rust collections were obtained from cooperators in Ontario, Quebec, and Alberta. Leaf rust collections from throughout Canada were processed for virulence phenotype identification on 16 differential lines of Thatcher wheat near-isogenic for leaf rust resistance genes *Lr1, Lr2a, Lr2c, Lr3, Lr9, Lr16, Lr24, Lr26, Lr3ka, Lr11, Lr17, Lr30*, *LrB, Lr10, Lr14a,* and *Lr18* Virulence phenotypes were assigned a three letter designation as used in previous publications.

RESULTS AND COMMENTS: In 1997, leaf rust of wheat was widespread across the Canadian prairies. Warm, dry weather facilitated the spread of leaf rust throughout the central plains of North America. In Canada, leaf rust severities on susceptible and resistant wheat cultivars were the highest reported in the last six years in Manitoba and Saskatchewan. Leaf rust infections were observed as far west as Alberta.

Cultivars with resistance genes *Lr13* and *Lr16* (AC Barrie, AC Majestic, Columbus) had higher leaf rust severities compared to past years due to the increase of leaf rust isolates with virulence to *Lr16*. Cultivars with *Lr34* and *Lr16* (AC Domain, AC Splendor) still had very high levels of resistance. In general, the more recently released hard red spring bread wheats had good to adequate levels of leaf rust resistance, while Canada Prairie Spring wheats were susceptible.

Table 1. Frequency (%) of predominant (>10%) virulence phenotypes of *Puccinia triticina* in Canada in 1997.

RACE	VIRULENCE COMBINATION	QUEBEC	ONTARIO	MANITOBA & SASK.	ALBERTA
MBD	1,3,17	10.5	5.2	38.4	1.8
MBR	1,3,3ka,11,30	10.5	5.2	20.0	8.8
MDR	1,3,24,3ka,11,30	19.3	13.8	11.1	3.5
NBB	1,2c	0.0	0.0	0.0	22.8
PBD	1,2c,3,17	0.0	0.0	0.0	29.8
PBL	1,2c,3,3ka	10.5	29.3	0.0	0.0
TJB	1,2a,2c,3,16,24	10.5	0.0	0.0	0.0
No. of virulence phenotypes		19	21	19	12
No. of isolates		57	58	19	57

Forty-seven virulence phenotypes were identified from 362 single pustule isolates of leaf rust in Canada in 1997.

Table 2. Frequencies (%) of *Puccinia triticina* isolates with virulence to Thatcher wheat lines with single leaf rust resistance genes in Canada in 1997.

RESISTANCE GENE	QUEBEC	ONTARIO	MANITOBA & SASK.	ALBERTA
Lr1	96.5	100.0	98.9	96.5
Lr2a	15.8	10.3	17.4	0.0
Lr2c	33.3	50.0	17.4	56.1
Lr3	96.5	98.3	100.0	77.2
Lr9	1.8	3.4	0.0	0.0
Lr16	14.0	5.2	16.3	0.0
Lr24	36.8	25.9	17.9	8.8
Lr3ka	57.9	69.0	34.2	17.5
Lr11	52.6	50.0	34.2	29.8
Lr17	15.8	8.6	46.8	36.8
Lr30	43.9	31.0	32.6	15.8
LrB	31.6	46.6	47.4	24.6
Lr10	96.5	100.0	100.0	68.4
Lr14a	89.5	60.3	100.0	47.4
Lr18	12.3	5.2	0.5	22.8

Oilseeds and Special Crops/Oléagineux et cultures spéciales

CROP: American ginseng (*Panax quinquefolius* L.)

LOCATION: Central and southern Alberta

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TITLE: DISEASES OF GINSENG IN ALBERTA IN 1997

METHODS: Seventeen ginseng gardens at 10 locations in central and southern Alberta were surveyed in August and September, 1997. The number of healthy and diseased plants in a one-square-meter area of raised bed was recorded. Five areas (four corners and the centre) were surveyed in each garden. Disease incidence (DI) was calculated by dividing the number of diseased plants by the total number plants surveyed and calculating a percentage. Disease severity (DS) was rated based on a 0 to 4 scale, where 0= no diseased plants; 1 = a single leaflet affected; 2 = two compound leaves and petioles affected; 3 = three leaves and petioles and stem affected; and 4 = all aboveground portions of the plant were killed and/or the roots were affected. An average disease severity was determined using the formula: $DS = [(1 \times DS_1 + 2 \times DS_2 + 3 \times DS_3 + 4 \times DS_4)] \div$ total number of plants surveyed.

Diseased roots, crowns, stems and leaves were returned to the laboratory and cut into 5 mm pieces, which were sterilized in 1% sodium hypochlorite solution for 10 seconds (leaf) to 2 min (stem and root). Samples were then rinsed four times with sterile distilled water and transferred onto petri plates containing potato dextrose agar. The plates were placed on a laboratory bench for 7 days. Isolated microorganisms were transferred onto PDA slants for further identification.

Leaves, both healthy and those showing interveinal chlorosis, and soil samples from one garden, were sent to the Soil and Crop Diagnostic Centre, Alberta Agriculture, Food and Rural Development, Edmonton, for elemental analysis.

RESULTS AND DISCUSSION: DS and DI varied with location and age of the crop (Table 1). DI ranged from 2.5-77.4%, while DS generally was low and ranged from 0.1-2.1. The highest DI (77.4%) occurred in garden #1, a 4-yr-old ginseng planting. The second highest DI was also observed in a 4-yr-old garden in southern Alberta. Damping-off and root rot diseases were prevalent in 1-yr-old seedlings gardens #7b and #10c. Diseased seedlings often had pale green and purplish leaves that were easily pulled off. Only low percentages of *Rhizoctonia solani* were found in diseased crowns (Table 2). *Alternaria* spp. were the predominate organisms isolated from lesioned leaves, followed by *Fusarium* spp. and bacteria. Alternaria leaf and stem blight was the most common disease in all gardens surveyed. *Fusarium* spp. were the major cause of stem, crown and root infections, but bacteria and *Alternaria* spp. were also involved. Bacteria were frequently isolated from symptomatic and rotted crowns and roots. Microorganisms isolated from 173 samples of 4-year-old roots were *Fusarium* spp.(35.5%), *Alternaria* spp. (17.5), *Cylindrocarpon* spp. (10.0%), *Penicillium* spp. (8.1%), *Rhizopus* spp. (2.0%), *S. sclerotiorum* (1.2%), bacteria and miscellaneous microorganisms (1.7%).

Nutrient deficiencies were a minor problem, occurring in localized areas of some ginseng gardens. Plants in garden #6 had brown to purple leaves with interveinal chlorosis, which resembled nutrient deficiency symptoms. However, soil analysis showed that nutrient levels were sufficient and it is believed that these symptoms were caused by flooding and infection by root pathogens. Powdery mildew, possibly *Erysiphe*

sp., was observed for the first time in Alberta in two gardens, #1 and #5. *Botrytis cinerea* and *Sclerotinia sclerotiorum* were isolated from leaves and stems for the first time in the survey. Since most growers followed organic farming practices and did not apply any pesticides, DI and DS ratings were higher than those seen in 1996 (1).

ACKNOWLEDGMENTS: C. Bandura assisted in the isolation of microorganisms, and S. Eliuk and J. Letal conducted leaf tissue and soil analyses. Financial support was provided through a grant from the Alberta Agricultural Research Institute, Edmonton.

REFERENCE:

Chang, K.F., R.J. Howard, R.G. Gaudiel, and S.F. Hwang. 1996. The occurrence of ginseng diseases in Alberta in 1996. Can. Pl. Dis. Surv. 77: 79-81.CROP: Coneflower (*Echinacea angustifolia, E. purpurea, E. pallida*)

Table 1. The occurrence of diseases in 16 ginseng gardens in Alberta in 1997.

GARDEN NUMBER	CROP AGE (years)	TOTAL PLANTS SURVEYED	DISEASE SEVERITY (0-4)	DISEASE INCIDENCE (%)
1	4	299	2.1	77.4
2	4	242	2.0	74.0
3	4	472	1.7	67.0
4	2	311	1.3	58.3
5	4	439	1.5	56.8
6	1	385	0.7	21.6
7a	4	149	1.6	48.2
7b	1	206	0.8	27.4
8a	1	418	0.3	18.1
8b	3	521	0.8	30.2
8c	4	426	0.3	27.4
8d	3	112	1.7	65.4
9a	4	1313	0.3	13.1
9b	1	78	0.1	3.3
10a	3	314	0.1	2.5
10b	2	282	0.2	6.1
10c	1	405	0.1	3.6

Table 2. Percent isolation of microorganisms from diseased ginseng samples collected from different locations in Alberta in 1997.

MATERIAL	NO. SAMPLES TESTED	Alt	Bac	Bot	Fus	Pen	Phy	Rho	Mis
Leaf	66	69.1	12.7	0.3	35.8	0.6	3.3	0.9	0.3
Leaf petiole	21	6.7	5.7	4.8	17.1	0.0	7.6	0.0	0.0
Stem	71	22.3	13.5	0.8	42.8	1.1	1.7	0.6	0.3
Basal stem	14	1.4	50.0	0.0	32.9	0.0	0.0	7.1	0.0
Root	43	1.8	27.2	0.0	32.4	2.3	4.7	3.7	0.0
Ginseng seed	380	0.0	0.0	0.0	73.7	21.0	0.0	20.5	1.4

Alt = *Alternaria* spp.; Bac = Bacteria; Bot= *Botrytis cinerea*; Fus = *Fusarium* spp.; Pen = *Penicillium* spp.; Phy = *Phytophthora* spp.; Rho = *Rhizopus* spp.; Mis = Miscellaneous (Unknown species plus low percentages of *Aspergillus* spp., *Cylindrocarpon* spp., *Rhizoctonia solani*, and *Sclerotinia sclerotiorum*)

CROP: Coneflower (*Echinacea angustifolia, E. purpurea, E. pallida*)

LOCATION: Central and southern Alberta

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TITLE: DISEASES OF ECHINACEA IN ALBERTA IN 1997

INTRODUCTION AND METHODS: Aster yellows, sclerotinia stem rot and botrytis blight diseases of echinacea have been observed in Alberta and B.C. (1, 2, 3). No systematic disease surveys have ever been conducted on this crop in Alberta. In 1997, eight echinacea plantings were surveyed from early August to late September. In small gardens, all plants were checked for presence of disease. In large plantings, the number of healthy and diseased plants were recorded in five, one-square-meter sample areas (four corners and the centre). Disease incidence (DI) was calculated by dividing the number of diseased plants by the total number plants surveyed and calculating a percentage. Disease severity (DS) was rated based on a 0 to 4 scale, where 0= no diseased plants; DS_1 = leaves showing reddening or yellowing or <1/3 leaf area of the plant showing brown spots; DS_2 = plant stunting, or up to ½ leaf area of the plant occupied by leaf spots ; DS_3 = >½ leaf area infected with leaf spots or plant showing witches' broom or bunching symptoms; and DS_4 = all above ground portions of the plant were killed or roots were affected or plants showed phyllody symptoms. An average disease severity was determined using the formula: $DS = [(1 \times DS_1 + 2 \times DS_2 + 3 \times DS_3 + 4 \times DS_4)] \div$ total number of plants surveyed. Diseased roots, stems and leaves were returned to the laboratory and cut into 5 mm pieces, which were sterilized in 1% sodium hypochlorite solution for 10 seconds for leaf samples and 2 minutes for stem and root samples. Samples were then rinsed four times with sterile distilled water and transferred onto petri plates containing potato dextrose agar. The plates were placed on a laboratory bench for 7 days. Isolated microorganisms were transferred onto PDA slants for further identification.

RESULTS AND DISCUSSION: Foliar diseases (alternaria leaf spot, botrytis blight), soil-borne diseases (damping-off, sclerotinia white mold) and phytoplasma diseases of *Echinacea* spp. were found in this survey. DS and DI varied with location, age and species of the crop (Table 1). DI ranged from 5.4-84.0%, while DS generally was low and ranged from 0.1-3.4. The highest DI (84.0%), caused mainly by damping-off pathogens (*Pythium* spp. and *Fusarium* spp.), occurred in a 1-year-old *E. angustifolia* (Ea) seedlings at Big Valley. Diseased seedlings were easily pulled from the ground due to root rot. The second highest DI was observed in a 2-year-old crop of *E. purpurea* (Ep) at Lacombe, where up to 40% of the plants were infected with the aster yellows phytoplasma. Yellows-affected plants showed leaf reddening and yellowing, stunting, and phyllody. Occasionally, some plants showed phyllody symptoms only. Aster yellows and sclerotinia white rot diseases commonly occurred on 2-year-old crops of Ea and Ep at Brooks (Table 2). Low percentages of *Rhizoctonia solani* were found in diseased plants (Table 3). *Alternaria* spp. were the predominate organisms isolated from lesioned leaves on the 3-year-old Ea plants at Clive, followed by *Fusarium* spp. and bacteria. Alternaria leaf spot manifested itself as round to elongate, dark brown to black lesions of varied size. The pathogens may also infect young shoots and small flowering head, resulting in dieback symptoms. *Fusarium* spp. were the major cause of root infections, but bacteria and *Alternaria* spp. were also involved. Bacteria were frequently isolated from all diseased parts of the plants. Nevertheless, their pathogenicity has not been verified.

In conclusion, aster yellows and sclerotinia white mold were the two most destructive diseases of echinacea crops in Alberta. Plants infected with the aster yellows phytoplasma cannot produce seeds and may be subject to winter kill and soilborne pathogen infection. Control measures for these diseases need to be developed if echinacea is to become a viable commercial crop in Alberta.

ACKNOWLEDGMENTS: C. Bandura assisted in the isolation of microorganisms. T. Walker helped to locate echinacea fields in Alberta. Financial support was provided through a grant from the Alberta Agricultural Research Institute, Edmonton.

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Hwang, S.F., K.F. Chang, R.J. Howard, A.H. Khadhair, R.G. Gaudiel, and C. Hiruki. 1997. First report of a yellows phytoplasma disease in purple coneflower (*Echinacea* spp.) in Canada. J. Plant Dis. Prot. 104: 182-192.

Table 1. Average disease incidence and severity in fields of *Echinacea* spp. at five locations in Alberta, 1997.

LOCATION	SPECIES	NO. PLANTS SURVEYED	CROP AGE (yr)	MAJOR DISEASE	DISEASE INCIDENCE (%)	DISEASE SEVERITY (0-4)
Big Valley	Ea	200	1	SD	84.0	3.4
Brooks	Ea	234	2	AYP	36.9	1.5
	Ea	309	1	SS	5.2	0.2
	Ea	613	2	SS	23.7	1.0
	Ep	156	2	SS	25.0	1.0
	Epa	120	2	SS	40.1	1.6
Clive	Ea	500	2	FD	15.8	0.2
Innisfail (1)	Ea	138	1	FD	8.7	0.2
(2)	Ea	1189	1	SD	16.0	0.3
Lacombe (1a)	Ep	1335	2	AYP	40.0	1.1
(1b)	Ea	1268	1	FD	5.4	0.1
(2)	Ea	1035	1	SS	16.4	0.7

Ea = *Echinacea angustifolia*; Ep = *E. purpurea*; Epa = *E. pallida*; Foliar diseases = *Alternaria* spp.; AYP = Aster yellows phytoplasma; SD = Soilborne diseases; SS = *Sclerotinia sclerotiorum.*

Table 2. The occurrence of white mold disease (*Sclerotinia sclerotiorum*) on *Echinacea* spp. at two locations in Alberta in 1997.

SPECIES	LOCATION	CROP AGE (yr)	NO. PLANTS SURVEYED	MORTALITY (%)	
				Range	Average
E. angustifolia	Brooks	1	309	0 - 21.4	5.2
		2	613	0 - 55.0	23.7
	Lacombe	1	1035	13.1 - 19.5	16.4
E. purpurea	Brooks	2	156	7.7 - 46.2	25.0
E. pallida	Brooks	2	120	35.0 - 45.0	40.1

Table 3. Percent recovery of microorganisms from infected *Echinacea* spp. obtained from five locations in Alberta in 1997.

LOCATION	*ALT.*[x] SPP.	*FUSARIUM* SPP.	BACTERIA	*PEN.*[y] SPP.	*PYTHIUM* SPP.	*RHIZ.*[z] *SOLANI*
Big Valley	24.4	15.6	0	6.7	0	0
Brooks	47.9	39.8	26.7	2.8	12.3	1.1
Clive	85.0	30.0	14.0	0	0	0
Innisfail	39.1	72.7	30.0	0	0	0
Lacombe	83.4	58.4	26.7	0	0	0

[x]*Alt*. = *Alternaria*; [y]*Pen*. = *Penicillium*; [z]*Rhiz*. = *Rhizoctonia*

CROP: Field bean

LOCATION: Manitoba

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TITLE: DISEASES OF FIELD BEAN IN MANITOBA IN 1997

METHODS: Diseases of field bean were surveyed at 16 different locations in Manitoba in the third week of August when the plants were in the pod-fill stage. The crops surveyed were chosen at random from regions in south-central Manitoba where most commercial field bean production takes place. Ten plants were sampled at each of five random sites for each crop surveyed. Diseases were identified by symptoms and rated as percentage of plants infected.

RESULTS AND COMMENTS: Seven diseases were observed in 1997 (Table 1). Common bacterial blight (*Xanthomonas campestris* pv.*phaseoli*), halo blight (*Pseudomonas syringae* pv. *phaseolicola*) and bacterial brown spot (*Pseudomonas syringae* pv. *syringae*) were the most commonly observed diseases. They were found in 16, 10 and 3 crops, respectively. The incidence of the three respective diseases was 70, 50 and 42 % on average, and ranged from 10 to 95%. Anthracnose (*Colletotrichum lindemuthianum*) and white mold (*Sclerotinia sclerotiorum*) were observed in 9 and 7 crops, respectively. Severe infection (incidence > 50%) by *anthracnose* was observed in 6 of the 9 infected crops, and by white mold in only one of the 7 infected crops. Other diseases including rust (*Uromyces appendiculatus*) and virus diseases appeared to be localized and each was observed in only one crop in 1997.

White mold has been the major yield-limiting factor for field bean production in Manitoba. Bean fields with over 50% white mold infection were commonly observed in a survey in Manitoba in 1996. Yield losses due to this disease can be over 50% when infection is severe. However, the survey in 1997 indicated that the incidence was lower than in 1996. This may have been due to the relatively warm and dry weather conditions in late July, August and September.

Bacterial blight diseases and anthracnose were more prevalent in 1997 compared to 1996. Yield reduction due to these diseases was estimated at 20-30% in 1997. Effective controls of these diseases are urgently needed in Manitoba.

Table 1. Prevalence and incidence of diseases in 16 bean crops in Manitoba in 1997

DISEASE	NO. CROPS AFFECTED	INCIDENCE (%) Mean	Range
Common Bacterial blight	16	70	30-95
Halo blight	10	50	10-80
Bacterial brown spot	3	42	10-90
Anthracnose	9	42	30-80
White mold	7	18	1-50
Rust	1	10	10
Virus diseases	1	50	50

CROP: Field pea

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISEASES OF FIELD PEA IN MANITOBA IN 1997

METHODS: Crops of field pea were surveyed for root diseases at 13 different locations and for foliar diseases at 23 locations in Manitoba. The survey for root diseases was conducted in the second week of July when the crop was at the flowering stage and for foliar diseases in the second week of August when the plants were at the pod-fill to early maturity stages. The crops surveyed were chosen at random from regions in southwest and south-central Manitoba, where most field pea is grown. Ten plants were sampled at each of five random sites for each crop surveyed. Diseases were identified by symptoms. Fusarium wilt and sclerotinia rot were rated as percentage of plants infected. The severity of other diagnosed diseases was estimated using a scale of 0 (no disease) to 9 (whole roots/plants were severely diseased). Five to ten symptomatic roots per field were collected for isolations of fungi in the laboratory in order to confirm the visual assessment.

RESULTS AND COMMENTS: Seven root diseases were observed (Table 1). Fusarium root rot (*Fusarium solani* f. sp. *pisi*), aphanomyces root rot (*Aphanomyces euteiches*), and rhizoctonia root rot (*Rhizoctonia solani*) were the most prevalent diseases and observed in 6, 4 and 4 of the 13 fields surveyed, respectively. Severe aphanomyces root rot was observed for 2 crops (Disease scores >6.0) and caused at least 40% yield reduction of these crops. Aphanomyces root rot has not been previously reported in pea in Manitoba. The disease was found to be associated with wet or poorly drained soils as a result of heavy rainfall in early July. Other root diseases including mycosphaerella root rot (*Mycosphaerella pinodes*), fusarium wilt (*Fusarium oxysporum* f. sp. *pisi*), pythium root rot (*Pythium* spp.) and sclerotinia seed rot (*Sclerotinia sclerotiorum*) were minor and each was observed once only.

Seven foliar diseases were observed in field pea in Manitoba in 1997 (Table 1). Mycosphaerella blight (*Mycosphaerella pinodes*) and powdery mildew (*Erysiphe pisi*) were the most dominant and observed in all 23 fields surveyed. The overall disease severity score was 3.9 for mycosphaerella blight and 5.5 for powdery mildew. The two diseases caused economically significant damage. Septoria leaf blotch (*Septoria pisi*) was observed in 12 crops. Severity ranged from 1.0 to 3.0 with a mean of 1.9 and the disease was not considered economically important. Other diseases including bacterial blight (*Pseudomonas syringae* pv. *pisi*), sclerotinia stem rot (*Sclerotinia sclerotiorum*), alternaria blight (*Alternaria alternata*) and rust (*Uromyces viciae-fabae*) were observed in 7, 5, 1 and 1 of the crops, respectively, and appeared to be of minor importance.

Powdery mildew has been the major disease problem of field pea production in Manitoba for the last two years. Yield reduction due this disease was estimated at 20% for each year. Pea lines with complete resistance to powdery mildew are available. However, most of the common field pea cultivars grown in western Canada are susceptible. Mycosphaerella blight severity was lower in 1997 than 1996. This may have been due to the relatively warm and dry weather conditions in late July and August in Manitoba.

Table 1. Prevalence and severity of root diseases in 13 crops and foliar diseases in 23 crops of field pea in Manitoba in 1997

DISEASE	NO. CROPS AFFECTED	DISEASE SEVERITY* Mean	Range
Root Diseases			
Aphanomyces root rot	4	3.8	1.0 - 6.5
Fusarium root rot	6	2.8	1.0 - 5.0
Mycosphaerella root rot	1	1.5	1.5
Pythium root rot	1	1.0	1.0
Rhizoctonia root rot	4	2.1	1.0 - 3.0
Sclerotinia seed rot	1	2.5	2.5
Fusarium wilt (%)	1	1.0	1.0
Foliar diseases			
Mycosphaerella blight	23	3.9	2.5 - 6.0
Powdery mildew	23	5.5	3.0 - 7.0
Bacterial blight	7	1.7	0.1 - 2.0
Septoria leaf blotch	12	1.9	1.0 - 3.0
Sclerotinia rot (%)	5	18.0	10.0 - 25.0
Rust	1	3.5	3.5
Alternaria blight	1	4.0	4.0

* Fusarium wilt and sclerotinia rot were rated as percent plants infected; other diseases were rated on a scale of 0 (no disease) to 9 (whole roots/plants severely diseased).

CROP: Flax

LOCATION: Manitoba

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TITLE: DISEASES OF FLAX IN MANITOBA IN 1997 AND FIRST REPORT OF POWDERY MILDEW ON FLAX IN WESTERN CANADA

METHODS: A total of 73 flax crops in southern Manitoba and four in southeastern Saskatchewan were surveyed in 1997. The crops were surveyed during the first week of September. Fourteen crops were "Solin" flax with low-linolenic acid and yellow seed colour, and 63 crops were normal flax with brown seed colour. Crops surveyed were selected at random along preplanned 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 each disease were recorded.

In addition, 23 samples of flax plants were submitted for analysis to the Manitoba Agriculture Crop Diagnostic Centre by agricultural representatives and growers.

RESULTS AND COMMENTS: Most flax crops surveyed in 1997 had excellent to good stand and vigour. The growing conditions were generally good throughout the 1997 season except for some shortage of moisture towards the end of the season in several areas.

Pasmo (*Septoria linicola*) was observed in 96% of the crops surveyed (Table 1). In the infested crops, the incidence of pasmo ranged from 1 to 60% infected plants, and severity from 1 to 40% stem and leaf area affected. Two crop had >60% infected plants with 10-40% stem and leaf area affected. The incidence and severity of pasmo vary from year to year and region to region depending on prevailing weather conditions towards the end of the season.

Fusarium wilt (*Fusarium oxysporum f.sp. lini*) was observed in 86% of the crops surveyed. The incidence of wilt in these crops was from trace to 5%, and disease severity ranged from 1% to 5%. Only five crops had 5% infected plants at 1-5% disease severity. The incidence and severity of fusarium wilt in 1997 was higher than in any of the last five years (2, 3).

Powdery mildew was observed on flax for the first time in western Canada. This disease was present in 22% of crops surveyed with severity range from trace to 20% of the green leaf area affected at the time of the survey. The fungus was identified on the basis of the imperfect stage as *Oidium lini* until proper identification is confirmed (1). The warm weather towards the end of the season probably contributed to the development and spread of powdery mildew on flax. Several flax crops near Yorkton and Fort Qu'Appelle in Saskatchewan, and in central Manitoba were the most affected by powdery mildew.

Traces of aster yellows (phytoplasma) were observed in one flax crop in 1997. Rust (*Melampsora lini*) was not observed in any of the 43 crops surveyed, nor in the rust-differential flax nurseries planted at Morden and Portage la Prairie.

Of the 23 flax samples submitted to the Manitoba Agriculture Crop Diagnostic Centre, four were affected by pasmo. In addition to diseases, four samples were affected by herbicide injury, two by nutrient deficiency, and 13 by heat canker or excess moisture.

ACKNOWLEDGEMENTS: The assistance of L. J. Wiebe and M. Penner in conducting this survey is gratefully acknowledged.

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Table 1. Incidence and severity of pasmo and fusarium wilt in flax in southern Manitoba and southeastern Saskatchewan in 1997

NO. AND % OF CROPS	CROPS AFFECTED BY PASMO		NO. AND % OF CROPS	CROPS AFFECTED BY FUSARIUM WILT	
	% Incidence*	% Severity**	% Incidence*	% Severity**	
3 (4%)	0	0	11 (14%)	0	0
16 (21%)	1-5	1-5	61 (79%)	1-5	1-5
20 (26%)	5-20	1-10	5 (7%)	10	1-5
36 (46%)	20-40	5-20	- -	-	-
2 (3%)	60	10-40	- -	-	-

* Incidence = Percentage of infected plants in each field.

** Severity = Percentage of stem and leaf area affected with pasmo and visual estimate of wilt, yellowing of leaves, and plant vigour for fusarium wilt.

CROP: Lentil

LOCATION: Southern Alberta

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TITLE: SURVEY OF DISEASES OF LENTIL IN SOUTHERN ALBERTA IN 1997

METHODS: Twelve dryland crops of lentil were surveyed during the early growing season (June 30) for seedling blight, and during the late growing season (September 3) for gray mold caused by *Botrytis cinerea*. Lentil fields were located in the area east of New Dayton-Warner-Milk River, Alberta. Each crop was sampled for emergence and gray mold by selecting ten sites approximately 20 m apart in a U-shaped pattern, with each site consisting of a 3 m long section of row. The emergence was calculated for each crop using the average number of plants per m of row, with 15 cm row spacing. Standards of comparison were established for each field by counting plants as above, in healthy portions of the crop. The emergence of each crop was characterized according to the following scale: (1) normal (85-100% of established stand), (2) reduced (70-84%), (3) severely reduced (50-69%), (4) very severely reduced (<50%).

The number of plants showing post emergent damping-off, and the number of healthy plants were recorded at each site. Samples of diseased plants were collected, surface sterilized for 90 sec. in 70% ethanol, placed on potato dextrose agar and incubated at 20 C under light for 2 weeks, to verify the causal agent. The percentage of plants with each disease was calculated for each crop by averaging the figures from the ten sites. The severity of gray mold in each crop was determined according to the following scale: (1) none (0% of plants infected), (2) trace (<1%), (3) light (1-10%), (4) moderate (11-25%), (5) severe (26-50%), (6) very severe (>50%).

RESULTS: Lentil crops with reduced emergence were found in 7 of the 12 fields surveyed (Table 1). Emergence ranged from 34% to 93%. The frequency of crops with reduced, severely reduced and very severely reduced emergence was 25%, 17% and 17%, respectively. The crops with reduced emergence were distributed throughout the entire area surveyed. Isolations from diseased seedlings showed that 75%, 14% and 11% of seedlings plated were infected with *Botrytis cinerea*, *Pythium* spp. and *Fusarium* spp., respectively.

The survey during the late growing season showed that gray mold was found in all 12 crops surveyed (Table 1). Disease incidence ranged from 4 to 62% of plants infected. The frequency of crops with moderate, severe and very severe incidence of gray mold was 50%, 33% and 8%, respectively. The disease was distributed throughout the entire lentil production area of southern Alberta.

DISCUSSION: Reduced emergence was reported in lentil in southern Alberta in 1995 (Huang and Erickson, 1996). This survey shows that damping-off is primarily caused by *Botrytis cinerea* and is a persistent problem in the lentil production area of southern Alberta. Although *Pythium* sp. group G caused severe damping-off of safflower in southern Alberta (Huang et al., 1992), the *Pythium* pathogen is not as important as *B. cinerea* for lentil.

Gray mold was found in lentil in Alberta in 1995 (Huang and Erickson, 1996), in Saskatchewan in 1994 (Morrall et al., 1995) and in dry bean in southern Alberta in 1993 (Huang and Erickson, 1994) and 1994 (Huang et al., 1995). The 1997 survey indicates that gray mold continues to be both widespread and severe on lentil in southern Alberta. The pathogen causes severe disease on lentil at both seedling and blossom stages of plant growth.

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Huang, H.C., G. Saindon and R.S. Erickson. 1995. Survey of diseases of dry bean in southern Alberta in 1994. Can. Plant Dis. Survey 75: 131-132.

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Table 1. Survey of lentil for emergence and gray mold in southern Alberta in 1997.

CROP	EMERGENCE* (%)	GRAY MOLD** (% PLANTS INFECTED)
1	93 N	13 M
2	90 N	11 M
3	87 N	17 M
4	86 N	4 L
5	85 N	18 M
6	81 R	14 M
7	77 R	26 S
8	72 R	23 M
9	58 S	62 VS
10	53 S	37 S
11	43 VS	27 S
12	34 VS	43 S

* N, normal (85-100% of established stand); R, reduced (70-84%); S, severely reduced (50-69%); VS, very severely reduced (<50%).

** N, none (0% of plants infected); T, trace (<1%); L, light (1-10%); M, moderate (11-25%); S, severe (26-50%); VS, very severe (>50%).

CROPS: Lentil, pea, chickpea

LOCATION: Saskatchewan

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TITLE: SEED-BORNE PATHOGENS OF LENTIL, PEA AND CHICKPEA IN SASKATCHEWAN IN 1997

METHODS: No systematic survey of diseases in commercial pulse crops was conducted during the growing season. However, from mid-June to early August casual observations were made by the senior author in a number of lentil, pea and chickpea crops, the majority in central and east-central Saskatchewan.

The results of agar plate tests conducted by three of the four companies testing commercial seed samples from the 1997 crop in Saskatchewan were summarized. The tests were conducted mainly to detect the pathogens causing ascochyta blight (*Didymella lentis*), anthracnose (*Colletotrichum truncatum*) and botrytis stem and pod rot (*Botrytis cinerea*) of lentil, ascochyta blights (*Mycosphaerella pinodes* and *Ascochyta pisi*) of pea, and ascochyta blight (*A. rabiei*) and botrytis blight (*B. cinerea*) of chickpea. Not all samples were tested for *Colletotrichum* and *Botrytis* but all were tested for their respective *Ascochyta* pathogens. Figures for *Ascochyta* spp. were classified according to crop districts [CD] of Saskatchewan (5). It was not possible to determine which of the samples came from crops that had been treated with registered fungicides. Bravo (a.i. chlorothalonil) is registered as a foliar protectant on all three pulse crops and Crown (a.i. thiabendazole + carbathiin) is registered as a seed treatment on lentil.

RESULTS AND COMMENTS: In most areas of Saskatchewan the growing season was marked by good moisture conditions for seeding in spring, then below-normal precipitation or drought for the remainder. One exception was part of east-central Saskatchewan where rainfall was abundant until late July. In all areas high temperatures in late July and August resulted in excellent conditions for the early completion of harvest.

Ascochyta blights were at generally low levels on the three pulse crops throughout most areas of cultivation. Exceptions were lentil crops planted on lentil stubble, some pea crops in east-central Saskatchewan, and crops of ascochyta-susceptible chickpea cultivars. Most chickpea crops were planted to the ascochyta-resistant cultivars Sanford, Dwelley and B-90 (Kabuli type) or Myles (Desi type). Bravo was sprayed on susceptible chickpea cultivars but use of the fungicide on lentil crops declined relative to 1996 (3, B. Blair, personal communication). In one area of CD 6B south of Saskatoon with a long history of lentil cultivation, farmers sprayed Bravo when anthracnose was detected in their crops before flowering. However, subsequent dry weather may have made these applications unnecessary.

By mid-February about 460 lentil, 750 pea and 70 chickpea seed samples had been tested by the three companies. There was an increase in pea and chickpea samples over 1996 and a decline in lentil samples (unpublished data). The increase in chickpea reflects a growing interest in the crop and increased acreage. Levels of seed-borne *Ascochya* spp. were generally at very low levels on all three pulses (Table 1). Overall, in lentil the highest value was 19.5% and no infection was detected in about 61% of the samples. The corresponding figures for pea were 17.5% and 65% and for chickpea were 1.3% and 87%.

The provincial mean level of *Ascochyta* infection in lentil was below 1.0% for the first time in 11 years (1,2,3,4). This, and the high percentage of samples with no infection detected, probably reflected the dry summer weather and ideal harvest conditions. The same probably applied to *Ascochyta* infection of pea, where the provincial mean level was less than half the values in 1996 and 1995 (3,4). In CD 5B the mean level was substantially higher than elsewhere (Table 1), probably due to greater rainfall in July. Low levels of *Ascochyta* in chickpea seed samples probably mainly reflected the use of resistant cultivars.

Colletotrichum was detected in only one sample of lentil at a level of 0.25%. *Botrytis* was detected in only 19% of lentil samples tested. The highest level of infection was 5.3%, and the mean was 0.1%. These values for *Botrytis* are all considerably lower than those for 1995 and 1996 (3,4). In pea and chickpea *Botrytis* levels were also very low, with most samples testing 0% and none more than 1%.

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Table 1. Number of pulse crop seed samples tested from August 1997 to February 1988 by three commercial companies, and mean percent infection with *Ascochyta* in relation to Saskatchewan crop districts[1] .

Crop District	LENTIL # samples	LENTIL Mean % *Ascochyta*	PEA # samples	PEA Mean % *Ascochyta*	CHICKPEA # samples	CHICKPEA Mean % *Ascochyta*
1A	5	0.2	11	1.0	2	0
1B	1	0.3	6	1.0	-	-
2A	44	0.3	14	0	2	0.4
2B	116	0.5	55	0.2	6	0
3A-S	15	0.3	8	0.1	3	0
3A-N	16	1.8	15	0.1	3	0
3B-S	6	1.0	2	0	1	0
3B-N	45	1.3	9	0.1	8	0
4A	3	0	4	0.1	-	-
4B	2	0.2	6	0	-	-
5A	21	0.4	34	0.4	-	-
5B	6	1.3	63	2.7	-	-
6A	45	0.6	51	0.1	1	0
6B	79	0.8	95	0.7	26	0.1
7A	36	0.6	41	0.2	13	0.1
7B	3	0.5	37	0.2	2	0
8A	1	0	76	1.3	-	-
8B	6	0.9	99	1.0	2	0
9A	4	0.2	62	0.2	-	-
9B	3	1.9	52	0.2	-	-
Total	457	0.7	740	0.7	69	0.1

[1] For map of crop districts, see reference 5.

CROP: Sunflower

LOCATION: Manitoba

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TITLE: DISEASES OF SUNFLOWER IN MANITOBA IN 1997

METHODS: Forty sunflower crops in southern Manitoba and southeastern Saskatchewan were surveyed in 1997. Twenty crops were oilseed hybrids and 20 were confectionery hybrids. Four crops were surveyed in the last week of July, 15 in the last week of August, and 20 in the first week of September. Crops were surveyed along preplanned 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 incidence 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*.), and stem infections (*Phoma spp. & Phomopsis spp.*) were measured as percent leaf and stem area infected. A disease index was calculated for each disease in every crop based on disease incidence or disease severity (Table 1).

In addition, 10 samples of sunflower plants were submitted for analysis to the Manitoba Agriculture Crop Diagnostic Centre by agricultural representatives and growers.

RESULTS AND COMMENTS: Most sunflower crops surveyed in 1997 had excellent to good stand and vigour. Growing conditions were generally good early in the season with dry and warm weather towards the end of the season. The dry and mild weather in the fall delayed the maturity, dry down, and the harvest of the crop.

Sclerotinia wilt/basal stem infection was present in 75% of the crops surveyed, with incidence ranging from trace to 10% infected plants (Table 1). Sclerotinia head rot and mid-stem breakage caused by ascospore infections were present in 60% of the crops surveyed towards the end of the season, with incidence ranging from trace to 5% infected plants in most crops. There was no evidence of head rot caused by *Rhizopus* or *Botrytis* in crops surveyed in 1997.

Verticillium wilt was present in 53% of the crops surveyed, with incidence ranging from trace to 20% infected plants (Table 1). The prevalence and incidence of verticillium wilt in 1997 was higher than in 1996 but comparable to levels prior to 1995 (1). This was probably due to an increase in the confectionery sunflower growing area and the generally low level of resistance to verticillium wilt in confectionery hybrids.

Downy mildew was observed in 20% of the crops surveyed, with incidence ranging from trace to 5% infected plants (Table 1). Dry soil conditions and above normal soil temperatures at the seedling stage may have contributed to low incidence of downy mildew. The use of Apron-treated seed (recently registered in Canada) for downy mildew control also probably reduced the incidence of the disease. The incidence of downy mildew in the last three years was low in comparison with 1994 (1, 2).

Rust was present in 68% of the crops surveyed, with severity ranging from trace to >60% leaf area infected (Table 1). Although rust prevalence in 1997 was similar to the last two years, rust severity has increased from 1995 to 1997 (1). Rust severity was at 20-60% leaf area affected in seven sunflower crops east of Portage, south of Morden and east of Baldur.

Leaf spots caused by *Septoria helianthi* and *Alternaria spp*. were observed in 38% of the crops surveyed at trace to 5% leaf area affected. Stem lesions caused by *Phoma spp*. were observed in 40% of the crops surveyed towards the end of the season, with severity ranging from trace to 10% infected stems. Stem lesions caused by *Phomopsis spp*. were observed in 5% of the crops surveyed towards the end of the season, with severity ranging from trace to 5% infected stems.

Of the 10 samples submitted to the Manitoba Agriculture Crop Diagnostic Centre, one sample was identified as root rot caused by *Fusarium spp*, and one head rot caused by *Sclerotinia sclerotiorum*. In addition to diseases, six samples were affected by herbicide injury, and two by other environmental damage.

ACKNOWLEDGEMENTS: The assistance of L. J. Wiebe and M. Penner in conducting this survey is gratefully acknowledged.

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Table 1. Prevalence and intensity of sunflower diseases in southern Manitoba and southeastern Saskatchewan in 1997

DISEASE	NO. AND % OF CROPS AFFECTED		DISEASE INDEX* Mean	Range
Sclerotinia wilt	30	(75%)	1.0	T-2
Sclerotinia head rot	24	(60%)	0.7	T-1
Verticillium wilt	21	(53%)	0.9	T-3
Downy mildew	8	(20%)	1.0	T-2
Rust	27	(68%)	1.6	T-5
Phoma stem lesion	16	(20%)	1.2	T-2
Phomopsis stem lesion	2	(5%)	0.8	T-1
Septoria leaf spot	15	(38%)	1.0	T-1
Stand	40		1.2	1-2
Vigour	40		.3	1-2

* Disease index is based on a scale of 1 to 5: Trace= < 1%, 1= 1% to 5% disease, 2= 5% to 20% disease, 3= 20% to 40% disease, 4= 40% to 60% disease and 5= greater than 60% disease levels. Index is based on disease incidence for downy mildew, verticillium wilt, sclerotinia infections, and rhizopus head rot; and on disease severity measured as percent leaf area affected for rust and leaf spots, and percent stem affected for *Phoma.*
Indexes for stand and vigour are based on 1-5 scale (1= very good and 5= very poor).

CROP: Yellow Mustard, *Sinapis alba* L.

LOCATION: Southern Alberta

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TITLE: SURVEY OF YELLOW MUSTARD CROPS FOR DISEASES AND INSECT PESTS IN SOUTHERN ALBERTA - 1997

INTRODUCTION: Very little work has been done on diseases and insect pests of mustard in southern Alberta and no major surveys have been carried out in the past decade. A few mustard fields have been included in surveys for blackleg and bertha armyworm in canola. Mustard is susceptible to many of the same diseases and insect pests that affect rapeseed, canola, radish and other cruciferous crops.

METHODS: Between 16 June and 03 July, 21 mustard fields (3816 ha) at growth stages 2 and 5 [1] were surveyed in southern Alberta (Fig. 1). The same fields were surveyed for a second time between 28 and 31 August. A total of 10,399 mustard plants were rated. Surveyors walked a transect through each field, stopped at five sites, and sampled plants within a 1 m^2 area. Plants were dug and returned to the laboratory where they were rated for disease incidence (% of plants affected) and severity (proportion of leaves, stems, roots or pods damaged), and the causal agents were identified. Overall rating for disease and insect damage severity was done as follows: 0% (0=clean); 1-5% (1=trace); 6-10% (2=slight); 11-30% (3=moderate); 31-50% (4=severe); and >50% of the surface area covered with lesions or holes (5=very severe). Sweeping was done to collect insects from each mustard field surveyed. The surveyors walked 100 paces into the field, then walked back while sweeping mustard plants on the right and the left. Insects collected were sent to the Crop Diversification Centre North in Edmonton for identification.

RESULTS AND COMMENTS: The overall incidence of alternaria leaf, pod and stem spot was low (21% in the first survey and 40% in the second), and severity was between trace and slight (Table 1). The only organism isolated from the spots was *Alternaria alternata*. In the first survey, lesions were mostly located on the margins and tips of lower leaves, and ranged from small spots to complete leaf decay. Only three samples collected from one field located in the northern region had 2-5 spots on the stems. However, infection had progressed in the second survey to include stems and pods. Downy mildew (*Peronospora parasitica*) was found, mostly on leaves, only in the second survey, with a low overall incidence of 8%. However, the fungus also occurred on elongated lesions on some stems. These lesions resembled those caused by *Alternaria*, but were lighter in color and much longer. In the second survey, root rot caused by *Fusarium* spp. and *Pythium* spp. was observed in three fields, but was very rare.

Tarnished plant bugs, crucifer flea beetles and cutworms/armyworms were common in most fields surveyed (Table 2). In addition, one weevil and one lacewing were also identified. Insect-related damage included small holes and white spots on the leaves, which was suspected to have been caused by crucifer flea beetles, and holes in the roots, which were likely caused by root maggots. Incidence and severity of damage caused by root maggots were 12% and 2, respectively, in the southern region and 15% and 1-3, respectively, in the northern region. Damage by root maggots was observed in the second survey only. Occasional twisting and pod malformation, which was caused by thrips, was also observed. Yellowing of

leaves and purpling of leaf margins were attributed to nutrient imbalance. Chemical damage symptoms included leaf twisting, crinkling and malformation, and stunting of plants, and appeared to have been caused by growth regulators. Mechanical damage was limited to abrasions and lesions caused by farm machinery or wind. Three plants from the northern region exhibited symptoms of intermingling between green and white colors on one-half the blade of some leaves, which was thought to be a genetic disorder called chimaera. In the second survey, four fields in the southern region showed symptoms of hail damage on stems, leaves and pods. Incidence ranged between 23 and 78%, with moderate to severe damage.

In conclusion, mustard seemed to be a relatively healthy crop in southern Alberta in 1997. Alternaria leaf, pod and stem spot was the most prevalent disease. Both alternaria spots and downy mildew were more concentrated in fields of the northern region, due to higher levels of precipitation and humid conditions (Fig. 2), compared to the southern region.

ACKNOWLEDGEMENTS: Appreciation is expressed to the following people who assisted with this survey: A.R. Reid and E. James of Brooks Diagnostics Ltd. and P. Huggons and J. Motta of Alberta Agriculture, Food and Rural Development. Thanks to J.P. Tewari of the University of Alberta for identifying the *Alternaria* cultures.

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Table 1. Incidence and severity of diseases and insect pests of yellow mustard in southern Alberta in 1997*.

REGION & TOTAL AREA DAMAGE SURVEYED		LEAF, POD & STEM SPOT		NUTRIENT IMBALANCE		CHEMICAL DAMAGE		DOWNY MILDEW		INSECT	
		I**	S***	I	S	I	S	I	S	I	S
NORTH (2656 ha)											
Survey 1: 16 June - 03 July											
Average	26		15		2		N/A		33		
Range		10-55	1-2	0-56	0-4	0-20	0-3	N/A	N/A	4-97	1-3
Survey 2: 28 - 31 August											
Average	31		10		<1		10		40		
Range		2-63	1-3	0-55	0-3	0-0.5	0-3	0-55	0-3	2-77	1-3
SOUTH (1160 ha)											
Survey 1: 16 June - 03 July											
Average	15		4		0.0		N/A		47		
Range		0-62	0-2	0-19	0-3	0.0	0	N/A	N/A	28-72	1-2
Survey 2: 28 - 31 August											
Average	48		5		<1		5		18		
Range		25-65	1-3	0-35	0-2	0-0.4	0-2	0-43	0-3	0.5-50	1-3

* Average of four samples per field.

** I= Disease or insect damage incidence (% of plants affected per field).

*** S= Disease or insect damage severity (proportion of leaves, stems, roots or pods damaged per plant), where 0=clean (0%); 1=trace (1-5%); 2=slight (6-10%); 3=moderate (11-30%); 4=severe (31-50%); and 5=very severe (>50% coverage).

Table 2: Number of insects present in fields surveyed in southern Alberta (16 June - 03 July) 1997*.

REGION & TOTAL AREA SURVEYED	INSECTS COLLECTED**												
	TPB	GPB	CFB	LFH	ALH	LMF	CAW	GSH	TBF	WWA	THS	LBB	PPF	PWS
NORTH (2656 ha)														
Average	4	<1	8	0	1	<1	21	3	<1	0	3	3	8	<1
Range		0-10	0-2 0-29	0	0-3	0-1 0-66	0-8	0-2 0	0-10	1-8 2-16	0-1			
SOUTH (1160 ha)														
Average	24	54	11	3	3	1	1	<1	<1	1	4	2	4	<1
Range		2-68	0-17	0-43	0-13	0-7	0-2 0-5	0-2	0-5	0-10	0-4	0-7	0-3	

* Average of five sampling sites per field.

** TPB=tarnished plant bug (*Lygus* spp.); GPB=grass plant bug; CFB=crucifer flea beetle; LFH=leafhopper; ALH=aster leafhopper; LMF=leafminer fly (*Liriomyza* spp.); CAW=cutworm/armyworm; GSH=grasshopper; TFB=tumbling flower beetle; WWA=wireworm adults; THS=thrips; LBB=ladybird beetle; PPF=predatory/parasitic flies; and PWS=parasitic wasps.

Figure 1. Distribution of surveyed yellow mustard fields in southern Alberta in 1997.

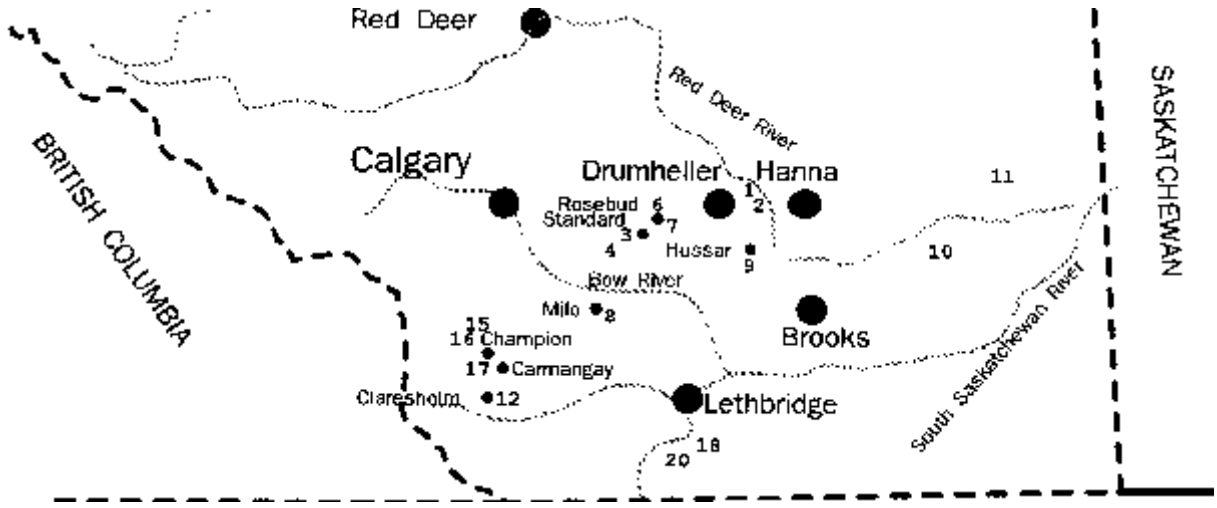
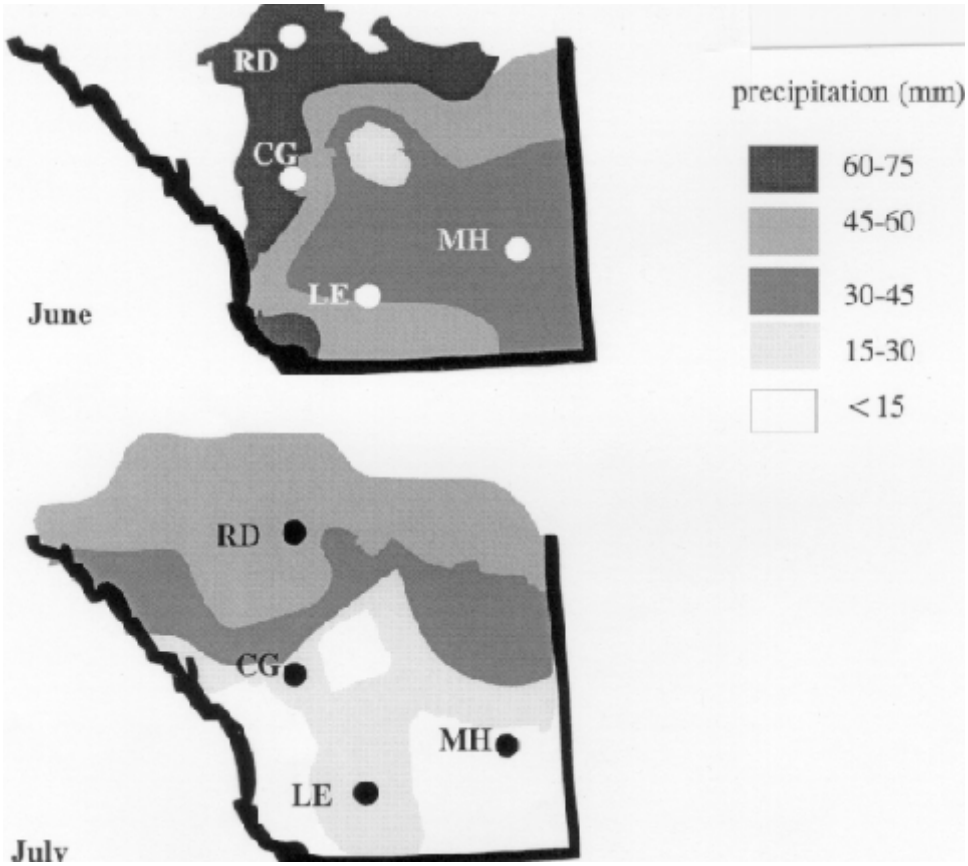


Figure 2. Precipitation maps of southern Alberta for the period 01-30 June and 01-31 July 1997. RD=Red Deer; CG=Calgary; LE=Lethbridge;MH=Medicine Hat (After AAFRD Agricultural Weather Summaries, Vol 11, issues 6 & 7).



Forage Legumes / Légumineuses fourragères

CROP: Alfalfa

LOCATION: Alberta and Saskatchewan

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TITLE: BLOSSOM BLIGHT IN ALFALFA SEED FIELDS IN ALBERTA AND SASKATCHEWAN, 1997.

METHODS: In 1997, 24 commercial alfalfa seed fields, representing the main production areas of Alberta and Saskatchewan, were sampled for blossom infestation every 7-10 days during flowering. For each sample, 40 mature alfalfa blossoms were collected and plated onto agar, without surface sterilization. After about 10 days of incubation, colonies of *Botrytis cinerea* and *Sclerotinia sclerotiorum* were counted and the percentage infestation with each pathogen was calculated. Observations were then summarized over early, mid and late bloom periods for each site.

RESULTS AND COMMENTS: Weather conditions during flowering were hot and dry across most of Alberta and Saskatchewan in 1997. Consequently, the incidence of both *B. cinerea* and *S. sclerotiorum* was low . However, cool wet conditions in the Peace River region of northern Alberta resulted in a high incidence of *B. cinerea* (Table 1).

The observation that high levels of flower infestation occurred almost exclusively in the Peace River region in 1997 supports previous reports that blossom blight is only a problem under cool wet conditions. However, both *B. cinerea* and *S. sclerotiorum* were recovered from almost every field sampled (Table 1), despite the dry conditions in most areas. This demonstrates that sources of inoculum were present in or near fields throughout the region. An example of the rapid increase in inoculum levels that is possible with changes in weather conditions was observed in northern Saskatchewan, where levels of *B. cinerea* in Field 5 increased from 13% to 58% late in the season, after only a few days of rain.

ACKNOWLEDGEMENT: Thanks to the CSGA, SASPA, ADF and AARI for funding.

Table 1. Flower infestation (%) by *B*otrytis *cinerea* (Bc) and *Sclerotinia sclerotiorum* (Ss) in 24 commercial alfalfa seed fields in Alberta and Saskachewan in 1997.

	SAMPLING TIME					
Location/	**Early Bloom**		**Mid-Bloom**		**Late Bloom**	
Field	**Bc**	**Ss**	**Bc**	**Ss**	**Bc**	**Ss**
Northern Alberta						
1	30	13	15	3	28	3
2	93	5	63	5	83	8
3	95	5	90	10	83	0
4	nd	nd	73	8	68	0
5	80	14	96	2	93	1
6	72	23	74	8	82	12
Mean	**76**	**12**	**68**	**6**	**72**	**4**
Southern Alberta						
1	0	15	2	8	1	5
2	0	0	0	0	5	3
3	0	25	3	10	3	0
4	3	3	0	0	3	0
5	0	3	0	5	0	0
6	0	3	8	3	0	0
7	3	3	8	0	0	3
8	0	3	0	8	0	3
Mean	**1**	**7**	**3**	**4**	**1**	**2**
Northern Saskatchewan						
1	0	0	4	0	0	0
2	3	3	0	0	0	0
3	5	3	0	0	10	3
4	nd	nd	0	0	nd	nd
5	nd	nd	13	28	58	38
Mean	**3**	**2**	**3**	**6**	**17**	**10**
Central Saskatchewan						
1	0	18	3	10	3	18
2	10	13	3	3	0	0
Mean	**5**	**16**	**3**	**17**	**2**	**9**
Southern Saskatchewan						
1	nd	nd	0	0	nd	nd
2	10	0	0	0	0	0
3	3	0	0	5	0	0
Mean	**7**	**0**	**0**	**2**	**0**	**0**

nd - not done.

Turfgrass / Gazon

CROP: Turfgrass

LOCATION: Ontario

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TITLE: IDENTITY OF ECTOTROPHIC BLACK RUNNER HYPHAE ON ROOTS OF *POA ANNUA*

INTRODUCTION: Summer patch is a destructive disease of *Poa* species including Kentucky bluegrass (*P. pratensis*) and annual bluegrass (*P. annua*). It has only been found in the northeast and the northern mid-west of the USA Ring-patch symptoms are most commonly observed in summer, under conditions of sustained high temperatures and heavy rainfall (Jackson, 1993). In southern Ontario and Quebec, there are claims that this disease is present, but no confirmed microscopic or molecular diagnosis has been reported. Interestingly, there is even a fungicide registered for control of this disease in Canada. In our previous screening of ring patches on Kentucky bluegrass (Hsiang et al. 1992), we only found *Leptosphaeria korrae*, and did not find the causal agent of summer patch, *Magnaporthe poae*, in any of the samples. Since then, we have continued to attempt to confirm the presence of this fungus in Canada.

METHODS: In September, 1997, we received a sample of putting green turfgrass (composed of a mix of *P. annua* and *Agrostis palustris*) which had symptoms resembling summer patch. This sample was obtained from the Pest Diagnostic Clinic at the University of Guelph, and had come from a golf course in southern Ontario. To confirm the identity of the causal agent, two isolates were cultured from roots of diseased tissue following the methods of Hsiang et al. (1992). These isolates, labelled MP5 and MP6, had cultural characteristics similar to those reported for *M. poae* (Landschoot, 1993). DNA was extracted from these isolates (Reader and Broda, 1985) and subjected to PCR-amplification of the ITS1 (internal transcribed spacer region 1) of the genomic ribosomal DNA using primers ITS1 and ITS2 (White et al. 1990). The PCR amplified products were then purified with a modified GeneClean procedure (Davis et al. 1986), and sequenced on an Applied Biosystems 377A automated DNA sequencer (Perkin Elmer, Mississauga, ON, Canada). The sequences were compared to records in an international, on-line database called GENBANK by conducting a BLAST search (http://www.ncbi.nlm.nih.gov/BLAST/).

RESULTS: The 188 bp sequence from MP5 comprising the entire ITS1 portion of the rDNA showed a 163/188 = 86% identity with the best match from GENBANK, an isolate of *Gaeumannomyces incrustans* (Accession U17214). The 215 bp sequence from MP6 comprising the entire ITS1 portion of rDNA plus a 35 bp part of the 18S gene showed a 211/215 = 98% identity with the best matches, an isolate of *Phialophora graminicola* (Accession U17218), and an isolate of *G. cylindrocarpus* (Accession U17211). Recently, these two latter fungi have been shown to be the same organism (Wetzel et al. 1997).

DISCUSSION: The ITS1 region is known to be variable within and between fungal species. However, a high nucleotide identity such as that of isolate MP6 with *G. cylindrocarpus*, is strong evidence that MP6 belongs to that species. Because the identity of sequences is only 86%, there is still uncertainty whether MP5 is an isolate of *G. incrustans*, but it certainly belongs within the *Gaeumannomyces - Phialophora* complex. *Gaeumannomyces cylindrocarpus* is regarded as nonpathogenic on grasses (Wetzel et al. 1997); however, *G. incrustans* has been found to be pathogenic on various turfgrasses, although its true impact is not certain (Landschoot, 1993). From the disease sample, we did not isolate *M. poae*, but the possibility still exists that it may have been present. At this time, there is no strong evidence that *M. poae* is present in Canada. However, based on distribution in neighbouring American States (Jackson 1993), it probably does occur here, although at a low level.

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There were no individual submissions in the following sections:

Forest trees / arbres forestiers

Ornamentals / plantes ornementales

Small fruits and berries / petits fruits et baies

Tree fruits / arbres fruitiers

Vegetables / légumes

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