Diagnostic Laboratories / Laboratoires diagnostiques

CROP: Commercial Crops - Diagnostic Laboratory Report

LOCATION: British Columbia

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS SUBMITTED TO THE BRITISH COLUMBIA PLANT DIAGNOSTIC LABORATORY IN 1995

METHODS: The B.C.M.A.F.F. Plant Diagnostic Laboratory provides diagnosis and control recommendations for diseases and disorders of commercial agricultural crops. The following data reflects the diagnoses of samples submitted to the laboratory by ministry extension staff, growers, agri-business, parks, and Master Gardeners. Diagnoses were accomplished by microscope examination, culturing onto artificial media, ELISA, BIOLOG® bacterial identification system and dot blot assay. Some samples 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 1-8 by crop category. Problems listed under "other" include: nutritional stress; pH imbalance; water stress; a poor sample; physiological responses to growing conditions; chemical damage; insect related injury; and damage where no conclusive disease causing organism was identified. The total number of submissions for each crop category is listed at the bottom of each table.

TABLE 1. Summary of diseases diagnosed on greenhouse vegetable samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Cucumber	Pythium crown and root rot	4
	Tricothecium stem rot	1
	CMV	1
Lettuce	*Bremia lactucae* downy mildew	1
Pepper	*Fusarium solani* stem canker	1
	Fusarium oxysporum wilt & crown rot	1
	Erwinia sp. soft rot	3
	Sclerotinia sclerotiorum	1
	INSV	1
Tomato	*Botrytis cinerea* stem canker	4
	Pythium root rot	1
	Humicola fuscoatra corky root	5
	Fusarium oxysporum wilt & crown vascular discolouration	8
	Erysiphe sp. powdery mildew	1
	INSV	1
Other		40
TOTAL		74

TABLE 2. Summary of diseases diagnosed on floriculture samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Anemone sp.	INSV	1
	Crown & root rot-Phycomycete	1
Begonia (Reiger)	INSV	2
Begonia (fibrous)	*Rhizoctonia solani* foliar blight	1
	Pythium root rot	1
Brachycome sp.	INSV	1
Browalia sp.	INSV	1
Celosia sp.	INSV	1
Centauria cineraria	Pythium root rot	1
Chrysanthemum sp.	Pythium root rot	2
Clerodendrum sp.	INSV	1
Cyclamen sp.	*Fusarium oxysporum* crown & root rot	1
Dianthus sp.	Crown and root rot-Phycomycete	1
Euphorbia pulcherrima	Crown and stem rot-Phycomycete	1
	Botrytis cinerea blight & canker	4
	Thielaviopsis basicola root rot	1
Exacum sp.	Pythium root rot	1
Fuchsia x hybrida	*Thielaviopsis basicola* root rot	1
Gazania sp.	INSV	1
Gerbera sp.	INSV	1
Hemerocallus sp.	*Botrytis elliptica* blight	1
Heliotrope sp.	INSV	1
Hypericum sp.	INSV	1
Impatiens wallerana	INSV	5
	Pythium root rot	2
	Botrytis cinerea blight	1
	Rhizoctonia foliar blight	1
Impatiens sp.	INSV	3
Iris sp.	Fusarium basal rot	1
	Sclerotium rolfsii crown rot	1
Iris x germanica	*Botrytis cinerea* neck rot	1
Iris pallida	*Erwinia carotovora* soft rot	1
Lisianthus sp.	Botrytis cinerea stem canker	1
Lobelia sp.	INSV	1
Maranta sp.	INSV	1
Narcissus spp.	*Fusarium oxysporum* f.sp. *narcissi*	2
	Botryotinia narcissicola smoulder	1
	Bulb and stem nematode	1
	Unidentified virus	1

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Pelargonium x hortorum	*Xanthomonas campestris* pv. *pelargonii*	5
	Pythium damping off	1
	Pythium root rot	1
	Rhizoctonia crown & root rot	1
	Puccinia pelargonii-zonalis rust	1*
Primula vulgaris	*Ramularia* sp. leaf spot	1
Ranunculus sp.	*Ramularia* sp. leaf spot	1
Saintpaulia sp.	*Ascochyta violae* leaf spot	1
Schizanthus sp.	INSV	1
Senecio cruentus	INSV	1
Schlumbergera sp.	*Erwinia* sp. soft rot	1
Statice sinuata	*Botrytis cinerea* blight	2
Tithonia sp.	*Sclerotinia* sp. crown rot	1
Tulipa sp.	*Botrytis tulipae* fire	1
Viola spp.	*Thielaviopsis basicola* root rot	4
	Pythium damping off	2
	Peronospora violae downy mildew	1
	Pythium crown & root rot	1
	Myxomycete slime mould	1
Zinnia sp.	*Sclerotinia sclerotiorum* stem rot	1
Other		83
TOTAL		164

* Sample from a home garden. Disease has not been found in commercial operations in British Columbia.

TABLE 3. Summary of diseases diagnosed on small fruit samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Blueberry	Alternaria fruit rot	1
	Botrytis fruit rot	1
	Botrytis blossom blight	9
	Botrytis twig die-back	2
	Coryneum stem canker	1
	Godronia cassandrae stem canker	4
	Monilinia vaccinii-corymbosi	4
	Pseudomonas syringae bact. blight	22
	Phytophthora cinnamomi root rot	4
	Root, stem and crown galls	4
	Colletotrichum gloeosporiodes fruit rot (isolated from stems)	1
Blackberry	Crown gall	1
	Pseudomonas syringae pv. *syringae*	1
	Botrytis cinerea blossom blight	1
Cranberry	*Phomopsis vaccinii* upright dieback	1
	Exobasidium rostrupii red leaf spot	1
Currant	*Drepanopeziza ribis* leaf spot	1
Raspberry	*Didymella applanata* spur blight	3
	Phytophthora fragariae root rot	7
	Pythium/Phytophthora root rot	4
	Agrobacterium tumefaciens crown gall	3
	Pseudomonas syringae pv. *syringae*	4
	Verticillium sp. cane wilt	1
	Sclerotinia sclerotiorum white mold	1
Strawberry	*Phytophthora* sp. crown & root rot	3
	Phytophthora cactorum crown rot	1
	Pratylenchus penetrans nematode	1
	Phomopsis obscurans leaf blight	1
Other		56
TOTAL		144

TABLE 4. Summary of diseases diagnosed on specialty crop samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Agaricus bisporus	*Trichoderma* sp.	1
Basil	*Rhizoctonia solani* aerial blight	1
Dill	Powdery mildew	1
Echinacea	*Fusarium* sp. crown rot	2
	Pythium/Phytophthora root rot	1
	Sclerotinia sclerotiorum crown rot	2
	Verticillium dahliae stem wilt	1
	Verticillium dahliae on leaves	1
Ginseng	Powdery mildew	1
	Alternaria panax leaf & stem blight	10
	A. panax assoc. with seed blight	1
	Cylindrocarpon destructans - disappearing root rot	4
	C. destructans rusty root	3
	Rhizoctonia sp. crown & root rot	4
	Pythium sp. root rot	1
	Phytophthora sp. crown & root rot	9
	Fusarium sp. root rot	2
	Sclerotinia sp. root rot	2
	Fusarium sp. seed rot	1
	Seed rot - *Fusarium, Rhizoctonia* &*Cylindrocarpon* spp.	1
	Meloidogyne sp. root knot nematode	4
Stevia	Fusarium crown rot	2
	Septoria leaf spot	1
Rosemary	*Thielaviopsis basicola* root rot	1
Valerian	*Ramularia* sp. leaf spot	1
Other		17
TOTAL		75

TABLE 5. Summary of diseases diagnosed on tree fruit samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Apple	*Venturia inaequalis* scab	1
	Nectria galligena canker	1
	Cytospora sp. (Valsa) canker	2
	Phytophthora sp. crown & root rot	2
	Rhizoctonia sp. in crown	1
	Basidiomycete wood rot	3
	Twig storage blight assoc. with *Fusarium* sp. and *Cylindrocarpon* sp.	1
	Erwinia amylovora fire blight	2
	Pseudomonas syringae blister spot	1
	Cork spot - calcium deficiency	1
Apricot	*Monilinia fructicola* brown rot	2
Cherry	*Agrobacterium tumefaciens* crown gall	1
Filbert	*Xanthomonas campestris* bacterial blight	1
Hazelnut	*Xanthomonas campestris* bacterial blight	2
Peach	Coryneum blight	1
Pear	*Gymnosporangium fuscum* trellis rust	1
Walnut	*Xanthomonas campestris* bact. blight	1
Other		31
TOTAL		55

TABLE 6. Summary of diseases diagnosed on field vegetable samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Asparagus	*Fusarium oxysporum* f. sp. *asparagi* crown & root rot	2
Bean	Pythium root rot	1
Beet	*Phoma betae* root rot	1
Broccoli	*Plasmodiophora brassicae* club root	1
Cantaloupe	Pythium damping off	1
Cauliflower	Rhizoctonia stem canker	1
Carrot	*Fusarium avenaceum* dry rot	1
	Pythium sp. cavity spot	1
	Rhizoctonia solani damping off	1
	Cercospora carotae leaf blight	1
	Meloidogyne sp. root knot nematode	1
Celery	*Septoria apiicola* late blight	5
	Fusarium oxysporum f. sp. *apii* Fusarium yellows	1
	Sclerotinia sclerotiorum pink rot	1
	Erwinia sp. bacterial soft rot	1
	Pseudomonas sp. leaf spot	1
	Blackheart - calcium deficiency	2
Corn	*Ustilago maydis* common smut	1
	Spacelotheca reiliana head smut	1
Cucumber	Powdery mildew	1
Eggplant	*Verticillium dahliae* wilt	1
Lettuce	*Sclerotinia* sp. crown rot	1
	Botrytis cinerea gray mold	1
Lo Bok	*Streptomyces scabies* scab	1
Mung bean	*Pseudomonas syringae* foliar blight	1
Onion	Botrytis bulb rot	1
	Sclerotinia cepivorum white rot	2
	Erwinia sp. bacterial soft neck	1
Potato	*Phytophthora erythroseptica* pink rot	1
	Phytophthora infestans late blight	5
	Alternaria solani early blight	2
	Leaf spots assoc. with *A. alternata*, *Ulocladium* sp. & *Stemphylium* spp.	2
	Streptomyces scabies common scab	2
	Erwinia carotovora tuber soft rot	2
	Fusarium solani tuber black eyes	1
	Fusarium sp. tuber dry rot	2
	Fusarium sp. stem wilt	1
	Verticillium dahliae wilt	5
	Rhizoctonia solani black scurf	3

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Pumpkin	*Cladosporium cucumerinum* scab	1
Squash	Pythium root rot	1
Tomato	*Phytophthora parasitica* buckeye rot	1
	Clavibacter michiganensis bacterial canker	1
Turnip	*Plasmodiophora brassicae* club root	1
Watermelon	Watermelon mosaic virus 2	3
Witloof	Pythium/Phytophthora crown rot	1
	Meloidogyne sp. root knot nematode	1
Zucchini	*Cladosporium cucumerinum* scab	1
Other		40
TOTAL		112

TABLE 7. Summary of diseases diagnosed on woody ornamental and herbaceous perennial samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Abies grandis	Phyllosticta needle blight	1
A. procera	Phytophthora root rot	1
Abies sp.	Sclerophoma needle blight	1
Acer palmatum	*Pseudomonas syringae* bacterial blight	4
	Verticillium dahliae wilt	4
	Phytophthora root rot	2
	Phomopsis twig blight & canker	1
A. pensylvanicum	*Pseudomonas syringae* bact. blight	1
A. macrophyllum	*Rhytisma punctatum* tar spot	1
Actinidia chinensis	*Thielaviopsis basicola* root rot	1
Arctostaphylos uva-ursi	Stem canker assoc. with *Phomopsis* sp. & *Coniothyrium* spp.	1
Aster spp.	Rhizoctonia crown & root rot	1
	Pythium/Phytophthora crown & root rot	1
	Fusarium stem & root rot	1
	INSV	1
Betula sp.	Basidiomycete canker rot	1
Calamondin orange	*Elsinoe fawcettii* sour scab	1
Calluna vulgaris	Phytophthora root rot	1
Castanea sp.	*Guignardia aesculi* leaf blotch	1
Cattleya orchid	Cymbidium Mosaic Virus	1
Cercis canadensis	*Verticillium* sp. wilt	1

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Chamaecyparis lawsoniana	Phytophthora root rot	2
	Kabatina thujae foliar blight	1
	Pestalotiopsis funerea leaf spot	1
Clematis spp.	*Phoma clematidina* stem rot	1
	Rhizoctonia solani wirestem	1
Cotoneaster spp.	*Nectria cinnabarina* canker	1
	Phytophthora root rot	2
	Phomopsis sp. twig dieback	1
Crataegus sp.	*Diplocarpon mespili* Fabrea blight	1
Cryptomeria japonica	Fusarium crown & root rot	1
Cymbidium orchid	*Colletotrichum gloeosporiodes*	1
Epigaea repens	Phytophthora crown & root rot	1
Euonymus sp.	*Marssonina* sp. leaf spot	1
Fraxinus sp.	*Discula* sp. anthracnose	1
Gaillardia sp.	*Entyloma* sp. leaf spot	1
Helleborus niger	Phytophthora crown & root rot	1
Hydrangea sp.	*Erysiphe* sp. powdery mildew	1
	Phytophthora crown & root rot	1
Ilex sp.	*Phytophthora ilicis* leaf blight	1
Juniperus spp.	Phytophthora root rot	4
	Kabatina juniperi	2
Kalmia latifolia	Rhododendron Necrotic Leafspot Virus	1
Lonicera sp.	Pythium/Phytophthora root rot	1
Lupinus sp.	*Gloeosporium* sp. anthracnose	1
Lewisia sp.	Pythium/Fusarium crown rot complex	1
Magnolia sp.	*Verticillium dahliae* wilt	1
Mahonia aquifolium	*Macrophoma* sp. leaf spot	1
Malus sp.	*Nectria galligena* European canker	1
	Venturia inaequalis scab	5
Musa sp. (banana)	*Pythium aphanidermatum* basal rot	1
Paeonia sp.	Unidentified virus	1
Paxistima canbyi	Pythium/Phytophthora cr. & root rot	1
Penstemon sp.	Crown & root rot-Phycomycete	2
Phlox maculata	*Thielaviopsis basicola* root rot	1
P. paniculata	*Thielaviopsis basicola* root rot	1
Picea pungens	*Rhizosphaera kalkhoffii* needlecast	3
	Sirococcus conigenus blight	2
Pinus contorta	*Lophodermium* sp. needlecast	1
Pinus spp.	*Lophodermium* sp. needlecast	1
	Lophodermella concolour needlecast	1
	Phythium/Phytophthora root rot	1
Platanus acerfolia	*Apiognomonia veneta* anthracnose	1
Populus spp.	*Venturia tremulae* shoot blight	1
	Crown rot assoc. with *Verticillium* sp. & *Fusarium* spp.	1

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Pseudotsuga menziesii	*Rhabdocline pseudotsugae* needlecast	1
	Phaeocryptus gaeumanni Swiss needlecast	2
	Rhizosphera kalkhoffii needlecast	1
Prunus besseyi	*Pseudomonas syringae* shot hole	1
P. laurocerasus	*Cytopspora* sp. canker	1
P. lusitanica	*Pseudomonas syringae* bacterial blight	1
P. serrulata	*Pseudomonas syringae* bacterial blight	1
	Phomopsis sp. twig blight	1
Prunus spp.	*Pseudomonas syringae* bacterial blight	1
	Pythium/Phytophthora crown & root rot	1
Quercus sp.	*Verticillium* sp. wilt	1
Rhododendron spp.	Phytophthora crown & root rot	1
	Phomopsis sp. dieback & canker	2
	Powdery mildew	1
	Pestalotia rhododendri leaf spot	1
	Chaetapiospora rhododendri leaf spot	2
Rosa spp.	*Leptosphaeria coniothyrium* canker	2
	Cercospora puderi leaf spot	1
	Diplocarpon rosae black spot	2
Rudbeckia hirta	*Sclerotinia sclerotiorum* stem rot	1
Salix sp.	*Marssonina salicicola* twig blight	1
Schefflera sp.	*Sclerotinia sclerotiorum* white mold	1
Sedum sp.	*Diplodia* sp. stem canker	1
Sophora sp.	*Botryosphaeria* sp. stem canker	1
Sorbus vilmorinii	*Erwinia amylovora* fireblight	1
Spirea sp.	*Microsphaera penicillata* powdery mildew	1
Syringa vulgaris	*Colleototrichum gloeosporiodes*	1
Taxus sp.	Phytophthora crown & root rot	3
Thuja occidentalis	*Kabatina thujae* dieback	1
	Pythium/Phytophthora root rot	3
T. plicata	*Didymascella thujina* (Keithia)	3
	Kabatina thujae dieback	1
Thuja spp.	*Didymascella thujina*	2
	Seiridium cardinale (Berckmann's)	1
	Pestalotiopsis sp. foliar browning	1
Tilia sp.	Bacterial slime flux	1
Vaccinium vitis	Crown & root rot-Phycomycete	1
Wisteria sp.	Watermelon Mosaic Virus 2	2
Other		194
TOTAL		331

TABLE 8. Summary of diseases diagnosed on turfgrass samples submitted to the B.C.M.A.F.F. Plant Diagnostic Laboratory in 1995.*

DISEASE/CAUSAL AGENT	GREEN	SOD	LAWN
Pythium spp. root rot	56	3	3
Gaeumannomyces graminis	5	2	
Ascochyta spp.	3		5
Microdochium nivale	9	3	1
Colletotrichum graminicola	7		6
Idriella bollyei	5		
Rhizoctonia spp.	2	2	2
Limonomyces roseipellis		1	
Laetisaria fuciformis	3	1	
Curvularia spp.	1		1
Drechslera spp.	1		1
Puccinia spp.		1	1
Basidiomycete fairy ring	2	1	2
Other	31	6	6
TOTAL	125	20	8

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

CROP: Commercial Crops, and others - Diagnostic Laboratory Report

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON VEGETABLE CROPS, GREENHOUSE CROPS, HERBACEOUS AND WOODY ORNAMENTALS, FRUIT CROPS, TURFGRASS, CEREAL CROPS, FORAGE CROPS, AND OILSEED AND SPECIAL FIELD CROPS FROM ALBERTA SUBMITTED TO BROOKS DIAGNOSTICS LIMITED IN 1995

METHODS: Brooks Diagnostics Limited (BDL) provided diagnosis of, and control recommendations for, disease problems of commercial and other crops submitted by district agriculturists, extension specialists and fertilizer company representatives, agri-business, farmers, market gardeners, florists, greenhouse growers, landscaping companies, municipal parks and recreation staff, nurseries, golf course supervisors, and the general public from January 1 to December 1, 1995. BDL, a private plant health clinic, assumed responsibility for operating the plant diagnostic laboratory at the Alberta Crop Diversification Centre - South, 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. We thank A. H. Henrickson and D.R. Bolding for technical assistance.

RESULTS: All of the disease identifications made by BDL on crops in the crop categories; field grown vegetable crops, greenhouse crops, herbaceous and woody ornamental plants, fruit crops, turfgrass, cereal crops, forage crops and oil and special field crops submitted in 1995 from various regions of Alberta have been pooled and are summarized in Tables 1-8. Problems associated with insect-related damage are not listed in this report. BDL also received samples from outside Alberta, which are not included in this report.

TABLE 1. Summary of diseases diagnosed on field grown vegetable crops submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Bean	Common blight	*Xanthomonas campestris* subsp. *phaseoli*
	Halo blight	*Pseudomonas syringae* subsp. *phaseolicola*
Beet	Necrotic leaf spot	Chemical damage
Cabbage	Damping-off	*Pythium* s.
		Rhizoctonia solani
	Crown/root rot	*Fusarium oxysporum*
Chard	Necrotic leaf spot	Chemical damage
Onion	Necrotic leaf spot	Chemical damage
Pea	Root rot	*Fusarium solani*
		Rhizoctonia solani

(cont'd.)

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
Pepper	Damping-off	*Rhizoctonia solani*
	Leaf spot	INSV (TSWV-I)*
	Root rot	*Pythium* spp.
		Rhizoctonia solani
	Crown/root rot	*Fusarium oxysporum*
		Rhizoctonia solani
Potato	Blackleg/	*Erwinia carotovora*
	soft rot	subsp. *atroseptica*
	Brown rot	Frost damage
	Early blight	*Alternaria solani*
	Powdery scab	*Spongospora subterranea*
	Black scurf	*Rhizoctonia solani*
	Pink rot	*Phytophthora erythroseptica*
	Leak	*Pythium ultimum*
	Common scab	*Streptomyces scabies*
	Blackheart	Inadequate oxygen supply
Sweet Corn	Seedling blight	*Fusarium* spp.
Tomato	Mottling	2,4-D injury
		Leaf malformation
Yellow Bean	Mottling	2,4-D injury
	Leaf malformation	
Yellow Pepper	Damping-off	*Rhizoctonia solani*
	SOUTH CENTRAL ALBERTA	
Pea	Downy mildew	*Peronospora viciae*
	Root rot	*Fusarium solani*
		Rhizoctonia solani
	Pythium sp.	
	NORTH WEST ALBERTA	
Potato	Soft rot	*Erwinia carotovora*
		subsp. *carotovora*
	Dry rot	*Fusarium solani*
	Pink rot	*Phytophthora erythroseptica*
	Viral	PVY
		PVS

* Strains of TSWV listed above were identified with strain specific antisera using the ELISA technique.

TABLE 2. Summary of diseases diagnosed on greenhouse crop samples submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Basil	Root rot	*Fusarium* spp.
Cucumber	Mosaic	CMV
	Leaf mottling	
	Distorted fruits	
	Crown/root rot	*Pythium* sp.
	Damping-off	
Geranium	Gray mold	*Botrytis cinerea*
Lobelia	Leaf spot	INSV (TSWV-I)*
Petunia	Leaf spot	Fluoride toxicity
	Leaf tip burn	
Snapdragon	Root rot	*Pythium* sp.
	Damping-off	
	SOUTH CENTRAL ALBERTA	
Basil	Gray mold	*Botrytis cinerea*
Geranium	Leaf spot	Petals dropping on leaves under wet conditions
	Damping-off	*Pythium* sp.
		Fusarium spp.
		Rhizoctonia solani
Poinsettia	Chlorosis	Nutritional deficiency
	Leaf twisting	Physiological disorder
	Leaf distortion	
Sweet Pea	Powdery mildew	*Microsphaera alni*
Tomato	Damping-off	*Rhizoctonia solani*
	Crown/root rot	*Fusarium oxysporum*
	NORTH CENTRAL ALBERTA	
Chrysanthemum	Chlorosis	Environmental stress
	Leaf tip burn	
Cucumber	Crown rot	*Rhizoctonia solani*
	Damping-off	
	Wilt	*Verticillium albo-atrum*
	NORTH WEST ALBERTA	
Impatiens	Leaf spot	INSV (TSWV-I)
Phalaenopsis	Leaf spot & tip burn	Environmental stress

* Strains of TSWV listed above were identified with strain specific antisera using the ELISA technique.

TABLE 3. Summary of diseases diagnosed on herbaceous and woody ornamental plants submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Ash	Wilt	*Verticillium* sp.
		Environmental stress
Birch	Chlorosis	Water stress
		Nutritional deficiency
Caragana	Chlorosis	Nutritional deficiency
Crabapple	Fire blight	*Erwinia amylovora*
Elm	Wilt	*Verticillium albo-atrum*
Hollyhock	Crown/root rot	*Fusarium* sp.
		Rhizoctonia solani
Juniper	Twig blight	Winter damage
Larkspur	Crown & stem rot	*Erwinia* spp.
Lilac	Shoot blight	*Phytophthora* sp.
Mayday	Leaf spot	Oil spill
Mountain Ash	Leaf spot	*Phyllosticta sorbi*
	Dieback	Transplant shock
Poplar	Dieback	Environmental stress
Russian Olive	Canker & dieback	*Camarosporium eleagnellum*
Spruce	Dieback	Root damage
	Dieback	Environmental stress
	Needle browning	Winter damage
		Herbicide damage
	Chlorosis	Iron deficiency
		High soil pH
Willow	Leaf browning	Environmental stress
	Chlorosis	Iron deficiency
	Leaf tip burn	Salt or fertilizer burn
	Blight & dieback	Winter damage
	Canker	*Cytospora chrysosperma*
	SOUTH CENTRAL ALBERTA	
Aspen	Leaf spot	*Marssonina* sp.
	Leaf & shoot blight	*Venturia tremulae*
Crabapple	Twig dieback	*Cytospora* sp.
	Fire blight	*Erwinia amylovora*
Elm	Wilt	*Verticillium albo-atrum*
	Wilt/dieback	*Dothiorella ulmi*
Pine	Needlecast	*Lophodermium pinastri*
	Needle browning & twisting	2,4-D injury
		(cont'd.)

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
Poplar	Canker	*Cryptodiaporthe populea*
	Canker	*Cytospora* sp.
		Frost injury
	Shoot blight	*Venturia populina*
Russian Olive	Dieback	Possible environmental stress
		Drought
Spruce	Dieback/	Environmental stress
	Needle browning	Winter damage
		Moss covering branches
	Needle browning & twisting	Climatic or chemical pollutant damage
	Needlecast	*Lophodermium picea*
		Ploioderma lethale
	Canker	*Cytospora chrysosperma*
Sweet Pea	Powdery mildew	*Microspaera alni*
Willow	Blight	*Glomerella miyabeana*
	Canker	*Cytospora chrysosperma*
	NORTH CENTRAL ALBERTA	
Elder	Dieback	Environmental stress
Elm	Wilt	*Verticillium albo-atrum*
Pine	Needlecast	*Dothistroma septospora*
	Chlorosis	Environmental stress
Poplar	Shoot blight	*Venturia populina*
Willow	Dieback	Environmental stress
	Canker	*Cytospora chrysosperma*
Spruce	Needlecast	*Lophodermium picea*
	Needle browning	Environmental stress
	NORTH EAST ALBERTA	
Bur Oak	Anthracnose	*Discula quercina*
	Leaf blight	
Maple	Dieback	Chemical damage
Poplar	Shoot blight	*Venturia populina*
Spruce	Needle browning	Winter damage
	NORTH WEST ALBERTA	
Manitoba Maple	Wilt	*Verticillium albo-atrum*
Pine	Needlecast	*Dothistroma septospora*
Poplar	Dieback	Transplant shock
	Crown gall	*Agrobacterium tumefaciens*
Spruce	Needle browning	Environmental stress

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	PEACE RIVER REGION	
Spruce	Chlorosis	Drought stress Low light
Willow	Blight	*Glomerella miyabeana*

TABLE 4. Summary of diseases diagnosed on fruit crops submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Apple	Fire/blossom blight	*Erwinia amylovora*
Crabapple	Fire blight	*Erwinia amylovora*
Plum	Wilt	*Verticillium* sp.
Saskatoon	Wilt	*Verticillium* sp.
	SOUTH CENTRAL ALBERTA	
Chokecherry	Bacterial blast/blight	*Pseudomonas syringae*
	Leaf mold	*Didymaria* sp.
Crabapple	Fire blight	*Erwinia amylovora*
Saskatoon	Crown gall	*Agrobacterium tumefaciens*
	NORTH CENTRAL ALBERTA	
Apple	Fire blight	*Erwinia amylovora*
Crabapple	Fire blight	*Erwinia amylovora*
	NORTH EAST ALBERTA	
Raspberry	Anthracnose	*Elsinoe veneta*

TABLE 5. Summary of diseases diagnosed on samples of turfgrass submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Turf	Leaf spot	*Drechslera poae*
	Pink snow mold	*Fusarium nivale*
	Fusarium patch	*Fusarium* spp.
		Fusarium nivale
	Brown patch	*Rhizoctonia solani*
	Downy mildew	*Sclerophthora macrospora*
	Crown/root rot	*Pythium* sp.
	Pythium blight	
	SOUTH CENTRAL ALBERTA	
Turf	Blister smut	*Entyloma dactylidis*
	Anthracnose	*Colletotrichum graminicola*
	Summer patch	*Magnaporthe poae*
	Leaf spot	*Cercospora* sp.
	Pink snow mold	*Fusarium nivale*
	Fusarium patch	*Fusarium* spp.
		Fusarium nivale
	Brown patch	*Rhizoctonia solani*
	Crown/root rot	*Pythium* sp.
	Pythium blight	
	Patch disease	Chemical (fertilizer) burn
	NORTH EAST ALBERTA	
Turf	Fusarium patch	*Fusarium* spp.
	Crown/root rot	*Pythium* sp.
	Pythium blight	
	NORTH WEST ALBERTA	
Turf	Summer patch	*Magnaporthe poae*
	Fusarium patch	*Fusarium* spp.
	Crown/root rot	*Pythium* sp.
	Pythium blight	

TABLE 6. Summary of diseases diagnosed on cereal crop samples submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Barley	Sharp eyespot	*Rhizoctonia* spp.
	Root rot	
	Leaf stripe	*Pyrenophora graminea*
	Root rot (browning)	*Pythium* sp.
	Leaf blotch	*Septoria avenae*
	Head blight	*Alternaria* sp.
	Black point	
Durum Wheat	Root rot	*Rhizoctonia solani*
	Twisted leaves & awns	Moisture stress
		Herbicide damage
Wheat	Leaf blotch	*Septoria* sp.
	Crinkle joint	Environmental stress
	Common root rot	*Bipolaris sorokiniana*
		Fusarium spp.
	Chlorosis, wilting	Frost
		Wind damage
	Root rot	*Rhizoctonia solani*
		Pythium spp.
	Leaf rust	*Puccinia recondita*
	Sooty head mold	*Alternaria* sp.
		Cladosporium sp.
	Leaf mosaic	Possible viral infection
	SOUTH CENTRAL ALBERTA	
Barley	Common root rot	*Fusarium* sp.
	Seedling blight	*Cochliobolus sativus*
	Sharp eyespot	*Rhizoctonia* spp.
	Root rot	
Wheat	Root rot	*Rhizoctonia solani*
	Common root rot	*Bipolaris sorokiniana*
	NORTH CENTRAL ALBERTA	
Barley	Common root rot & seedling blight	*Fusarium* spp.
	Sharp eyespot	*Rhizoctonia* spp.
	Root rot	
Wheat	Root rot	*Rhizoctonia solani*
	NORTH WEST ALBERTA	
Barley	Twisted leaves & awns	Moisture stress
		Herbicide damage

TABLE 7. Summary of diseases diagnosed on forage crop samples submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Alfalfa	Crown/root rot	*Rhizoctonia solani*
		Fusarium spp.
	Leaf spot	*Stemphylium botryosum*
	Seedling blight	*Pythium* sp.
	Downy mildew	*Peronospora trifoliorum*
	Wilt	*Verticillium albo-atrum*

TABLE 8. Summary of diseases diagnosed on oilseed and special field crop samples submitted to Brooks Diagnostics Limited in 1995.

CROP/PLANT	DISEASE/SYMPTOM	CAUSAL AGENT/PLANT PATHOGEN
	SOUTHERN ALBERTA	
Canola	Basal stem rot	*Fusarium* sp.
Flax	Seedling blight	*Fusarium* sp.
Ginseng	Leaf blight	*Alternaria panax*
	Damping-off	*Rhizoctonia solani*
	NORTH EAST REGION	
Canola	Blackleg	*Leptosphaeria maculans**

* Disease was confirmed serologically with specific monoclonal antibodies using the ELISA technique.

CROP: Commercial crops and woody ornamental plants - Diagnostic Laboratory Report

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS AND WOODY ORNAMENTAL PLANTS SUBMITTED TO THE MANITOBA AGRICULTURE CROP DIAGNOSTIC CENTRE IN 1995

METHODS: The Manitoba Agriculture Crop Diagnostic Centre provides the diagnosis of, and control recommendations primarily for, diseases of commercial crops and woody ornamental plants. The following data lists samples submitted to the diagnostic centre by Manitoba Agriculture extension staff, growers, agri-business and the general public. Diagnosis is based on visual examination for symptoms, microscopic observation and culturing on artificial media. Assisting with the diagnosis was M. Desjardins.

RESULTS AND COMMENTS: Summaries of diseases diagnosed on crops of each of the following commodities: cereal crops, oilseed crops, vegetable crops, forage crops, turfgrass, and fruit crops are presented in Tables 1 through 7.

TABLE 1. Summary of diseases diagnosed on cereal crops submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1995.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF SAMPLES
Wheat	Septoria leaf spot	*Septoria* spp.	25
	Head blight	*Fusarium* spp.	5
	Common root rot	*Fusarium* spp. *Cochliobolus sativus*	2
	Barley yellow dwarf	barley yellow dwarf virus	1
	Tan spot	*Pyrenophora tritici-repentis*	1
Barley	Net blotch	*Pyrenophora teres*	8
	Common root rot	*Fusarium* spp. *Cochliobolus sativus*	6
	Fusarium head blight	*Fusarium* spp.	2
	Loose smut	*Ustilago nuda*	1
Oat	Bacterial blight	*Pseudomonas syringae*	1
	Fusarium head blight	*Fusarium* spp.	1

TABLE 2. Summary of diseases diagnosed on oilseed crops submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1995.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF SAMPLES
Flax	Root rot, seedling blight	*Fusarium* spp., *Pythium* spp., *Rhizoctonia* spp.	4
Sunflower	Sclerotinia head rot	*Sclerotinia sclerotiorum*	2
Canola	Blackleg	*Leptosphaeria maculans*	16
	Downy mildew	*Peronospora parasitica*	6
	Black spot	*Alternaria* spp.	5
	Root rot,	*Rhizoctonia solani*	4
	seedling blight	Fusarium spp.	4
	Stem blight	*Sclerotinia sclerotiorum*	2
	Aster yellows	Aster yellows mycoplasma	1

TABLE 3. Summary of diseases diagnosed on pulse crops submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1995.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF SAMPLES
Field bean	Root rot	*Fusarium* spp.	4
	Bacterial blight	*Xanthomonas campestris* pv. *phaseoli*	1
	Brown spot	*Pseudomonas syringae* pv. *syringae*	1
	Halo blight	*Pseudomonas syringae* pv. *phaseolicola*	1
Lentil	Anthracnose	*Colletotrichum truncatum*	2
	Ascochyta blight	*Ascochyta fabae* f. sp. *lentis*	1
	Root rot	*Fusarium* spp.	1

TABLE 4. Summary of diseases diagnosed on vegetable crops submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1995.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF SAMPLES
Potato	Early blight	*Alternaria solani*	23
	Fusarium root rot	*Fusarium* spp.	7
	Late blight	*Phytophthora infestans*	12
	Gray mould	*Botrytis cinerea*	4
	Black dot	*Colletotrichum atramentarium*	1
	Verticillium wilt	*Verticillium dahliae*	1
	Bacterial soft rot	*Erwinia carotovora* var. *carotovora*	1
Tomato	Septoria leaf spot	*Septoria lycopersici*	1
Carrot	Crown rot	*Rhizoctonia* sp.	3
Onion	Root Rot	*Fusarium* sp.	2
	Smut	*Urocystis cepulae*	1
Cauliflower	Downy mildew	*Peronospora parasitica*	1
Corn	Common smut	*Ustilago maydis*	1
Red beet	Phoma rot	*Phoma betae*	3
Cabbage	Downy mildew	*Peronospora parasitica*	1

TABLE 5. Summary of diseases diagnosed on forage crops and grasses submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1995.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF SAMPLES
Alfalfa	Root rot	*Fusarium* spp.	6
	Black stem	*Phoma medicaginis*	4
	Common leaf spot	*Pseudopeziza medicaginis*	1
Timothy	Purple spot	*Heterosporium phlei*	1
Turf Grass	Root rot	*Fusarium* spp.	4

TABLE 6. Summary of diseases diagnosed on fruit crops submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1995.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF SAMPLES
Apple	Fireblight	*Erwinia amylovora*	7
	Canker	*Cytospora* sp.	4
	Canker	*Nectria cinnabarina*	1
	Silver leaf	*Chondrostereum purpureum*	1
Strawberry	Crown rot, root rot	*Fusarium* spp.	6
	Botrytis	*Botrytis cinerea*	1
	Hainesia	*Hainesia lythri*	1
	Leaf spot	*Mycosphaerella fragariae*	1
Saskatoon	Brown rot	*Monilinia amelanchieris*	1
	Cankers	*Cytospora* spp.	1
	Leaf spot	*Entomosporium mespili*	1
Raspberry	Cane blight	*Leptosphaeria coniothyrium*	4
	Anthracnose	*Elsinoe veneta*	2
	Powdery mildew	*Sphaerotheca macularis*	1
	Spur blight	*Didymella applanata*	1
	Virus		1

TABLE 7. Summary of diseases diagnosed on shade trees and woody ornamentals submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1995.

CROP	SYMPTOM/DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF SAMPLE
Basswood	Canker	undetermined	1
Lilac	Root rot	undetermined	3
Russian olive	Nectria canker	*Nectria cinnabarina*	1
	Rust	*Puccinia* sp.	1
Crabapple	Canker	*Cytospora* sp.	1
	Fireblight	*Erwinia amylovora*	1
Dogwood	Root rot	undetermined	1
Juniper	Root rot	undetermined	1
Mountain ash	Canker	*Cytospora* spp.	2
Elm	Dutch elm disease	*Ophiostoma ulmi*	9
	Canker	*Cytospora* spp.	2
	Dothiorella wilt	*Dothiorella ulmi*	1
Willow	Canker	*Cytospora* sp.	1
	Fungal leaf spot	*Marssonina* sp.	1
Spruce	Needle cast	*Rhizosphaera kalkoffii*	10
	Cytospora canker	*Cytospora kunzei*	6
Pine	Needle cast	*Lophodermium* sp.	1
	Western gall rust	*Endocronartium harknessii*	1
Poplar	Canker	*Hypoxylon mammatum*	1
	Shoot blight	*Pollacia* sp.	1
	Septoria leaf spot	*Septoria* sp.	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 OMAFRA PEST DIAGNOSTIC CLINIC IN 1995

METHODS: The OMAFRA 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 agriculture 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 1995 the Pest Diagnostic Clinic received 1871 samples including nematodes. About 35% of the samples submitted were for disease diagnosis. Of these nearly 60% were ornamentals*. Vegetable, fruit, turf, cereal and forage samples completed, in that order, most of the submissions to the clinic. OMAFRA with other public agencies, and horticultural businesses including growers, each submitted about one third of the samples received for disease diagnosis at the clinic this year. The remaining samples were submitted by homeowners. A summary of the disease diagnoses is presented in the following tables (1-6).

*Ornamentals include both woody and herbaceous plants, outdoors, in atria and in greenhouses.

TABLE 1. Summary of diseases diagnosed on cereal, field corn and forage crop samples submitted to the OMAFRA Pest Diagnostic Clinic in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Alfalfa	Physiological disorders	5
Barley	Barley Yellow Dwarf Virus	1
Canola	*Alternaria brassicae*	1
	Physiological disorders	6
Corn	Herbicide injury	1
	Other physiological disorders	6
Lupin	Physiological disorder	1
Oat	Physiological disorder	1
Stevia	*Septoria* sp.	2
Timothy grass	Physiological disorder	1
Wheat	*Erysiphe graminis f. sp. tritici*	1
	Fusarium graminearum	1
	Septoria tritici	1
	Ustilago tritici	1
	Barley Yellow Dwarf Virus	1
	Black head molds	1
	Physiological disorders	3

TABLE 2. Summary of diseases diagnosed on legume samples submitted to the OMAFRA Pest Diagnostic Clinic in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Bean	*Phaeoisariopsis griseola*	1
	Bacterial leaf spot	1
	Physiological disorders	2
Pea	Physiological disorder	1
Soybean	Fusarium crown rot	2
	Herbicide injury	4
	Other physiological disorders	3

TABLE 3. Summary of diseases diagnosed on vegetable samples submitted to the OMAFRA Pest Diagnostic Clinic in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Beet	*Rhizoctonia solani*	1
Cabbage	*Xanthomonas campestris* pv. *campestris*	3
Carrot	*Agrobacterium* sp.	1
	Physiological disorder	1
Cauliflower	*Xanthomonas campestris* pv. *campestris*	1
Celery	Physiological disorder	1
Cucumber	*Cladosporium cucumerinum*	1
	Viral diseases	2
	Physiological disorders	4
Eggplant	Physiological disorders	2
Garlic	*Fusarium* sp.	1
	Growth cracks	1
	Other physiological disorder	1
Ginseng	Herbicide injury	1
Lettuce	*Xanthomonas campestris* pv. *vitians*	1
	Herbicide injury	1
Onion	Fusaruim rot	1
	Physiological disorder	1
Parsley	Herbicide injury	1
Pepper	*Xanthomonas campestris* pv. *vesicatoria*	1
	Physiological disorder	1

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Potato	*Erwinia carotovora* pv. *atroseptica*	1
	Colletotrichum atramentarium	1
	Phytophthora infestans	1
	Rhizoctonia solani	1
	Verticillium sp.	1
	Hollow heart	1
	Internal brown spot	1
	Other physiological disorders	7
Radicchio	black core	1
Rapini	Physiological disorder	1
Rutabaga	*Xanthomonas campestris* pv. *campestris*	1
	Leptosphaeria maculans	1
	Sclerotinia sclerotiorum	1
	Physiological disorder	1
Squash	Physiological disorder	1
Tomato	*Clavibacter michiganense* pv.*michiganense*	1
	Erwinia carotovora pv. *carotovora*	1
	Pseudomonas syringae pv. *tomato*	3
	Botrytis cinerea	1
	Phytophthora sp.	1
	Pyrenochaeta lycopersici	3
	Pythium sp.	3
	Septoria lycopersici	2
	Black walnut toxicity	3
	Herbicide injury	2
	Other physiological disorders	27

TABLE 4. Summary of diseases diagnosed on fruit samples submitted to the OMAFRA Pest Diagnostic Clinic in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Apple	*Erwinia amylovora*	1
	Botryosphaeria obtusa	4
	Gloeosporium alba	2
	Venturia inaequalis	2
	Potassium deficiency	1
	Frost rings	1
	Other physiological disorders	10
Blueberry	*Phomopsis* sp.	1
	Sunscald	1
	Winter injury	1
	Other physiological disorders	6

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Cherry	Physiological disorder	1
Cranberry	Bud blast	1
Filbert	*Phyllosticta coryli*	1
	Physiological disorder	1
Grape	*Guignardia bidwellii*	1
	Uncinula necator	1
Mango	Physiological disorder	1
Pear	*Erwinia amylovora*	2
	Venturia pirina	1
	Physiological disorder	1
Raspberry	*Agrobacterium tumefaciens*	2
	Erwinia amylovora	1
	Winter injury	2
	Other physiological disorders	5
Strawberry	*Xanthomonas fragariae*	1
	Colletotrichum dematium	1
	Diplocarpon earliana	1
	Mycosphaerella fragariae	1
	Ramularia tulasnei	1
	Herbicide injury	1
	Other physiological disorders	19

TABLE 5. Summary of diseases diagnosed on turf samples submitted to the OMAFRA Pest Diagnostic Clinic in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Turf	*Leptosphaeria korrae*	7
	Rhizoctonia solani	5
	Pythium sp.	4
	Drechslera sp.	3
	Laetisaria fuciformis	1
	Fusarium patch	1
	Physiological disorders	36

TABLE 6. Summary of diseases diagnosed on ornamentals submitted to the OMAFRA Pest Diagnostic Clinic in 1995.

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Ajuga	Physiological disorder	1
Alternanthera	Physiological disorder	1
Aralia (Japanese)	Physiological disorder	1
Aschyntus	Physiological disorder	1
Ash	Anthracnose	2
	Physiological disorder	1
Aster	Physiological disorder	1
Beech	Physiological disorders	2
Begonia	*Xanthomonas campestris* pv. *begoniae*	1
	Physiological disorders	4
Birch	Bacterial wetwood	1
	Herbicide injury	1
	Other physiological disorders	2
Bouvardia	Impatiens Necrotic Spot Virus (INSV)	1
Cactus	Fusarium crown rot	2
	Physiological disorders	2
Cherry	*Coccomyces hiemalis*	1
	Physiological disorders	3
Clematis	*Phoma* sp.	1
	Physiological disorders	2
Cotoneaster	*Erwinia amylovora*	1
	Physiological disorder	1
Crabapple	*Venturia inaequalis*	1
	Physiological disorders	4
Currant	Physiological disorder	1
Cyclamen	Physiological disorder	1
Cypress	Physiological disorder	1
Dahlia	*Sclerotinia sclerotiorum*	1
Devil's walking stick	Physiological disorder	1
Dogwood	*Septoria cornicola*	1
	Herbicide injury	1
	Other physiological disorders	7
Douglas fir	Physiological disorder	1
Elm	*Ophiostoma ulmi*	2
	Physiological disorder	1
Euonymous	*Gloeosporium* sp.	6
	Physiological disorders	9
Euphorbia	Physiological disorder	1
Exacum	*Botrytis cinerea*	1
Fir	Physiological disorders	4
Forsythia	Herbicide injury	1
Fuchsia	Physiological disorder	1
Gaillardia	Physiological disorder	1

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Geranium	*Xanthomonas campestris* pv. *pelargonii*	10
	Pseudomonas solanacearum	1
	Fusarium sp.	1
	Pythium sp.	1
	Oedema	2
	High salts	2
	Other physiological disorders	5
Gloxinia	Impatiens Necrotic Spot Virus (INSV)	2
Hawthorn	*Gymnosporangium globosum*	1
	Phytophthora cinnamomi	1
Hemlock	Physiological disorder	1
Hibiscus	Physiological disorders	3
Hickory	*Microsphaera caryae*	1
Hollyhock	*Puccinia malvacearum*	1
Honey locust	Physiological disorder	1
Hydrangea	Bacterial leaf spot	1
	Physiological disorder	1
Impatiens	Impatiens Necrotic Spot Virus (INSV)	1
	Physiological disorders	4
Ivy (Boston)	Physiological disorder	1
Jade	Physiological disorder	1
Juniper	*Gymnosporangium clavipes*	1
	Kabatina juniperi	1
	Physiological disorders	9
Kalanchoe	*Thielaviopsis* sp.	1
	Physiological disorders	4
Katsura Tree	Physiological disorders	2
Larch	Physiological disorder	1
Lavatera	Physiological disorder	1
Lilac	Flower blast	1
	Herbicide injury	1
	Other physiological disorders	8
Lily (calla)	*Erwinia* sp.	3
Lily (oriental)	*Pythium* sp.	1
Limonium	*Verticillium* sp.	2
Lisianthus	Impatiens Necrotic Spot Virus (INSV)	1
	Pythium sp.	1
Magnolia	Physiological disorder	1
Maple	Anthracnose	5
	Rhytisma spp.	3
	Verticillium wilt	3
	Herbicide injury	1
	Physiological disorders	20
Morning glory	Ethylene injury	1
Mountain ash	*Botryosphaeria obtusa*	1
	Other physiological disorders	5
Mulberry	Physiological disorder	1

(cont'd.)

CROP	DISEASE/CAUSAL AGENT	NO. OF SAMPLES
Nasturium	Physiological disorder	1
Oak	*Apiognomonia quercina*	2
	Powdery mildew	1
	Iron deficiency	1
	Other physiological disorders	5
Orchid	*Fusarium* sp.	1
	Physiological disorders	3
Pandanus veithii	*Erwinia* sp.	1
Peony	*Botrytis* sp.	1
	Physiological disorder	1
Petunia	Physiological disorders	6
Philadelphus sp.	*Pseudomonas syringae*	1
	Physiological disorder	1
Phlox	Physiological disorder	1
Pine	*Cronartium ribicola*	3
	Physiological disorders	19
Plum	Physiological disorder	1
Poinsettia	*Pythuim* sp.	1
	Oedema	1
	Other physiological disorder	1
Poplar	*Marssonina populi*	1
	Physiological disorders	2
Rhododendron	Physiological disorder	1
Rose	*Leptosphaeria coniothyrium*	1
	Sphaceloma rosarum	1
	Diplocarpon rosae	1
	Powdery mildew	1
	Physiological disorders	7
Serviceberry	Physiological disorder	1
Spruce	*Rhizosphaera kalkhoffii*	1
	Herbicide injury	3
	Winter injury	4
	Other physiological disorders	16
Spruce (Blue)	*Rhizosphaera kalkhoffii*	1
	Herbicide injury	1
	Other physiological disorders	5
Stephanotis floribunda	Impatiens Necrotic Spot Virus	1
Statice	Physiological disorder	1
Thuja	Physiological disorders	15
Tulip	*Botrytis tulipae*	1
Tulip tree	Physiological disorders	3
Verbena	Impatiens Necrotic Spot Virus (INSV)	1
Viburnum sp.	*Peronospora viburni*	1
Vinca	*Phoma exigua*	1
Yew	Physiological disorders	4
Yucca	Physiological disorder	1
Zinnia	*Xanthomonas nigromaculans* pv. *zinnia*	1

CROP: Diagnostic Laboratory Report - Commercial Crops

LOCATION: Québec

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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS SUBMITTED TO THE MAPAQ DIAGNOSTIC LABORATORY IN 1995

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 for 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®, ELISA and PCR tests; and for virus ELISA and double stranded RNA analysis.

RESULTS AND COMMENTS: The crop distribution of samples was: vegetable crops (field and greenhouse) 53%, small fruits 17%, herbaceous and woody ornamentals 17%, fruit trees 3%, field crops 3%, cereal crops 2% and other samples 5%. 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 Anne Lahaie, Mario Tésolin and Lise Vézina for technical assistance.

TABLE 1. Summary of vegetable crop diseases diagnosed by the MAPAQ diagnostic laboratory in 1995.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Bean	*Botrytis cinerea* (pod)	1
	Fusarium foot and root rot	6
	Pythium root rot	1
	Rhizoctonia stem and root canker	3
	Pseudomonas leaf spot	1
	Sunscald (pod)	2
	Wind injury (pod)	1
Beet	Pythium root rot	1
Brocoli	Pythium stem rot	2
	Pseudomonas soft rot	2
	Heat injury (curd browning)	3

(cont'd.)

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Cabbage	*Alternaria brassicae*	1
	Fusarium oxysporum	4
	Rhizoctonia solani	1
	Erwinia carotovora subsp. *carotovora*	1
	Xanthomonas campestris pv. *campestris*	6
	Boron deficiency	1
	Chilling injury	4
	Molybdenum deficiency	1
	Heat injury	3
Cantaloup	Pyrenochaeta root rot	1
	Verticillium sp.	1
Carrot	*Alternaria dauci*	1
	Cercospora carotae	2
	Fusarium solani	3
	Rhizoctonia crown rot	5
	Meloidogyne sp.	4
	Boron deficiency (five o'clock shadow)	1
	Heat canker	4
Cauliflower	*Plasmodiophora brassicae*	1
	Pythium stem rot	1
	Rhizoctonia solani	1
	Pseudomonas soft rot	1
	Xanthomonas campestris pv. *campestris*	5
	Calcium deficiency	5
	Chilling injury	1
Celery	Rhizoctonia crown rot	1
	Erwinia carotovora subsp. *carotovora*	1
	Aster yellows	2
	CMV	1
	Calcium deficiency	1
Chinese cabbage	*Alternaria brassicae*	1
	Alternaria brassicicola	1
	Pythium crown rot	1
	Rhizoctonia solani	1
	Erwinia carotovora subsp. *carotovora*	1
Corn	Fusarium stalk and root rot	2
Cucumber	*Alternaria cucumerina*	2
	Phoma fruit rot	1
	Rhizoctonia fruit rot	1
	Poor pollination	2
Eggplant	*Alternaria solani*	1
	Fusarium root rot	1
	Pyrenochaeta root rot	1
	Pseudomonas leaf spot	2
Leek	Fusarium basal rot	4
	Pyrenochaeta root rot	2
	Rhizoctonia root rot	1

(cont'd.)

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Lettuce	Alternaria leaf spot	1
	Botrytis cinerea	1
	Bremia lactucae	1
	Pythium root rot	5
	Sclerotinia sclerotiorum	2
	Xanthomonas campestris pv. *vitians*	1
	Heat stress	4
Onion	*Botrytis cinerea* (leaf spot)	2
	Fusarium basal rot	4
	Pyrenochaeta root rot	2
	Erwinia carotovora subsp. *carotovora*	1
	Pseudomonas soft rot	1
	Nitrogen deficiency	7
	Rain injury (leaf rot)	6
Pea	*Ascochyta pisi*	1
	Fusarium stem and root rot	3
Pepper	Alternaria fruit rot	1
	Pythium root rot	1
	Phytophthora capsici	4
	Erwinia carotovora subsp. *carotovora*	1
Pepper	*Xanthomonas campestris* pv. *vesicatoria*	4
	CMV	6
	Potyvirus	2
	Boron deficiency	3
	Oedema	1
	Sunscald	1
Potato	*Alternaria solani* (leaf blight)	3
	Botrytis cinerea	2
	Fusarium tuber rot	6
	Phytophthora erythroseptica	3
	Phytophthora infestans	7
	Pythium tuber rot	1
	Rhizoctonia solani	4
	Verticillium sp.	1
	Clavibacter michiganensis subsp. *sepedonicus*	5
	Erwinia carotovora subsp. *carotovora*1	7
	Streptomyces spp.	8
	AMV	1
	PLRV	1
	PVX	1
	TSWV	2
	Genetic disorder	2
	Heat injury	9
	Hollow heart	1
	Mechanical injury	4
	Ozone injury	1
	Rapid vine killing injury	8

(cont'd.)

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Parsnip	*Cercospora pastinacae*	1
	Rhizoctonia root rot	1
Pumpkin	*Botrytis cinerea*	2
	Didymella bryoniae	10
	Sphaerotheca fuliginea	1
	Phytophthora fruit rot	2
	Pythium fruit rot	3
	Rhizopus fruit rot	1
	Septoria cucurbitacearum	1
	Sphaerotheca fuliginea	2
	Erwinia carotovora subsp. *carotovora*	4
	Pseudomonas viridiflava	1
	CMV	14
	Mechanical injury	2
Rhubarb	*Ascochyta rhei*	1
	Phytophthora crown rot	1
	Ramularia rhei	1
	Rhizoctonia solani	4
Rutabaga	*Alternaria brassicicola*	1
	Peronospora parasitica	1
	Plasmodiophora brassicae	1
	Pythium root rot	1
	Rhizoctonia solani	2
	Potyvirus	1
	TuMV	1
	Boron deficiency	2
	Growth crack	1
Squash	*Didymella bryoniae*	3
	Mucor fruit rot	1
	Pythium fruit rot	2
	Pseudomonas viridiflava	1
	CMV	5
	Potyvirus	1
	Poor pollination	1
Tomato	*Alternaria solani* (leaf blight)	3
	Alternaria fruit rot	1
	Botrytis cinerea	1
	Fusarium fruit rot	2
	Phytophthora infestans	1
	Pythium root rot	1
	Rhizoctonia solani	1
	Septoria lycopersici	4
	Pseudomonas solanacearum	1
	Pseudomonas syringae pv. *tomato*	1
	AMV	2
	ToMV	3
	Gray wall	1
	Heat injury	1

(cond't.)

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Tomato	Magnesium deficiency	1
	Phosphorus deficiency	1
	Potassium deficiency	1
	Yellow shoulder	2
Watermelon	Pyrenochaeta root rot	2
	Phytophthora capsici	2
	Pythium fruit rot	1

TABLE 2. Summary of greenhouse vegetable diseases diagnosed by the MAPAQ diagnostic laboratory in 1995.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Cucumber	*Botrytis cinerea*	1
	Pythium crown and root rot	8
	Erwinia carotovora subsp. *carotovora*	2
	Pseudomonas syringae pv. *lachrymans*	3
	Meloidogyne sp.	1
	Calcium deficiency	1
	Salt injury	2
Tomato	*Alternaria solani* (leaf blight)	4
	Botrytis cinerea	12
	Colletotrichum coccodes	3
	Erysiphe sp.	3
	Fulvia fulva	2
	Fusarium oxysporum f. sp. *radicis-lycopersici*	16
	Geotrichum fruit rot	1
	Humicola root rot	5
	Mucor fruit ro	1
	Phytophthora infestans	2
	Pyrenochaeta lycopersici	5
	Pythium root rot	11
	Rhizoctonia solani	2
	Sclerotinia sclerotiorum	2
	Septoria lycopersici	3
	Erwinia carotovora subsp. *carotovora*	7
	Pseudomonas corrugata	4
	CMV	1
	TSWV	2
	Calcium deficiency	1
	Genetic disorder	6
	Gold speck	2
	Gray wall	1
	Magnesium deficiency	1

(cond't.)

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
	Manganese deficiency	1
	Manganese toxicity	1
	Russeting	1
	Salt injury	3
	Silver leaf	1
	Yellow shoulder	3

TABLE 3. Summary of small fruit diseases diagnosed by the MAPAQ diagnostic laboratory in 1995.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Blueberry	*Botrytis cinerea*	1
	Cytospora sp.	2
	Godronia cassandrae	2
	Monilinia vaccinii-corymbosi	1
	Pythium root rot	1
	Septoria sp.	2
	Agrobacterium tumefaciens	1
	Winter injury	2
Strawberry	*Botrytis cinerea*	2
	Diplocarpon earliana	1
	Mycosphaerella fragariae	5
	Phytophthora fragariae	22
	Sphaerotheca macularis	1
	Verticillium sp.	5
	Xanthomonas fragariae	1
	Phytoplasma	1
	Black root rot	30
	Calcium deficiency	1
	Heat injury	5
Raspberry	*Botrytis cinerea*	1
	Didymella applanata	2
	Elsinoe veneta	3
	Phytophthora root rot	33
	Agrobacterium tumefaciens	15
	Black root rot	7
	Boron deficiency	1
	Winter injury	15

TABLE 4. Summary of herbaceous and woody ornamental diseases diagnosed by the MAPAQ diagnostic laboratory in 1995.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Alternanthera sp.	Rhizoctonia stem rot	2
Adenium sp.	Pythium stem rot	2
Antirrhinum sp.	*Peronospora antirrhini*	1
Begonia sp.	*Botrytis cinerea*	1
	INSV	2
Browallia sp.	Pythium stem rot	2
Calendula sp.	Phytoplasma	1
Clematis sp.	Rhizoctonia stem rot	1
Cyclamen persicum	*Fusarium oxysporum*	2
	INSV	1
Dahlia sp.	Rhizoctonia stem rot	2
Elaeagnus sp.	*Nectria* sp.	2
Euphorbia	Rhizoctonia stem and root rot	2
pulcherrima	Salt injury	1
Forsythia sp.	Phytophthora root rot	1
Fraxinus sp.	*Discula* sp.	1
Gladiolus sp.	Pythium root rot	1
Hedera helix	*Xanthomonas campestris* pv. *hederae*	1
Helichrysum sp.	*Verticillium* sp.	2
Hemerocallis sp.	Colletotrichum leaf scorch	2
Hibiscus sp.	Phytophthora stem rot	1
	Erwinia carotovora subsp. *carotovora*	1
Impatiens sp.	Alternaria leaf spot	4
	Botrytis cinerea	1
	Fusarium root rot	1
	Rhizoctonia root rot	4
	INSV	2
Juniperus sp.	*Kabatina* sp.	1
	Phytophthora root rot	2
Ipomoea aquatica	Pythium root rot	9
	CMV	1
Lavatera sp.	INSV	2
Pelargonium sp.	*Botrytis cinerea*	2
	Rhodococcus facians	1
Primula sp.	INSV	1
Rhododendron sp.	Cylindrocladium stem and root rot	1
	Phytophthora stem and root rot	3
Rosa sp.	*Botrytis cinerea*	2
Senecio x hybridus	Phytophthora root rot	1
Sinningia speciosa	Phytophthora crown rot	1
	INSV	1
Sorbus sp.	*Erwinia amylovora*	2

TABLE 5. Summary of apple tree diseases diagnosed by the MAPAQ diagnostic laboratory in 1995.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Apple	*Alternaria alternata* (leaf spot)	4
	Cytospora sp.	2
	Nectria cinnabarina	1
	Sclerotinia sclerotiorum	1
	Venturia inaequalis	2
	Erwinia amylovora	3

TABLE 6. Summary of cereal crop diseases diagnosed by the MAPAQ diagnostic laboratory in 1995.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Barley	*Bipolaris sorokiniana*	1
	Puccinia graminis	2
Oat	*Puccinia coronata*	3
Wheat	*Septoria nodorum*	1
	BYDV	1
Rye	*Claviceps purpurea*	1

TABLE 7. Summary of other crop diseases diagnosed by the MAPAQ diagnostic laboratory in 1995.

CROP	CAUSAL AGENT/DISEASE	NO. OF SAMPLES
Alfalfa	Ascochyta leaf spot	1
	Phytophthora root rot	1
	Pseudopeziza medicaginis	1
Chive	Phytophthora root rot	1
Ginseng	Rhizoctonia root rot	1
Pepper mint	Rhizoctonia stem rot	1
	Sclerotinia sclerotiorum	1
Sage	Phytophthora root rot	1
	Rhizoctonia root rot	1
	Meloidogyne sp.	2
Soybean	Fusarium stem and root rot	3
	Peronospora manshurica	7
	Phytophthora root rot	5
	Pythium root rot	1
	Rhizoctonia solani	5
Tobacco	*Rhizoctonia solani*	2
	Thielaviopsis basicola	1

CROP: Commercial Crops - Diagnostic Laboratory Report

LOCATION: Prince Edward Island

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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS IN PRINCE EDWARD ISLAND, 1995

METHODS: The P.E.I. Department of Agriculture, Fisheries 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. The following data lists samples 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 318 samples were processed during the period June 1995 - October 1995. Results are summarized in Table 1. As many samples were diagnosed with more than one disease, a total of 401 diagnoses are listed in Table 1.

TABLE 1. Diseases diagnosed on commercial crop samples submitted to the Plant Health Services group, Prince Edward Island Department of Agriculture Fisheries and Forestry, Prince Edward Island, 1995.

CROP	DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF TIMES AGENTS WERE IDENTIFIED
VEGETABLES:			
Bean	Physiological Disorder	Leaf burn	1
	White Mold	*Sclerotinia sp.*	1
Beet	Leaf Spot	*Alternaria sp.*	1
Carrot	Root Rot	*Rhizoctonia solani*	1
	Cercospora Blight	*Cercospora sp.*	1
	Crater Rot	*Rhizoctonia solani*	1
	Crown Rot	*Rhizoctonia solani*	1
	Cavity Spot	*Pythium sp.*	1
		Aster yellows	1
	Physiological Disorder	Heat canker	1
Cauliflower	Physiological Disorder	Herbicide damage	1
Onion	Basal Rot	*Fusarium oxysporum*	1
	Soft Rot	*Erwinia sp.*	1
Pea	Root Rot	*Fusarium solani*	1

(cont'd.)

CROP	DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF TIMES AGENTS WERE IDENTIFIED
Potato	Early Blight	*Alternaria alternata*	7
		Alternaria solani	3
		Stemphylium spp.	1
	Gray Mold	*Botrytis cinerea*	23
	Late Blight	*Phytophthora infestans*	46
	Dry Rot	*Fusarium* spp.	1
		Phoma sp.	1
	Pink Rot	*Phytophthora erythroseptica*	27
	Black Dot	*Colletotrichum coccodes*	4
	White Mold	*Sclerotinia sclerotiorum*	8
	Seed Piece Decay	*Fusarium* spp.	4
		Erwinia sp.	6
		Rhizoctonia spp.	5
	Soft Rot	*Erwinia sp.*	28
	Black Scurf	*Rhizoctonia solani*	12
	Stem Canker	*Rhizoctonia solani*	35
	Silver Scurf	*Helminthosporium solani*	3
	Scab	*Streptomyces scabies*	10
	Pink Eye	*Pseudomonas* spp.	12
	Blackleg	*Erwinia* sp.	4
	Virus	Calico Alfalfa	1
	Physiological Disorders	Chemical damage	6
		Mechanical damage	11
		Stem-end browning	4
	Physiological disorders	Nutritional disorders	3
		Wind damage	31
		Heat stress	11
		Physiological young seed	2
		High salt levels	1
		Lightening damage	1
		Tipburn	6
		Salt burn	2
		Blackheart	7
		Hollow heart	5
		Enlarged lenticels	14
		Secondary tubers	1
		Greening	1
		Growth cracks	1
		Jelly end rot	1
		Elephant hide	3
	Wilt	*Fusarium* spp.	4
		Verticillium spp.	5
	Early Dying Syndrome	*Rhizoctonia solani*	2
		Fusarium spp.	2
		Verticillium spp.	2
		Colletotrichum sp.	1
		Alternaria alternata	6

(cont'd.)

CROP	DISEASE	CAUSAL AGENT/PLANT PATHOGEN	NO. OF TIMES AGENTS WERE IDENTIFIED
Rutabaga	Physiological Disorder	Hollow heart	1
CEREALS:			
Barley	Net blotch	*Pyrenophora teres*	1
Wheat	Take-all	*Gaeumannomyces graminis var. tritici*	1
SMALL FRUITS:			
Blueberry	Powdery Mildew	*Microsphaera vaccinii*	1
Strawberry	Root rot	*Fusarium sp.*	1
	Red Stele	*Phytophthora sp.*	1
SPECIALITY CROPS:			
Ginseng	Root Rot	*Phytophthora* sp.	2
	Tip-over	*Rhizoctonia solani*	1
		Nematode damage	1
Tobacco	Stalk Rot	*Sclerotinia sclerotiorum*	1
	Sore shin	*Rhizoctonia solani*	1
	Leaf Spot	*Botrytis cinerea*	1
TOTAL			**401**