Canadian Plant Disease Survey

Inventaire des maladies des plantes au Canada

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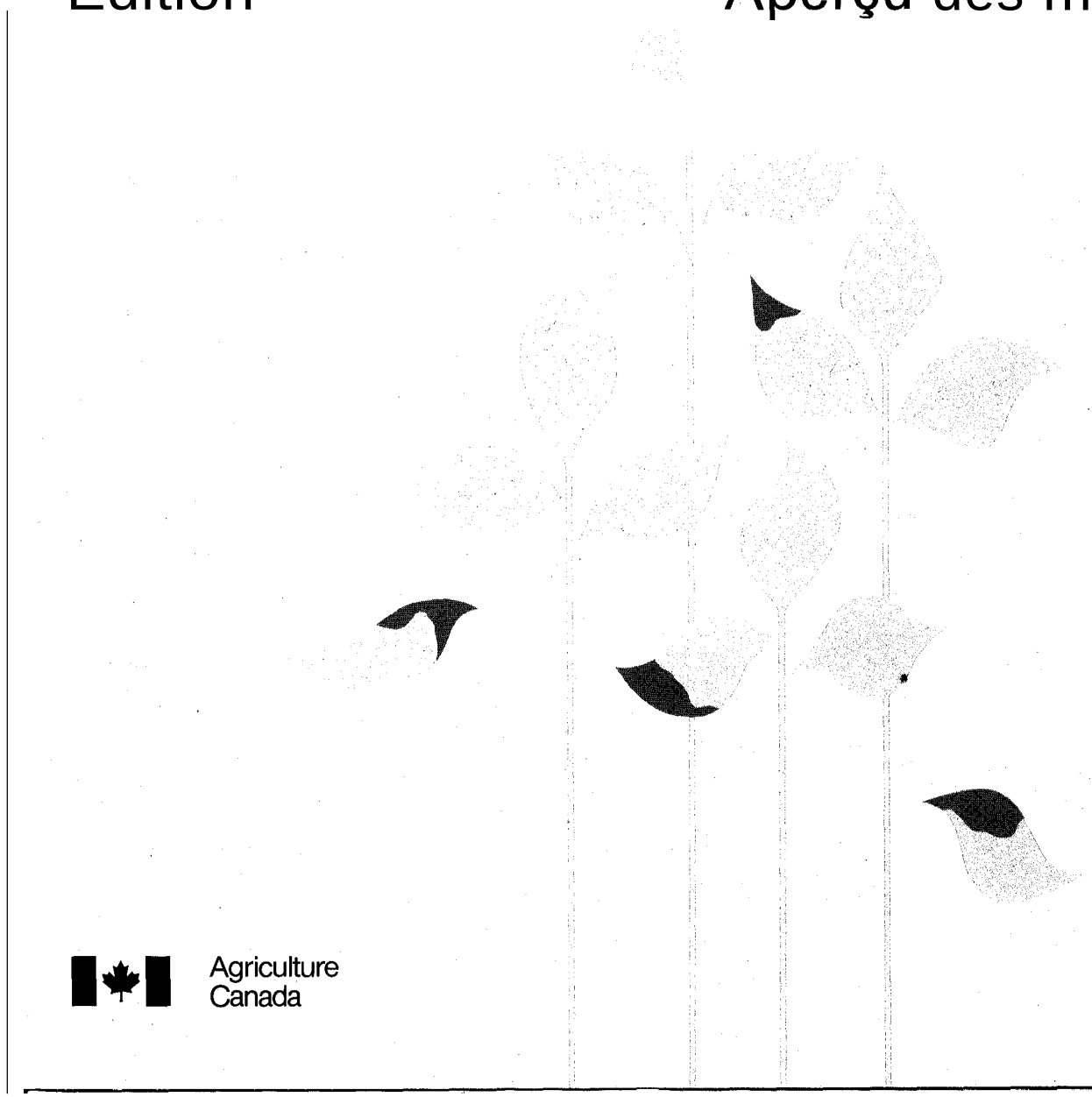
Disease Highlights Edition

Edition Aperçu des maladies



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Contents

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. Other original information such as the development of methods of investigation and control, including the evaluation of new materials, will also be accepted. Review papers and compilations of practical value to plant pathologists will be included from time to time.

L'inventaire des maladies des plantes au Canada est un periodique d'information sur la frequence des maladies des plantes au Canada, leur gravite, et les pertes qu'elles occasionnent. La redaction accepte d'autres communications originales notamment sur la mise au point de nouvelles methodes d'enqête et de lutte ainsi que sur l'evaluation des nouveaux produits. De temps a autre, il inclut des revues et des syntheses de rapports d'intérêt immediat pour les phytopathologistes.

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Foreword

This issue of the Canadian Plant Disease Survey includes a compilation of plant disease survey results for the 1992 crop year. This is the sixth year the Canadian Phytopathological Society and Research Program Service, Research Branch, Agriculture Canada have undertaken this co-operative project.

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. These surveys become an intrinsic part of the literature of plant pathology in Canada.

The publication of this report depends upon voluntary contributions by Canadian plant pathologists and the collation of the survey results by experts familiar with the diseases of the major crop categories. The survey is published annually in the spring issue of *Canadian Plant Disease Survey.* To meet publication deadlines all the results are due to the collators by the first of December. Instructions for submissions and forms are available from the collators. The list of collators is appended.

We wish to thank the contributors and collators who devoted their time to the production of this publication, and look forward to future contributions.

L.W. Stobbs
National Coordinator

R.M. McNeil, B.A. Morrison and J. Lorion
Compilers, Canadian Plant Disease Survey

Avant-propos

Ce numero de l'Inventaire des maladies des plantes au Canada contient les resultats compilés d'études effectuées sur les maladies des plantes pour la campagne agricole de 1992. C'est la sixième année d'un projet entrepris par la Société canadienne de phytopathologie et le Service aux programmes de recherche de la Direction générale de la recherche d'Agriculture Canada.

La Société reconnaît la nécessité de publier ces résultats sur lesquels s'appuient les organismes fédéraux et provinciaux pour planifier les travaux de recherche qui s'imposent pour lutter contre les maladies des plantes. De plus, ces etudes viennent enrichir incontestablement la documentation sur la pathologie des plantes au Canada.

La publication de ces rapports est réalisable grâce à la contribution bénévole de phytopathologistes canadiens et au collationnement de leurs résultats par des spécialistes des maladies des grandes cultures. On trouvera en annexe la liste des analystes faisant le collationnement. Comme la publication des résultats se fait chaque année dans le numéro du printemps de *l'Inventaire des maladies des plantes au Canada,* les rapports doivent Qtre remis aux analystes avant le 1er décembre. On peut s'adresser A eux pour obtenir les formulaires et la marche A suivre pour presenter ces rapports.

Nous tenons A remercier tous les contributeurs et analystes qui ont consacré une grande partie de leur temps à la production de cette publication annuelle des résultats des etudes sur les maladies des plantes et espérons vous compter de nouveau parmi nos collaborateurs.

L.W. Stobbs
Nationale Coordonnateur

R.M. McNeil, B.A. Morrison et J. Lorion
Compilateurs, Inventaire des maladies des plantes au Canada

The Occurrence of root rot disease complex of alstroemeria in Alberta

K.F. Chang and M. Mirza[1]

The incidence and severity of alstroemeria root rot disease complex was determined for 15 cultivars from seven commercial greenhouses in Alberta in 1990. Among cultivars, the highest disease incidence (DI) occured on Orange Monarch (67.9%) while the highest disease severity (DS) rating was observed on Saxony (47%). The lowest DI and DS values occurred on Paloma (16.6% and 11% respectively). The pathogens most frequently isolated from cultivars in the greenhouses examined were *Fusarium* spp. and to a lesser extent Pythium spp. and *Rhizoctonia* solani. The rate of simultaneous infection of alstroemeria by *Fusarium* spp. and *R.* solani was higher than any of the other possible pathogen combinations.

Can. Plant *Dis. Surv. 73:1, 3-8, 1993.*

En 1990, l'incidence et la virulence du pourridié s'attaquant à l'alstroemeriaont été determine a partir de quinze cultivars provenant de sept serres commerciales de l'Alberta. Parmi les cultivars, l'incidence la plus élevée de la maladie (DI) a été relevée dans le cas du cultivar Orange Monarch (67.9 %) alors que le degre de virulence le plus élevé (DS) de la maladie a été observe chez le cultivar Saxony (47 %). Les valeurs DI et DS les plus basses ont été enregistrees pour le cultivar Paloma (16.6 *Y.* et 11 % respectivement). Les pathogenes les plus fréquemment isolés lors de l'examen en serres de ces cultivars, ont été *Fusarium* spp. Les pathogenes Pythium spp. et *Rhizoctonia solani* ont également été isolés, mais en moins grande quantité. Le taux d'infection simultane de l'alstroemeriapar *Fusarium* spp. et *R. solani* a été plus élevé que n'importe quelles combinaisons possibles de pathogenes.

Introduction

Lily-of-the-Inca or Peruvian lily *(Alstroemeria* spp.) originated from plants collected in South America. Commercial cultivars of alstroemeria are popular as cut flowers in many countries because of their low energy requirement for growth and the excellent keeping quality of the flowers (6,8,11,14; Fig. 1). The flower type and growth characteristics have been used to describe four categories of plants: orchid, butterfly, in-between, and carmen **(8).** Practices for improving the floral production of alstroemeria have concentrated primarily on elucidating the environmental conditions for optimum plant growth (1,2,7,10). Comparatively little information is available on the identification and biology of diseases affecting alstroemeria (5,9). In Canada, Chang *et al.* (3,4) reported that an alstroemeria root rot disease complex was caused by three pathogenic fungi: *Fusarium oxysporum* (Schlecht.) Snyd. and Hans., *R. solani* Kuhn, and *Pythium* spp. These three pathogens have been isolated from an individual stem or rhizome indicating their ability to coexist during infection. The above-ground symptoms of diseased plants include dark and necrotic stripes along leaf margins (Fig. 4) and pale green or chlorotic leaves (Fig. 2). A brown discoloration often occurs on the basal stem, rhizomes, and both the fibrous and storage roots. Severely infected rhizomes may have discolored vascular bundles and brown necrotic lesions (Fig. 3). Uninfected storage tubers are usually white, while infected tubers have small to large brown lesions (Fig. *5).* Plants infected with this disease may produce small abnormal flowers. In a greenhouse near Edmonton, alstroemeria flower production by several cultivars declined dramatically when the disease complex became widespread (Elaine Horner, personal communication).

An important prerequisite for developing an integrated management strategy for control of the disease complex in alstroemeria is to determine the incidence and severity of the complex in different commercial greenhouses, and to determine whether varietal differences exist in susceptibility to the disease. The objectives of this study were to determine the incidence and severity of alstroemeria root rot complex on cultivars grown in Alberta greenhouses and the isolation frequency, singly or in combination, of the three main pathogens involved in the disease complex.

Materials and methods

In June 1990, plant samples of 15 cultivars of *Alstroemeria* spp. were collected from seven greenhouses in southern and central Alberta. Stems were selected or removed from

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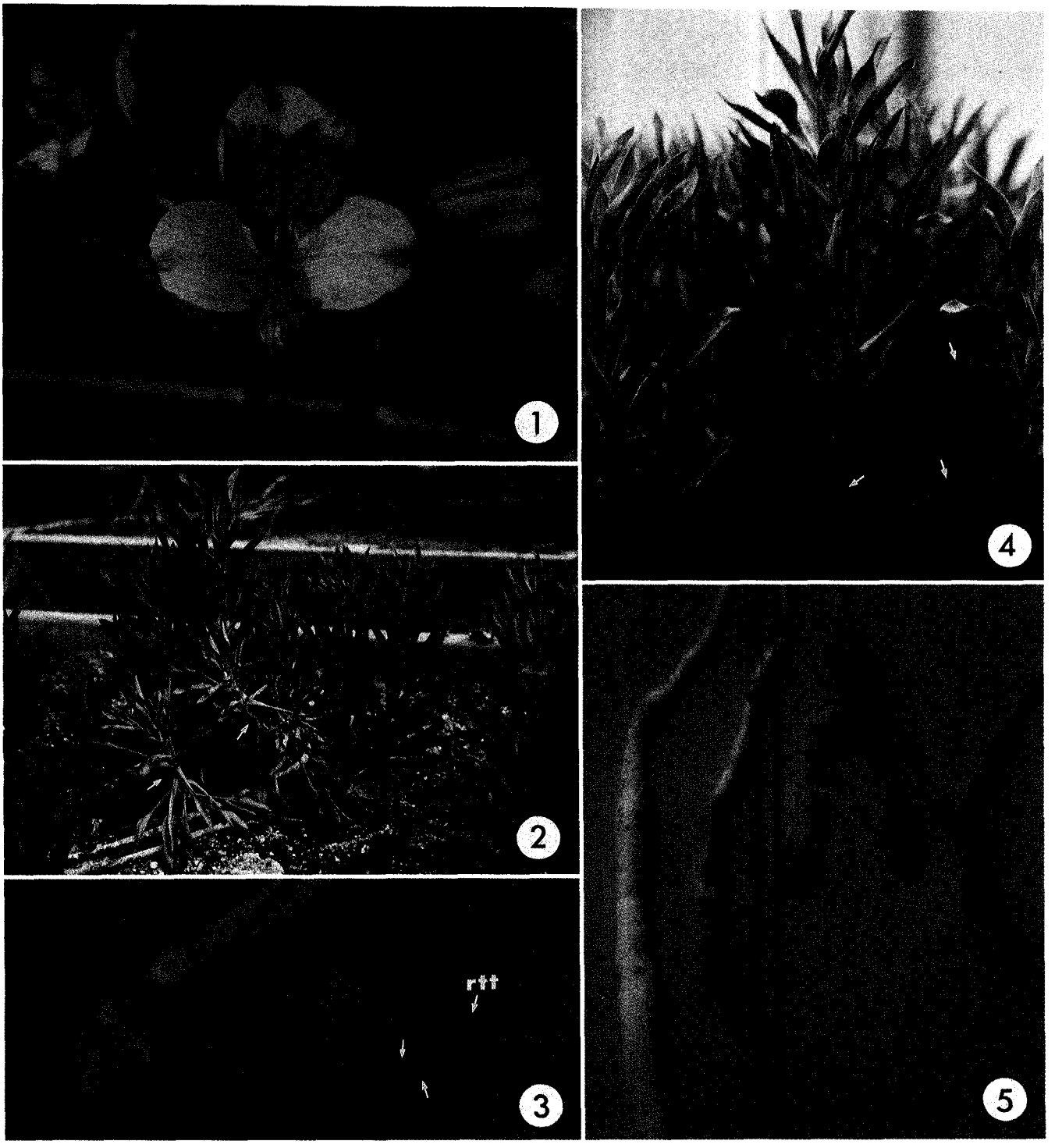

Fig. 1. A showy flower of alstroemeria.
Fig. 2. Infected plants growing in a soilless mix medium showing yellowing and dying stems (arrows).
Fig. 3. The most common symptoms on rhizomes are discoloration of vascular bundles (arrows) and rotted terminal tissues (rtt).
Fig. 4. Diseased plants showing symptoms of necrosis and discoloration along the leaf margin (arrows).
Fig. 5. Symptoms on the storage tubers; left healthy tuber and from left to right tubers with increasingly severe symptoms.

the one-meter-wide growing beds and the lower portions of the stems were examined for infection. The disease severity (DS) on these stems was based on a scale of 0 to S_4 where 0 = healthy, S_1 = 1-25%, S_2 = 26-50%, S_3 = 51-75%, and S_4 = 76-100% of the underground portion of the stem infected, respectively (4). The mean DS for the symptoms were calculated according to the following equation: $DS = [(S_1x1) + (S_2x2) + (S_3x3) + (S_4x4)]x100/Tx4$ where S_{1-4} = number of diseased plants in each category, and T = total number of stems examined, including healthy ones. The mean disease incidence (DI) was determined by dividing the number of infected stems by the total number of stems examined.

Fungal pathogens were isolated from the underground stems and rhizomes. Pieces of these organs, 5 mm long, were immersed in 1% sodium hypochlorite for 2 min, rinsed three times in sterilized distilled water and transferred onto potato dextrose agar (PDA) (Difco Inc.) in petri plates. The plates were incubated in darkness at 20°C for six days. Hyphal tips growing out from the tissue were excised and transferred onto PDA slants for further growth and identification.

The isolation rate of various combinations of *Fusarium* spp., *Pythium* spp., and *R. solani* from diseased tissues of rhizomes and basal stems were recorded for each cultivar. The DI and DS values were transformed using arcsine transformation, pooled according to different flowering types and examined statistically by an analysis of variance. Significance among the means was calculated with Duncan's multiple range test (12).

Results and discussion

Disease incidence and severity of the root rot disease complex of alstroemeria varied considerably among greenhouses and cultivars. Among the seven greenhouses surveyed the average disease incidence varied from 0 to 60.3% with a mean of 36.1%, while average disease severity ranged from 0 to 53% with a mean of 27% (Table 1). Among cultivars, the highest DI occurred on Orange Monarch (67.9%) while the DS was greatest on Saxony (47%) (Table 2). Both the lowest DI and DS values occurred on Paloma (16.6% and 11%, respectively). There was a weak correlation between DS and DI (R^2 = 0.31) at the time of the survey. Although there was uneven representation of cultivars in the four flower types among the greenhouses, plants with butterfly-type flowers had significantly higher DS and DI means than the plants with orchid-type flowers (Table 2). The mean DS and DI values for the butterfly, carmen and in-between types were not significantly different. There was a tendendcy for cultivars with flower colors other than pink to be more disease resistant than those with pink flowers (Table 2). Nevertheless, further studies using controlled inoculum levels and environmental conditions are needed to confirm this observation.

The isolation frequencies of pathogens from underground basal stems were quite different among greenhouses (Table 3). The most commonly isolated fungal pathogens in all seven greenhouses were *Fusarium* spp. In addition, frequent isolations of *Pythium* spp. occurred in greenhouses 3 and 5, and *R. solani* in greenhouses 4 and 6. The other four microorganisms and unknown ones isolated from alstroemeria (Table 3) were determined as nonpathogenic in a previous study (4).

Rhizomes and storage roots were embedded in growing media and were not easily removed, therefore, samples were taken only from greenhouse 7. *Fusarium* spp. were the major colonizing pathogens in rhizomes (85.7%) followed by *R. solani* (29.5%), and *Pythium* spp. (13.4%) (Table 4). Synchronous isolations of pathogens from rhizomes and basal stems are reported in Table 5. *Fusarium* spp. and *R. solani* were most frequently simultaneously isolated while *Fusarium* + *Pythium* was the next most common combination. This is not surprising because under natural conditions the highest infection rate of alstroemeria by a single pathogen was caused by *Fusarium* spp. (Tables 3 and 4). Likewise, the low isolation rate of each of *Pythium* spp. and *R. solani* from basal stems and rhizomes resulted in a low frequency of the combinations of *Pythium* + *Rhizoctonia* and *Pythium* + *Rhizoctonia* + *Fusarium.* Further study is needed to clarify whether synergistic or antagonistic effects occur among these pathogens on their host plants.

Flowers of alstroemeria can be harvested either by pulling or cutting the flowering stems, depending upon soil type, age of the plant, and cultivar (11). The wound caused by pulling the stem is an important site for penetration of pathogens into the rhizome (4). Since plants with butterfly-type flowers are more susceptible to the disease than those of the orchid-type, this suggests that harvesting by pulling stems of plants with butterfly-type flowers should be avoided when a greenhouse is contaminated with root-rot disease.

Unlike the other greenhouses, the growing medium of alstroemeria used in greenhouse 3 at Red Cliff was a soilless mix. It contained peat moss and vermiculite (1:1, v/v) which was steam sterilized prior to crop establishment. Using clean medium apparently was one of the important reasons for not finding the disease complex in the greenhouse.

Use of root-rot resistant cultivars has been an effective method for managing infection by organisms that incite soil-borne diseases (13). Low DS associated with high DI in the

cultivars Stripe Bird and Orange Monarch suggests that these cultivars may possess a certain degree of resistance. Paloma and Rio are tolerant to the pathogens investigated. These cultivars therefore are potentially useful as breeding material for developing resistant plants. However, chemical control of the disease should also be employed for susceptible cultivars with preferable flower colors. Since different pathogens are involved in the disease complex, the simultaneous application of a combination of fungicides should also be considered in an integrated management strategy. Until the most effective methods for controlling the disease complex have been elucidated, the prevalence and severity of the disease will likely continue to increase and may become a limiting factor in the floral production of alstroemeria.

Acknowledgements

The authors wish to thank Drs. L. M. Dosdall, Alberta Environmental Centre, Vegreville; R. L. Conner, Research Station of Agriculture Canada, Lethbridge; and E. Schneider, Plant Research Centre, Agriculture Canada, Ottawa for their valuable suggestions on the manuscript. The cooperation of the owners of the greenhouses is also gratefully appreciated.

Literature cited

1. Bik, R.A. and Th. J.M. Van Den Berg. **1982.** Nitrogen and potassium fertilization of the alstroemeria cultivars 'Orchid' and 'Carmen' grown on peat. Acta Hortic. 126:287-292.

2. Blom, T.J. and B.D. Piott. 1990. Constant soil temperature influences flowering of alstroemerias. Hortic. Sci. 25:189-191.

3. Chang, K.F., M. Mirza and S.F. Hwang. **1991.** Etiology and the occurrence of root rot disease complex of alstroemeria. Can. J. Plant Pathol. 13:273 (Abstr.).

4. Chang, K.F., M. Mirza and S.F. Hwang. **1992.** Etiology of a root rot disease complex of alstroemeria in Alberta, Canada. J. Phytopathol. (In press).

5. Hakkaart, F.A. and J.M.A. Versluijs. **1985.** Viruses of alstroemeria and preliminary results of meristem culture. Acta Hortic. 164:71-75.

6. Healy, W.E. and H.F. Wilkins. **1986.** Alstroemeria culture. Herbertia 42:16-20.

7. Heins, R.D. and H.F. Wilkins. **1979.** Effect of soil temperature and photoperiod on vegetative and reproductive growth of alstroemeria 'Regina'. J. Am. Soc. Hortic. Sci. 111:94-97.

8. Hughes, J., M.J. Tsujita, T.J. Blom and W.W. Brown. **1986.** Alstroemeria. Can. Flor., Greenhouse & Nursery 81:4,38, 40-41.

9. Leliveld, H.P.J. **1976.** Ziektebestrijding in a alstroemeria-teelt. VBL 31:15.

10. Lin, W.C. and J.M. Molnar. **1983.** Effect of photoperiod and high intensity supplementary lighting on flowering of alstroemeria 'Orchid' and 'Regina'. J. Am. Soc. Hortic. Sci. 108:914-917.

11. Molnar, J. **1975.** Alstroemeria - A promising new cut flower. Ohio Flor. Assn. Bull. 553:3-5.

12. Steel, R.G.D. and J.H. Torrie. **1980.** Principles and procedures of statistics - a biometric approach. McGraw Hill Book Co., New York. 633 pp.

13. Tinline, R.D., K.L. Bailey and H. Harding. **1989.** Role of plant breeding in controlling soiil-borne diseases. Can. J. Plant Pathol. 11:158-165.

14. Ziv, M., R. Kanterovitz and A.H. Halevy. **1973.** Vegetative propagation of alstroemeria in vitro. Sci. Hortic. 1:271-277.

Table 1. Average incidence and severity of root rot disease complex of alstroemeria in seven Alberta greenhouses.

Number	Greenhouse Location	Incidence (%)[a]		Severity index (%)[ab]	
		Mean	Range	Mean	Range
3	Red Cliff	0	0	0	0
5	Lethbridge	18.5	0 - 57.1	23	0 - 39
6	Blackfalds	60.3	16.7 - 76.3	27	8 - 48
2	Red Cliff	48.6	20.6 - 90.4	28	11 - 67
7	Edmonton	45.1	7.50 - 73.2	30	15 - 46
1	Forestburg	45.5	7.50 - 64.0	30	3 - 54
4	Lethbridge	35.0	1.30 - 68.0	53	34 - 71
	Mean	36.1	27		

a Based on the average from cultivars planted in the greenhouse.

b Based on a scale of 0 - 4 where 0 = healthy, 1 = 1 - 25%, 2 = 26 - 50%, 3 = 51 - 75%, 4 = 76 - 100% of the underground portion of the stem infected.

Table 2. Average incidence and severity of root rot disease complex on 15 cultivars of alstroemeria grown in greenhouses of Alberta.

Cultivar	Flower type[1]	Flower colour	Disease* incidence (%)	Disease* severity index (%)[2]
Paloma	O	White	16.6	11
Rio	O	Yellow	29.7	26
group means			23.2 b	18.5 b
Striped Bird	I	Pale pink	40.0	18
Samora	I	Salmon pink	26.9	22
Westland	I	Purplish pink	54.0	31
Verloni	I	Pale pink	46.0	34
Othello		Purplish pink	58.5	37
group means			45.1 ab	28.4 ab
Red Bird	C	Dark red	39.9	19
Orange Monarch	C	Orange	67.9	22
Vanitas	C	Light pink	22.2	34
group means			43.3 ab	25.0 ab
Onasis	B	Dark pink	36.0	25
Jacqueline	B	Pink	48.6	32
Saffier	B	Purplish pink	56.0	40
Ontario	B	Dark pink	48.2	42
Saxony	B	Purplish pink	64.0	47
group means			50.6 a	37.2 a

1 Flower type:
O = Orchid-type (Plants produce tall, vigorous stems); B = Butterfly-type (Plants are shorter than 1.5 m and bloom later); I = In-between-type (Between the O and B types; produces flowers all year round); C = Carmen-type (Plants produce medium tall stems with a wide selection in colors)

2 Based on a scale of 0 - 4, where 0 = healthy, 1 = 1-25%, 2 = 26-50%, 3 = 51-75%, 4 = 76-100% of the underground portion of the stem infected, respectively.

* Arcsin transformation used for analysis; untransformed means presented in table. Means followed by the same letter within a column are not significantly different at the 5% level according to Duncan's multiple range test.

Table 3. Average percent recovery of the microorganisms from discoloured underground stems of 15 cultivars of alstroemeria grown in greenhouses of Alberta.

Microorganism	Greenhouse							Average
	1	2	3	4	5	6	7	
Fusarium spp.	40.3	41.6	38.5	41.1	33.3	35.9	43.4	39.2
Rhizopus spp.	28.7	21.6	0	1.9	8.3	9.7	23.2	13.3
Penicillium spp.	7.9	8.5	38.5	9.3	8.3	1.0	17.2	13.0
Pythium spp.	6.4	6.4	15.3	9.3	33.4	3.9	0.8	10.8
Rhizoctonia solani	5.9	4.6	7.7	14.1	8.4	17.5	5.7	9.1
Bacteria	9.6	12.8	0	15.9	8.3	8.7	6.3	8.8
Botrytis spp.	0	0	0	6.5	0	2.9	1.1	1.5
Others (unkwown)	1.2	4.5	0	1.9	0	20.4	2.3	4.3

Table 4. Recovery (%) of the microorganisms from diseased rhizomes of alstroemeria cultivars.

Microorganism	Cultivar					Average
	Othello	Jacqueline	Rio	Ontario	Samora	
Fusarium spp.	68.2	83.9	85.7	100	90.9	85.7
Rhizoctonia solani	13.5	36.3	40.0	21.2	36.4	29.5
Penicillium spp.	12.0	29.8	17.1	6.1	3.0	13.6
Pythium spp.	29.2	4.8	8.6	0	24.2	13.4
Bacteria	9.9	16.1	14.3	9.1	12.1	12.3
Rhizopus spp.	16.9	6.5	0	0	3.0	5.3
Others	5.7	7.3	0	0	0	2.6

Data from greenhouse 7 only.

Table 5. Recovery (%) of the combination of *Fusarium* spp., *Rhizoctonia solani* and *Pythium* spp. from diseased basal stems and rhizomes of alstroemeria cultivars.

Cultivar	No. plants sampled	% isolation[x]			
		F + R	F + P	P + R	P + R + F
basal stem[y]					
Jacqueline	283	18.0	8.5	1.8	1.8
Ontario	78	11.5	2.6	0	0
Orange Monarch	24	4.1	12.5	0	0
Othello	188	6.9	3.2	0	0
Paloma	15	13.3	13.3	0	0
Red Bird	45	20.0	17.8	2.2	2.2
Rio	25	24.0	4.0	0	0
Saffier	29	3.4	6.9	0	0
Samora	40	17.5	0.0	0	0
Saxony	33	33.3	9.1	0	0
Striped Bird	42	2.3	11.9	0	0
Vanitas	76	9.0	6.4	0	0
Verloni	20	5.0	10.0	5.0	5.0
Victoria	9	33.3	0.0	0	0
Westland	33	15.2	3.0	3.0	3.0
group means		**14.5**	**7.3**	**0.8**	**0.8**
rhizome[z]					
Jacqueline	124	31.5	2.4	2.4	2.4
Ontario	33	21.2	0	0	0
Othello	192	8.9	8.3	2.6	0
Rio	35	28.6	5.7	5.7	2.8
Samora	33	33.3	18.2	3.0	3.0
group means		**24.7**	**6.9**	**2.7**	**1.6**

[x] F = *Fusarium* spp.; R = *Rhizoctonia solani;* P = *Pythium* spp.
[y] data were averaged from the samples of all greenhouses.
[z] data were obtained from greenhouse 7 only.

Response of cultivars and breeding lines of *Lycopersicon* spp. to *Septoria lycopersici*

V. Poysa and J.C. Tu[1]

From 1987 to 1992 more than 700 tomato cultivars, breeding lines, and accessions of related species, were evaluated for resistance to septoria leaf spot, caused by *Septoria lycopersici* Speg. The levels of resistance for selected test lines are reported here.

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Entre 1987 et 1992, plus de sept cents cultivars de tomate, lignées généalogiques et d'obtsntions d'espèces apparentées ont été évalués pour leur resistance à la tache septorienne causée par le pathogène *Septoria lycopersici* Speg. Les niveaux de résistance de ces lignées sélectionnées figurent dans ce rapport.

Introduction

Septoria leaf spot of tomato (*Lycopersicon esculentum* Mill.) has been, and continues to be, an important disease in eastern Canada and the United States (MacNeill, 1950; Ferrandino and Elmer, 1992). While fungicides have been routinely used to control this and other foliar fungal diseases of tomato (Brammall, 1993), there is increasing interest in reducing the dependence on agricultural chemicals because of concern for environmental quality. Development of cultivars resistant to septoria leaf spot and their use in commercial tomato production would be the most effective means of controlling this disease.

Moderate resistance to septoria leaf spot, which is controlled by a single dominant gene, has been identified in *L. pimpinellifolium* (Jusl.) Mill. line, PI 422397 (Barksdale and Stoner, 1978). Resistance from this line, however, has not been incorporated into any commercially grown cultivar due to its moderate level and association with small fruit size and lateness. The identification of other sources of resistance could provide a broader genetic base to facilitate the development of resistant cultivars. This report contains the results from a series of screening trials which evaluated more than 500 tomato breeding lines, accessions, and cultivars, along with more than 200 wild species accessions or interspecific breeding lines for resistance to septoria leaf spot.

Materials and methods

Each year 80 to 180 selected lines were screened for resistance in a greenhouse chamber similar to that described by Gardner (1990) for screening for early blight resistance. For each screening trial 100 plants were sown in a checkerboard design, in 200 cell trays (Plastomer, Co., Barrie, Ont.) to facilitate inoculation and disease rating. Twenty plants per line were evaluated in each of two to four replications. A susceptible control, Heinz 2653, was sown at both ends of each tray to serve as a spreader. Inoculum (10^6 spores/mL water) was prepared as previously described (Tu and Poysa, 1990). When the plants were 4-5 weeks old, the last fully expanded leaf was rubbed between thumb and forefingers to break foliar trichomes and reduce surface tension of epicuticular wax, permitting uniform spread of the spore suspension on the leaf surface. Inoculum was sprayed on to run-off, and the leaves were rubbed again. The plants were placed in a plastic-covered chamber and were intermittently misted by a cool-mist humidifier to maintain near 100% relative humidity. From the second to the fifth day after inoculation, the plastic sides of the chamber were raised and the humidifier turned off for a 12 hour light period to allow the plants to dry during the day. The high humidity regime was reestablished each night. Disease reaction was determined 7-10 days after inoculation, based on the size and number of lesions on the inoculated and adjacent leaves. Disease severity was rated on a 1 to 9 scale: 1=asymptomatic; 2=few small lesions; 3=moderate number of small lesions; 4=several small lesions, <10% leaf infected; 5=10-20% leaf infected; 6=21-50% leaf infected; 7=51-80% leaf infected; 8=81-99% leaf infected; 9=plant dead.

A score of 1 to 3.9 represents a high level of resistance: plants with this level of resistance would not develop the disease in the field. A score of 4.0 to 5.9 represents a moderate level of resistance: plants with this level of resistance would not normally suffer yield losses due to septoria leaf spot in the field. Scores from 6.0 to 9.0

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represent moderate to high levels of susceptibility. Any material rated resistant (disease rating < 6) was reevaluated to verify the level of resistance. Data reported in the tables are averages over all tests in which each line occured.

Results and discussion

The levels of resistance to septoria leaf spot for the commercial cultivars evaluated all exceeded 7.0, indicating that these materials were quite susceptible to the pathogen (Table 1). Several breeding lines and plant introductions had disease ratings between 4.0 and 5.9 and thus had moderate levels of resistance, suggesting that these could be used by breeders in developing resistant cultivars. Several of these lines had levels of resistance similar to the previously reported (Barksdale and Stoner, 1978) *L. pimpinellifolium* line, PI422397, combined with improved fruit size and fruit yield, relative to PI422397. The majority of Harrow (HRS) *L. esculentum* breeding lines evaluated were rated >5.0 and have not been reported.

The disease severity rating for twenty-two accessions of related species, especially *L. hirsutum* and *L. peruvianum,* were between 2.0 and 3.9, indicating that they were more resistant than PI422397 (Table 2). In addition, useful levels of resistance were also found in *L. pennellii, L. pimpinellifolium, L. chilense*, and *L. esculentum* var. *cerasiforme.* Although the most resistant lines were accessions of *L. hirsutum* and *L. peruvianum,* some lines of these species were moderately to highly susceptible.

High levels of resistance were retained in six interspecific breeding lines with *L. hirsutum* accessions (Table 3). These six lines, however, had one or more undesirable agronomic traits, such as being indeterminate, late maturing, and relatively low yielding. Thirty-one interspecific breeding lines derived from several wild species exhibited moderate levels of resistance with ratings between 4.2 and 5.5, indicating that they might be potential sources of resistance for breeding programs. The more than 100 interspecific breeding lines from the Harrow program (HRS lines) with disease ratings over 6.0 are not reported.

These results suggest that the testing procedures can provide an estimate of resistance to septoria leaf spot in a range of plant material currently available for commercial development. The results also provide information on sources of resistance that could be useful to breeders and seed companies in their dewelopment of tomato cultivars resistant to septoria leaf spot.

Literature cited

1. Barksdale, T.H. and A.K. Stoner. 1978. Resistance in tomato to *Septoria lycopersici.* Plant Dis. Reptr. 62:844-847.
2. Brammall, R.A. 1993. Effects of foliar fungicide on early blight and yield in fresh market tomatoes. Plant Dis. (In press).
3. Ferrandino, F.J. and W.H. Elmer. 1992. Reduction in tomato yield due to septoria leaf spot. Plant Dis. 76:208-211.
4. Gardner, R.G. 1990. Greenhouse disease screen facilitates breeding resistance to tomato early blight. Hort Sci. 25:222-223.
5. MacNeill, B.H. 1950. Studies in *Septoria lycopersici* Speg. Can. J. Res. 28:645-672.
6. Tu, J.C. and V. Poysa. 1990. A brushing method of inoculation for screening tomato seedlings for resistance to *Septoria lycopersici.* Plant Dis. 74:294-297.

Table 1. Response of *L. esculentum* breeding lines, accessions, and cultivars to *Septoria lycopersici* infection.

Disease Severity Rating[1] (1-9 scale)	Line[2]
1.0 - 1.9	
2.0 - 2.9	
3.0 - 3.9	
4.0 - 4.9	PI111406, HRS84-297, HRS84-303, HRS84-311, HRS84-312, HRS84-316, HRS84-317, HRS84-319, HRS84-314, HRS85-261, HRS85-271, HRS85-282
5.0 - 5.9	PI372364, PI427149, PI438875, PI97321, PI262892, PI270418, PI312188, PI452027
6.0 - 6.9	PE-58, PE-59, PE-60, PI142698, PI201266, PI268407, PI309690, PI311115, PI311279, PI270407, PI270149, PI414164
7.0 - 7.9	Ohio 832, Ohio 8245, FM6203, PE-57, PI270403,
8.0 - 8.9	Purdue 812, Heinz 2653, Ohio 7814, TH 318, PI201476
9.0	

1 Based on a 1-9 scale, where 1=asymptomatic; 2=few small lesions; 3=moderate number of small lesions; 4=several small lesions, <10% leaf infected; 5=10-20% leaf infected; 6=21-50% leaf infected; 7=51-80% leaf infected; 8=81-99% leaf infected; 9=plant dead.

2 PI lines obtained from the Plant Introduction Station, USDA, Geneva, **N.Y.**; HRS lines from **V.** Poysa, Agriculture Canada, Harrow Research Station, Harrow, Ontario; PE lines obtained from Dr. J. Cuartero, CSIC, Malaga, Spain.

Table 2. Response of related *Lycopersicon* **spp.** to *Septoria lycopersici* infection.

Disease Severity Rating[1] (1-9 scale)	Line[2*]
1.0 - 1.9	
2.0 - 2.9	LA2100[a], LA2650[a], LA2204[a], PE-36[a], LA1675[b], LA1360[b], PI251307[b], PE-33[b], PI270435[b], PI390655[b], PE-44[1]
3.0 - 3.9	LA1366[a], LA2124[a], LA1910[b], LA1292[b], LA1304[b], LA1365[b], LA255[a], PI128654[b], PI390671[b], PI365951[b], PE-32[b]
4.0 - 4.9	PI422397[d], PI365934[a], PE-34[a], PI390513[a], PI251305[a], PI415127[b], LYCA/66[d], PE-8[d], PE-12[d], PE-22[b], PE-31[b], PE-48[b], PE-49[b], LA1723[b], PI306811[b], LA1960[e], LA2404[e], LA1983[b]
5.0 - 5.9	PE-3[d], PE-14[d], PE-47[c], PE-64[f], PE-69[f], PE-78[f], LA1929[b], LA2326[b], LA2573[b], LA2581[b]
6.0 - 6.9	PE-2[d], PE-63[f], PI379014[a], PI390667[b], PI438880[f], PI438888[f]
7.0 - 7.9	PE-73[f], LA751[c], LA1299[c], LA1303[c], PI129144[b], PI375937[d]
8.0 - 8.9	LA1920[c], PI251312[b], PI379017[b], PI308183[b]
9.0	

1 Based on a 1-9 scale, where 1=asymptomatic; 2=few small lesions; 3=moderate number of small lesions; 4=several small lesions, <10% leaf infected; 5=10-20% leaf infected; 6=21-50% leaf infected; 7=51-80% leaf infected; 8=81-99% leaf infected; 9=plant dead.

2 **LA** lines obtained from Dr. C. Rick, Tomato Genetics Resource Center, Davis, California; PI lines obtained from the Plant Introduction Station, USDA, Geneva, **N.Y.**; PE lines obtained from Dr. J. Cuartero, CSIC, Malaga, Spain.

* Superscripts following each line indicate the species: [a] *L. hirsutum*; [b] *L. peruvianum*; [c] *L. pennellii*; [d] *L. pimpinellifolium* [e] *L. chilense*; [f] *L. esculentum* var. *cerasiforme*.

Table 3. Response of interspecific hybrids to *Septoria lycopersici* infection.

Disease Severity Rating[1] (1-9 scale)	Line[2]*
1.0 - 1.9	
2.0 - 2.9	HRS90-189[a], HRS90-301[a], HRS90-303[a]
3.0 - 3.9	HRS90-304[a], HRS90-305[a], HRS90-306[a]
4.0 - 4.9	HRS84-305[b], HRS84-307[b], HRS84-308[b], HRS85-262[b], HRS85-266[b], HRS85-267[b], HRS85-268[b], HRS85-278[b], HRS86-212[b], HRS88-368[c], HRS88-376[a], HRS88-378[d], HRS88-350[e], HRS88-354[e], HRS88-358[e], HRS88-353[f], HRS88-372[f], HRS88-365[d], HRS88-370[g], HRS88-373[e], HRS88-364[d], HRS90-108[a], HRS90-109[a], HRS90-302[a], HRS90-307[a], HRS-SRPR-1[c]
5.0 - 5.9	PI298934[c], HRS86-207[b], HRS88-357[g], HRS88-155[b], HRS88-366[d]
6.0 - 6.9	
7.0 - 7.9	
8.0 - 8.9	
9.0	

1 Based on a 1-9 scale, where 1=asymptomatic; 2=few small lesions; 3=moderate number of small lesions; 4=several small lesions, <10% leaf infected; 5=10-20% leaf infected; 6=21-50% leaf infected; 7=51-80% leaf infected; 8=81-99% leaf infected; 9=plant dead.

2 PI lines obtained from the Plant Introduction Station, USDA, Geneva, **N.Y.**; HRS lines from V. Poysa, Agriculture Canada, Harrow Research Station, Harrow, Ontario.

* Superscripts following each line indicate the related species involved in the cross: [a] *L. hirsutum*; [b] *L. pimpinellifolium*; [c] *L. peruvianum*; [d] *pimpinellifolium/hirsutum*; [e] *L. pennellii*; [f] *L. esculentum* var. *cerasiforme*; [g] *peruvianum/pimpinellifolium*.

Disease Highlights 1993 Aperçu des maladies

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Diagnostic laboratories/Laboratoires diagnostiques

CROP: Diagnostic Laboratory Report - Alfalfa

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON ALFALFA, SUBMITTED TO THE MANITOBA AGRICULTURE CROP DIAGNOSTIC CENTRE IN 1992

METHODS: The Manitoba Agriculture Crop Diagnostic Centre provides diagnoses and control recommendations for disease problems of 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 AND COMMENTS: Results are presented in Table 1. Black stem *(Phoma medicaginis)* was detected in 6 samples, common leaf spot *(Pseudopeziza medicaginis)* in 4 samples, and crown rot *(Fusarium* sp.) and yellow leaf blotch *(Leptotrochila medicaginis)* in 2 samples each. In addition to the fungal diseases noted 5 samples were found to be affected by nutrient deficiencies, **5** by environmental stress and 1 sample showed evidence of a herbicide injury.

Table 1. Summary of diseases diagnosed on alfalfa submissions to the Manitoba Agriculture Crop Diagnostic Centre in 1992.

DISEASE	PATHOGEN	NUMBER OF SAMPLES
Black Stem	*Phoma medicaginis*	6
Common Leaf Spot	*Pseudopeziza medicaginis*	4
Crown Rot	*Fusarium* spp.	2
Yellow Leaf Blotch	*Leptotrochila medicaginis*	2
Environmental Stress	winter injury	5
Nutrient Deficiency	potassium deficiency	5
Herbicide Injury	undetermined	1

CROP: Diagnostic Laboratory Report - Forages and Field Crops

LOCATION: Alberta

NAME AND AGENCY:
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Alberta Special Crops and Horticultural Research Centre
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TITLE: DISEASES DIAGNOSED ON FORAGES AND FIELD CROPS

METHODS: The Regional Crop Laboratory (RCL) at the Alberta Special Crops and Horticultural Research Centre (ASCHRC) received samples on field crops from district agriculturalists, farmers, and from fertilizer or chemical companies. Diagnoses were made from symptoms or by isolating plant pathogens from diseased tissues in the laboratory.

RESULTS: The RCL at ASCHRC received a total of 125 requests for disease identification on forages and field crops in 1992. Results are summarized in Table 1 below.

Table 1. Summary of diagnoses made on forage and field crop samples submitted to the RCL in 1992

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Alfalfa	Anthracnose	*Colletotrichum destructivus*	2
	Black Stem	*Phoma medicaginis*	1
	Chlorosis	Iron Deficiency	1
	Crown/Root Rot	*Fusarium roseum*	2
		Rhizoctonia solani	2
	Damping off	*Pythium* spp.	1
	Grey Mold	*Botrytis cinerea*	1
	Leaf/Stem Spot	Pesticide Injury	1
		Alternaria brassicae	1
		Phoma medicaginis	1
		Stemphylium botryosum	1
		Ascochyta imperfecta	1
	.Wilt	*Verticillium albo-atrum*	1
Barley	Barley Yellow Dwarf	BYDV	1
	Black Point	*Alternaria* spp.	2
		Fusarium spp.	2
		Cladosporium spp.	1
	Chlorosis	WSMV	1
	Crown/Root Rot	*Cochliobolus sativus*	7
		Fusarium spp.	8
		Pythium spp.	2

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Barley (cont'd)		*Rhizoctonia* spp.	1
	Double Heads	Pesticide Injury	1
	Leaf Purpling	Phosphorus Deficiency	1
	Leaf Blotch	*Septoria avenae*	1
	Leaf Stripe	*Pyrenophora graminea*	1
	Loose Smut	*Ustilago nuda*	1
	Net Blotch	*Pyrenophora teres*	10
	Spot Blotch	*Cochliobolus sativus*	4
Canola	Blackleg	*Leptosphaeria maculans*	1
	Black Spot	*Alternaria brassicae*	2
	Canker	*Sclerotinia sclerotiorum*	3
	Leaf Distortion	Pesticide Injury	1
	Leaf Spot	Hail	1
	Pod Spot	*Alternaria brassicae*	2
		Sclerotinia sclerotiorum	1
	Stem Rot	*Alternaria* spp.	1
Chickpea	Root Rot	*Pythium* spp.	1
Coriander	Head Blight	*Gloeosporium* spp.	1
		Alternaria spp.	1
Field Beans	Chlorosis	Pesticide Injury	1
		Nutrient Deficiency	1
	Leaf Distortion	Pesticide Injury	1
	Pithy Root	Environmental Stress	1
	Root Rot	*Fusarium* spp.	1
	Seed Decay	*Fusarium* spp.	1
		Pythium spp.	1
		Rhizopus spp.	1
Flax	Pasmo	*Septoria linicola*	1
	Root Rot	*Fusarium* spp.	1
		Pythium spp.	1
	Wilt	*Fusarium oxysporum*	1
Oats	Root Rot	*Fusarium* spp.	1
Peas	Leaf Blight	*Mycosphaerella pinodes*	3
	Leaf Spot	*Ascochyta pinodella*	2
		Hail	1
	Mildew	*Peronospora viciae*	1
	Pod Spot	Hail	1
Peppermint	Storage Rot	*Alternaria* spp.	1
		Fusarium spp.	1
		Penicillium spp.	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Spearmint	Root/Crown Rot	*Fusarium* spp.	2
		Pythium spp.	1
		Rhizoctonia spp.	1
Wheat	Black Point	*Alternaria alternata*	**5**
		Fusarium spp.	1
	Chlorosis	Nutrient Deficiency	1
	Crinkle Joint	Pesticides	1
	Crown/Root Rot	*Bipolaris sorokiniana*	1
		Cochliobolus sativus	28
		Fusarium spp.	37
		Pythium spp.	9
	Ergot	*Claviceps purpurea*	1
	Glume Blotch	*Alternaria* spp.	1
	Head Blight	*Fusarium graminearum*	**5**
	Leaf Spot	Environmental Stress	**3**
		WSMV	**3**
	Scab	*Fusarium* spp.	1
	Seedling Blight	*Fusarium* spp.	1
	Sooty Leaf Mold	*Cladosporium* spp.	1
	Spot Blotch	*Cochliobolus* sativus	12
	Stem Distortion	Pesticide Injury	2
		Rapid Early Growth	1
	Stunting	Cool Temperatures	1

CROP: Diagnostic Laboratory Report - Cereals

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON CEREAL CROPS BY THE MANITOBA AGRICULTURE CROP DIAGNOSTIC CENTRE IN 1992

METHODS: The Manitoba Agriculture Crop Diagnostic Centre provides diagnoses and control recommendations for disease problems of 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 AND COMMENTS: Results of cereal submissions are presented in Table 1. The most commonly encountered problem in barley was net blotch. Scald and barley stripe were found to be the cause of damage in two samples. These two diseases were favoured by cool spring weather in 1992. Bacterial blight was a common problem in samples of oats submitted during the month of June, however it did not result in significant economic loss. Tan spot was the most frequent problem detected in wheat. Leaf rust was found in five samples however it did not result in as much loss as in 1991 as the disease did not become a problem until late July about 3 weeks later than normal.

Table 1. Summary of diseases diagnosed on samples submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1992.

DISEASE	SCIENTIFIC NAME	NUMBER OF SAMPLES
BARLEY		
Net blotch	*Pyrenophora teres*	27
Common root rot	*Cochliobolus sativus, Fusarium spp*	**5**
Ergot	*Claviceps purpurea*	**4**
Flame chlorosis	Flame chlorosis (virus like agent)	3
Bacterial blight	*Xanthomonas translucens*	2
Barley Yellow Dwarf	Barley yellow dwarf virus	2
Barley stripe	*Pyrenophora graminea*	1
Leaf rust	*Puccinia recondita*	1
Scald	*Rhynchosporium secalis*	1
Environmental stress		**8**
Physiological leaf spot		**6**
Herbicide injury		3
Nutrient deficiency		1

DISEASE	SCIENTIFIC NAME	NUMBER OF SAMPLES
OATS		
Bacterial blight	*Pseudomonas syringae* pv. *coronafaciens*	11
Barley yellow dwarf	Barley yellow dwarf virus	**2**
Crown rust	*Puccinia coronata* f. sp. *avenae*	1
Environmental stress		**2**
Herbicide injury		1
WHEAT		
Tan spot	*Pyrenophora tritici - repentis*	**42**
Barley yellow dwarf virus	Barley yellow dwarf	11
Common root rot	*Cochliobolus sativus, Fusarium* spp.	**6**
Head molds	*Alternaria* spp., *Cladosporium* spp.	**6**
Leaf rust	*Puccinia recondita*	**5**
Septoria leaf rust	*Septoria* spp.	**5**
Glume blotch	*Septoria* spp.	**3**
Wheat streak mosaic	Wheat streak mosaic virus	**3**
Head blight	*Fusarium* spp.	2
Environmental stress		**25**
Herbicide injury		18
Nutrient deficiency		**5**

CROP: Diagnostic Laboratory Report - Fruit Crops

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON FRUIT CROPS

METHODS: The Regional Crop Laboratory (RCL) at the Alberta Special Crops and Horticultural Research Centre (ASCHRC) received samples on fruit from district agriculturalists, farmers, market gardeners and from greenhouse growers. Diagnoses were made from symptoms or by isolating plant pathogens from diseased tissues in the laboratory.

RESULTS: The RCL at ASCHRC received a total of 63 requests for disease identification on fruit crops in 1992. Results are summarized in Table 1 below.

Table 1. Summary of diagnoses made on fruit crop samples submitted to the RCL in 1992.

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Apple	Apple Scab	Venturia inaequalis	1
	Canker	Cytospora spp.	3
		Sunscald Injury	1
	Chlorosis	Iron Deficiency	2
	Fireblight	Erwinia amylovora	22
	Leaf Distortion	Frost Injury	4
	Leaf Spot	Frost Injury	1
		Nutrient Deficiency	1
		Pesticide Injury	1
	Sooty Mold	Capnodiaceae	1
Apricot	Fireblight	*Erwinia* amylovora	1
Cherry	Chlorosis	Iron Deficiency	1
	Silver Leaf	Stereum *purpurea*	1
Chokecherry	Bud Necrosis	Frost Injury	1
	Crown Gall	Agrobacterium *tumefaciens*	1
	Fireblight	Erwinia amylovora	2
	Leaf Spot	Frost Injury	1
Crabapple	Canker	Cytospora spp.	1
	Fireblight	Erwinia amylovora	7
	Leaf Tattering	Wind Damage	1
	Russetting	Sunscald Injury	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Currant	Chlorosis	Nutrient Deficiency	1
	Leaf Spot	*Mycosphaerella ribis*	2
Pear	Fireblight	*Erwinia amylovora*	1
Plum	Brown Rot	*Monolinia fructicola*	1
	Fireblight	*Erwinia amylovora*	1
Raspberry	Bacterial Blight	*Pseudomonas syringae*	1
	Dieback	Low Temperature Injury	1
	Fireblight	*Erwinia amylovora*	2
Saskatoon	Bud Necrosis	Frost Injury	2
	Crown Rot	*Phytophthora cactorium*	1
	Fireblight	*Erwinia amylovora*	1
	Leaf Distortion	Frost Injury	1
	Rust	*Gymnosporangium* spp.	1
Strawberry	Crown/Root Rot	*Fusarium* spp.	4
		Rhizoctonia solani	3
		Rhizopus spp.	2
		Penicillium spp.	1
	Grey mold	*Botrytis cinerea*	2
	June Yellows	Not Known	1
	Leaf Spot	Nutrient Deficiency	1
		Botrytis cinerea	1
		Mycosphaerella fragariae	1
	Powdery Mildew	*Sphaerotheca mucularis*	1
	Root Rot	*Cylindrocarpon* spp.	2
	Pythium spp.		1
	Slime Mold	*Physarum* spp.	1

CROP: Diagnostic Laboratory Report - Potato

LOCATION: Manitoba

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TITLE: DISEASES DIAGNOSED ON POTATO SUBMITTED TO THE MANITOBA AGRICULTURE CROP DIAGNOSTIC CENTRE IN MANITOBA IN 1992

METHODS: The Manitoba Agriculture Crop Diagnostic Centre provides diagnoses and control recommendations for disease problems of 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 AND COMMENTS: Results of submissions are presented in Table 1. Fusarium root rot was the most common problem associated with potatoes submitted to the Crop Diagnostic Centre. Early blight was observed on fewer samples than in 1991. Late blight was found on samples from several commercial potato fields in the Winkler area. Late blight is only very infrequently observed in Manitba but its development in 1992 was favoured by abnormally cool weather almost throughout the growing seasons. Rhizoctonia was also seen more frequently than usual.

Table 1. Summary of diseases diagnosed on potato samples Submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1992.

DISEASE	SCIENTIFIC NAME	NUMBER OF SAMPLES
Fusarium root rot	*Fusarium* spp.	**8**
Early blight	*Alternaria solani*	5
Rhizoctonia root rot	*Rhizoctonia solani*	4
Fusarium dry rot	*Fusarium* spp.	3
Blackleg	*Erwinia carotovora* var. *atroseptica*	2
Bacterial soft rot	*Erwinia carotovora* var. *carotovora*	2
Late blight	*Phytophthora infestans*	2
Verticillium wilt	*Verticillium dahliae*	2
Virus	PVS, PVX	2
Common scab	*Streptomyces scabies*	1
Purple top	Aster yellows MLO	1
Sclerotinia	*Sclerotinia sclerotiorum*	1
Environmental stress	drought, black heart	3

CROP : Diagnostic Laboratory Report - Vegetable Crops

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON VEGETABLE CROPS

METHODS: The Regional Crop Laboratory (RCL) at the Alberta Special Crops and Horticultural Research Centre (ASCHRC) received samples from district agriculturalists, market gardeners, farmers, extension specialists or from the general public. Diagnoses were made from symptoms or by isolating plant pathogens from diseased tissues in the laboratory.

RESULTS: The RCL at ASCHRC received a total of 108 requests for disease identification on vegetables in 1992. Results are summarized in Table 1 below.

Table 1. Summary of diagnoses made on vegetable samples submitted to the RCL in 1992.

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Bean	Chlorosis	Nutrient Deficiency	2
	Pithy Root	Environmental Stress	1
Broccoli	Head Blight	Alternaria brassicae	1
	Hollow Heart	Calcium Deficiency	1
Cabbage	Black Speckle	Physiological Aging	1
	Heat Canker	High Soil Temperature	1
	Leaf Spot	*Alternaria* brassicae	2
	Soft Rot	Sclerotinia sclerotiorurn	1
	Stem Distortion	Pesticide Injury	1
Canteloupe	Anthracnose	Colletotrichurnorbiculare	1
	Leaf Spot	Pseudornonaslachryrnans	1
Carrot	Crown Gall	Agrobacteriurn turnefaciens	1
	Soft Rot	Frost Injury	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Cauliflower	Leaf Spot	*Alternaria brassicae*	1
	Stem Gall	Pesticide Injury	1
	Wirestem	*Rhizoctonia solani*	1
Celery	Early Blight	*Cercospora apii*	1
	Late Blight	*Septoria apiicoli*	2
Corn	Common Smut	*Ustilago maydis*	1
	Leaf Spot	*Pseudomonas syringe*	1
	Stalk Rot	*Fusarium* spp.	1
	Stunting	Pesticide Injury	1
Cucumber	Chlorosis	Nutrient deficiency	2
	Crown/Root Rot	*Pythium* spp.	1
	Leaf Spot	Frost Injury	1
		Pseudomonas syringe	1
	Wilt	*Fusarium* spp.	1
Lettuce	Soft Rot	*Etwinia carotovora*	1
Onion	Crown/Root Rot	*Botrytis allii*	1
	Leaf Spot	*Botrytis allii*	1
		Botrytis squamosa	1
Pea	Crown/Root Rot	*Fusarium* spp.	2
		Rhizoctonia solani	1
	Leaf/Pod Spot	*Ascochyta pisi*	1
Pepper	Anthracnose	*Colletotrichum capsici*	1
	Fruit Spot	*Alternaria* spp.	1
		Colletotrichum capsici	1
	Soft Rot	*Sclerotinia sclerotiorum*	1
Potato	Blackening	Frost Injury	1
	Black Heart	Chilling Injury	1
	Blackleg	*Etwinia carotovora*	6
	Black Scurf	*Rhizoctonia solani*	7
	Bruising	Mechanical Injury	2
	Canker	*Rhizoctonia solani*	2
	Chlorosis	PVX/PVY	1
	PLRV		1
	Common Scab	*Streptomyces scabies*	11
	Dieback	Pesticide Injury	1
	Dry Rot	*Fusarium* spp.	14
	Early Blight	*Alternaria solani*	7
	Fiddlehead	Tordon Injury	6

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Potato (cont'd.)	Gangrene	*Phoma exigua*	1
	Late Blight	*Phytophthora infestans*	16
	Leaf Roll	Pesticide Injury	1
		PLRV	2
	Leaf Spot	Frost Injury	1
	High Soil Salinity		2
	Leak	*Pythium debaryanum*	19
	Mahogany Browning	Environmental Stress	1
	Net Necrosis	PLRV	1
	Mouse Damage	*Mus musculus*	1
	Powdery Scab	*Spongospora subterranea*	1
	Seed Decay	*Erwinia carotovora*	1
	Skin Spot	*Oospora* spp.	1
	Silver Scurf	*Helminosporium solani*	5
	Soft Rot	*Envinia carotovora*	24
	Frost Injury		1
	Vascular	*Fusarium oxysporum*	1
	Browning	Rapid Topkilling	1
		Verticillium spp.	3
	Wilt	*Verticillium* spp.	3
Pumpkin	Leaf Spot	*Pseudomonas lachrymans*	1
Tomato	Blossom End Rot	Nutrient Deficiency	1
	Canker	Environmental Stress	2
	Chlorosis	Nutrient Deficiency	1
	Early Blight	*Alternaria solani*	5
	Flower Distortion	Frost Injury	2
	Late Blight	*Phytophthora infestans*	2
	Leaf Distortion	Pesticide Injury	2
	Wilt	*Fusarium oxysporum*	1
Watermelon	Leaf Spot	*Alfernaria* spp.	1
		Pseudomonas lachrymans	1
Zucchini	Blossom End Rot	Nutrient Deficiency	1
	Wilt	*Fusarium* spp.	1

CROP: Diagnostic Laboratory Report - Vegetables

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON VEGETABLES SUBMITTED TO THE MANITOBA AGRICULTURE CROP DIAGNOSTIC CENTRE IN MANITOBA IN 1992

METHODS: The Manitoba Agriculture Crop Diagnostic Centre provides diagnoses and control recommendations for disease problems of 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 AND COMMENTS: The disease submissions on vegetable crops are presented in Table 1. Fusarium crown rot of asparagus was diagnosed in samples from Portage. Phoma leaf spot was found on cabbage. Aster yellows was the most common problem affecting carrots. Black root rot was found on carrots returned from Winnipeg stores to the Manitoba Vegetable Marketing Board. Angular leaf spot and root rot were the most commonly encountered diseases of cucumbers. The environmental stress of prolonged cool summer temperatures resulted in a severe reduction of the commercial cucumber crop. White rot was diagnosed for the first time in Manitoba from a commercial onion crop in the Stonewall area. Environmental stress of prolonged cool temperatures resulted in immaturity of much of the onion crops at harvest and storage losses due to neck rot were prevalent in onions from Portage and Winkler. Septoria leaf spot was the most common disease in samples of tomatoes submitted.

Table 1. Summary of diseases diagnosed on vegetable samples submitted to the Manitoba Agriculture Crop Diagnostic Centre in Manitoba in 1992.

DISEASE	SCIENTIFIC NAME	NUMBER OF SAMPLES
ASPARAGUS		
Root Rot	*Fusarium* sp.	1
Total		1
CABBAGE		
Phoma leaf spot	*Leptosphaeria maculens*	2
Root rot and wilt	*Fusarium* sp.	1
Rhizoctonia rot	*Rhizoctonia solani*	1
Environmental stress		2
Total		6
CARROT		
Aster yellows	Aster yellows MLO	3
Black root rot	*Thielaviopsis basicola*	1
Herbicide injury		1
Total		5
CUCUMBER		
Angular leaf spot	*Pseudomonas lachrymans*	2
Root rot	*Fusarium* & *Pythium* spp.	2
Environmental stress		1
Total		6
ONION		
Blast	*Botrytis* spp.	2
Neck rot	*Botrytis* spp.	2
White rot	*Sclerotium cepivorum*	2
Downy mildew	*Peronospora destructor*	1
Environmental stress		2
Total		9
TOMATO		
Septoria leaf spot	*Septoria lycopersici*	6
Early blight	*Alternaria solani*	3
Bacterial speck	*Pseudomonas syringae* pv. tomato	2
Root rot	*Fusarium* sp.	1
Herbicide injury		8
Environmental stress		6
Nutrient deficiency		1
Total		27

CROP: Diagnostic Laboratory Report - Greenhouse Crops

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON GREENHOUSE CROPS

METHODS: The Regional Crop Laboratory (RCL) at the Alberta Special Crops and Horticultural Research Centre (ASCHRC) received samples from district agriculturalists, florists, extension specialists or directly from commercial greenhouses. Diagnoses were made from symptoms or by isolating plant pathogens from diseased tissues in the laboratory.

RESULTS: The RCL at ASCHRC received a total of 101 requests for disease identification on greenhouse crops in 1992. Results are summarized in Table 1 below.

Table 1. Summary of diagnoses made on greenhouse samples submitted to the RCL in 1992.

CROPS	DISEASES	CAUSAL AGENTS OR PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Alstroemeria	Bud Distortion	Pesticide Injury	1
	Root Rot	*Fusarium* spp.	1
		Pythium spp.	1
Aster	Leaf Speckle	Nutrient Deficiency	1
Babaco	Leaf Spot	Environmental Stress	1
Begonia	Root Rot	*Pythium* spp.	1
Bellflower	Leaf/Stem Spot	*Botrytis cinerea*	1
Browalia	Leaf Distortion	TSWV	1
	Leaf Spot	TSWV	1
Cactus	Leaf Spot	Nutrient Deficiency	1
Campanula	Leaf Spot	*Botrytis cinerea*	1
Chrysanthemum	Bud Necrosis	TSWV	1
	Leaf Distortion	TSWV	1
	Leaf Spot	TSWV	1
	Leaf Spot	Pesticide Injury	1
	Stem Splitting	Environmental Stress	1
	Wilt	*Fusarium* spp.	1

CROPS	DISEASES	CAUSAL AGENTS OR PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Cucumber	Albinoism	Pesticide Injury	1
	Canker	Environmental Stress	1
		Cladosporium spp.	1
		Fusarium spp.	1
	Chlorosis	Environmental Stress	2
		Nutrient Deficiency	2
		Pesticide Injury	1
	Crown/Root Rot	*Fusarium* spp.	2
		Pythium spp.	3
	Leaf Crinkle	Environmental Stress	1
	Leaf Mottle	Virus/Not Identified	1
	Leaf Spot	*Alternaria cucumeris*	1
		Environmental Stress	2
		Nutrient Deficiency	1
		Pseudomonas lachrymans	1
	Oedema	Excessive Humidity	1
	Powdery Mildew	*Erysiphe cichoracearum*	1
		Sphaerotheca fuliginea	1
	Soft Rot	*Sclerotinia sclerotiorum*	1
	Stunting	Environmental Stress	1
	Wilt	Environmental Stress	1
Cyclamen	Leaf Spot	Pesticide injury	1
	Ring Spot	TSWV	1
	Wilt	*Fusarium* spp.	1
Eucalyptus	Leaf Burn	Environmental Stress	1
Freesia	Corm Rot	*Penicillium* spp.	1
		Fusarium oxysporum	2
Geranium	Chlorosis	Nutrient Deficiency	1
	Crown/Root Rot	Fertilizer Burn	1
		Fusarium spp.	1
		Pythium spp.	3
		Rhizoctonia solani	1
	Damping-Off	*Rhizoctonia solani*	2
	Fasciation	*Corynebacteriums fascians*	2
Gladiolas	Bulb Rot	*Fusarium oxysporum*	1
		Erwinia carotovora	1
Gloxinia	Ring Spot	TSWV	1
Gopher Purge	Crown/Root Rot	*Pythium* spp.	1
		Rhizoctonia spp.	1
Gypsy	Leaf Spot	Low Temperature Stress	1
Hibiscus	Leaf Spot	*Phyllosticta syriaca*	1

CROPS	DISEASES	CAUSAL AGENTS OR PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Hydrangea	Stunting	Soil Compaction	1
Impatiens	Chlorosis	TSWV	1
	Crown/Root Rot	*Fusarium* spp.	2
		Pythium spp.	1
		Rhizoctonia solani	1
	Leaf Spot	TSWV	1
Lavatera	Leaf Spot	*Botrytis cinerea*	1
Lily	Grey Mold	*Botrytis cinerea*	1
Magnolia	Frog-Eye Spot	*Botryosphaeria obtusa*	1
	Leaf Spot	Environmental Stress	1
Marigold	Stunting	Environmental Stress	1
Orchid	Leaf Spot	Virus/Not Identified	2
Pepper	Fruit Mottling	Environmental Stress	1
Petunia	Root Rot	High Soil Salinity	1
Poinsettia	Grey Mold	*Botrytis cinerea*	1
	Crown\Root Rot	*Fusarium* spp.	2
		Pythium spp.	1
	Leaf Spot	Nutrient Deficiency	1
		Pesticide Injury	1
Primula	Leaf Spot	TSWV	1
Rose	Grey Mold	*Botrytis cinerea*	3
	Petal/Stem Spot	*Botrytis cinerea*	1
		Poor Sanitation	1
Tomato	Blossom End Rot	Calcium Deficiency	1
	Canker	*Clavibacter michiganensis*	5
	Chlorosis	CMV	1
		Nutrient Deficiency	1
		Environmental Stress	1
		Virus/Not Identified	1
	Early Blight	*Alternaria solani*	5
	Grey Mold	*Botrytis cinerea*	2
		Nutrient Deficiency	2
	Leaf Distortion	Pesticide Injury	2
	Leaf Spot	Environmental Stress	1
		Nutrient Deficiency	2
		Pesticide Injury	1
	Root Rot	*Pythium* spp.	
	Soft Rot	*Erwinia carotovora*	3
Verbena	Leaf Spot	Pesticide Injury	1
		TSWV	1

CROP: Diagnostic Laboratory Report - Greenhouse Crops

LOCATION: British Columbia

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON COMMERCIAL CROPS IN BRITISH COLUMBIA, 1991 AND 1992

METHODS: The B.C.M.A.F.F. Plant Diagnostic Lab provides the diagnosis of, and control recommendations for disease problems of commercial crops. The following data reflects samples submitted to the lab by ministry extension staff, growers and agribusiness. Diagnosis was accomplished by microscope examination, culturing onto artificial media and ELISA. Assisting with the diagnoses were Leslie MacDonald and Dave J. Ormrod, Plant Pathologists at the B.C.M.A.F.F. Viruses were identified with the assistance of Dr. R. Stace-Smith, Dr. D. MacKenzie and Dr. P. Ellis, Agriculture Canada Research Station, Vancouver, through sap inoculation onto indicator plants, electron microscopy and ELISA.

RESULTS AND COMMENTS: The total number of submissions for each crop category is listed at the bottom of each table. Only diseases of significance are listed in the attached summaries. Problems not listed include: nutritional stress; pH imbalance; water stress; poor sample; physiological response; chemical damage (unless more than 1 plant); insect-related damage; and samples where no conclusive disease-causing organism was identified. These submissions are grouped under the heading 'OTHER' at the bottom of each table. Sample numbers are based on submissions received from January through December in 1991 and from January through to October of 1992.

Table 1. Summary of greenhouse vegetable crop diseases submitted in 1991 and 1992.

CROP	DISEASE	No. of Samples	
		1991	1992
Cucumber	*Botrytis cinerea*	1	
	Cladosporium cucumerinum	1	
	Didymella bryoniae	2	
	Powdery mildew	2	
	Pythium crown and root rot	17	1
	Sclerotinia sclerotiorum -stem rot	1	2
	Bacterial stem end rot of fruit	1	
	Pale fruit viroid?		1
Water spinach - *Ipomoea aquatica*	Oedema	1	
	Pythium root rot	1	
Lettuce	*Sclerotinia sclerotiorum* - bottom rot		1

CROP	DISEASE	No. of Samples	
		1991	1992
Pepper	*Fusarium solani* -stem rot	1	2
	Pythium root rot	3	1
	Rhizoctonia damping off	1	
	TSWV - Impatiens strain (TSWV-I)	2	**3
	TSWV - Lettuce strain (TSWV-L)	1	
	Pepper mild mottle virus (PMMV)	*26	*23
	Xanthomonas campestris pv *vesicatoria?* -black spot		1
	Sclerotinia sclerotiorum -stem rot		1
Tomato	Botrytis stem rot	2	
	Fusarium oxysporum f. sp. *radicis-lycopersici*	2	
	Pythium root rot	5	2
	Pith necrosis	1	
	Cladosporium leaf mold		3
	Phytophthora infestans		1
	Pyrenochaeta lycopersici		1
	TSWV - L	3	
	TSWV - I	1	
	Herbicide damage		2
OTHER		52	18
Total		128	62

* Samples submitted from 7 sites with PMMV.
** Samples submitted from 1 site with TSWV.

Table 2. Summary of floriculture crop diseases submitted in 1991 and 1992.

CROP	DISEASE	No. of Samples	
		1991	1992
Achillea sp.	Root rot (Phycomycete)		1
Aeschynanthus pulcher	TSWV - I		1*
Alyssum sp.	*Peronospora* sp. -downy mildew	1	1
Alstroemeria sp.	Phytophthora crown and root rot	2	
Anemone sp.	Botrytis collar rot	1	
Antirrhinum spp.	Botrytis damping off	1	
	Damping off (Phycomycete)	1	
	Puccinia antirrhini		1
	Peronospora sp. -downy mildew	2	2
Aralia sp.	TSWV - I	1	
Aubretia sp.	*Albugo* sp. -white rust		1
Begonia spp.	*Xanthomonas campestris* pv. *begoniae*	2	2
	TSWV - I	3	2
	Pythium root rot		1

CROP	DISEASE	No. of Samples	
		1991	1992
Brachycome iberidifolia	TSWV - I	1	
	TSWV - L	1	
Calceolaria sp.	TSWV - I		1
Chrysanthemum x *morifolium*	Unknown wilting		2
	TSWV - L	1	
Crassula arborescens	*Sphaerotheca macularis*	1	
Cyclamen persicum	TSWV - I	1	1
Delphinium sp.	Powdery mildew	1	
Dianthus barbatus	Erwinia soft rot		1
	Cladosporium leaf spot	1	
Dracaena fragrans	Fusarium stem rot	1	
	Root rot (Phycomycete)		1
Centaurea cineraria	*Sclerotinia sclerotiorum* -stem rot		1
	Downy mildew		1
Echinops ritro	TSWV - I and L		1
Episcia dianthiflora	TSWV - I	1	
Eryngium planum	Fusarium crown rot		1
Euphorbia pulcherrima	Pythium root rot	3	3
	Rhizoctonia stem rot	1	
	Undetermined branch wilt-physiological	5	
Exacum affine	TSWV - I	1	
Ficus elastica	TSWV - I	1	
F. pumila	TSWV - I	1	
Freesia sp.	*Stomatinia gladioli*		1
Fuchsia x *hybrida*	Pythium root rot	2	3
	Thielaviopsis basicola	1	
	TSWV - I	1	
	Pucciniastrum epilobii		2
Gerbera sp.	Root rot (Phycomycete)	1	1
Gladiolus sp.	*Stomatinia gladioli*		1
Impatiens wallerana	Alternaria leaf spot	1	
	TSWV - I	9	2
	TSWV - L	3	
	TSWV - I and L	1	
Iris spp.	*Mycosphaerella macrospora*	1	1
	Penicillium rot		1
Kalanchoe spp.	Pythium root rot	1	
	Rhizoctonia root and stem rot		1
Kangaroo Paw	Fusarium crown rot	1	
Lantana sp.	TSWV - I	1	
Lilium spp.	Fusarium bulb rot	1	
	Erwinia soft rot		1
Limonium vulgare	Fusarium crown rot	1	
Lisianthus spp.	Fusarium crown rot	1	
	Pythium crown rot	1	1
	TSWV - I	1	

CROP	DISEASE	No. of Samples	
		1991	1992
Lupinus sp.	Downy mildew		2
Narcissus pseudonarcissus	Fusarium bulb rot	1	1
Mimulus sp.	TSWV - I	1	
Paeonia spp.	Botrytis leaf spot	1	
	Pythium root rot	1	
Papaver sp.	Downy mildew	1	
Pelargonium x *hortorum*	*Botrytis cinerea*	2	1
	Pythium root rot	1	
	Puccinia pelargonii-zonalis		*1*
	Rhizoctonia stem rot	1	
	Pseudomonas chichorii		*1*
	Xanthomonas campestris pv. *pelargonii*	*3*	6
	TSWV -I	1	
	Nutritional disorder	8	
	Oedema		1
P. peltatum	Pythium root rot	3	
	Oedema	3	
Phalaenopsis sp.	*Erwinia chrysanthemi*	1	
Primula sp.	Pseudomonas leaf spot	1	
Radermachera sinica	TSWV - I	1	
Schefflera spp.	*Pseudomonas cichorii*	*1*	
	TSWV - I	1	
Senecio cruentus	TSWV - I	2	
Sinningia speciosa	TSWV - I	1	
Spathiphyllum sp.	TSWV - I	1	
Tulipa spp.	*Botrytis tulipae*	1	
	Pythium bulb rot	1	
Tradescantia sp.	Pythium root rot	1	
Viola spp.	Ramularia leaf spot	2	3
	Thielaviopsis basicola	1	
Zinnia sp.	*Botrytis cinerea*		*1*
OTHER		36	31
Total		**142**	**87**

* Most of the TSWV work in 1991 was done by Iris Bitterlich as part of **D.A.T.E.** Project 311.

Table 3. Summary of small fruit diseases submitted in 1991 and 1992.

CROP	DISEASE	No. of Samples	
		1991	1992
Blueberry	*Botrytis cinerea*	10	10
	Godronia cassandrae	3	2
	Monilinia vaccinii-corymbosi	4	3
	Phomopsis canker	1	
	Root and crown rot (Phytophthora?)		5
	Pseudomonas syringae	8	3
	Agrobacterium tumefaciens?	2	2
	Nutrient deficiency	3	2
	Environmental stress	4	6
Cranberry	*Exobasidium vaccinii*	1	
	Phyllosticta vaccinii		1
Raspberry	Phytophthora root rot	2	3
	Agrobacterium tumefaciens		2
	Phragmidium rubi-idaei	1	
	Elsinoe veneta	1	
	Didymella applanata	1	
	Verticillium wilt	1	
	Pseudomonas syringae	1	
	Environmental stress		2
Strawberry	Fusarium crown rot	2	
	Mycosphaerella fragariae	3	
	Phytophthora fragariae	2	13
	Rhizoctonia crown rot		1
	Verticillium albo-atrum	1	2
	Water damage		2
	Winter injury	2	
OTHER		13	26
Total		66	85

Table 4 . Summary of specialty crop diseases submitted in 1991 and 1992.

CROP	DISEASE	No. of Samples	
		1991	1992
Basil	Fusarium stem rot	1	
Ginseng	*Alternaria panax*	6	9
	Cladosporium leaf spot (saprophyte)	2	
	Root rot (Fusarium/Rhizoctonia)	2	3
	Phytophthora cactorum		4
	Sclerotinia sclerotiorum		2
	Heat stress		2
OTHER		16	11
Total		27	31

Table 5. Summary of tree fruit diseases submitted in 1991 and 1992.

CROP	DISEASE	No. of Samples	
		1991	1992
Apple	Alternaria leaf spot	1	
	Nectria coccinea	3	
	Nectria galligena	3	3
	Pezicula malicorticis		4
	Erwinia amylovora (on Gala)	4	
	Winter injury	2	
Apricot	*Stigmina carpophila*	1	1
Cherry	*Stigmina carpophila*	1	
	Winter injury	1	
Filbert	*Xanthomonas campestris* pv. *corylina*		1
	Winter injury	1	
Peach	*Stigmina carpophila*		1
	Taphrina deformans		1
Saskatoon	*Cylindrosporium* sp. -leaf spot	1	
	Gymnosporangium sp. -leaf rust	2	
	Phytophthora root rot	1	
Walnut	*Mierostroma juglandis*	1	
	Xanthomonas campestris pv. *juglandis*	1	
OTHER		3	19
Total		26	30

Table 6. Summary of vegetable crop diseases submitted in 1991 and 1992.

CROP	DISEASE	No. of Samples	
		1991	1992
Bean	*Botrytis cinerea*	All fields	
	Sclerotinia sclerotiorum	Most fields	
	Pythium crown and root rot		1
Beet	*Botrytis cinerea*	1	
	Sclerotinia sclerotiorum	1	
Carrot	*Alternaria dauci*		1
	Cercospora carotae	2	
	Etwinia carotovora	3	
	Flood damage	3	
Cabbage	*Xanthomonas campestris* pv. *campestris*	1	
Cauliflower	*Etwinia carotovora*	1	
Corn	Fusarium stem rot		1
Cucumber	*Erysiphae cichoraceorum*		1
	Pythium root rot	2	
Eggplant	*Sclerotinia sclerotiorum*		1
Garlic	*Sclerotium cepivorum*	2	1
	Botrytis bulb rot	1	
Lettuce	*Marssonina panattoniana*		1
	Rhizoctonia solani	1	
	Sclerotinia sclerotiorum	1	
	Pseudomonas leaf spot		1
Melon	Alternaria black spot		1
	Sclerotinia sclerotiorum	1	
Onion	Botrytis blast	1	
	Peronospora destructor	2	1
	Pythium sp. -damping off		1
	Phoma terrestris	3	1
	Sclerotium cepivorum	7	2
	Stemphylium blight		1
	Albinism		1
Pea	*Thielaviopsis basicola*		1
	Erysiphe sp. -powdery mildew		1
Pepper	Alternaria stem rot		1
	Sclerotinia sclerotiorum	1	1
	TSWV - L	1	
Cape Gooseberry (*Physalis* sp.)	*Entyloma australe*		1
Potato	*Alternaria solani*	2	2
	Botrytis cinerea	3	
	Helminthosporium solani	1	
	Phytophthora infestans	7	4
	Rhizoctonia solani	1	
	Clavibacter michiganensis subsp. *sepedonicum*	1	1
	Streptomyces scabies	3	
	Current season leafroll virus		3

CROP	DISEASE	No. of Samples	
		1991	1992
Rutabaga	*Plasmodiophora brassicae*	1	1
	Rhizoctonia crater rot	1	
Squash	Cladosporium leaf spot		1
Tomato	*Colletotrichum caccodes*		1
	Fusarium oxysporum		1
	Phytophthora infestans	1	
	TSWV - I	1	
OTHER		35	52
Total		92	87

Table 7. Summary of woody ornamental diseases submitted in 1991 and 1992.

CROP	DISEASE	No. of Samples	
		1991	1992
Abies spp.	*Rhizosphaera kalkhoffii*	3	
	Sclerophoma blight	1	
	Phytophthora crown rot		2
	Current season needle necrosis		2
Acer spp.	*Kabatiella* sp. -anthracnose	3	2
	Nectria canker	1	1
	Verticillium dahliae	1	1
	Pseudomonas syringae		4
Alnus rubra	Pseudomonas leaf spot	1	
Arctostaphylos uva-ursi	Pythium root rot	1	
Aucuba japonica	Fusarium damping off	1	
Cedrus atlantica	Phomopsis canker	1	1
	Sirococcus conigenus	2	
C. deodora	Winter injury	3	
Clematis spp.	Phytophthora root and crown rot	2	3
	Ascochyta stem blight		4
	Botrytis cinerea		1
Cornus spp.	*Discula* sp. -anthracnose	1	
	Nectria canker	1	
	Pseudomonas syringae		2
Cotoneaster spp.	Phytophthora root rot		1
	Winter injury	1	
Erica sp.	Phytophthora root rot	1	1
Eucalyptus sp.	Phomopsis canker		1
Euonymus sp.	Phytophthora root rot		2
Ilex spp.	Phomopsis blight		1
	Phytophthora leaf and twig blight		1

CROP	DISEASE	No. of Samples	
		1991	1992
Juniperus spp.	*Kabatina juniperi*	3	
	Phomopsis dieback	1	1
	Phytophthora root rot	3	3
	Sclerophoma pithiophila		1
Larix decidua	Phytophthora root and crown rot		1
Lonicera spp.	Phoma stem rot	1	
	Pythium root rot	1	
Magnolia grandiflora	Cladosporium leaf spot	1	
Malus floribunda	*Erwinia amylovora*		1
Photinia fraserii	Fabraea leaf spot	1	
Picea pungens	*Botrytis cinerea* -shoot blight	1	
	Rhizosphaera kalkhoffii	2	2
	Phomopsis canker		1
	Slime mold	1	
Pieris japonica	Phytophthora root rot	1	3
	Winter injury	1	
Pinus mugo	Winter injury	1	
P. ponderosa	*Leptomelanconium cinereum*	1	
	Sphaeropsis *sapinea*	1	
P. sylvestsris	Lophodermium needle cast	2	1
Populus tremuloides	*Venturia* **sp.** -shoot dieback	1	
Prunus laurocerasus	Phyllachora leaf spot	1	
	Pseudomonas syringae		1
P. maackii	Cytospora dieback	1	
P. serrulata cv. 'Kwanzan'	*Monilinia fructicola*	1	
	Pseudomonas syringae	2	
Pseudotsuga menziesii	*Botrytis cinerea* -shoot blight	1	
	Phaeocryptopus gaeumannii	3	2
	Phomopsis canker	1	
	Phytophthora sp. -collar rot		3
	Rhabdocline pseudotsuga	2	
	Rhizosphaera kalkhoffii	2	
Pyracantha sp.	Pseudomonas stem blight		1
Pyrus calleryana	*Pseudomonas syringae*		2
Quercus sp.	*Discula* sp. -anthracnose	2	
Rhododendron spp.	Phytophthora crown rot		3
	Colletotrichum sp. -anthracnose	1	
	Pestalotia leaf blight		2
	Winter injury	4	1
Robinia Pseudoacacia	*Nectria gailigena*	1	
Rosa spp.	*Coniothyrium fuckellii*	1	
	Peronospora sparsa	1	1
	Pythium cutting rot	1	
	Root rot *(Phytophthora* sp.?)	1	1
	Winter injury	2	
Salix sp.	Pseudomonas blight		1
Schizanthus sp.	Phytophthora root rot		1

CROP	DISEASE	No. of Samples	
		1991	1992
Sequoiadendron sp.	*Botrytis cinerea* -shoot blight	1	1
Sorbus reducta	Winter injury	2	
Syringa vulgaris	*Pseudomonas syringae*		1
Thuja occidentalis	Armillaria root rot	1	
	Kabatina thujae	5	2
	Pythium cutting rot	1	
	Root rot (Phycomycete)	2	2
	Sclerophoma pithiophila	1	
	Environmental stress	6	4
T. plicata	*Fusarium oxysporum*	1	
	Didymascella thujina	1	3
	Sclerophoma and *Botrytis* sp. -tip dieback		1
	Seiridium cardinale		1
	Winter injury	1	
Vaccinium vitis-idaea var *minus*	Phytophthora root rot	1	
OTHER		74	95
Total		171	174

Table 8. Summary of turfgrass diseases submitted in **1991** and **1992.**

DISEASE	Golf Course		Sod Farm		Lawn	
	1991	*1992*	*1991*	*1992*	*1991*	*1992*
Root rot - *Pythium* sp. and *Pythium graminicola*	4*	2(12*)	4*	2(3*)	**3**	1
Ascochyta leaf blight	1(1*)	3*		1	**6**	8
Rhizoctonia patch		1(5*)		2	1	3
Colletotrichum graminicola	1(3*)	1*			**3**	**4**
Leptosphaeria korrae					*6*	
Curvularia sp. and *Drechslera* sp.	1		1*	1	**5**	**3**
Microdochium nivale	1	1	**2**	**3**	**4**	
Gaeumannomyces graminis var *avenae*	3*	3*	2*	1*	1*?	
Laetisaria fuciformis and *Limonomyces roseipellis*	1		3	**2**	**4**	**2**
Lanzia/Moellerodiscus - (*Sclerotinia homoecarpa)*	3*					
Typhula ishikariensis var *ishikariensis*	1*		2(1*)		1?	
Rust - *Puccinia* sp.				**2**	1	
Sclerotinia borealis					1	
Algae	4*	1			**2**	
Black plug layer	1*	2*				
Total	25	**31**	15	17	38	21

OTHER for **1991** - 6
OTHER for **1992** - 11

* Indicates the number of bentgrass samples, If in brackets, the total is in addition to the number of mixed species. Unstarred numbers refer to mixes of fescues, ryegrass, Kentucky bluegrass and *Poa annua*.

CROP: Diagnostic Laboratory Report - Ornamentals

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON HERBACEOUS AND WOODY ORNAMENTALS

METHODS: The Regional Crop Laboratory (RCL) at the Alberta Special Crops and Horticultural Research Centre (ASCHRC) received samples on woody and herbaceous ornamentals from district agriculturalists, landscaping companies, florists, municipal parks and recreation staff, extension specialists and the general public. Diagnoses were made from symptoms or by isolating plant pathogens from diseased tissues in the laboratory.

RESULTS: The RCL at ASCHRC received a total of 352 requests for disease identification on woody and herbaceous ornamentals in 1992. Results are summarized in Table 1 below.

Table 1. Summary of diagnoses made on woody and herbaceous ornamental samples submitted to the RCL in 1992.

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Aspen	Canker	Cytospora spp.	1
	Dieback	Venturia populina	1
Aster	Aster Yellows	MLO	1
Avacado	Leaf Drop	Low Light Intensity	1
Blue Spruce	Brown Blight	*Herpotrichia juniperi*	1
	Bud Bleaching	Pesticide Injury	1
	Bud Necrosis	Frost Injury	12
	Canker	Cytospora spp.	2
		Frost Injury	2
	Chlorosis	Pesticide Injury	1
	Leaf Distortion	Frost Injury	4
	Lichens	*Thamnium vermicularis*	1
		Lecidea fuscoata	1
	Needle Browning	Mechanical Damage	1
		Moisture Stress	1
		Pesticide Injury	9
		Winter Desiccation	44
	Needle Cast	*Rhizosphaera kalkhoffi*	2
		Low Light Intensity	6
	Pitch Deposit	Mechanical Injury	1
	Twig Distortion	Frost Injury	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Birch	Canker	*Cytospora* spp.	1
	Chlorosis	Iron Deficiency	1
		Physiological Yellowing	5
	Coral Spot	*Nectria cinnabarina*	1
	Dieback	Winter Desiccation	8
	Leaf Spot	Frost Injury	1
		Marssonina spp.	1
		Moisture Stress	1
		Pesticide Injury	2
	Shelf Fungus	*Polyporus* spp.	1
	Wetwood	*Enterobacter* spp.	1
Black Ash	Anthracnose	*Gloeosporium aridum*	1
Bougainvillea	Chlorosis	Low Light Intensity	1
		Iron Deficiency	1
		Pool Chlorine	1
	Leaf Burn	Pesticide Injury	1
	Leaf Shatter	Mechanical injury	1
Caragana	Leaf Distortion	Pesticide Injury	1
Cedar	Needle Browning	High Soil Salinity	2
		Winter Desiccation	10
	Needle Cast	Low Light Intensity	1
Chokecherry	Coral Spot	*Nectria cinnabarina*	1
Clematis	Canker	*Septoria* spp.	1
	Leaf Spot	*Septoria* spp.	1
	Rust	*Puccinia clematis*	1
Cotoneaster	Bacterial Blight	*Pseudomonas syringe*	1
	Bud Necrosis	Frost Injury	1
	Canker	*Botryosphaeria obtusa*	1
		Cytospora spp.	1
		Nectria cinnabarina	1
	Chlorosis	Iron Deficiency	1
	Fireblight	*Erwinia amylovora*	3
Dogwood	Canker	*Botryosphaeria dothidea*	1
		Cytospora spp.	1
		Frost Injury	1
	Leaf Spot	Moisture Stress	1
Dieffenbachia	Leaf Drop	Low Light Intensity	1
		Overwatering	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Elm	Canker	*Cytospora* spp.	2
	Chlorosis	Iron Deficiency	1
	Coral Spot	*Nectria cinnabarina*	1
	Dieback	Winter Desiccation	1
	Leaf Distortion	Pesticide Injury	3
	Leaf Scorch	*Xylemella fastidiosum*	1
	Leaf Spot	*Gnomonia ulmea*	2
		Frost Injury	2
		Pesticide Injury	1
	Wilt	*Botryosphaeria dothidea*	1
		Moisture Stress	2
		Phoma spp.	1
English Ivy	Leaf Spot	Environmental Stress	1
Flowering Crabapple	Fireblight	*Erwinia amylovora*	2
	Scab	*Venturia inaequalis*	1
Flowering Cherry	Fireblight	*Erwinia amylovora*	1
Flowering Plum	Coral Spot	*Nectria cinnabarina*	1
	Fireblight	*Erwinia amylovora*	3
	Leaf Spot	*Alternaria* spp.	1
		Coccomyces lutenscens	1
		Environmental Stress	1
Geranium	Canker	*Xanthomonas pelargonii*	1
	Chlorosis	Nutritional Deficiency	2
	Leaf Spot	Environmental Stress	1
		Xanthomonas pelargonii	1
Gladiolus	Corm Rot	*Fusarium oxysporum*	1
Golden Elder	Leaf Spot	Environmental Stress	1
Green Ash	Anthracnose	*Gloeosporium aridum*	2
	Bud Necrosis	Frost Injury	2
	Canker	*Cytospora* spp.	3
		Enterobacter spp.	1
		Sunscald	1
	Leaf Distortion	Frost Injury	2
		Pesticide Injury	4
	Leaf Spot	Moisture Stress	1
		Pesticide Injury	2
	Shelf Fungus	*Polyporus* spp.	1
	Sooty Mold	Capnodiaceae	1
	Wilt	Moisture Stress	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Hawthorn	Bacterial Blight	*Pseudomonas syringe*	1
Honeysuckle	Leaf Spot	*Insolibasidium deformans*	2
Hibiscus	Leaf Spot	*Alternaria* spp.	1
		High Soil Salinity	1
Hollyhock	Rust	*Puccinia malvacearum*	2
Impatiens	Leaf Spot	Mechanical Injury	1
Iris	Bulb/Crown Rot	*Erwinia carotovora*	1
		Fusarium oxysporum	2
		Penicillium spp.	2
		Mucor spp.	1
Juniper	Crown/Root Rot	Low Temperature Injury	1
	Scale Browning	Winter Desiccation	2
Lilac	Bacterial Blight	*Pseudomonas syringe*	3
	Chlorosis	Iron Deficiency	1
	Dieback	Low Temperature Injury	1
	Leaf Distortion	Frost Injury	1
	Leaf Spot	Pesticide Injury	1
	Sooty Mold	Capnodiaceae	1
Lily	Black Scale	*Colletotrichum lilii*	1
Lupin	Crown/Root Rot	*Fusarium* spp.	1
		Mucor spp.	1
		Rhizoctonia solani	1
Maple	Anthracnose	*Kabatiella apocrypta*	1
	Canker	*Cytospora* spp.	1
	Leaf Distortion	Pesticide Injury	1
	Leaf Spot	*Alternaria* spp.	1
		Pesticide Injury	1
	Sooty Mold	Capnodiaceae	1
	Tar Spot	*Rhytisma acerinum*	2
Marigold	Canker	*Phytophthora cryptogea*	1
Mayday	Canker	*Cytospora* spp.	2
		Frost Injury	1
		Enterobacter spp.	1
	Coral Spot	*Nectria cinnabarina*	2
	Chlorosis	Iron Deficiency	1
		Nitrogen Deficiency	1
		Pesticide Injury	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Mayday (cont'd)	Dieback	Low Temperature Injury	1
	Leaf Spot	*Coccomyces lutescens*	2
		Moisture Stress	4
	Leaf Shatter	Wind	1
	Powdery Mildew	*Podospora clandestina*	1
	Saprophytic Mold	*Fusarium* spp.	1
		Capnodiaceae	1
Mugo Pine	Needle Browning	Winter Desiccation	1
Mountain Ash	Bacterial Blight	*Pseudomonas syringe*	2
	Canker	*Cytospora* spp.	1
	Chlorosis	Iron Deficiency	1
	Dieback	Winter Desiccation	1
	Fireblight	*Erwinia amylovora*	11
	Leaf Distortion	Frost Injury	1
	Leaf Spot	Frost Injury	1
		Pesticide Injury	1
		Venturia inaequalis	1
	Powdery Mildew	*Podospora clandestina*	1
Norfolk Pine	Needle Cast	Low Light Intensity	1
Oak	Leaf Blister	*Taphrina caerulescens*	1
Oleander	Leaf Spot	Environmental Stress	1
Ostrich Fern	Leaf Distortion	Pesticide Injury	1
Peony	Bud Necrosis	Frost Injury	1
Petunia	Abnormal Petal Pigmentation	Genetic Anomally	1
Pine	Chlorosis	Low Light Intensity	5
	Needle Browning	Winter Desiccation	5
	Needle Cast	*Dothistroma pini*	1
		Lophodermium pinastrum	1
Poplar	Bud Necrosis	Frost Injury	1
	Canker	*Cytospora* spp.	2
		Enterobacter spp.	1
		Hypoxylon mammatum	1
		Mechanical Injury	2
	Coral Spot	*Nectria cinnabarina*	1
	Dieback	Winter Desiccation	1

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Poplar (cont'd)	Leaf Distortion	Frost Injury	1
	Leaf Spot	Fertilizer Burn	1
		Frost Injury	3
		Marssonina spp.	11
		Moisture Stress	2
		Septoria spp.	1
	Rust	*Melampsora medusa*	1
Rose	Black Spot	*Diplocarpon rosae*	1
	Chlorosis	Nutritional Deficiency	1
	Dieback	Low Temperature Injury	1
	Rust	*Phragmidium* spp.	2
Russian Olive	Canker	*Cytospora* spp.	1
	Coral Spot	*Nectria cinnabarina*	1
	Leaf Spot	*Septoria elaegni*	1
	Wilt	*Verticillium albo-atrum*	3
Sea Buckthorn	Dieback	Winter Desiccation	1
	Crown/Root Rot	*Phytophthora cactorum*	1
Serviceberry	Chlorosis	Iron Deficiency	1
	Fireblight	*Erwinia amylovora*	1
Sumac	Crown/Root Rot	*Fusarium* spp.	1
		Pythium spp.	1
Umbrella Tree	Chlorosis	Low Light Intensity	1
Viburnum	Leaf Spot	Environmental Stress	1
Vinca	Crown/Root Rot	*Fusarium* spp.	1
		Pythium spp.	1
Virginia Creeper	Leaf Distortion	Pesticide Injury	1
Willow	Black Canker	Environmental Stress	5
		Glomerella miyabaena	4
		Mechanical Injury	1
		High Soil Salinity	1
	Canker	*Cytospora* spp.	1
	Chlorosis	Pesticide Injury	1
	Leaf Spot	*Marssonina* spp.	2
White Spruce	Storage Rot	*Gloeosporium* spp.	1
		Penecillium spp.	1
		Rhizopus spp.	1

CROP: Diagnostic Laboratory Report - Turfgrass

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: DISEASES DIAGNOSED ON AMENITY TURF

METHODS: The Regional Crop Laboratory (RCL) at the Alberta Special Crops and Horticultural Research Centre (ASCHRC) received samples from district agriculturalists, golf courses, municipal parks and recreation departments, and from the general public. Diagnoses were made from symptoms or by isolating plant pathogens from diseased tissues in the laboratory.

RESULTS: The RCL at ASCHRC received a total of 20 requests for disease identification on amenity turf in 1992. Results are summarized in Table 1 below.

Table 1. Summary of diagnoses made on amenity turf samples submitted to the RCL in 1992.

CROPS	DISEASES	CAUSAL AGENTS / PLANT PATHOGENS	NO. OF TIMES AGENTS WERE IDENTIFIED
Bentgrass	Crown/Root Rot	*Drechslera erythrospilla*	1
		Fusarium spp.	1
		Pythium spp.	1
	Dieback	*Bipolaris sorokiniana*	1
		Fusarium spp.	1
	Melting-out	Cold Temperatures	1
		Fusarium spp.	1
Turf	Algae	*Ulotrix* spp.	1
	Anthracnose	*Colletotrichum gramicola*	3
	Brown Patch	*Rhizoctonia solani*	1
	Crown/Root Rot	*Fusarium* spp.	1
		Rhizoctonia solani	1
	Dieback	Environmental	1
		Fusarium spp.	2
		Pesticides	1
	Fusarium Patch	*Fusarium nivale*	1
	Red Thread	*Lactisaria fuciformis*	1
	Slime Mold	*Physarum cinereum*	1
	Snow Mold	*Fusarium* spp.	2
		Saprophytic Fungi	1

CROP: Diagnostic Laboratory Report - Turfgrass

LOCATION: Manitoba

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TITLE: DISEASES DIAGNOSED ON TURFGRASS, SUBMITTED TO THE MANITOBA AGRICULTURE CROP DIAGNOSTIC CENTRE IN 1992

METHODS: There were 21 samples of turfgrass submitted for diagnosis to the Manitoba Agriculture Crop Diagnostic Centre by Manitoba Agriculture extension staff, farmers, agri-business and the general public in 1992. Samples were examined for disease symptoms and where necessary isolations were made onto Potato Dextrose Agar (PDA) for identification of the causal fungus.

RESULTS AND COMMENTS: The results of the laboratory diagnoses are presented in Table 1. Leaf diseases such as anthracnose, ascochyta and melting-out were less prominent in 1992 than in 1991 primarily as a result of prolonged cool, moist weather during the months of June, July and August. Snow mould was not a major problem in 1992. Slime mold was favoured by wet weather conditions in June.

Table 1. Summary of diseases diagnosed on turfgrass samples submitted to the Manitoba Agriculture Crop Diagnostic Centre in 1992.

DISEASE	SCIENTIFIC NAME	NUMBER OF SAMPLES
Anthracnose	*Colletotrichum graminicola*	6
Melting-out	*Drechslera* spp.	4
Slime mold	*Physarum* spp.	4
Fairy ring	*Marasmius oreades*	3
Leaf Blight	*Ascochyta* spp.	3
Leaf spot	*Septoria* spp.	2
Snow mould	*Typhula* spp.	2
Algae Slime	*Cyanobacteria* sp.	1
Leptosphaerulina leaf blight	*Leptosphaerulina trifolii*	1
Red Thread	*Laetisaria fuciformis*	1
Root Rot		1
Environmental stress		4
Herbicide		2
Total Samples Submitted		21

Forage legumes / Legumineuses fourrageres

CROP: Alfalfa

LOCATION: South Western Ontario

NAME AND AGENCY:
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TITLE: SURVEY OF *APHANOMYCES* SP. IN ALFALFA FIELDS IN SOUTH WESTERN ONTARIO

METHODS: Eighty three established alfalfa fields scattered in 18 counties across south western Ontario were visited during mid May and early July, 1992. The alfalfa stands ranged from 1 to 8 years old and were on different types of soil. Soil samples were taken from five random sites in each field, and **3-5** L of soil was collected from most of the fields. The samples were stored at -10°C in a cold room for **3-5** weeks before processing.

After being taken out from storage, the soil samples were saturated with distilled water, incubated for 10 days at 20°C in a growth room, and potted. Four pots (10-cm diameters) of soil were prepared for each field, placed in an aluminum-foil tray, and watered. Sixty alfalfa seeds of cultivar Saranac were sown in each pot, and kept at 22°C for 3 days. Roughly at the stage of early seedling emergence, the soils were flooded for 7 consecutive days.

Alfalfa seedlings were removed from the soil after flooding. Roots and hypocotyl with water-soaked discoloration were surface-disinfested with a 0.6% NaOCl solution, placed on metalaxyl-benomyl-vancomycin agar, a semiselective medium for *Aphanomyces* sp., and incubated at 20°C for 4-7 days. Colonies with mycelium typical of *Aphanomyces* spp. were transferred to cornmeal agar and incubated at 20°C for further identification. After surface disinfestation, some diseased seedlings were placed in 9-cm petri dishes containing 10 mL of distilled water. Growth of fungi from the seedlings was examined under a microscope.

To confirm the pathogenicity of the isolates of *Aphanomyces* sp., an inoculation test was conducted in a controlled environment. Inoculum of *Aphanomyces* sp. was produced through procedure modified from previously reported methods. Briefly, mycelium grown on potato dextrose agar was transferred to a broth containing 2% peptone and 0.5% glucose, and cultured with shaking for 7 days at 22°C. The contents were then broken into small pieces with a food blender. Twenty-five alfalfa seeds of cultivar Apollo II were planted in microwave-sterilized soil in a 10-cm pot. The seedlings in each pot were inoculated with 10 mL of the inoculum using a syringe **4** days after planting, and treated pots were placed in aluminum-foil trays. Two hours later, water was added to the trays to a level 5 cm from the top of the pots and was maintained there for 7 consecutive days. Seedlings were then removed from the soil and examined for the presence of the pathogen using the procedure described above.

In addition, diseased alfalfa plants from eight new spring seedings with extensive root rot damage were surface disinfested using the method described above, and incubated on the semiselective medium and water agar **(0.5%)** for identification of the causal agent.

RESULTS AND DISCUSSION: *Aphanomyces* sp. was found in 6 of **83** alfalfa fields examined, and the infested fields occurred in five counties (Figure 1). Alfalfa had been grown in the infested fields for 2 to 4 years, and soils in the fields were generally clay-loam. One of the fields traditionally had root-rot problems, but no typical root-rot symptoms were observed at the time of field visit.

Other fungi isolated most frequently from the soil samples using the semiselective medium were *Fusarium* spp. and *Rhizopus* spp. However, pathogenicity of the two genera on alfalfa seedlings was not observed in an inoculation test in a controlled environment.

Phytophthora megasperma f.sp. *medicaginis* was often isolated from diseased plants collected from new alfalfa spring seedings with serious root rot damage, and most of those stands were cultivars susceptible to moderately resistant to the pathogen. But in a few cases, *Phytophfhora* root rot occurred

widespread and severely in resistant varieties. *Aphanomyces* sp. was not observed in those diseased plants obtained from fields.

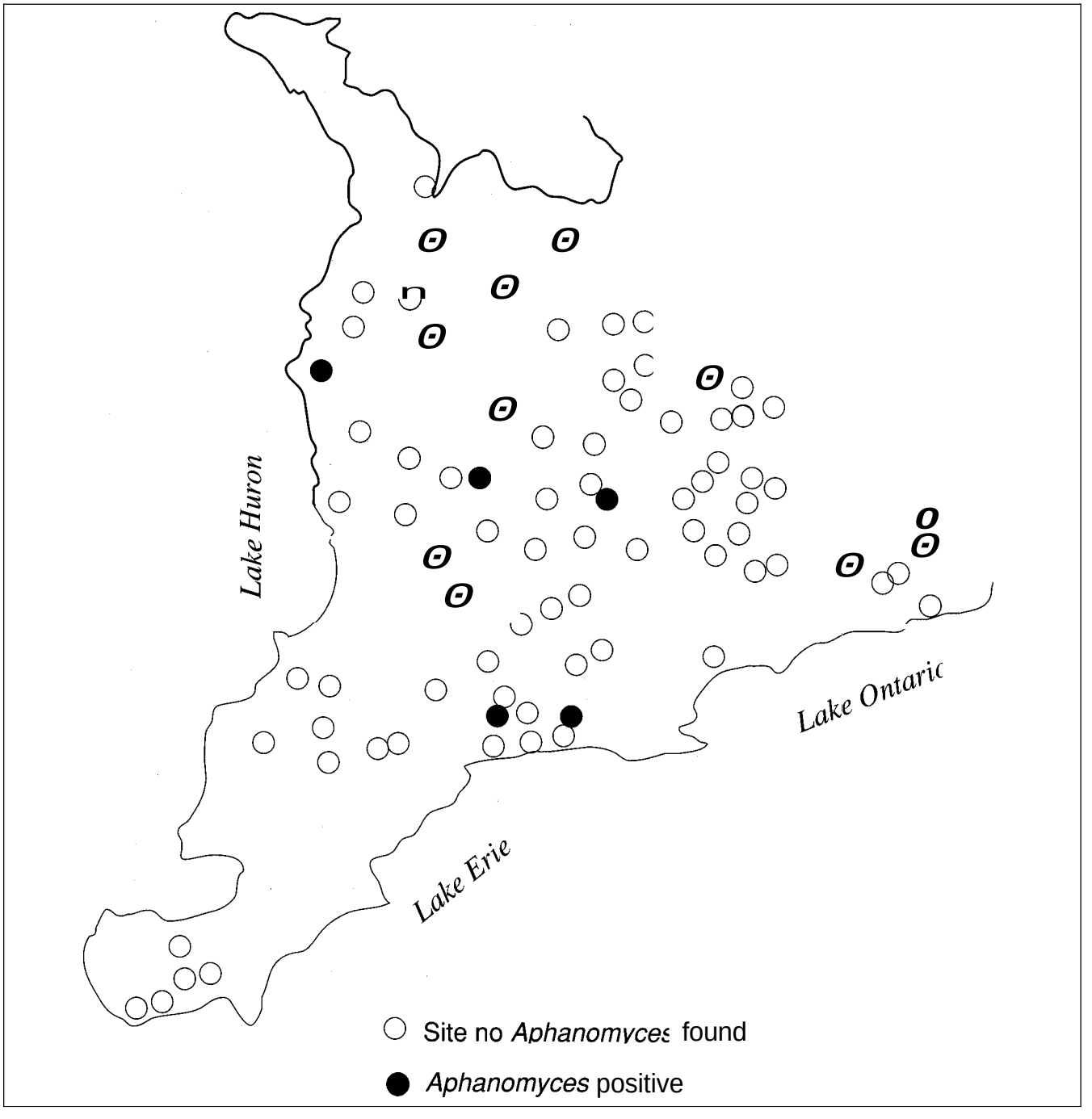
The survey covered a large area in south-western Ontario to investigate distribution of *Aphanomyces* sp. in alfalfa fields. The results indicated that the pathogen was isolated from only 7% of the fields sampled, which was significantly lower than figures released from a previous study around the London, Ontario area.

Aphanomyces is a water mold which requires saturated soil conditions for infection. The crop season of 1992 was exceptionally wet and cool in south-western Ontario, but damage to new alfalfa seeding caused by the pathogen was not observed in our field trips. In controlled environments, isolates of *Aphanomyces* sp. recovered from the area caused severe damage to alfalfa seedlings when the plants were flooded for 7 days after inoculation. The results may suggest that *Aphanomyces* **sp.** is potentially a serious pathogen of alfalfa in Ontario. However, more field observation is needed to understand the real impact of the disease on alfalfa production.

ACKNOWLEDGEMENTS: It is a pleasure to recognize Jonathan Willis and Wilfred Shier for great assistance, and to acknowledge Tom Hartman, Albert Tenuta, Jerry Winnicki, John Harvey for taking some of the soil samples.

REFERENCES

1. Beghdadi, A., C. Richard, and D. Dostaler. **1992.** L`*Aphanomyces eufeiches* des luzernieres du Quebec: isolement, morphologie et variabilite de la croissance et du pouvoir pathogene. Can. J. Bot. 70:1903-1911.
2. Delwiche, P.A., C.R. Grau, E.B. Holub and J.B Perry. **1987.** Characterization of *Aphanomyces eufeiches* isolates recovered from alfalfa in Wisconsin. Plant Dis. 71:155-161.
3. McKeen, W.E. and J.A. Traquair. **1980.** *Aphanomyces* sp., an alfalfa pathogen in Ontario. Can. J. Plant Path. 2:42-44.



'igure 1. Survey of *Aphanomyces* **sp.** in South Western Ontario (1992)

Cereals / Cereales

CROP: Cereals

LOCATION: Maritime Provinces

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TITLE: CEREAL DISEASE PROFILE IN THE MARITIME PROVINCES - 1992

Weather Conditions: Winter conditions were in general not conducive to survival of winter wheat crops. Temperatures were low and snow cover often poor. Ice sheeting was a serious problems in many fields. The spring and summer conditions were more conducive to the production of small grain cereals. The May planting period was characterized by normal temperatures and below average rainfall. Moisture levels were variable with most areas being average through June, as were the temperature means. Conditions in July were about 3°C below normal, while in some locations rainfall was dramatically up over the long term mean. In PEI the July rainfall was twice normal levels. Temperatures returned to normal levels in August and while rainfall in Nova Scotia was well below average, PEI levels were still twice the 30 year average.

Barley: Weather conditions from planting to mid-season did not promote rapid development of the two most common foliar diseases, net blotch and scald, incited by *Pyrenophora teres* and *Rhynchosporium secalis* respectively. Net blotch was at low levels in Nova Scotia and New Brunswick. In PEI net blotch severity was low until after heading when severity increased rapidly to moderate levels. On PEI significant scald was not apparent until after heading when the disease progressed rapidly. In general the severity of scald was greatest on six row cultivars compared to two row cultivars, although there were variations. This was particularly evident in one experimental trial where several of the two row cultivars had the highest scald levels. When severe disease symptoms did occur, these were in general at a late growth stage and impact on yield was low, and excellent yields were obtained. Fusarium head blight, incited by *Fusarium graminearum* and other species, was not a problem in 1992, and there were only a few incidences of loose smut, incited by *Ustilago nuda*, being a problem.

Wheat: The severe winter conditions resulted in wide-spread winter killing of winter wheats. In general weather conditions were favourable for spring wheat production and yields were consistently above average. Septoria leaf and glume blotch, incited by *Sepforia nodorum*, were not serious problems and symptoms developed later in the season than normal. Powdery mildew, incited by *Erysiphe graminis* f.sp. *tritici*, was not a significant problem in most areas. The decline in production of mildew susceptilble winter wheats due to winter kill coupled with less production of milling wheat, which requires high nitrogen fertility, contributed to the lowered importance of this disease. Late season weather conditions were favourable for harvest, while fusarium head blight, incited by *Fusarium graminearum* and other species, was not a serious problem, only isolated heads displayed symptoms. Loose smut, incited by *Ustilago tritici*, was found on susceptible cultivars such as Max, but generally only at low incidence levels. Most seed is treated with fungicides which keeps the incidence low. Take-all, incited by *Gaeumannomyces graminis,* was noted only in isolated patches in a few fields.

Oats: Speckled leaf blotch, incited by *Sepforia avenae,* was the only major disease recorded on this crop and severity was below the long term average. Some BYDV was present and several suspected but isolated cases of bacterial blight were noted. Crown rust, incited by *Puccinia coronata*, was found to be more common than usual, in central Prince Edward Island, but remained at levels which would not cause significant yield loss.

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Manitoba

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TITLE: SURVEY FOR FOLIAR DISEASES OF BARLEY IN MANITOBA, 1992

METHODS: Barley fields in southern Manitoba were surveyed for foliar disease incidence and severity between July 20 and August 14, 1992. The 122 fields were selected at random every 10-20 km along the survey routes depending on crop frequency and availability. At each site 10 or more plants along a diamond-shaped transect 25 m long per side were examined for symptoms. Disease levels were estimated visually in both the upper (flag and flag-1 leaves) and lower canopies using a four-point scale: trace (<5% leaf area affected): slight (5-15%); moderate (16-40%); and severe (41-100%). Leaf samples were collected and subsequently surface-sterilized and placed in petri dish moist chambers to promote pathogen sporulation to aid in disease identification.

RESULTS AND COMMENTS: Moist and very cool conditions characterized the growing season in much of Manitoba in 1992. Foliar diseases were evident in most fields, and one or more pathogens were isolated from all but one of the 110 fields of 6-row and 12 fields of 2-row barley sampled (Fig. 1). Most fields were in the milk to soft dough stage when examined. Disease severities on upper leaves were mainly in the slight (62% of fields) or trace categories (30%) and on lower leaves were slight (48%) or moderate (36%). These levels suggest that damage to barley from foliar diseases was relatively low in 1992. Early observations indicated, however, that disease levels in fields re-cropped to barley were considerably higher than in fields where rotation had taken place; this and the delayed crop maturity in 1992 suggest that in such fields some loss would have occurred. *Pyrenophora teres* was the predominant pathogen isolated from leaf samples (found in 99.2% of fields); in contrast to previous years, the incidence of *Cochliobolus sativus* was considerably lower (53.5%). *Rhynchosporium secalis* was detected in 9% of fields (a higher level than normal), primarily in western regions. By contrast, *Septoria passerrinii* was isolated from only 4% of fields, a considerably lower proportion than found in 1991. *Colletotrichum graminicola* was isolated from one field near Fraserwood in the Interlake region, and appeared to be responsible for the small leaf spots observed. Based on symptomatology, the predominant foliar disease of barley in Manitoba in 1992 was the net form of net blotch, caused by *P. teres* f. *teres.*

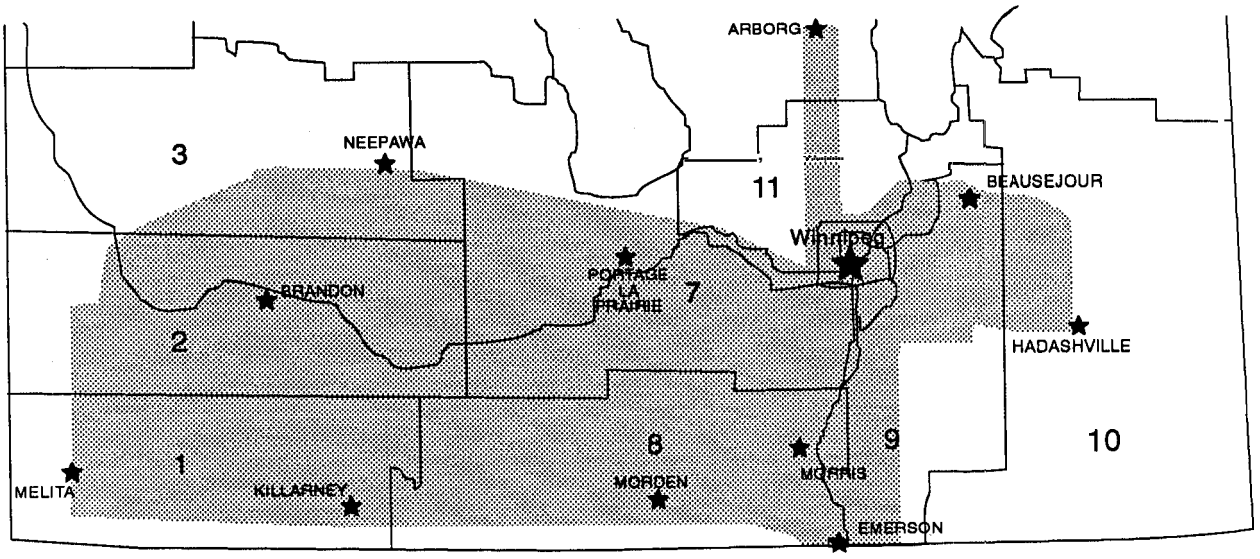

Figure 1. Area of Manitoba sampled for foliar diseases of barley in 1992.

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Saskatchewan and central Alberta

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TITLE: SASKATCHEWAN/CENTRAL ALBERTA BARLEY DISEASE SURVEY, 1992

METHODS: A barley disease survey was conducted in 102 fields in Saskatchewan and 33 fields in central Alberta between flowering and early dough growth stages. Random fields were assessed for the diseases present in a minimum sample of 10 plants taken at least 20 paces from the field edge. Diseases such as smut, ergot, take-all, and viruses were estimated for the percent incidence in either the plant sample or over the entire field. Common root rot was estimated by counting the number of plants in the sample that had lesions covering more than 50% of the sub-crown internode. Rust diseases were evaluated on the basis of both severity and infection type as described in the Cereal Methodology Manual (1986) published by CIMMYT. The remaining foliar and leaf spot diseases were assessed on a 0-9 scale based on those described by Saari and Prescott (1975) and by Couture (1980). Samples of diseased leaf tissue were plated to determine the causal agents of leaf spots. Dry leaves cut into 4 cm long segments were washed for one hour and disinfected for one minute with 0.5% sodium hypochlorite. Three pieces were placed in a petri dish on water agar containing 100 mg/L streptomycin sulfate and 50 mg/L vancomycin hydrochloride and incubated for one week under a mixture of black light, black-blue light, and cool white fluorescent light for 12 hours alternating light and dark at 20°C. When enough leaf material was available, two plates were done for each sample. On the basis of sporulation and visual symptoms on the leaf surface, estimations were made on the importance of the causal agents, *Pyrenophora teres* (spotted and netted types) and *Bipolaris sorokiniana.*

RESULTS AND COMMENTS: There were 87 two-row and 47 six-row barley fields surveyed. The distribution, severity, and prevalence of diseases by crop districts are shown in Table 1. Leaf spots and common root rot were the most prevalent diseases and were found in more than 87% of the fields. The most important foliar disease was net blotch which occurred in 98% of fields at light to severe levels. Trace to moderate levels of scald occurred in 39% of the fields. Scald was most severe in the northern crop districts of Saskatchewan and crop districts bordering on central Alberta and Saskatchewan. Smuts were found at trace to moderate levels in 16% of the fields. There was no leaf rust, and stem rust was only found in one field. Low levels of powdery mildew, barley yellow dwarf virus, ergot, take-all, and bacterial blight were rarely found.

A summary of the most prevalent diseases showed that two-row barleys had more severe leaf spots, scald, and common root rot infections than the six-row barleys (Table 2). Leaf spots and common root rot were present in at least 90% of the fields of two- and six-row barley. However, scald was seen in 57% of the six-row barley fields and only in 33% of the two-row barley fields. Smut was more severe and more prevalent in the six-row barleys. Leaf samples from 14 fields of six-row barley showed that the net form of net blotch (*P. feres* f. *teres)* was the most important leaf spot occurring in 12 samples while spot blotch *(B. sorokiniana)* occurred in 3 samples. Leaf samples from 28 fields of two-row barley indicated that the net form of net blotch occurred in 24 samples, the spot form of net blotch (*P. teres* f. *maculata*) in 6 samples, and spot blotch in 8 samples.

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Observations were recorded on previous crop in both the barley and wheat disease surveys in 1992 (Table 3). The most common rotations were a cereal crop followed by a cereal (44%), summerfallow followed by a cereal (31%), and an oilseed followed by a cereal (21%). Four percent of the fields were zero or minimum-till cereals. Leaf spot diseases appeared to be more severe in zero-till fields and in continuous cereals. However, the average leaf spot ratings in the various rotations were similar when the results from 1991 and 1992 were combined. Common root rot was more severe in barley than wheat but there was no clear association with crop rotation.

REFERENCES

1. Couture, L. **1980.** Assessment of severity of foliage diseases of cereals in cooperative evaluation tests. Can. Plant Dis. Surv. 60(1): **8-10**

2. Saari, E.E. and J.M. Prescott. **1975.** A scale for appraising the foliar intensity of wheat diseases. Plant Dis. Reptr. 59:377-380.

Table 1. Distribution, severity, and prevalence of barley diseases in Saskatchewan and Alberta fields surveyed between milk to early dough stages in 1992.

Crop district	No. fields	Net blotch	Scald	CRR %	Smut %	Leaf rust	Stem rust	Powdery mildew	BYDV %	Ergot %	Take-all	Bacterial blight %
SASKATCHEWAN												
1A	4	3.014 *	TR/1	5614	1.013	-					TR/1	
1B	3	2.613	TR/1	3713		-					TW	
2A	1	2.0/1		3011		-						
2B	1	5.011		45/1		-						
3A	0	**				-						
3B	4	6.414		28/3		-						
4A	1	5.011		2011		-						
4B	2	6.5/2		2512	TR/1	-					TR/1	
5A	5	3.2/5	TW2	1814	TR/1	-						
5B	6	4.916	TW3	1516	TR/1	-						
6A	3	5.013		3813		-						
6B	9	4.419	TW2	3118	1.312	-				0.02/1	-	
7A	3	7.313		25/2		-			0.01/1			
7B	2	5.012	5.011	40/2		-						
8A	21	3.7120	3.6/10	31/19	1.012	-	1R/1			-	-	
8B	23	5.1121	1.014	23/20		-				-	-	
9A	9	5.619	1.815	4319	0.0512	-		2.012		-	-	
9B	5	7.015	4.0/1	3813		-				-	-	
ALBERTA												
5	1	6.0/1	5.0/1	1011		-						
8	32	5.3131	5.9122	8/25	TR/10	-				TW2	-	TR/1
Average or total	135	4.711 32	2.7153	3011.17	0.5122	-	1R/1	2.0/2	0.01/1	0.0213	TW3	TR/1

* Average disease rating (0-9 scale after Couture 1980)/number of fields affected.
** Not observed or not recorded.

Table 2. Distribution and severity of the prevalent diseases of two- and six-row barleys in Saskatchewan and Alberta in 1992.

Crop district	Row type	No. fields	Net blotch	Scald	CRR %	Smut %
SASKATCHEWAN						
1	2	2	5.512 *	TR/1	5912	
	6	5	3.515	TR/1	3815	1.013
2	2	2	3.512		3812	
	6	0	**			
3	2	4	5.714		2813	
	6	0				
4	2	3	5.513		2313	TR/1
	6	0				
5	2	7	6.217	2.513	2017	TR/1
	6	4	2.914	TR/2	11/4	TR/1
6	2	7	5.317		2716	
	6	5	4.215	TR/2	3815	1.312
7	2	5	6.215	5.011	3314	
	6	0				
8	2	24	5.0123	2.819	26123	1.011
	6	20	4.2118	1.6110	24116	1.011
9	2	9	6.617	4.0/1	46/7	0.512
	6	5	3.615	1.815	2215	
ALBERTA						
5	2	1	6.011	5.011	1011	
	6	0				
8	2	13	6.0112	6.7110	10111	TR/1
	6	10	4.6119	5.1112	6/14	TR/10
Average or total	2	77	5.5173	3.7126	291619	0.416
	6	56	3.8156	1.8132	23149	1.4/17

* Average disease rating (0-9 scale after Couture 1980)/number of fields affected.
** Not observed or not recorded.

Table 3. Effect of previous crop on leaf spot and common root rot ratings of wheat and barley grown in Saskatchewan in 1992.

Previous crop	Current crop	No. of fields		Leaf spot rating (0-9)		Common root rot (%)	
Summerfallow	Cereal	60	(113)*	5.1	(5.8)	21	(22)
	Barley	25	(47)	4.7	(5.7)	25	(30)
	Wheat	35	(6)	5.3	(5.9)	16	(15)
Cereal	Cereal	84	(131)	5.3	(5.9)	18	(19)
	Barley	26	(45)	5.5	(6.2)	20	(25)
	Wheat	58	(86)	5.1	(5.7)	16	(14)
Oilseed	Cereal	41	(56)	4.3	(5.8)	23	(24)
	Barley	11	(20)	4.7	(6.3)	29	(26)
	Wheat	30	(36)	3.8	(5.2)	17	(22)
Zero-till cereal	Cereal	6		5.8		23	

* Numbers in parentheses are totals or averages of 1991 and 1992.

CROP: Barley, Oat and Wheat

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: STEM RUSTS OF CEREALS IN WESTERN CANADA IN 1992

METHODS: Surveys of barley, oat, and wheat fields for stem rust incidence and severity were conducted in Manitoba and eastern Saskatchewan in July and August 1992. Samples for race identification were also obtained from field plots and trap nurseries in the four western provinces.

RESULTS AND COMMENTS: In the prairie region of Canada, the stem rusts of wheat, oat, and barley were very light in 1992. All recommended wheat cultivars are resistant to stem rust, therefore no losses are expected in commercial production. However, little rust appeared in susceptible plots in nurseries. In commercial barley fields, the maximum infection levels were 1-2%, with no losses. All oat cultivars recommended for the rust area of the prairies are resistant to stem rust, but only light infections were observed on wild *Avena fatua*. In the Okanagan Valley of British Columbia, there were reports of near total crop failure in at least one field of barley (cv. Duke) due to stem rust. Samples were received at the Winnipeg Research Station (courtesy of G. Jesperson). To date no important changes in virulence of any of the stem rusts have been detected.

CROP: Barley, Oat and Wheat

LOCATION: Manitoba and Saskatchewan

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TITLE: CEREAL SMUT SURVEY, 1992

METHODS: In July 1992, cereal crops were surveyed for *Ustilago hordei, U. nigra, U. nuda, U. tritici, U. avenae,* and *U. kolleri* in Manitoba and Saskatchewan. The area was covered by a route from Winnipeg-Swift Current-Kindersley-Yorkton-Prince Albert-Swan River-Winnipeg and one day trips north and south of Winnipeg. Fields were selected at random at approximately 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 plants in a 1 m^2 area at at least two sites on the path. *U. nuda* and *U. nigra* were differentiated by observing germinating teliospores with a microscope.

RESULTS: See Table 1. Smut was found in 51% of the fields of barley, 20% of the common wheat, 77% of the durum, and 23% of the oat. The average levels were 0.4% for barley, 0.1% for durum wheat and common wheat, and trace for oat. The most smut observed at any one site was 7% loose smut and 5% covered smut in one field of barley near Swan River, Manitoba.

COMMENTS: The amount of smut in cereals remains relatively low, reflecting the low moisture levels of recent years. The increase of smut in common wheat is due to an increase in production of susceptible semi-dwarf cultivars.

Table 1. Incidence of smut in cereals in Manitoba and Saskatchewan in 1992.

Crop	No. fields	Smut species	% Fields affected		Mean % infected plants	
			MB	SK	MB	SK
Common wheat	256	*U. tritici*	28	14	0.2	0.1
Durum wheat	43	*U. tritici*	57	81	*0.2*	0.1
Oat	39	*U. avenae*	7	25	tr*	0.1
		U. kolleri	*0*	13	*0*	0.1
Barley	185	*U. nuda*	60	35	0.3	0.1
		U. hordei	9	6	0.1	tr
		U. nigra	9	14	0.2	0.1

* tr = less than 0.1%

CROP: Oat, *Avena sativa* L.

LOCATION: Quebec

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TITLE: A SUMMARY OF DISEASES ON OAT CROPS IN QUEBEC IN 1992

METHODS: Most experimental sites of cereals in Quebec were visited at least once from mid-July to mid-August. At each visited site, diseases were identified and their severity assessed in a number of oat lines and cultivars. Plant samples were also collected at random from field crops at various locations in the Eastern Townships and in the Lower St. Lawrence region in August. They were tested in the laboratory for PAV-BYDV using ELISA technique. Growth stages of plants at the times of assessment or sampling ranged from medium milk to medium dough.

RESULTS AND COMMENTS: The disease picture was somewhat modified when prevailing weather conditions differed notably from the normal situation. The most drastic changes to the growth season occurred in July when the precipitation record was more than twice the long term average. At the same time, the monthly average temperature dropped nearly 3° C.

Moderate levels of speckled leaf blotch (*Stagonospora avenae)* were observed although its occurrence was general. The disease developed later in the season than it usually does, resulting in lower records. The Lac Saint-Jean region was the most affected in the province.

At locations where crown rust (*Puccinia coronata)* is usually found, small amounts were detached. The highest severity occurred as usual in the south-west part of the province but light symptoms only were recorded. The disease was absent or limited to traces elsewhere.

Stem rust (*Puccinia graminis*) appeared to be absent as is usually the case in the province.

Foliage symptoms of yellow dwarf (Barley Yellow Dwarf Virus) were found throughout the province up to moderate levels in general and moderate to severe in the north-west crop district. Infection appeared to have come late. The experimental oat lines Q.O. 615.6 consistently showed somewhat severe symptoms. Tolerant cultivars released from the former Agriculture Canada breeding program at Sainte-Foy displayed their advantage. Fifty-five percent of plant samples were tested positive for PAV-BYDV (they were not tested for MAV). There was a general increase in aphid populations which were much higher than normal.

An outbreak of oat blast was highly noticeable. Its occurrence was common. Hot temperature at the time of tillering may be partly responsible for this. BYDV iinfection also is one of the known causes of this disease. The resulting damage of blasted florets was more severe than foliage diseases in many fields. Some naked oat cultivars such as AC Hill and AC Percy were more severely affected than others.

Although of limited importance, smut diseases (*Ustilago* spp.) appear to be on the increase in farmers fields. This is likely the result of a tendency of lessening seed treatment quality as well as of a general decrease in use of seed treatments.

CROP: Oat, *Avena sativa* L.

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: CROWN RUST OF OAT IN WESTERN CANADA IN 1992

METHODS: Surveys for oat crown rust incidence and severity were conducted in Manitoba and eastern Saskatchewan from early July to late August 1992. Crown rust samples were obtained from wild oat *(Avena fatua* L.) in field surveys and from susceptible oat lines grown in uniform rust nurseries located near Beausejour, Brandon, Emerson, Morden, and Shoal Lake, Manitoba. For virulence phenotype (race) identification, rust collections were established on a susceptible cultivar, Makuru. Twenty single-gene oat lines, carrying Pc35, Pc38, Pc39, Pc40, Pc45, Pc46, Pc48, Pc50, Pc54, Pc55, Pc56, Pc58, Pc59, Pc60, Pc61, Pc62, Pc63, Pc64, Pc67, and Pc68, were used as differentials.

RESULTS AND COMMENTS: Crown rust of oat was first observed in trace amounts in susceptible oat in southern Manitoba on July 14. The unusually moist conditions and low temperatures during the growing season restricted the development of the rust and kept infections light in most parts of the province. By mid-August levels of crown rust infections generally ranged from light to moderate in wild oat and susceptible oat in rust nurseries, and light in commercial oat fields. In 1992 crown rust was not found west of Virden, Manitoba.

To date, 47 of the 140 single-pustule isolates identified from the rust collections were virulence phenotypes that can attack the presently recommended cvs. Dumont, Riel, Robert, AC Marie, and the newly released AC Belmont. These cultivars rely mainly on genes Pc38 and Pc39 for crown rust resistance. Another important finding of the 1992 survey is the detection of virulence to crown rust resistance gene, Pc68. For the second year, phenotypes with combined virulences to this gene and other Pc genes were isolated from resistant traps grown in the rust nurseries. Pc68 was isolated from wild *Avena sterilis* in 1982, and is being used in oat breeding programs in Winnipeg and Ottawa to enhance the resistance in the current well-adapted cultivars with Pc38 and Pc39. For longer term effectiveness, it is imperative that Pc68 be used in combination with other effective resistance gene(s), in addition to Pc38 and Pc39.

CROP: Spring Wheat

LOCATION: Quebec

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TITLE: DISEASES OF WHEAT IN QUEBEC IN 1992

METHODS: The incidence of diseases was recorded on different lines and cultivars of spring wheat at ten localities in the seven regions surveyed in Quebec in 1992. Disease severity assessments was made during the late milk to soft dough stage.

RESULTS AND COMMENTS: Powdery mildew *(frysiphe graminis)* was observed mostly at St. Hyacinthe and Lennoxville with a moderate infection on susceptible cultivars. Infections were very low at Deschambault, Normandin, and St-Eugene. It was not observed at Ste-Rosalie, Ste-Anne de Bellevue, and Pintendre.

Leaf spots caused mostly by *Pyrenophora tritici-repentis* and mixed later in the season with *Septoria nodorum,* were as usual widespread throughout the province. The overall severity was intermediate at all locations with maximum intensity at Deschambault.

Glume blotch *(Septoria nodorum)* occurred as usual mostly at Lennoxville where its severity was low. It was also observed in trace amounts at Deschambault.

Leaf rust *(Septoria nodorum)* occurred as usual mostly at Lennoxville where its severity was low. It was also observed in trace amounts at Deschambault.

Leaf rust (*Puccinia nodorum)* occurred late in the season on susceptible cultivars mostly at St-Hyacinthe and Deschambault. Its overall intensity was moderate. It occurred only in trace amounts at other localities.

Fusarium head blight *(Fusarium graminearum)* varied from low to severe at St-Hyacinthe and Ste-Rosalie. Severity was low to moderate in the Drummondville, Sherbrooke, and Quebec City regions, and very low at other locations. Loose smut (*Ustilago tritititici*) was seen mostly in low quantities on the cultivars Max and Casavant.

Take-all *(Gaeumannomyces graminis)* did not occur extensively being restricted to the northern region in low quantities. It occurred in only three fields at St-Hyacinthe with low and moderate infections.

Barley Yellow Dwarf virus was observed only at St-Hyacinthe on winter wheat cultivars where winter survival was very low again this year.

CROP: Spring Wheat

LOCATION: Quebec

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TITLE: SURVEY OF SPRING WHEAT DISEASES IN 1992

METHODS: Sixteen wheat fields (1 of Aquino, 1 of Celtic, 1 of Glenlea, 2 of Laura, 1 of Laval-19, 5 of Max, 2 of Messier, 2 of Norseman, and 1 of Roblin) were surveyed for diseases at Zadoks et al. growth stage[1] 31, 59, 77, and 85. The intensity of foliar diseases was assessed on plants observed at 10 sights along a W transect in the fields. Samples of 10 plants were pulled out at each sight at ZGS 77 to note stem and root diseases. Leaf diseases were noted up to heading as a percentage grading system[2]. After heading, the flag leaves only were assessed. The number of heads, as well as the number of spikelets per head, showing symptoms of *Fusarium* head blight were counted on rows of 50 heads at four different sites in each field.

RESULTS AND COMMENTS: Table 1 gives the minimum-maximum percent disease severity recorded before and after heading. At heading, learf diseases were low: tan spot *(Pyrenophora tritici-repentis*) was seen only in trace amounts except for one field of cultivar Max with a maximum of 0.5% flag leaf area affected. Powdery mildew (*Erysiphe graminis)* was observed on only three cultivars with a maximum of 1.2% leaf area affected on Roblin. After heading, leaf spots increased gradually affecting a maximum of 4.7% leaf area of flag leaves at ZGS 77, and up to 8.0% at ZGS 85. Powdery mildew was observed only on Roblin with a maximum infection of 4.0% flag leaf area. Leaf rust (*Puccinia recondita*) was very low even at ZGS 85. Slight stem necrosis caused by *Bipolaris* sp. and *Fusarium* sp. on basal portion of stems was seen on up to 21.7% of stems of cultivar Max and from 0-10% on all the other cultivars. *Fusarium* head blight *(F. graminearum*) affected all cultivars with less than 1% infected heads except on Norseman with 2.9%, Max with 4.5% and the maximum on Celtic with 6.9% (52.0% infected spikelets). Take-all *(Gaeumannomyces graminis)* was observed with less than 1% infected plants in a field of Max and one of Messier. However from 10-15% of the plants in one field of Laval 19 were affected.

Table 1. Prevalance and intensity of spring wheat diseases in the St-Hyacinthe region in 1992.

		Percent minimum-maximum disease intensity[2]						
							Head blight	
Growth Stages[1]		Leaf spots	Powdery mildew	Leaf rust	Stem necrosis	Take-all	Heads	Spike-lets
Before heading*		0-2.6	0-0.5	0				
Heading**	59	0-0.5	0-1.2	0				
After Heading**	77	tr.-4.7	0-3.5	0-tr				
	85	0.7-0.8	0-4.0	0-tr.	0-21.7	0-15.0	0.1-6.9	1.0-52.0

1 Zadoks *et al.* Growth stages of cereals. 1974. Weed Res. 14(6).
2 Horsfall and Barratt grading system. 1945. Phytopathology 35 (8):635 (Abstr.).
* Disease assessment on all the leaves.
** Disease assessment on flag leaves only.

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba

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TITLE: FOLIAR DISEASES OF SPRING WHEAT IN MANITOBA IN 1992

METHODS: Surveys for diseases of spring wheats were conducted in southern Manitoba between 9 July and 14 August 1992. Leaves were collected from 187 fields (136 common, 13 durum, 38 semi-dwarf) between heading and soft dough stages of development. Severity of disease on upper and lower leaves was categorized as 0, 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 confirm disease identification.

RESULTS AND COMMENTS: Abundant rain and cool temperatures throughout the growing season promoted leaf-spotting diseases in fields across the surveyed area in 1992 (Fig 1). One or more pathogens were isolated from all but one of the fields. Disease severity levels were light (1) on upper leaves and moderate (2) on lower leaves in samples collected in July. In later-collected samples upper leaves had moderate (2) and lower leaves moderate to severe (2-3) levels. Lower leaves had senesced in many late-surveyed fields. The pathogens, *Septoria nodorum,* S. *tritici,* and *S. avenae* f. sp. *triticea* (septoria leaf blotch complex), *Pyrenophora tritici-repenfis* (tan spot), and *Cochliobolus sativus* (spot blotch) were isolated from 82.9%, 73.8%, and 53.5% of fields, respectively (Table 1). The prevailing conditions may have favoured development of *S. tritici* and reduced incidence of *C. sativus* compared to other years. *Septoria triticiwas* widespread in Manitoba for the first time in 5 years, but incidence and severity of *C. sativus* was lower than in 1989-1991. *Septoria tritici* was not isolated from durum wheat. Incidence of *Septoria* diseases has increased steadily from 34% in 1989, 45% in 1990, 61% in 19911, to more than 80% in 1992. The increase is most likely due to higher rainfall in the past 2 years in combination with conservation tillage practices. The cool moist summer also favoured development of tan spot which was found at higher levels than in 1991.

Table 1. Frequency of diseases identified in 187 wheat fields in Manitoba in 1992.

Wheat type	Septoria leaf blotch			Tan spot	spot blotch
	'nodorum'	*'avenae'*	*'fritici'*		
Common	90	38	50	98	71
Semi-dwarf	28	12	9	28	23
Durum	9	4	0	12	6
Total	127	54	59	138	100
Fields (%)	67.9	28.9	31.6	73.8	53.5

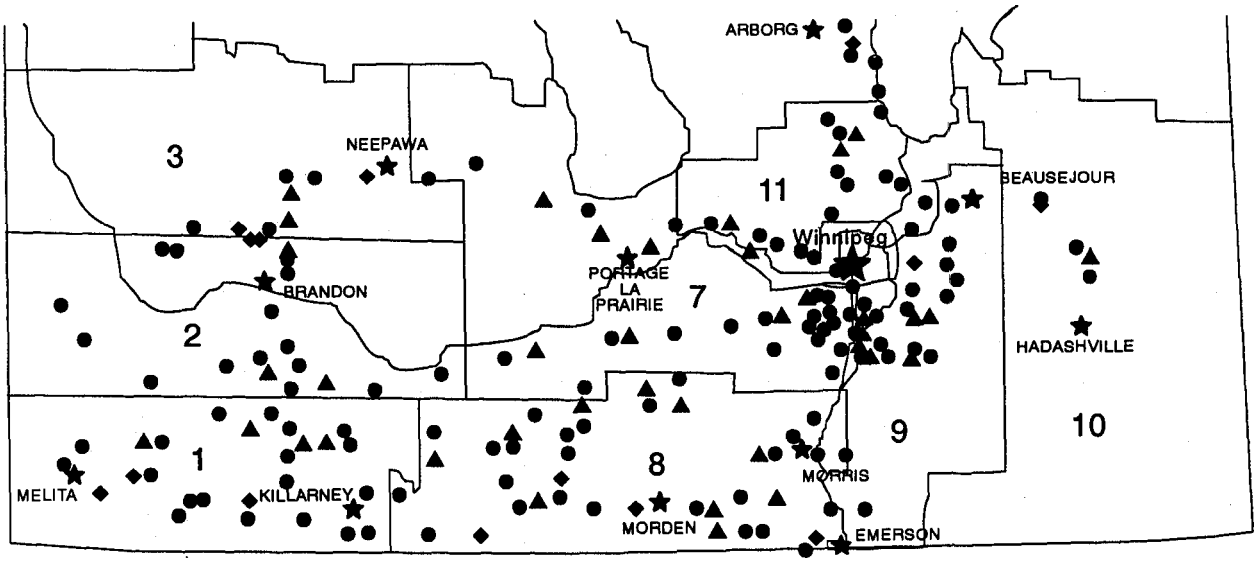

Fig. 1. Crop districts and locations of common (●), durum (◆), and semi-dwarf (▲) wheat fields surveyed for foliar pathogens in 1992.

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba

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TITLE: OCCURRENCE OF FUSARIUM HEAD BLIGHT IN MANITOBA IN 1992

METHODS: A survey for fusarium head blight (FHB) in spring wheat fields was conducted in southern Manitoba between 29 July and 14 August 1992. Heads were examined in 100 fields (68 common, 5 durum, 32 semi-dwarf) between watery-ripe and soft dough stages of development. The percentage of heads affected with blight was estimated in each field. Glumes and kernels from sampled heads were surface sterilized and incubated on 15% V8 juice agar for 5-7 days to confirm diagnosis and for species identification.

RESULTS AND COMMENTS: Fusarium head blight was found in 36% of wheat fields examined but did not occur as far west or east as in 1991 (Fig. 1). It was found in 34% of common, 35% of semi-dwarf, and 40% of durum wheat fields. Severity ranged from trace to 4% of heads infected and was lower than that found in the past two years. Severity levels in all wheat classes were similar. As in past years the more severely infested fields were found in crop district 8, and *F. graminearum* was the principal causal species (Table 1).

Table 1. Distribution of *Fusarium* species in common, durum and semi-dwarf wheat fields in southern Manitoba in 1992.

	No. wheat fields			
Fusarium spp.	Common	Semi-dwarf	Durum	Total
F. graminearum	19	11	2	32
F. crookwellense	2	5	1	8
F. culmorum	3	2	1	6
F. avenaceum	1			1
F. poae		1		1
F. equiseti			1	1

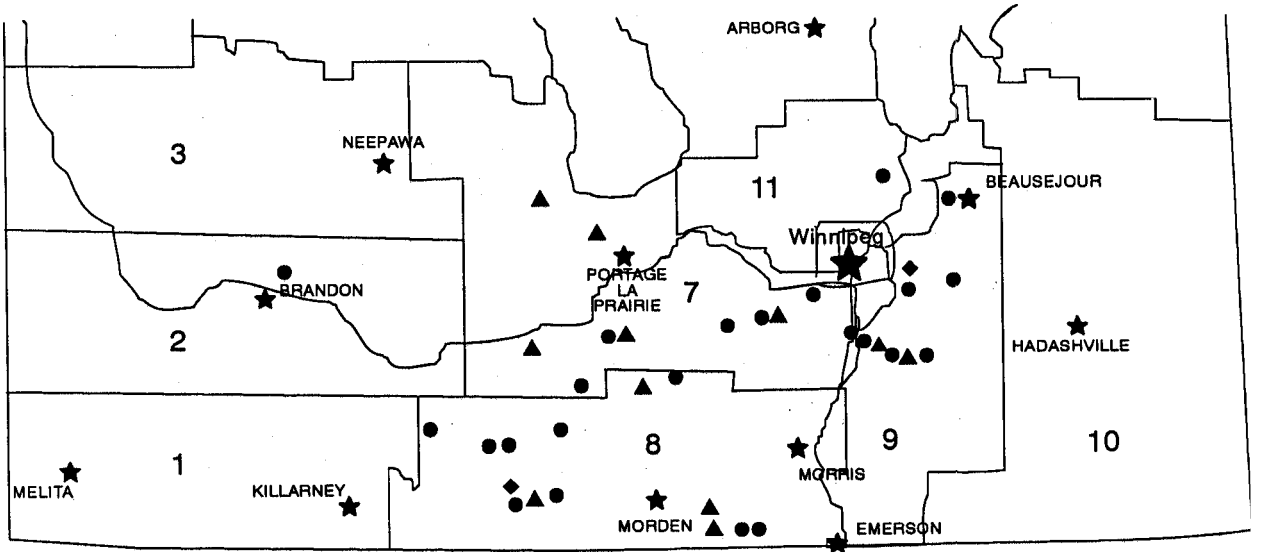

Fig. 1 Crop districts and locations of common (●), durum (◆), and semi-dwarf (▲) wheat fields positive for fusarium head blight in 1992.

CROP: Wheat and Barley

LOCATION: Manitoba & eastern Saskatchewan

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TITLE: 1992 SURVEY OF FLAME CHLOROSIS IN MANITOBA AND EASTERN SASKATCHEWAN

BACKGROUND: Surveys for flame chlorosis (FC), a soil-borne, virus-like disease of spring cereals (1-3), have documented its spread and apparent intensification since it was first observed in western Manitoba in 1985 (1). Until 1988 FC was observed only in barley, but it has since been confirmed in wheat and oat (3), triticale (6), and two grassy weed species (7). Starting from the base established with the 1990 survey, the annual FC surveys monitor the epidemiological trend of the disease. The 1992 survey sought to examine areas of Manitoba and eastern Saskatchewan not covered in earlier surveys to determine whether FC was spreading to areas outside the main disease centres in western Manitoba and the Red River valley south of Winnipeg.

METHODS: As noted in earlier reports (1,2), FC is readily diagnosed between the seedling and 4-node stages of growth on the basis of striking and characteristic symptoms. Agricultural survey personnel familiar with the visual diagnosis of FC recorded survey data using the surveying method described previously (2).

Specimens of FC plants from fields where the disease was observed were forwarded promptly to the Plant Pathology Laboratory of Manitoba Agriculture to confirm the diagnosis (2). About one tenth of putative FC-positive specimens and those specimens which could not be diagnosed with certainty as FC-positive on the basis of visual symptoms were tested by dot-blot assay for FC-specific RNA (4) to confirm reliability.

RESULTS AND COMMENTS: Earlier surveys (2,5) contained no reports of FC in barley and wheat in southcentral and extreme southwestern Manitoba. The 1992 survey indicates that this is because the disease is absent (cf. map) or present at extremely low levels in this area, an observation consistent with the hypothesis of a link between FC and high frequencies of continuous cereal cultivation (3). The area south of Ashern in the northwest Interlake region recorded FC for the first time in 1992.

The 1992 FC survey in eastern Saskatchewan continues the systematic effort begun in 1991 to monitor the disease beyond the borders of Manitoba, following from the 1990 discovery of FC in western Manitoba within a few km of the Saskatchewan border. No FC was observed at 42 sites (7 barley, 35 wheat fields) in eastern Saskatchewan within a 50-80 km-wide strip bordering Manitoba from approximately 49° 30'N to 51° 50'N.

The extension of the FC host range to a grassy weed species noted in the 1991 survey (5) was strengthened in 1992 with the demonstration that barnyard grass (*Echinochloa crusgalli*

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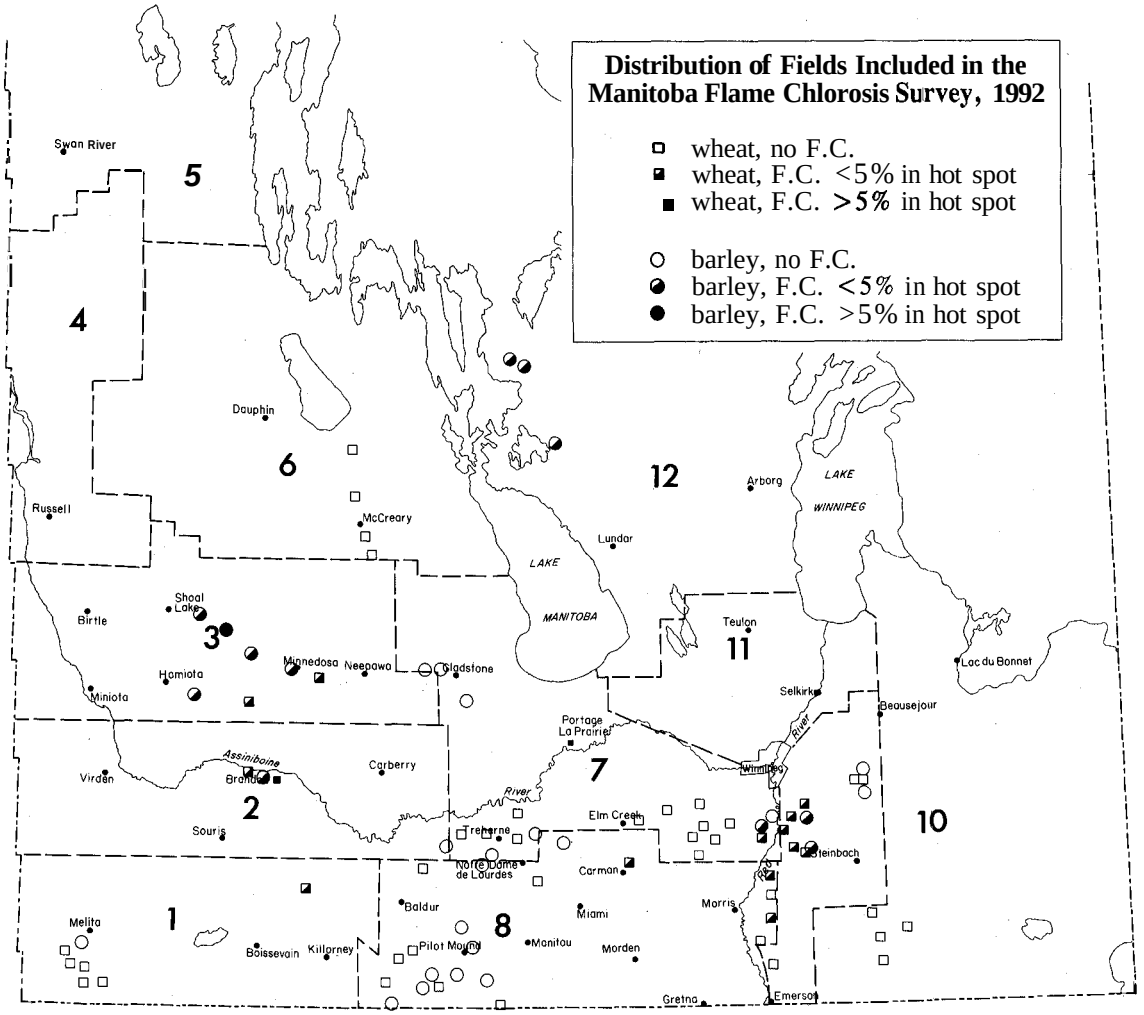
L.) as well as green foxtail *(Setariaviridis* L.) were hosts of the agent that caused **FC** in barley and wheat (7). **A** more extensive FC host range among monocot species, might increase the threat posed by FC to cereal grain cultivation in certain parts of Manitoba.

REFERENCES

1. Haber, S., W. Kim, R. Gillespie and A. Tekauz. 1990. Flame Chlorosis: a new soil-borne, virus-like disease of barley in Manitoba. Can. J. Phytopathol. 129(3):245-256.
2. Haber, S. and R.G. Platford. 1991. 1990 survey of flame chlorosis in Manitoba. Can. Plant Dis. Surv. 71(1):79-80.
3. Haber, S., D.J.S. Barr and R.G. Platford. 1991. Observations on the distribution of flame chlorosis in Manitoba and its association with certain zoosporic fungi and the intense cultivation of cereals. Can. J. Plant Pathol. 13:241-246.
4. Haber, S., D.A. Wakarchuk, S.E. Cvitkovitch and G. Murray. 1991. Diagnosis of flame chlorosis, a novel, virus-like disease of cereals by detection of disease-specific double-stranded RNA with digoxigenin-labelled RNA probes. Plant Dis. 76:590-594.
5. Haber, S., R.G. Platford, L. Duczek and K. Bailey. 1992. 1991 survey of flame chlorosis in Manitoba and eastern Saskatchewan. Can. Plant Dis. Surv. 72:154-55.
6. Haber, S., S. Prashar and G. Murray. 1992. Triticale confirmed as host of the virus-like agent causing flame chlorosis in cereals. Plant Dis. (*In* press).
7. Haber, S. and D.E. Harder. 1992. Green Foxtail (Setaria viridis) and barnyardgrass (Echinochloa crusgalli) - new hosts of the virus-like agent causing flame chlorosis in cereals. Can. J. Plant Pathol. 14(4):(*In press*)



CROP: Wheat, *Triticum aestivum* L.

LOCATION: Saskatchewan and central Alberta

NAME AND AGENCY:

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TITLE: SASKATCHEWAN/CENTRAL ALBERTA WHEAT DISEASE SURVEY 1992

METHODS: A province wide survey of Saskatchewan was conducted in 220 wheat fields between flowering and early dough growth stages. Fifteen wheat fields were surveyed in the area of Lacombe, Alberta. Disease was assessed in random fields on a sample of 10 plants taken at least 20 paces from the field edge. Diseases such as smut, ergot, take-all, and viruses were estimated for the percent incidence in either the plant sample or over the entire field. Common root rot was estimated by counting the number of plants in the sample that had lesions covering more than 50% of the sub-crown internode. Rust diseases were evaluated on the basis of both severity and infection type as described in the Cereal Methodology Manual (1986) published by CIMMYT. The remaining foliar and leaf spot diseases were assessed on a 0-9 scale based on those described by Saari and Prescott (1975) and by Couture (1980). Samples of diseased leaf tissue were plated to determine the causal agents of leaf spots. Dry leaves cut into 4 cm long segments were washed for one hour and disinfected for one minute with 0.5% sodium hypochlorite. Three pieces were plated on water agar containing 100 mg/L streptomycin sulfate and 50 mg/L vancomycin hydrochloride. When enough leaf tissue was available, two plates were done for each sample. The plates were incubated for one week under a mixture of black light, black-blue light, and cool white fluorescent light for 12 hours alternating light and dark at 20°C. On the basis of sporulation on the leaf surface, estimates were made on the importance of the following causal agents: *Septoria nodorum*, S. *tritici*, *S. avenae* f. sp. *triticea,* and *Pyrenophora tritici-repentis. Bipolaris sorokinina* was noted on some samples but did not appear to be a significant pathogen.

RESULTS AND COMMENTS: There were 211 hexaploid and 24 durum wheat fields surveyed. The distribution by crop districts, severity, and prevalence of the diseases are shown in Table 1. The most prevalent diseases were leaf spots (99% of the fields lightly to moderately infected), common root rot (65% of the fields with severely infected1 plants), glume blotch (trace levels in 40% of fields), and leaf rust (trace to moderate infections in 32% of fields). Low levels of powdery mildew were observed in 10% of fields surveyed. These fields were mainly in the eastern and northern crop districts of Saskatchewan but higher severities were observed in five fields around Lacombe. Take-all occurred in 7% of the fields and smuts in 6%. The incidence of take-all in these fields ranged from less than 1% to a high of 10%. In the southeast corner *of* Saskatchewan, 12 cases of wheat streak mosaic virus were noted. Low moisture levels in the spring and early summer and cool growing temperatures resulted in highly stressed and late developed crops in most areas of Saskatchewan.

In central Alberta, aphids were present in 40% of the fields examined and occurred in higher numbers than normally seen. Ergot *(Clavicepspurpurea)* and eyespot *(Pseudocercosporella herpotrichoides)* were found in trace amounts in four and five fields, respectively, in crop district 8. The incidence of take-all *(Gaeumannomyces graminis)* appeared to be increasing compared to previous years and was mixed with eyespot infections.

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Pyrenophora tritici-repentis was the major leaf spotting pathogen on hexaploid wheat except in crop districts 2A and 4A where *Septoria nodorum* was more important (Table 2). *S. tritici* was less common and *S. avenae* f. sp. *triticea* was not found. The distribution of fungi was variable throughout the regions of the province. The percentage of *P. tritici-repentis* was less in the southeast corner of Saskatchewan (crop districts 1 and 2). Higher percentages of *S. tritici* were isolated from leaf samples collected from central Saskatchewan (crop districts 5, 6, and 7). In durum wheats, *P. tritici-repentis* was the most important leaf spotting pathogen (Table 3). It represented 90% or more of the leaf spotting fungi in 22 of the 24 durum fields.

REFERENCES

1. Couture, L. 1980. Assessment of severity of foliage diseases of cereals in cooperative evaluation tests. Can. Plant Dis. Surv. 60(1): 8-10.

2. Saari, E.E. and J.M. Prescott. 1975. A scale for appraising the foliar intensity of wheat diseases. Plant Dis. Reptr. 59:377-380.

Table 1. Distribution, severity, and prevalence of wheat diseases in Saskatchewan and Alberta fields surveyed between milk and early dough stages in 1992.

Crop district	No. fields	Leaf spot	Leaf rust	CRR %	Powdery mildew	Glume blotch	Ergot %	Smut %	Take-all %	BYDV %	Bacterial blight	WSMV (%)	Eye spot (%)
SASKATCHEWAN													
1A	10	2.8/10*	TR-MSI7	43/10		TR/1		1.014	10.012	-	TR/1	1.012	-
1B	5	2.715	1MS/4	1415								TR/4	-
2A	2	2.512	TR-MS/2	1812									
2B	4	2.414	TR-MS/2	28/4				TR/1				TR/2	
3A	0	**											
3B	34	5.4134	1-40MS/8	23117		TR/22		TR/3	TR/7				
4A	6	6.416	1-20MS/4	1513		TR/6		TR/1	TR/1		-	-	-
4B	7	2.3/7	1MS/1	2815		TW2			1.0/1				
5A	15	4.1115	TW4	23110		TR/1						TR/4	-
5B	16	5.5/15	TR/1	1015	TR/3			1.0/1					
6A	7	5.4/7		1815	TR/1	TR/1				TR/2	-	-	-
6B	16	6.8116	TR/3	1919	TR/1	0.815		0.0111			-	-	-
7A	6	5.7/6	TR/1	2012		TR/2		TR/1			-	-	-
7B	10	5.2/10		19110		TW6		TR/1		TR/1	-	-	-
8A	27	3.7126	1R-5MR/7	19/22	0.518	2.2/15					-	-	-
8B	26	4.5125	1W24	19119	0.1/2	0.4/13					-	-	-
9A	17	5.5117	TR-MS/6	17111	1.5/3	2.0/8		0.0111			-	-	-
9B	12	3.4/12	TR/1	2717		TR/4					-	-	-
ALBERTA													
5	3	6.0/3	5M/1	012	4.512	2.0/3							
8	12	4.8/12	1R/1	3110	4.013	0.5/4	TW4		2.0/7	-	TR/1	-	TR/5
Average or total	235	4.5/232	1R-40MS /77	19/158	1.4/23	0.6/93	TR/4	0.3/14	2.6118	TR/3	TR/2	0.3/12	TR/5

* Average disease rating (0-9 scale after Couture 1980)/number of fields affected.
** Not observed or not recorded.

Table 2. Estimation of the percentage of leaf-spot fungi on leaf samples of hexaploid wheat collected in Saskatchewan in 1992.

Crop district	No. of samples	% of leaf-spot fungi		
		Septoria nodorum	*S. tritici*	*Pyrenophora tritici-repentis*
1A	9	45	2	53
1B	5	40	22	38
2A	2	90	0	10
2B	4	19	4	77
3BS	15	41	6	53
3BN	5	26	1	73
4A	2	53	7	40
4B	3	23	0	77
5A	15	28	17	55
5B	16	16	19	65
6A	7	18	16	66
6B	14	27	12	61
7A	5	14	7	79
8B	11	38	10	52
9A	16	34	3	63
9B	10	36	8	56

Table 3. Estimation of the percentage of leaf-spot fungi on leaf samples of durum wheat collected in Saskatchewan in 1992.

Crop district	No. of samples	% of leaf-spot fungi		
		Septoria nodorum	*S. tritici*	*Pyrenophora tritici-repentis*
1A	1	5	5	90
2B	1	20	0	80
3BS	11	7	0	93
3BN	5	3	0	97
4A	2	35	0	65
4B	3	7	0	93
8B	1	1	0	99
9A	1	0	0	100

CROP: Wheat. *Triticum aestivum* L.

LOCATION: Eastern Prairies

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TITLE: WHEAT LEAF RUST IN THE EASTERN PRAIRIES IN 1992

METHODS: Trap nurseries and commercial farm fields in southern Manitoba and eastern Saskatchewan were surveyed for leaf rust incidence and severity from June to August, 1992.

RESULTS AND COMMENTS: Wheat leaf rust was first detected in 1992 during the second week of June, in winter wheat plots at Portage, Manitoba. However, the lack of southerly winds in June and July reduced the initial amount of inoculum and slowed the general rate of leaf rust increase. By the first week of July, leaf rust was present only in trace amounts at scattered locations throughout southern Manitoba. By the second week of August, leaf rust had increased to moderate severity levels in fields of Katepwa, Neepawa, and Biggar in southern Manitoba. Yield loss due to leaf rust was possible in late planted fields of these cultivars. Leaf rust levels were very low in fields of the resistant cultivars Roblin, Columbus, Pasqua, and Grandin. The severity of leaf rust infection on susceptible cultivars was significantly lower in eastern Saskatchewan. Only trace levels of rust could be found north of Regina. Losses were not expected in this area.

Oilseeds and special crops/Oléagineux et cultures speciales

CROP: Buckwheat

LOCATION: Manitoba

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TITLE: DOWNY MILDEW ON BUCKWHEAT

Downy mildew (*Peronospora ducometi*) was identified as the cause of a foliar disease of buckwheat in Manitoba in the 1970's. Three fields were examined on August 12 for this disease. Downy mildew occurred at moderate-severe levels. The disease is seedborne and can be expected to be present in all buckwheat fields, depending on temperature and moisture. Past experience indicates that the cool, wet conditions this year were ideal for downy mildew development. Because of its ability to cause systemic infection of upper foliage, some effect on yield probably occurred.

CROP: Canola

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISTRIBUTION, PREVALENCE AND INCIDENCE OF CANOLA DISEASES IN 1992

METHODS: Two surveys were conducted in Manitoba. During the first, **52** fields of *Brassica napus* and one of *B. rapa* (syn. *B. campestris)* were surveyed in the southern crop districts in the last week of August. During the second, **29** fields of *B. napus* and six fields of *B. rapa* were surveyed in the northern crop districts in the second week of September. The presence of various diseases was noted in each field and disease incidence was determined on a sample of 50 plants. In addition **98** samples of canola were submitted for analysis to the Manitoba Agriculture Crop Diagnostic Centre.

RESULTS AND COMMENTS: Sclerotinia stem rot, caused by *Sclerotinia sclerotiorum,* was observed in **79** of 88 fields (Table 1). Affected fields were found in all crop districts. Disease incidence was generally low, but did reach **54%** in one field. Mean incidence ranged from **2** to **9%** in the western crop districts (1-4), and from **14** to 19% in the eastern and northern crop districts. Morrall et al. **(1984)** found that disease incidence was two times the associated percentage yield loss. Based on this relationship, the average yield loss caused by S. *sclerotiorum* was about **2%** in the western crop districts and 8% in the other crop districts.

Blackleg, caused by *Leptosphaeria maculans,* was found in **21** fields (Table 1). Blackleg was found in most crop districts. Mean incidence ranged from 1% in crop district **2** to **10%** in crop district 1. In comparison to 1990 and **1991,** number of infected fields and mean incidence were much lower.

Foot rot caused by *Fusarium* spp. & *Rhizoctonia solani* was observed in 7 fields distributed throughout Manitoba (Table 1). Incidence was less than **4%** in all fields. Aster yellows (Mycoplasma-like organism) was observed in **43** fields, distributed over the entire province. Incidence ranged from trace to **2%.** Staghead *(Albugocandida)* was observed in one field of crop district **3** with an incidence of **20%.** Trace levels of black spot *(Alternaria* sp.) were observed in five fields distributed throughout Manitoba in Crop Districts 5 and **6.**

In Manitoba, the **1992** growing season was exceptionally cool and characterized by many cloudy and rainy days. As a result, plant development was rather slow and the survey was conducted about two weeks lateir than in previous years. As well, the crop was still standing in most fields. In standing crops, sclerotinia stem rot and aster yellows can be assessed easily and accurately. However, blackleg and foot rot are more difficult to evaluate as symptoims develop rapidly during maturation. Consequently, the incidence of blackleg and foot rot are probably underestimated.

Of the **98** samples submitted to the Manitoba Agriculture Crop Diagnostic Centre 7 showed black spot (*Alternaria* spp.), **6** root rot *(Fusarium* spp.) 5 aster yellows (Mycoplasma-like organism), **4** sclerotinia stem rot *(Sclerotinia sclerotiorum),* and **3** downy mildew *(Peronospora parasitica).* Fifteen showed symptoms of a nutrient deficiency, usually from a lack of sulphur, **12** were affected by environmental stress and **46** samples were diagnosed as being affected by herbicide injury.

REFERENCES

1. Morrall, R.A.A., J. Dueck and P.R. Verrna. 1984. Yield losses due to sclerotinia stem rot in western Canadian rapeseed. Can. J. Plant Pathol. 6:265 [Abstr.].

Table 1. Prevalence and incidence of canola diseases by crop district in Manitoba in 1992.

Crop district**	No. of sampled fields	No. of affected fields				Range of incidence*	
		Sclerotinia	Blackleg	Foot rot	Aster yellows	Sclerotinia	Blackleg
1	5	5	4	1	3	t- 6	8-12
2	6	5	3	-	3	t-10	t- 2
3	13	9	2	1	6	t-42	2- 4
4	7	6	4	-	1	2-18	4-10
5	9	7	1	1	2	4-32	2
6	12	11		1	3	4-36	
7	14	14	2	2	8	t-54	2
8	11	11	4	1	9	2-38	t- 8
9	8	8		-	8	t-34	
11+12	3	3	1	-		2-28	4
Total	88	79	21	7	43		

* t = present in the field at trace level, but not detected in the 50-plant sample.
** For a map with crop districts see Van den Berg *et al.* 1992. Can. Plant Dis. Surv. 72: 69-71.

CROP: Canola

LOCATION: Central Alberta

NAME AND AGENCY:
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TITLE: SURVEY OF ALTERNARIA BLACKSPOT AND SCLEROTINIA STEM ROT OF CANOLA IN CENTRAL ALBERTA IN 1992

METHODS: Fifty-one fields of canola were surveyed in central Alberta during the third week of August. Twenty-eight of these fields were of *Brassica campestris* and 23 were of *B. napus.* The disease severity at 2 locations within each field, away from the edge, was estimated visually and the mean recorded. For assessment of alternaria blackspot caused by *Alfernaria brassicae,* percent areas of siliques covered with lesions were determined using an assessment key (Conn *et al.*, 1990). Fields with 0 to less than 1% alternaria blackspot were categorized as having trace levels. For assessment of sclerotinia stem rot caused by *Sclerotinia sclerotiorum,* the percentage of stems with symptoms was determined. Fields with between 0 and 1% sclerotinia stem rot were categorized as having trace levels.

RESULTS AND COMMENTS: Fields surveyed had either trace amounts or no alternaria blackspot on the siliques (Fig. 1). The percentage of stems with sclerotinia stem rot ranged from 0 to 10% (Fig. 2). If the fields with trace levels are set to 0%, then the mean for the 51 fields was 0.4%. These low levels of alternaria blackspot and sclerotinia stem rot were likely due to the hot and dry weather during the latter part of July and the first half of August in central Alberta.

The ratio of *B. napus* to *B. campestris* fields was much higher this year than in the past few years, with 45% of the fields being those of *B. napus.* This would affect the level *of* alternaria blackspot because *B. napus* is less susceptible to *A. brassicae* than *B. campestris* (Conn and Tewari, 1989; Skoropad and Tewari, 1977). In this survey 26% of the *B. napus* fields had alternaria blackspot compared to 46% of the *B. campestris* fields (Fig. 1). There was not much difference in the amount of sclerotinia stem rot between *B. napus* and *B. campestris* fields. Fifty-two percent of the *B. napus* fields had sclerotinia stem rot as compared to 61% of the *B. campestrisfields* (Fig. 2).

During this survey the presence or absence of some other diseases was also noted. Staghead caused by *Albugo candida* was observed in all the fields of *B. campestris* surveyed. Aster yellows caused by a mycoplasma-like organism was observed in all the fields of *B. campestris* and some of the fields of *B. napus.* Gray stem caused by *Pseudocercosporella capsellae* was observed in only a few fields.

ACKNOWLEDGEMENTS: This survey was financed by grants from the International Development Research Centre, Ottawa and the Natural Sciences and Engineering Research Council of Canada, Ottawa.

REFERENCES

1. Conn, K.L. and J.P. Tewari. **1989.** Interactions of Alternaria brassicae conidia with leaf epicuticular wax of canola. Mycol. Res. 93:240-242.
2. Conn, K.L., Tewari, J.P. and R.P. Awasthi. **1990.** A disease assessment key for alternaria blackspot in rapeseed and mustard. Can. Plant Dis. Surv. 70:19-22.
3. Skoropad, W.P. and J.P. Tewari. **1977.** Field evaluation of the role of epicuticular wax in rapeseed and mustard in resistance to Alternaria blackspot. Can. J. Plant Sci. 57:1001-1003.

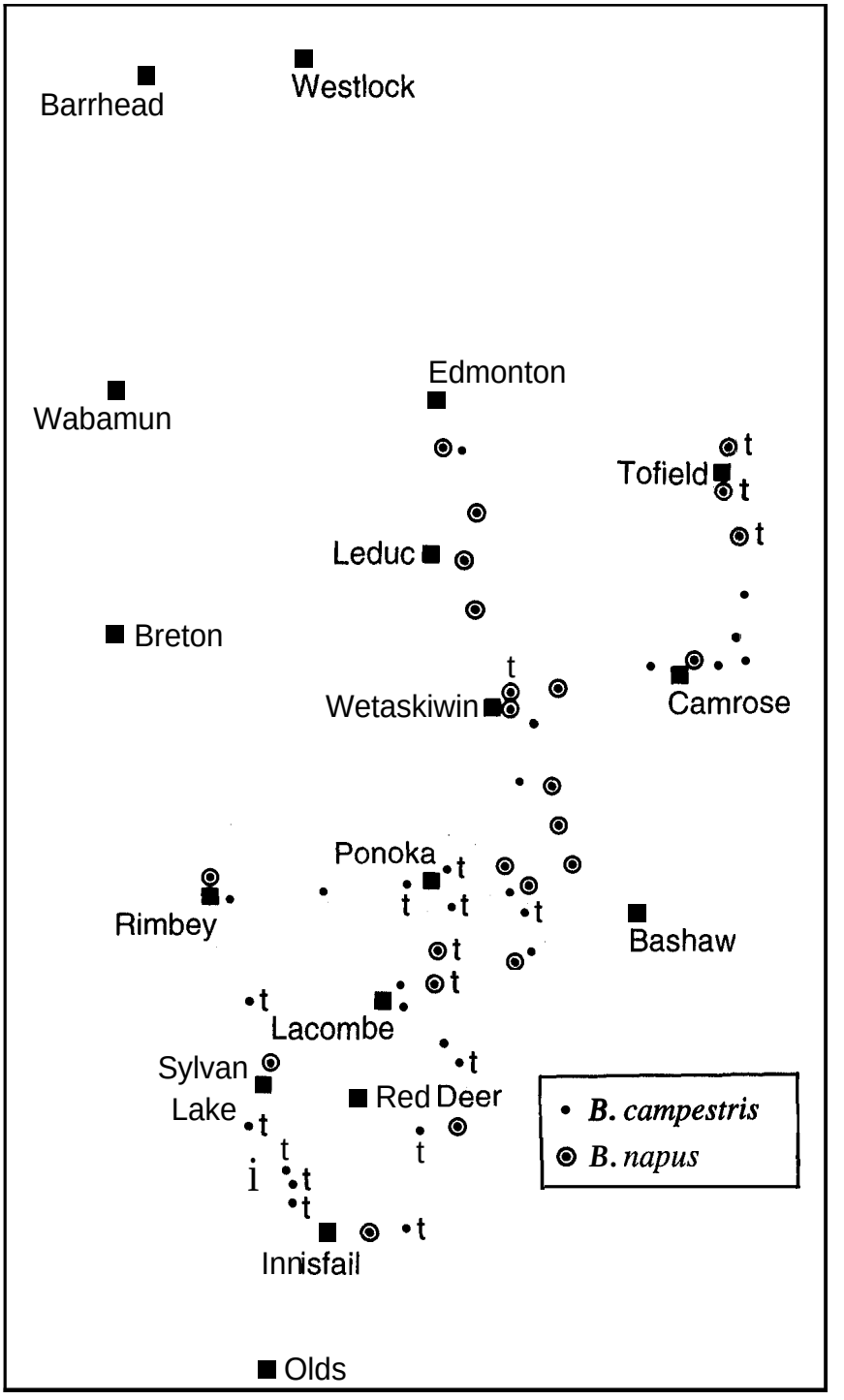

Figure 1. Locations of fields in central Alberta surveyed for alternaria blackspot in 1992. The numbers represent percent areas of siliques covered with lesions. Locations without numbers had 0% infection. Fields with 0 to less than 1% infection were categorized as having trace (t) levels.

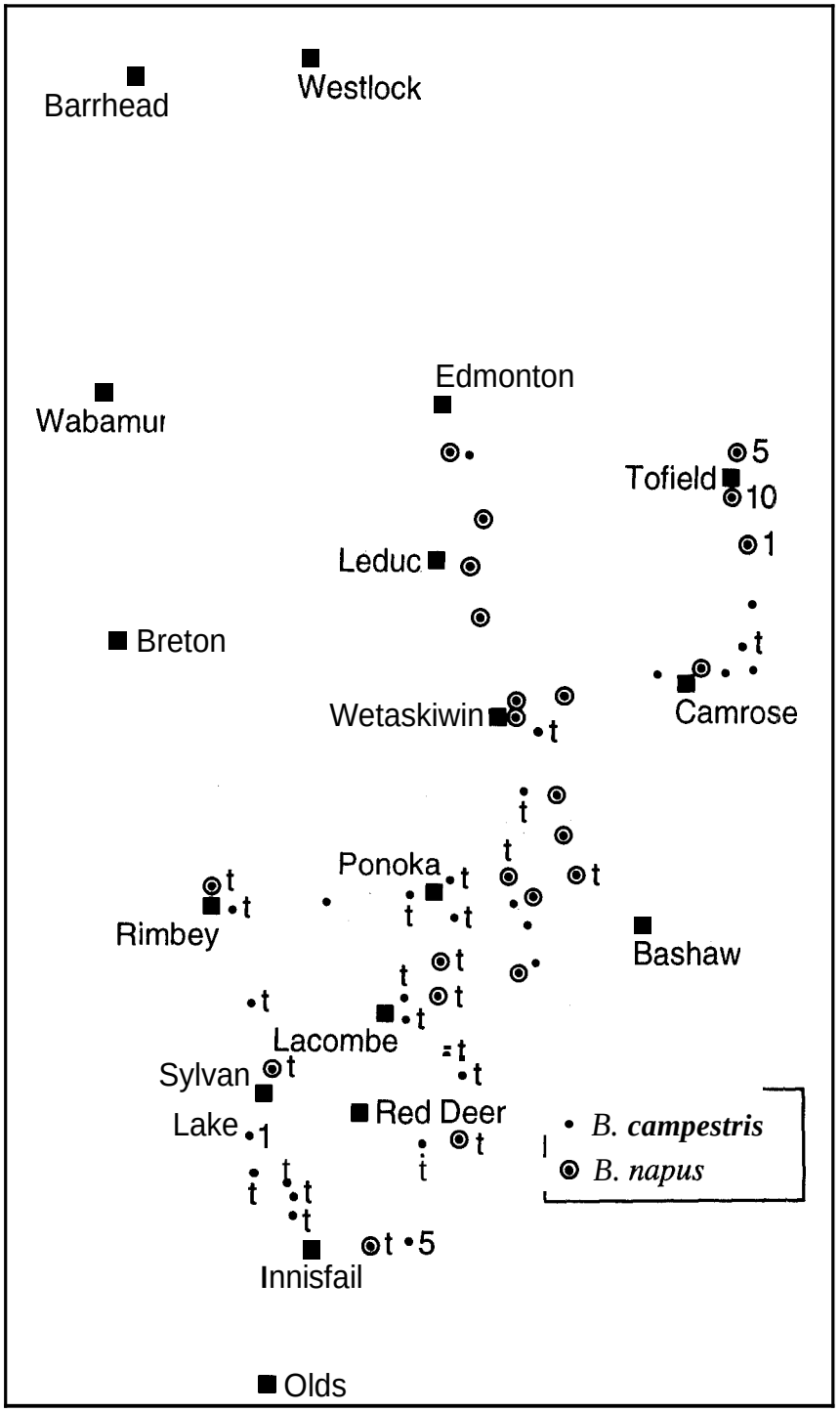

Figure 2. Locations of fields in central Alberta surveyed for sclerotinia stem rot in 1992. The numbers represent percent of stems with symptoms. Locations without numbers had 0% infection. Fields with 0 to less than 1% infection were categorized as having trace (t) levels.

CROP: Canola

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: BLACKLEG OF CANOLA SURVEY IN ALBERTA - 1992

INTRODUCTIONAND METHODS: For the fifth year in a row, a province-wide survey was carried out for virulent blackleg (*Leptosphaeria maculans*) of canola. The survey was in co-operation with fieldmen in each of the 67 provincial municipalities, Alberta Agriculture staff and Agriculture Canada inspectors. Diagnostic confirmation for the disease was available in regional laboratories at Brooks and Fairview and at the Environmental Centre at Vegreville.

As in previous years the survey by fieldmen was based on inspecting one field for every 2,000 ha of canola grown in the municipality. Fieldmen were asked to randomly check fields for virulent blackleg, particularly in areas or regions where they suspected shortened crop rotations, i.e. canola every second or third year. Fields were sampled as previously described (2,3,4). A follow up was also conducted for the third year on 47 fields where virulent blackleg had been confirmed in 1989 (2,3,4).

RESULTS AND COMMENTS: In the east central region of Alberta, virulent blackleg incidence and damage levels were below the previous year. Whereas in 1991 virulent blackleg was identified in 50% of these fields, the identifiable occurrence in 1992 was not more than 10% of fields in many areas inspected. There were no reports of fields with extensive virulent blackleg damage. In the County of Flagstaff where blackleg was confirmed in 50% of the fields in 1991, only 40 out of 120 or 33% were positive for the disease this year.

In the Peace Region of Alberta, 309 fields were surveyed and one field of cv. Alto in the Municipality of Smoky River was found to have a trace level of virulent blackleg. The crop which had been hail-damaged in early July produced a respectable 1.7 tonnes/ha yield. In the previous year, the field had grown a crop of canola cv. Westar. Westar and Alto are by far the most blackleg-susceptible of the *Brassica napus* cultivars grown on the prairies. This is the first confirmed incidence of virulent blackleg in a commercial field of canola in the Peace Region where about 33% of the provincial crop is grown.

Seed Inspectors for Agriculture Canada found only one virulent blackleg infestation in a 6.5 ha field of cv. Westar, out of 339 fields totalling 7,428 ha.

The third follow-up on the 47 fields in which blackleg of canola was confirmed in 1989 revealed that 7 of the growers seeded the land to canola this year. In the previous year, only 1 grower seeded to canola. All of the growers had been requested in 1989 to follow a 4-year crop rotation and, to their credit, 39 out of the 47 complied. The general compliance by Alberta growers with crop rotation recommendations by Alberta Agriculture, coupled with much more resistant (tolerant) canola cultivars are likely responsible for the visible decline in incidence and severity of virulent blackleg in Alberta this year. Provincial crop losses have been kept to a minimum. Resistant canolas *(B. rapa, B. napus* and *B. juncea)* are the long term answer to blackleg but fully resistant or highly tolerant cultivars are still some years away. In the meantime, blackleg-free seed, seed treatments and 4-year crop rotations are still necessary in keeping this destructive disease under control.

REFERENCES

1. Evans, I.R., P.D. Kharbanda, L. Harrison and D. Kaminski. 1992. Blackleg of canola survey in Alberta - 1991. Can. Plant Dis. Surv. 72:73.
2. Evans, I.R., P.D. Kharbanda, L. Harrison and D. Kaminski. 1991. Blackleg of canola survey in Alberta - 1990. Can. Plant Dis. Surv. 71:98-99.
3. Evans, I.R., P.D. Kharbanda, L. Harrison and D. Kaminski. 1990. Blackleg of canola survey in Alberta - 1989. Can. Plant Dis. Surv. 70:63-64.
4. Kharbanda, P.D., I.R. Evans, L. Harrison, S. Slopek, H.C. Huang, D. Kaminski and J.P. Tewari. 1989. Blackleg of canola survey in Alberta - 1988. Can. Plant Dis. Surv. 69:55-57.
5. McGee, D.C. and G.A. Petrie. 1978. Variability of Leptosphaeria maculans in relation to blackleg of oilseed rape. Phytopathology 68:625-630.

CROP: Flax

LOCATION: Manitoba

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TITLE: DISEASES OF FLAX IN MANITOBA IN 1992

METHODS: A total of 33 flax fields were surveyed in Southern Manitoba in 1992. Two fields were surveyed on July 6, 14 on August 13, seven on August 20, five on August 27, and five on September 3. Fields were selected at random in different regions. Each field was sampled by two persons walking 100 m in opposite directions in the field following an inverted V pattern. Diseases were identified by symptoms and the incidence of each disease was recorded. In addition, 10 samples of flax were submitted for analysis to the Manitoba Agriculture Crop Diagnostic Centre by agricultural representatives and growers.

RESULTS AND COMMENTS: Crop emergence was good and stand was excellent in most of the fields surveyed. The soil moisture was adequate and the crop vigour was generally good to excellent in most fields. The incidence of heat canker was very low in the spring. Fusarium wilt (*Fusarium oxysporum* f. sp. *lini*) was observed in three fields with disease incidence at less than 1%.

Pasmo (*Septoria linicola*) was observed in two fields; 5% infected plants were found in one field and less than 1% in the other. Aster yellows (Mycoplasma-like organism) was observed in two fields at trace levels.

Rust (*Melampsora lini*) was not observed in any of the fields surveyed, nor on 30 rust differential lines planted at Morden and Portage la Prairie.

Of the 10 samples submitted to the Manitoba Agriculture Crop Diagnostic Centre, 1 showed pasmo, 1 aster yellows, 1 leaf spot (*Alternaria alternata*), 1 root rot (*Fusarium* spp.), and 6 environmental stress.

CROP: Lentil

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: ANTHRACNOSE AND OTHER DISEASES OF LENTIL IN MANITOBA IN 1992

METHODS: Samples from 69 lentil fields were submitted to the Manitoba Agriculture Plant Pathology Laboratory, where they were diagnosed for the presence of fungal diseases and physiological injuries. Another 13 samples were brought to the Department of Plant Science for diagnosis.

A survey for anthracnose caused by *Colletotrichum truncatum* was undertaken by the Department of Plant Science to assess the severity of the disease in the southern Red River Valley (24 fields), at Portage la Prairie (2 fields) and around Carman (6 fields), all areas with a history of lentil and bean cropping. The disease was rated using the same method as in 1991 (1).

The appearance of the first symptoms of anthracnose and the rate of disease development were followed closely in six fields around Rosenort (Southern Red River Valley) during the growing season of 1992, as in 1991 (1). At two week intervals, 10 plants were sampled at five marked locations in each field. Plants showing stem lesions with sporulating anthracnose were rated. Plants with no sporulation were treated with paraquat (0.3% a.i.) and incubated for four days before rating.

Accu-test Seedlab had tested 20 seed samples of lentil from Manitoba by October 1992. From each sample 400 seeds were surface sterilized in 5% sodium hypochlorite for 5 min. and plated on potato dextrose agar amended with streptomycin. The plates were incubated at 20° C with a 12 h photoperiod for 10 days and rated for seed borne fungi.

RESULTS AND DISCUSSION: The 82 lentil samples that were submitted because some problems had already been observed do not represent a random disease survey. However, of these samples 41% were diagnosed with anthracnose *(C. truncatum),* which was the most frequently occurring disease of lentil in 1992 (Table 1) as in 1991 (1). The origin of the lentil samples and the locations where anthracnose was found are shown on the map of Manitoba in Fig. 1. As in 1991, anthracnose was mainly a problem in the southern Red River Valley, around Portage la Prairie and Dauphin, which are all areas with a history of lentil cropping. In 1992, the disease seems to have become established closer to Winnipeg and around Carman and sporadic attacks were also found in most of southern Manitoba.

Ascochyta blight *(Ascochyta fabae* f. sp. *lentis*), Sclerotinia stem rot *(Sclerotiniasclerotiorum)* and root rot (*Fusarium* spp.) were diagnosed in 12-15% of the samples (Table 1). Root rot was the cause of total crop loss in a few fields in the Red River area, with each field having had intensive rotations of lentil, bean and pea. Half of the physiological injuries were due to excess water, as a result of the unusual wet and cold growing season in 1992. This was in contrast to 1991, when herbicides were the cause of most of the physiological injuries.

As expected, a high incidence of anthracnose was found in most of the 32 fields in the survey (Fig. 1, Table 2). Almost half of the fields had 21-75% anthracnose, while one third had more than 75%. Based on fungicide trials carried out in 1992, yields were reduced up to 60% because of anthracnose.

The first symptoms of anthracnose were observed on plants in the 10-13 node stage sampled on July 2. This was two weeks later than in 1991 (1) and probably a result of the cooler weather, which also delayed crop development. The number of plants with sporulating anthracnose on the day of sampling was much lower in 1992 than in the warmer season the year before. However, after paraquat treatment the number of sporulating stem lesions increased during the season at a rate which was comparable to the rate of infection in 1991.

Up to October only one seed sample had been found with anthracnose (0.3% infected seeds), while ascochyta was found in 80% of the samples, with an average of 8.7% infected seeds.

ACKNOWLEDGEMENTS: The financial support of the Manitoba Pulse Growers Association and the Western Grains Research Foundation is gratefully acknowledged. Data on seed testing from Marie Greeniaus (Accu-Test Seedlab, Rivers, Manitoba) and the co-operation of many lentil growers are appreciated.

REFERENCES

1. Buchwaldt, L., R.G. Platford and C.C. Bernier. 1992. Diseases of lentil in Southern Manitoba in 1991. Can. Plant Dis. Surv. 72: 78-79.

Table 1. Summary of diseases and physiological disorders diagnosed on lentil samples submitted to the Manitoba Agriculture Plant Pathology Laboratory (69 samples) and the Depairtment of Plant Science, Univ. of Manitoba (13 samples) in 1992. Some samples carried more than one disease.

Disease	Pathogen	No. of samples
Anthracnose	*Colletotrichum truncatum*	34
Ascochyta blight	*Ascochyta fabae* f. sp. *lentis*	10
Root rot	*Fusarium* spp.	10
Sclerotinia stem rot	*Sclerotinia sclerotiorum*	12
No disease		11
Herbicide injury		1
Excess moisture		8
Nutrient deficiency and other injuries		7

Table 2. Levels of anthracnose infection in 32 lentil fields in areas where lentil has been grown for a number of years.

Grower area	0%	1-20%	21-75%	76-100%	No. of samples
South of Winnipeg					
Red River Valley					
Headingley	0	1	0	0	1
Glenlea	0	1	2	0	3
Rosenort	1	1	2	6	10
Morris	0	3	4	0	7
St. Jean Baptiste	0	0	0	2	2
Domain	0	0	1	0	1
West of Winnipeg					
Portage la Prairie	0	0	1	1	2
Southwest of Winnipeg					
Miami	0	0	2	0	2
Carman	0	2	2	0	4
Total	1	8	14	9	32

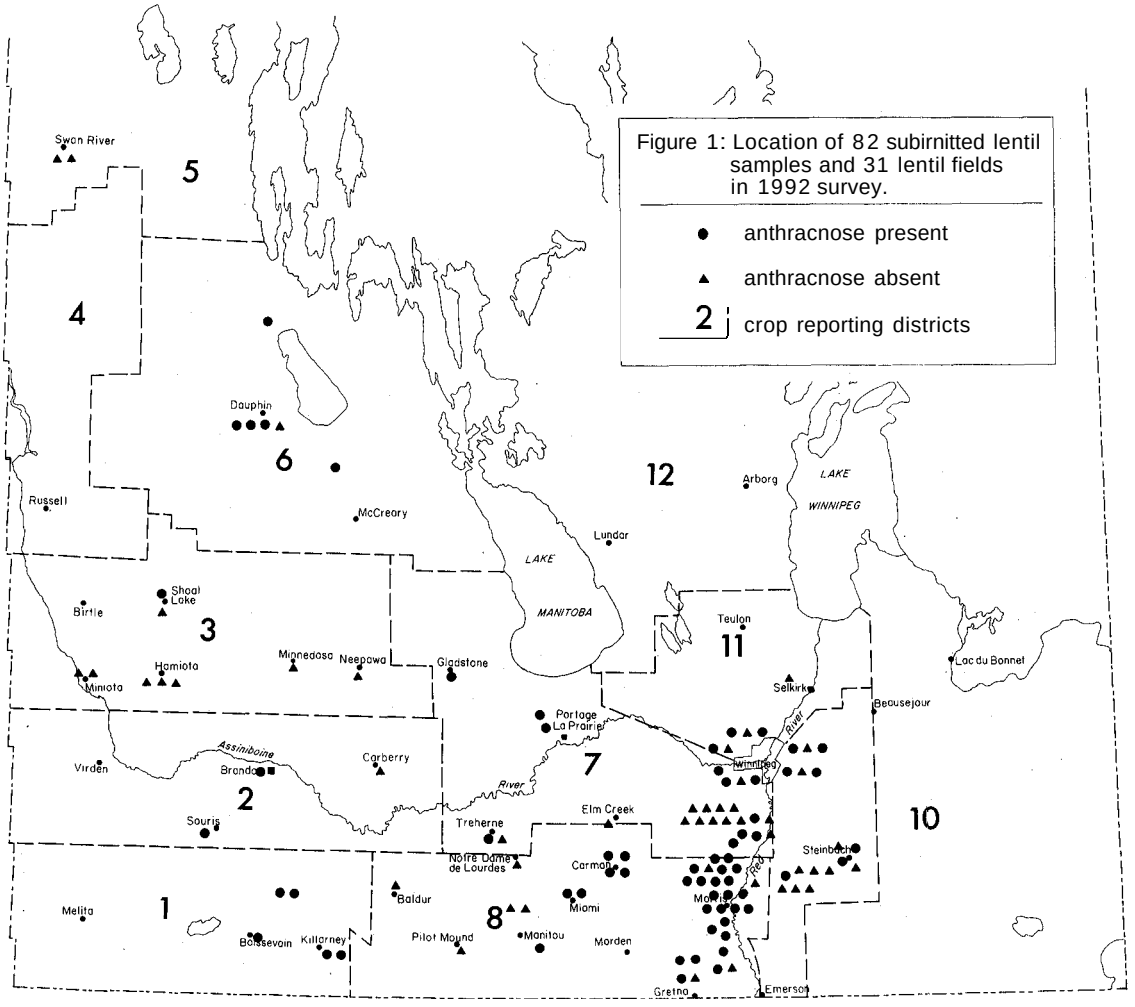

Figure 1. Map of Manitoba showing origin of the 82 submitted lentil samples and the 31 lentil fields in the survey. ● = anthracnose present, ▲ = anthracnose absent.

CROP: Lentil

LOCATION: Central Saskatchewan

NAME AND AGENCY:
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TITLE: ANTHRACNOSE AND ASCOCHYTA BLIGHT OF LENTIL IN CENTRAL SASKATCHEWAN IN 1992

METHODS: Ascochyta blight caused by *Ascochyfa fabae* Speg. f. sp. *lentis* Gossen et al. and anthracnose caused by *Colletotrichum truncatum* (Schwein.) Andrus and W.D. Moore are the two principal diseases of lentil in Saskatchewan. The main objective of this survey was to monitor the development of anthracnose in commercial crops in two areas where the disease is known to occur (2) and attempt to relate the results to cropping practices. All crops were in Saskatchewan Crop District 6B (2). Twenty were in the dark-brown soil zone near Zealandia (100 km S.W. of Saskatoon) and 18 in the black soil zone near Laird (60 km N. of Saskatoon). Most crops were the cultivar Laird, which is moderately resistant to ascochyta blight and susceptible to anthracnose; however, two in the Zealandia area were the landrace Spanish Brown, which is highly susceptible to both diseases.

Each crop was visited four times from early June to mid-August, at times approximately corresponding to the seedling stage, the late vegetative stage, the mid- to late flowering stage and the ripening stage (i.e. shortly before harvest). On each visit a crop was normally inspected in two places by an observer walking at least 100 m through the crop. Particular attention was paid to edges of fields adjacent to lentil residues from 1991. A subjective assessment of the severity of the diseases as absent, trace, slight, moderate or severe was made for each crop. Background information was obtained from the growers on the crop history of fields in the survey, as well as the crops grown in adjacent fields in 1991.

Information about infection with *A. fabae* f. sp. *lentis* and *C. truncatum* in seed harvested from Saskatchewan crops in 1992 was obtained from two commercial seed testing companies.

RESULTS AND COMMENTS: The entire growing season was abnormally cool in Saskatchewan and below-normal rainfall occurred in June and early July in the two areas surveyed. Consequently, development of both ascochyta blight and anthracnose was very limited before the final survey date. Anthracnose was not found until the third survey visit and even then it was observed at only a trace level in one crop. In mid-August it was rated trace in 6 crops and slight in one (Table 1). Ascochyta blight was absent in all but three crops at the seedling stage. By the second survey date it was present in 17 of 20 crops in the Zealandiai area, but mostly at trace or slight levels; in the Laird area it was observed in only four crops. At late flowering, during the third survey visit ascochyta blight was observed in most crops in both areas, but usually at trace or slight levels. On the final survey visit, the disease was observed in all but eight fields, but still usually at low levels (Table 1).

The majority of crops surveyed in the Zealandia area were in fields on three-year rotations, whereas in the Laird area most were on rotations of more than four years (Table 1). This may be partly because lentil growers in the black soil zone are traditionally more concerned about ascochyta blight. However, because of unfavoralble weather, disease levels were too low to be able to draw firm conclusions about the effects of crop rotation on development or severity of anthracnose. For both ascochyta blight and anthracnose, the ratio of presence to absence of disease in crops was somewhat higher when 1991 lentil residues were in proximity than would be expected from the ratios for the total number of crops (Table 2). The fact that ascochyta blight occurred in more crops than anthracnose probably partly reflects the fact that it is a more highly seed-borne disease and growers commonly plant infected seed (1).

By the middle of December two companies reported having tested 845 samples of lentil seed from Saskatchewan. These included samples from areas where June and July rainfall were higher than in the areas of the field survey. Anthracnose was found in only one sample at a low level. *Ascochyfa* was

found at levels ranging up to 62% but with an overall mean of 4.02%. This level is lower than that reported in 1991, but considerably higher than in the previous four years (1, 2).

ACKNOWLEDGEMENTS: The financial support of the Western Grains Research Foundation and the Saskatchewan Pulse Crop Development Board is acknowledged. We also appreciate the co-operation of Janet Paisley (Newfield Seeds) and Marilyn French (Saskatchewan Wheat Pool) for providing data on seed testing.

REFERENCES

1. Morrall R.A.A. 1992. Significance of seed-borne inoculum of lentil pathogens in western Canada. Proc. 1st Europ. Conf. on Grain Legumes, Angers, France, 1-3 June, 1992. 313-314.

2. Morrall R.A.A., J.R. Thomson, S.J. Bond, J.L. Downing, J. May-Melin and D.K. Thompson. 1992. Diseases of lentil in Saskatchewan in 1991. Can. Plant Dis. Surv. 72: 80-82

Table 1. Distribution of lentil crops in two areas of Saskatchewan in 1992 in relation to disease severity and crop rotation.

Area	No. of years since previous lentil or pea crop in the field	Disease severity class* (Ascochyta blight/Anthracnose)				
		Absent	Trace	Slight	Moderate	Severe
Zealandia	1	-/1	-/1		1/-	1/-
	2	-/1	-/1	2/-		
	3	2112	311	5/-	3/-	
	4					
	>4	I/3	1/-	1/-		
Laird	1					
	2	1/1	-/2	1/-	1/-	
	3	-/1	1/1	-/1	2/-	
	4	1/1				
	>4	3110	5/-	2/-		
Unknown	-/1	1/-				

* Final ratings shortly before harvest

Table 2. Presence of disease in lentil crops in two areas of Saskatchewan in 1992 in relation to presence of 1991 lentil residues in the same or adjacent fields.

1991 Lentil Residues in proximity?	Ascochyta blight		Anthracnose	
	Absent	Present	Absent	Present
No	5	11	15	1
Yes	3	19	16	6
Totals	8	30	31	7

CROP: Lentil

LOCATION: Southern Alberta

NAME AND AGENCY:
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TITLE: SURVEY FOR LENTIL DISEASES IN SOUTHERN ALBERTA - 1992

METHODS: Eleven lentil fields in five districts of southern Alberta (Fig. 1) were surveyed for anthracnose (*Colletotrichum truncatum*) and ascochyta blight (*Ascochyta fabae* f.sp. *lentis*) from August 11 to **14.** Sample sites within fields were chosen by selecting ten points, spaced approximately 100 paces apart, along a teardrop-shaped survey path formed by walking toward the center of the field then back out to the entry point. Disease severity was assessed within a $1m^2$ area at each sample site using the following rating scale: Clean (0) = no disease; Slight (1) = >0 to 10% of leaf area blighted; Moderate (2) = 11 to 50% blighted, and Severe (3) = >50% blighted. Casual observations of the presence of other diseases were also made.

RESULTS AND COMMENTS: None of the 11 fields surveyed had any anthracnose (Table 1). Five fields comprising 47% of the surveyed area were infested with ascochyta blight, but less than 1% of the leaf area was affected in all cases. Four fields had some sclerotinia stem rot (*Sclerotinia sclerotiorum*), with the most severe outbreaks in one field each of cvs. Eston and Laird. Three fields, one of Eston and two of Laird, were infested with botrytis stem and pod rot (*Botrytis cinerea*), with the disease severity ranging from slight to moderate.

ACKNOWLEDGEMENTS: The assistance of Mr. R. Winter, Irrigation and Resource Management Division, Alberta Agriculture, Brooks, in preparing the figure is gratefully acknowledged. Thanks are also due to Mr. S.A. Dereniwski, Alberta Agriculture, Medicine Hat, and Mr. J.P. Ruschkowski, Alberta Agriculture, Oyen, for their help in locating lentil fields.

Table 1. Severity of ascochyta blight and anthracnose in 11 lentil fields in southern Alberta in 1992.

District surveyed	Field size (ha)	Cultivar	Field status[1]	Disease severity[2]	
				Anthracnose	Ascochyta blight
co. of Wheatland (#16)	85	Laird[3]	NI	0	0.7
M.D. of Cypress (I.D. #1)	105	Eston[4]	I	0	0.3
	16	Eston	NI	0	0
	53	Laird[5]	NI	0	0.1
co. of Forty Mile (#8)	26	Eston[6]	I	0	0.3
M.D. of Acadia Valley (#34)	40	Laird	NI	0	0
Special Area #3	61	Laird	NI	0	0
	53	Laird	NI	0	0.1
	116	Laird	NI	0	0
	61	Laird	NI	0	0
	64	Laird	NI	0	0

1 Field status: I = Irrigated, NI = Non-Irrigated.
2 Disease severity: Clean (0) = no disease, Slight (1) = >0 to 10% of leaf area blighted, Moderate (2) = 11 to 50% blighted and Severe (3) = >50% blighted.
3 This field had moderate infestations of both sclerotinia stem rot and botrytis stem and pod rot.
4 This field was severely affected by sclerotinia stem rot and slightly affected by botrytis stem and pod rot.
5 This field had slight infestations of both sclerotinia stem rot and botrytis stem and pod rot.
6 This field had severe sclerotinia stem rot.

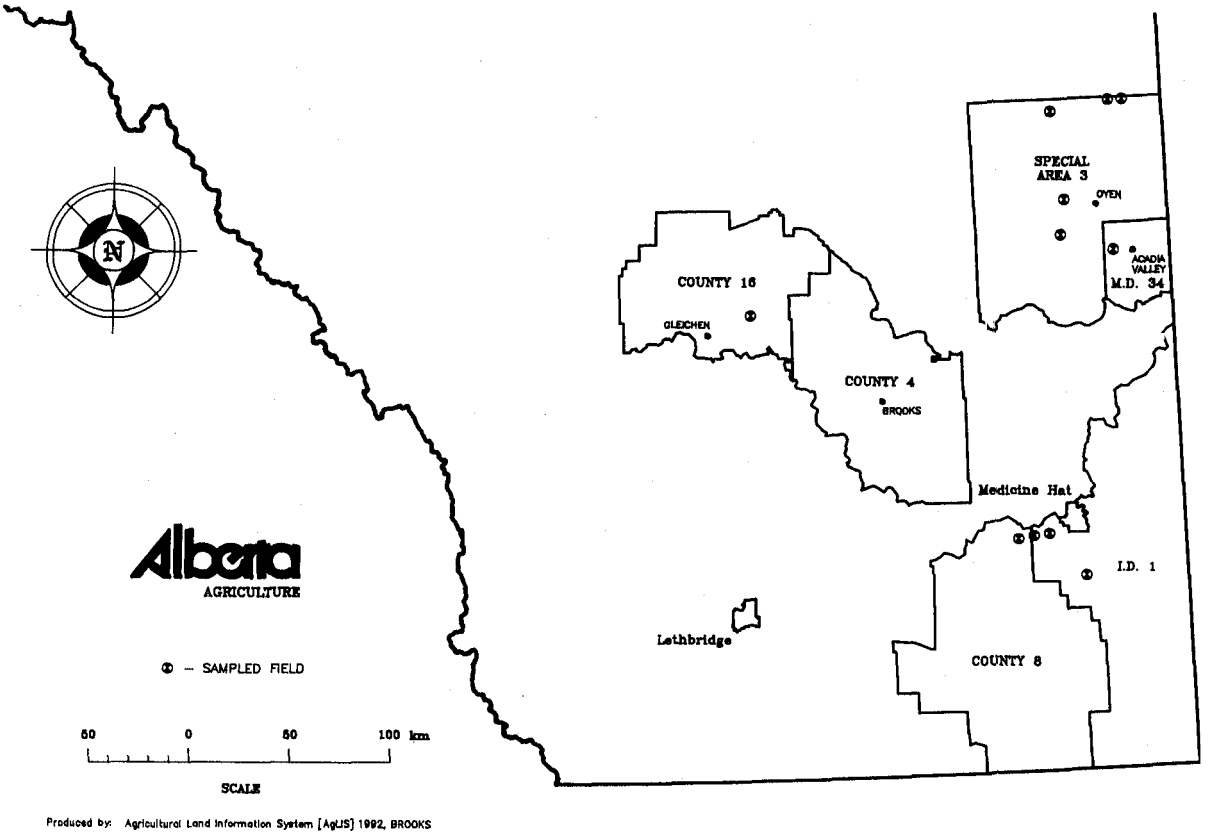

Fig. 1 Districts in southern Alberta and locations of lentil fields surveyed for diseases in August, 1992.

CROP: Field Pea and Field Bean

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISEASES OF FIELD PEA AND FIELD BEAN IN SOUTHERN MANITOBA IN 1992

FIELD PEA

METHODS: Forty-six fields were examined in the principal pea growing areas in Manitoba in 1992. Eleven were surveyed on July 14 and 35 on August 12; the approximate field locations are indicated in Fig. 1. The survey pattern in each field followed an inverted V, the point of the V being approximately 100 m into the field. At about 20 m intervals, 5-10 plants were examined for disease. The diseases were identified by symptoms and the severity of each disease was estimated. In addition, 10 samples of field pea were submitted for analysis to the Manitoba Agriculture Crop Diagnostic Centre from agricultural representatives and growers.

RESULTS AND COMMENTS: Numerous rains, sometimes heavy, occurred throughout the growing season, providing excellent conditions for foliar disease development.

On July 14, mycosphaerella blight (*Mycosphaerella pinodes*) was present at trace to moderately severe levels in all 11 fields observed in the Morden, Carman, Elm Creek and Portage la Prairie areas. By August 12, surveys in the Morden, Winkler, Plum Coulee, Horndean, St. Jean, Graysville, Carman, Elm Creek and Portage areas showed that mycosphaerella blight had progressed to the tops of the plants in many fields, especially in crops which were relatively mature. Downy mildew (DM) (*Peronospora viciae*) was present at light to moderate severity in 9 of 11 fields on July 14. On August 12, the incidence of DM had dropped to 9 of 35 fields, and the severity of infection generally was light. In 1992, although the severity of infection was appreciably greater than in past years, there probably was little effect on yield. In previous years, DM generally was found mainly around the Portage la Prairie area, where the temperature is moderated by the presence of Lake Manitoba. In 1992, in addition to the rainy conditions throughout the summer, lower than normal temperatures resulted in DM throughout pea-growing regions (Fig. 1). Sclerotinia stem and pod rot (*Sclerotinia sclerotiorum*) was present at light - moderate severity levels in 19 of 35 fields observed on August 12; it would have caused some yield reduction this year. This is the first in several years that *Sclerotinia* has been a significant problem on field pea. Neither bacterial blight nor powdery mildew were conspicuous in 1992; low temperatures probably were responsible in both instances.

Of the 10 samples of field pea submitted to the Crop Diagnostic Centre for analysis, 3 showed sclerotinia stem rot, 2 root rot (*Fusarium* spp.), 1 bacterial blight (*Pseudomonas syringae* pv. *pisi*), 1 downy mildew, 1 mycosphaerella blight and 3 herbicide injury.

FIELD BEAN

Surveys of commercial field bean fields were carried out on the same dates as the field pea surveys. In the 15 fields examined on the three dates, bacterial blight (common) was present in 13 at severity levels varying from light to moderately severe. Sclerotinia white mould was found at trace level in one field (August 13 survey). On September 24, a separate 1-day survey trip for *Sclerotinia* infection was carried out in the Morden, Winkler, Graysville and Portage la Prairie bean-growing areas in southern Manitoba. Incidence of *Sclerotinia* infection was estimated in one area of the field by determining visually the ratio of infected:healthy plants. Infection occurred in all 11 fields; incidence of infection ranged from less than 1% to 30%.

An additional 24 fields were monitored on a weekly basis throughout the growing season by the Manitoba Agriculture Crop Diagnostic Centre. Bacterial blight was found in all fields at levels from trace to 90%. Sclerotinia white mould was found in 71% of fields at an average incidence of 36%. The average yield of the fields harvested was 1320 kg/ha and ranged from 495 kg/ha to 1980 kg/ha. Highest yields were in the Winkler area. Several fields were not harvested because of hail and delayed crop maturity. The cool growing season in 1992 delayed maturity and reduced yields of field bean.

One hundred samples of field bean submitted by agricultural representatives and growers were analyzed by the Crop Diagnostic Centre. Results are presented in Table 1. Bacterial blight was found in 49% of samples, white mould in 24% and root rot in 8%. Environmental stress including late spring frost, prolonged cool weather and hail was the cause of the damage associated with 24% of the samples. Herbicide injury was detected in 3% of the samples submitted.

Table 1. Summary of 100 field bean submissions in Manitoba in 1992.

DISEASE	SCIENTIFIC NAME	NUMBER OF SAMPLES
Bacterial blights including:		
Common blight	*Xanthomonas campestris* pv. *phaseoli*	49
Halo blight	*Pseudomonas syringae* pv. *phaseolicola*	
Brown spot	*Pseudomonas syringae* pv. *syringae*	
White mould	*Sclerotinia sclerotiorum*	**24**
Root rot	*Fusarium* spp.	8
Environmental		24
Herbicide injury		3

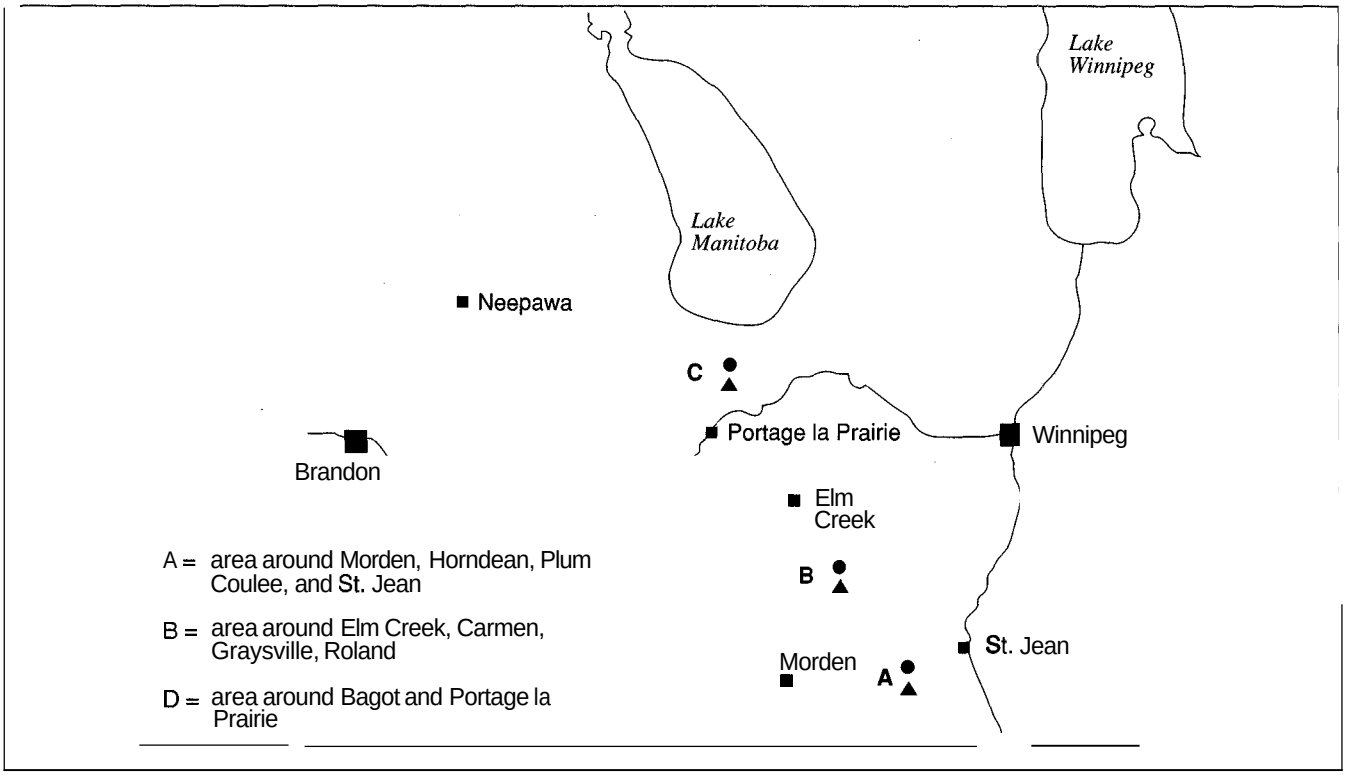

Figure 1. General locations of field bean (O) and field pea (A) fields surveyed for disease in Manitoba in 1992.

CROP: Field Pea

LOCATION: Central Saskatchewan

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TITLE: ROOT ROT DISEASE COMPLEX OF FIELD PEA IN CENTRAL SASKATCHEWAN IN 1990

METHODS: Twenty-eight pea fields in central Saskatchewan were surveyed in July 1990 for the presence of the pea root rot disease complex. In each field, 10 plants were dug up at each of 10 sites along a W-pattern transect through the field. The incidence and severity of root rot were assessed. Severity ratings were assigned on a scale of 0 to 4, where 0 = healthy, 1 = 1-10%, 2 = 11-25%, 3 = 26-50%, and 4 = 50-100% root discoloration. Nodulation was evaluated on a scale of 0 to 3, where 0 = no nodules, 1 = few nodules, 2 = moderate nodule numbers, and 3 = abundant nodules. Ten small pieces of discolored root tissue were removed from each of 10 randomly selected plants from each of the 28 fields sampled. The root tissue was surface sterilized and placed on acidified potato dextrose agar (PDA). Hyphal tips growing out of the tissue were cut off and transferred to PDA slants for further growth and identification. Soil dilution series were conducted with soil samples collected from each pea field onto pentachloronitrobenzene medium, which is selective for *Fusarium,* and onto pimaricin-vancomycin agar, which is selective for *Pythium.* Five plates were prepared for each sample. The numbers of *Fusarium* and *Pythium* propagules were recorded after 7 and 2 days, respectively.

RESULTS AND COMMENTS: Pea plants with the root rot disease complex were found in all fields surveyed. Mean disease incidence and sewerity were 36.1% and 0.70, respectively (Table 1). The nodulation of plants examined was quite poor; mean nodulation was 0.84 (Table 1). Populations of *Fusarium* spp. and *Pythium* spp. averaged 22.8×10^2 and 22.7×10^2 propagules/g soil, respectively (Table 2). A few isolates of *Pythium* spp. were highly pathogenic on the pea cultivar Tipu. *Pythium* spp. may play a significant role in the pea root rot disease complex in the early stage of plant growth and when the soil is poorly drained and cold. *Fusarium* was the genus isolated most frequently from root rot-infected plants. Of the total *Fusarium* cultures recovered, the ratio of *F. oxysporum* :*F. solani* : other *Fusarium* was 6:1:9. The high frequency of isolation of *F. oxysporum* indicates that it is one of the major fungal components of the root rot disease complex in central Saskatchewan. Therefore, large-scale isolation of wilt pathogens based on a more extensive survey is needed to identify the race(s) of *F. oxysporum* f. sp. pisi in Saskatchewan.

ACKNOWLEDGEMENTS: Many thanks to N. Cowle and L. Wood who assisted in this survey. This study was funded by the Agriculture Development Fund of Saskatchewan Agriculture and the Alberta Agricultural Research Institute, Matching Grants Program.

Table 1. Incidence and severity of root rot and nodulation in pea fields surveyed in central Saskatchewan in 1990.

Location	No. of Fields	% Incidence		Severity*		Nodulation	
		Mean	Range	Mean	Range	Mean	Range
Melfort	7	64	23-100	1.4	0.9-2.8	0.7	0.4-1.0
Wakaw	3	14	1-23	0.2	0.01-0.3	0.9	0.5-1.5
Rosthern	3	21	9-28	0.2	0.1-0.3	1.1	0.9-1.3
Biggar	7	25	10-83	0.5	0.1-2.1	0.8	0.5-1.5
Wilkie	5	63	16-90	1.4	0.2-2.0	0.6	0.1-1.0
Unity	3	30	19-48	0.5	0.3-0.9	1.1	1.0-1.3
Total/Average	28	36		0.7		0.9	

* Severity on a scale of 0-4.

Table 2. Populations of *Fusarium* spp. and *Pythium* spp. in pea fields surveyed in central Saskatchewan in 1990.

Location	Propagules/g air-dried soil			
	Fusarium ($\times 10^2$)		*Pythium* ($\times 10^2$)	
	Range	Mean	Range	Mean
Melfort	2-21	11.5	13-24	18.2
Wakaw	7-19	13.0	12-24	15.9
Rosthern	13-28	20.6	11-33	25.3
Biggar	33-79	44.8	10-23	15.81
Wilkie	12-32	25.4	11-56	27.1
Unity	16-25	21.2	25-40	33.7
Average		22.8		22.7

CROP: Radley field pea

LOCATION: Central Alberta

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TITLE: SURVEY OF RADLEY PEA IN CENTRAL ALBERTA - 1992

METHODS: Six fields of Radley field pea representing three pairs were surveyed. Each pair was farmed by the same person and consisted of one field that was sown to peas for the first time and the other sown for the second time. The previous pea crop in these fields was 3 years ago. Each field was visited twice during the growing season and ten plants were collected at random. These plants were scored visually for disease symptoms and diseased portions were plated on PDA in the laboratory for further analysis. The effects of a severe frost of -5.5C on August 24 precluded a third visit.

RESULTS AND COMMENTS: Disease levels were low in all fields examined. The first examination was on August 13 and the trend was for lower visual disease symptoms for the second-crop pea. In the plated samples, the percentages of *Fusarium* spp. isolated from the roots and *Ascochyta* isolated from the leaves were higher in the fields that were seeded to field pea for the first time. Downy mildew (*Peronospora viciae*) was present at lower levels in the fields that were seeded to field pea for the second time. At the time of the second assessment (September 4), downy mildew was no longer evident as the lower portions of the plants had dried out and the disease had not spread to the upper parts. Powdery mildew (*Erysiphe polygoni*), which had not been evident at the August assessment, was present in only one pair of fields at the September assessment. At the later assessment, the pea plants were dried up and it was more difficult to rate disease symptoms. Materials that were plated out had higher percentages of *Fusarium* spp. on the roots in the second-crop peas. *Ascochyta* was present on the leaves. In addition, what appeared to be *Sclerotinia sclerotiorum* was plated out mainly from the leaves but also from the roots of first-year pea. The main features that were noted were differences between growers' crops as well as the unexpected finding that second-crop pea tended to have lower disease levels than pea grown for the first time, depending on sampling time.

Table 1. Percentages of pathogens isolated from diseased samples.

		August 13					September 4				
	First Or Second	Roots		Leaves			Roots		Leaves		
Farmer	Pea Crop	Fus*	S.s.	Asc	Fus	S.s	Fus	S.s	Asc	Fus	S.s.
A	1	67	0	78	0	0	71	29	80	0	20
	2	56	0	20	50	0	100	0	0	0	86
B	1	60	0	90	20	0	33	33	0	0	100
	2	40	0	21	0	0	75	0	Not plated		
C	1	17	0	86	0	0	75	0	Not plated		
	2	33	0	58	0	0	80	0	64	18	18

*Fus = *Fusarium* spp; Asc = *Ascochyta*; S.s. = *Sclerotinia sclerotiorum*

CROP: Sunflower

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: DISEASES OF SUNFLOWER IN MANITOBA IN 1992

METHODS: A total of 86 sunflower fields were surveyed in southern Manitoba in 1992. Nine fields were surveyed on July 6, two on July 21, 11 on August 13, 20 on August 20, 11 on August 27, 26 on September 2 and 3, and seven on September 29. Five fields were surveyed a second time on September 29 to check on sclerotinia infections. Fields were selected at random in different regions. Each field 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 (*Sclerotinia sclerotiorum*), and verticillium wilt (*Verticillium dahliae*) were recorded. Disease severity for rust (*Puccinia helianthi*) was measured as percent leaf area infected. A disease index was calculated for each disease in every field based on disease incidence or disease severity (Table 1). In addition, 18 samples of sunflower were submitted for analysis to the Manitoba Agriculture Crop Diagnostic Centre by agriculture representatives and growers.

RESULTS AND COMMENTS: The growing conditions were generally good during the summer with stand and vigour ranging from excellent to good. However, the crop was 2-3 weeks later than normal and delayed maturity affected the yield and quality at harvest. Although rust was the most prevalent disease and was observed in 56% of fields surveyed, the severity of this disease was lower than observed in previous years (1,2), and ranged from trace to 2% leaf area infected. The severity of rust in most fields surveyed in July was in the trace to 1% range. Fields surveyed towards the end of the season had 1% to 8% leaf area infected.

The prevalence and incidence of sclerotinia wilt were lower than those observed in previous years (1,2). Sclerotinia wilt/basal stem infections were observed in 52% of fields surveyed with incidence ranging from trace to 5% infected plants. However, the incidence and severity of headrot and mid-stem infections by sclerotinia observed towards the end of the season were much higher in 1992 than in previous years. A survey of 12 sunflower fields in southern Manitoba during the last week of September showed that headrot/mid-stem infections were prevalent in all fields (Table 1) with incidence ranging from trace to 20%. The incidence of mid-stem infections in two of the 12 fields was greater than 90% with all infected plants showing broken stems.

The prevalence and incidence of verticillium wilt were low in 1992. The disease was observed in 21% of the fields surveyed with incidence ranging from trace to 5%.

Downy mildew was observed in 28% of the fields surveyed and the disease incidence ranged from trace to 5% in the infested fields.

Traces of stem lesions (Phoma spp. and *Phomopsis* spp.), leaf spots (Septoria helianfhi and *Alternaria* spp.), and botrytis head rot (*Botrytis* spp.) were observed in various sunflower fields towards the end of the season.

Of the 18 samples submitted to the Manitoba Agriculture Crop Diagnostic Centre, 3 showed sclerotinia wilt, 2 downy mildew, 1 rust, and 2 alternaria leaf spot. In addition to diseases, 10 of the samples were found to be affected by herbicide drift.

REFERENCES

1. Rashid, K.Y. and R.G. Platford. 1991. Survey of sunflower diseases in Manitoba in 1990. Can. Plant Dis. Surv. 71:110-111.
2. Rashid, K.Y. and R.G. Platford. 1992. Survey of sunflower diseases in Manitoba in 1991. Can. Plant Dis. Surv. 72:88-89.

Table 1. Prevalence and severity of sunflower diseases in southern Manitoba in 1992.

DISEASE	NO. AND % OF FIELDS INFESTED	MEAN DISEASE INDEX*	RANGE OF DISEASE INDEX*
Rust	48 (56%)	0.8	T-2
Sclerotinia wilt	45 (52%)	0.7	T-1
Downy mildew	24 (28%)	0.7	T-2
Verticillium wilt	18 (21%)	0.6	T-1
Sclerotinia headrot	12 (100%)**	1.6	1-2
Sclerotinia midstem	12 (100%)**	2.2	1-5
Stand	86	1.5	1-3
Vigour	86	1.4	1.3

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

** Sclerotinia headrot and midstem infections were observed during a second survey conducted in only 2 fields in southern Manitoba.

CROP: Sunola

LOCATION: Saskatchewan

NAME AND AGENCY:
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TITLE: INCIDENCE OF SCLEROTINIA ON SUNOLA IN SASKATCHEWAN IN 1992

INTRODUCTION: In most of Saskatchewan the production of sunflower as an oilseed has been limited by the short growing season and conventional farm equipment. Recently, cultivars have been developed which are early maturing (98-101 days) and have a dwarf stature (50-100 cm tall). This new oilseed crop is called sunola and two cultivars, AC Aurora and AC Sierra, are adapted to northern and southern regions of Saskatchewan, respectively. A serious pathogen of sunflower is *Sclerotinia sclerotiorum* (1). Aerial infection, causing upper stem and head rot, results from carpogenic germination of sclerotia. Basal stem rot results from myceliogenic germination of sclerotia near host roots. The potential impact of the pathogen on sunola in Saskatchewan is not known.

METHODS: Twenty eight crops sown as foundation seed for the production of certified seed and one ADF demonstration crop (including both cultivars) were surveyed for incidence of basal stem and head rot. The survey accounted for 72% of the total sunola crops grown in 1992. The survey was conducted between August 11 and 28 when the plants were at late anthesis and beginning to set seed. Information gathered included the cultivar, crop history, and agronomic practices used. Most fields were 20 ha and the majority of crops were sown at 5.6 kg/ha with an air seeder.

The fields were sampled at four well-separated sites. If disease incidence (DI) was more than 1%, samples of 100 plants were scored at each site and mean DI was calculated. When disease was present in a field, but mean DI was less than 5%, it was recorded as a trace. The pattern of basal stem rot was observed in each sample to determine the incidence of secondary or plant-to-plant spread, which occurs through root contact (2).

RESULTS AND DISCUSSION: No disease was observed in sunola crops in Crop District (CD) 4, southern regions of CD's 6 and 7, and one crop in CD 8 (Fig. 1). In CD's 1, 2, and 5 only traces of disease were detected. However, DI ranged from trace to about 5% in CD's 6 and 8, and from trace to 14% in CD 9. Most infected crops were in areas of canola production, indicating the presence of sclerotia in the soil. No differences in DI between AC Aurora and AC Sierra were detected.

Both aerial and basal stem infections were evident but basal stem rot was more frequent. Plant-to-plant spread of basal stem rot was common, as doublets, triplets, quadruplets, and clumps of diseased plants were observed (2). A low level of aerial infection at the time of the survey was likely a result of low precipitation during late July and early August in most parts of Saskatchewan. One crop was sampled a second time on October 4 after an interval of moist conditions. Disease incidence had increased from 6 to 13%, the increase primarily due to aerial infection. This crop was across the road from a field with canola residue which may have served as a source of aerial inoculum.

In the 28 sunola crops surveyed, there was no correlation between number of years since the last susceptible crop and DI. Generally in the southern regions, where canola and pea are not commonly grown and precipitation is less, DI was low or absent. In the northern regions, rotations varied from greater than 4 years to 1 year between susceptible crops. The highest DI's (14 and 13%) occurred in fields which had not had a susceptible crop for 4 and 5 years, respectively, thus indicating the long survival period of sclerotia in the soil.

ACKNOWLEDGEMENTS: The assistance of D.S. Hutcheson, J.L. Downing, and the seed growers is gratefully acknowledged.

REFERENCES

1. Hoes, J.A. and H.C. Huang. 1976. Importance of disease to sunflower in Manitoba in 1975. Can. Plant Dis. Surv. 56:75-76.

2. Huang, H.C. and J.A. Hoes. 1980. Importance of plant spacing and sclerotial position to development of sclerotinia wilt of sunflower. Plant Dis. 64:81-84.

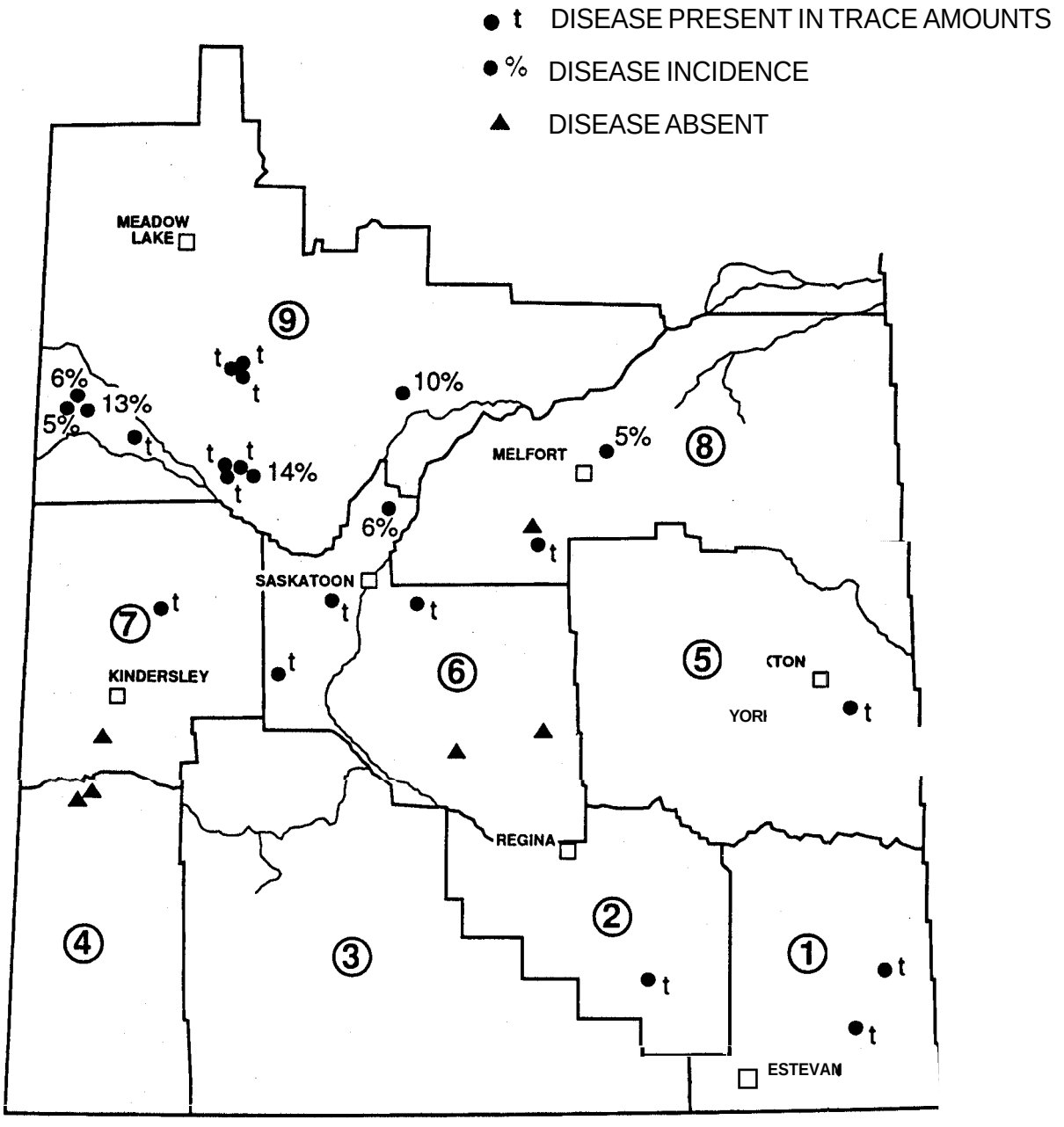

Fig. 1. Map of Saskatchewan crop districts showing location of sunola crops surveyed in 1992 and percent incidence of infection with *Sclerotinia sclerotiorum*.

Vegetables / Legumes

CROP: Lettuce

LOCATION: Ontario

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TITLE: SURVEY OF LETTUCE DROP AT HOLLAND MARSH, ONTARIO

METHODS: Seven fields of lettuce were surveyed for lettuce drop from 1989 to 1991. Twenty plants at each of 10 to 12 sampling sites along a zigzag pattern, with 15 m between sites, were examined for lettuce drop caused by *Sclerotinia minor* and S. *sclerotiorum* in each field. Three of the fields were known to have a history of lettuce drop. The history of the other fields was not known.

RESULTS AND COMMENTS: Lettuce drop was present in all fields surveyed. Lettuce drop caused by S. *minor* and S. *sclerotiorum* was present in 71% and 57% of the fields, respectively. *Sclerotinia minor* was the more prevalent of the two species.

Table 1. Incidence and etiology of lettuce drop at Holland Marsh, Ontario.

Year	% Total Lettuce Drop	% Caused by *S. minor*	% Caused by *S. sclerotiorum*
1989	50*	50	0
	50*	50	0
1990	17	0	17
	61*	61	0
	9	4	5
1991	1	0	1
	6	4	2

* Fields known to have a history of lettuce drop.

CROP: Potato

LOCATION: Southern Alberta

NAME AND AGENCY:
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TITLE: POTATO LATE BLIGHT SURVEY IN SOUTHERN ALBERTA - 1992

METHODS: Eighty-six irrigated commercial potato fields in four districts of southern Alberta were surveyed for late blight between August 26 and 31. The districts surveyed included the County of Newell (Brooks-Bassano-Rosemary), Municipal District of Taber (Taber-Vauxhall), County of Lethbridge (Lethbridge-Coaldale), and County of Forty Mile (Bow Island-Foremost). Only table stock and processing fields were selected for this survey. Seed fields were excluded for reasons of sanitation. The plants at five sample sites in each field were assessed for late blight incidence and severity. These sites were selected by entering individual fields at one corner, walking 200 paces toward the center, then stopping at five equidistant points along an exit transect to the nearest edge of the field. Late blight incidence was determined by counting the number of affected plants out of 10 along a row at each sample site. Severity was estimated visually on the same plants using the following scale: Clean = no late blight, Slight = >0 to 10% of the foliage blighted, Moderate = 11 to 50% blighted, and Severe = >50% blighted. In addition, ten tubers were dug at each sample site and bagged for later observation. Leaf samples were also taken from each field. If a field had been topkilled, foliar blight ratings were not made and leaf samples were not taken. Casual observations of the occurrence of other diseases and disorders were also made during the survey.

Leaf and tuber samples were returned to the ASCHRC for study. Individual samples of foliage were washed and placed in separate plastic bags, which were inflated and incubated at ca. 16-20°C for 3-5 days. After this time, each sample was examined microscopically for signs of the pathogen, *Phytophthora infestans.* Tubers were placed unwashed in cool (15 + 2°C), humid (95 + 5%) storage rooms for a 3 wk incubation period. Afterwards, each tuber was cut and examined for symptoms of late blight tuber rot.

RESULTS: Late blight was found in all of the districts surveyed (Table 1). Of 2930 ha examined, 1723 ha or approximately 59% were infested. Assessments of foliar late blight were made in only 45 of the 86 surveyed fields because the remainder had been topkilled. Some of the latter fields were known to have had late blight and were chemically desiccated in an effort to slow the spread of the disease. The percentage of fields surveyed affected by foliar late blight was very high, whereas the proportion with tuber rot was considerably lower.

Foliar late blight incidence (% affected plants) was highest in the Co. of Forty Mile, Co. of Newell and M.D. of Taber, respectively, where up to 100% of the plants in some fields had the disease (Table 2). Levels of tuber rot in the same fields were considerably lower, generally less than 1%; however, in one field in the M.D. of Taber, 18% of the tubers had late blight.

All fields of the cultivars Atlantic, Bintje, Norchip, Shepody and Yukon Gold that were surveyed had foliar late blight (Table 3). Tuber rot was detected in 100% of the fields of Bintje and Sangre. Monona, Norgold Russet and Superior were the only cultivars in which late blight was not confirmed; however, all of these fields had been topkilled and foliar blight could not be assessed.

Other diseases and disorders encountered during the survey were: bacterial ring rot (*Clavibacter michiganensis* subsp. *sepedonicuss),* bacterial soft rot (*Erwinia carofovora* subsp. *carotovora),* blackleg, (*Erwinia carotovora* subsp. *atroseptica*), black dot (*Colletotrichum* sp.), early blight *(Alternaria solani*), leak (*Pythium* sp.), scab *(Streptomyces scabies),* silver scurf *(Helminthosporium solani*), wilt (*Fusarium* and *Verticillium* spp.), frost and hail damage, and early senescence (mainly nitrogen deficiency).

COMMENTS: Late blight occurred at epidemic levels in southern Alberta in 1992. This is the first record of such a severe outbreak of this disease in this region. Mild

temperatures during the winter of 1991-92 permitted tubers to survive in the soil and in cull piles, which probably enhanced inoculum levels during the 1992 growing season. Cool temperatures and above-average rainfall during the spring and summer of 1992 provided favorable conditions for foliar late blight development. Repeated fungicide sprays, early topkilling and a two-week period of hot, dry weather in early August arrested foliar late blight for the remainder of the growing season in most of the infested fields. Late blight did not develop in the potato-growing areas of central and northern Alberta in 1992.

ACKNOWLEDGEMENTS: The assistance of the following organizations in conducting the survey is gratefully acknowledged: Bassano Growers Co-op Ltd., Hostess Frito-Lay Co., Old Dutch Foods Ltd., Pak-Wel Produce Ltd., Potato Growers of Alberta, Vauxhall Foods Ltd., and York Farms.

Table 1. Number and hectarage of potato fields surveyed for late blight, percentage of surveyed area with blight, and number and percentage of fields with foliar blight and tuber rot in four districts of southern Alberta in August, 1992.

District	No. fields surveyed	Area surveyed (ha)	% area surveyed with late blight	Foliar blight		Tuber rot	
				No. fields surv.	%	No. fields surv.	%
co. of Newell	33	987	46	15	94	33	12
M.D. of Taber	45	1680	67	25	96	45	7
co. of Lethbridge	4	118	41	4	75	4	0
co. of Forty Mile	4	145	66	1	100	4	50
	86	2930		45		136	

Table 2. Late blight incidence on the foliage and tubers of commercial potato crops in four districts in southern Alberta in August, 1992.

District	% affected plants		% affected tubers	
	Average	Range	Average	Range
Co. of Newell	99	98-100	<1	0-2
M.D. of Taber	70	0-100	<1	0-18
Co. of Lethbridge	3.5	0-8	0	0
Co. of Forty Mile	100	100	2.1	0-4.5

Table 3. Percentage of fields affected by foliar late blight and tuber rot, and the percentage of the area surveyed affected by late blight for twelve potato cultivars grown commercially in southern Alberta in August, 1992.

Cultivar*	% Fields with foliar blight	% Fields with tuber rot	Area surveyed (ha)	% area surveyed with blight
Atlantic (1/0)	100	0	24	100
Bintje (2/0)	100	100	50	100
Monona (1/1)	n/a	0	18	0
Norchip (14110)	100	14	574	34
Norgold Russet (1/1)	n/a	0	8	0
Norland (11111)	nla	9	298	13
Russet Burbank (4015)	94	23	1543	84
Russet Norkotah (9/7)	50	22	331	22
Sangre (1/1)	n/a	100	14	100
Shepody (2/0)	100	0	13	100
Superior (1/1)	n/a	0	16	0
Yukon Gold (3/2)	100	33	42	24

* The numbers in parenthesis following the cultivar names represent: Total number of fields surveyed/Number of fields topkilled. The topkilled fields were not surveyed for foliar blight.

Tree fruits and nuts / Arbres fruitiers et noix

CROP: Apple

LOCATION: Ontario

NAME AND AGENCY:
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TITLE: DISEASE SURVEY OF COMMERCIAL APPLE ORCHARDS IN SOUTHERN ONTARIO - 1992

METHODS: Fruit harvest assessments were carried out in southern Ontario in 90 different commercial orchards and 1 abandoned orchard. At most sites, McIntosh or Red Delicious were checked, but occasionally Empire and Idared were assessed. Fruit were sampled at or just prior to harvest maturity. From standard sized trees, four trees of the same variety per orchard were examined. Thirty-three fruit from the top, skirt inside and skirt outside were checked. One extra apple was checked from each tree to bring the sample total to 100 apples per tree. From dwarf sized trees, 50 fruit of the same variety from each of eight trees were checked. In the abandoned orchard 50 fruit were randomly sampled.

Fruit was checked for apple scab (*Venturia inaequalis* (Cke.) Wint.), fly speck (*Leptothyrium pomi* (Mont. and Fr.) Sacc.), sooty blotch (*Gloeodes pomigena* (Schw.) Colby), quince rust (*Gymnosporangium clavipes* Cke., and Pk.), cedar apple rust (G. *juniperi-virginianae* Schw.), powdery mildew (*Podosphaera leucotricha* (Ell. & Ev.) Salm.), calyx end rot (causal organism undetermined) and insect injury. These were reported by area as to the presence or absence of disease or insect injury.

RESULTS AND COMMENTS: In general, the incidence of disease was higher in 1992 than in the past four years. Calyx end rot was unusually prevalent in Essex-Kent and Georgian Bay. Powdery mildew affected more fruit in 1992 than in the past four years.

Cedar apple rust was prevalent (especially on Idared and Mutsu) on foliage in eastern Ontario. Injury to the fruit from either cedar apple or quince rust was, however, minimal; none was reported from assessed orchards. Fruit injury from insect pests was, in general, higher than damage from diseases.

ACKNOWLEDGEMENTS: We thank the Horticultural Crop Advisors, Pest Management Advisors, students and others who collected the data for the apple harvest assessments.

Table 1. Comparison of disease incidence and insect damage in commercial and abandoned orchards, 1992.

		PERCENT OF FRUIT AFFECTED						
AREA	Number of Fruit	S*	F.S.	S.B.	C.E.R.	P.M.	D.	I.D.
Ontario (Commercial)	36,000	1.3	0.8	0.1	0.2	0.2	2.5	4.1
Abandoned: Durham	50	16.0	50.0	42.0	0.0	0.0	36.0	100.0

*S. = Scab, F.S. = Fly Speck, S.B. = Sooty Blotch, C.E.R. = Calyx End Rot, P.M. = Powdery Mildew, D. = Disease, I.D. = Insect Damage

NUMBER OF FRUIT AFFECTED (RANGE)*

Area	Number of Orchards Assessed	Number of Apples Assessed ('00)	Scab	Fly Speck	sooty Blotch	Calyx End Rot	Powdery Mildew	PERCENT DAMAGE Insect	PERCENT DAMAGE Disease
Essex-Kent	9	36	23 (1-8)	0	1	25 (1-6)	0	2.0	1.1
Oxford	3	12	8 (8)	0	0	0	0	3.8**	0.7
Middlesex	9	36	44 (1-32)	24 (3-13)	0	7 (1-5)	2 (1)	3.6	2.1
Norfolk-Brant	23	92	96 (1-30)	226 (1-71)	10 (10)	9 (1-3)	1	4.8	3.9
Niagara	5	20	18 (1-12)	0	0	0	0	3.5	0.9
Georgian Bay	7	28	79 (1-34)	17 (1-10)	1	16 (1-6)	59 (2-20)	8.8	6.1
Durham	4	16	9 (2-5)	32 (32)	2 (2)	7 (1-5)	0	2.2	2.2
Northumberland, -Prince Edward, -Hastings	26	104	156 (1-34)	0	0	6 (1-3)	0	3.3	2.8
Ottawa Valley	4	16	31 (2-20)	4 (4)	0	1 (1)	0	4.5	2.4

* Fruit not necessarily out of grade.
** Does not include Mullein bug damage (46%) at one orchard.

NUMBER OF ORCHARDS AFFECTED

Area	Number of Orchards Assessed	Scab	Fly Speck	sooty Blotch	Calyx End Rot	Powdery Mildew
Essex-Kent	9	7	0	1	8	0
Oxford	3	1	0	0	0	1
Middlesex	9	4	3	3	3	2
Norfolk- Brant	23	13	13	2	6	1
Niagara	5	5	0	0	0	0
Georgian Bay	7	6	5	1	5	6
Durham	4	3	1	1	3	0
Northumberland, -Prince Edward, -Hastings	26	14	0	0	4	0
Ottawa Valley	4	3	1	0	2	3

CROP: Sweet Cherry

LOCATION: British Columbia

NAME AND AGENCY:
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TITLE: LITTLE CHERRY VIRUS SURVEY IN THE OKANAGAN VALLEY OF BRITISH COLUMBIA

METHODS: Cherry trees in the Okanagan Valley of British Columbia were surveyed between June 22 and July 6, 1992 for symptoms of little cherry virus disease. Two employees of the B.C. Ministry of Agriculture, Fisheries and Food examined orchards in districts with a history of the disease, including the areas around Penticton, Naramata, Summerland, Westbank, Kelowna and Oyama. Approximately 40 orchards and 40 residential yards were included in the survey. Diagnosis of little cherry disease was based on symptoms, including small, pointed and angular fruit with poor colour and poor flavour. Following diagnosis, tree owners were issued removal notices under the authority of the B.C. Plant Protection Act. Trees with questionable symptoms were indexed at the Agriculture Canada Research Station virus orchard at Summerland, by grafting buds onto indicator cherry trees, variety Canindex 1. Indexing results for 1992 samples will be available by September, 1993.

RESULTS AND COMMENTS: Thirty-six diseased trees were identified in 1992, with the majority (thirty-four) located in the Penticton area. One diseased tree was found in Naramata, and one in Westbank. Fourteen of these trees were identified visually, while the remainder were identified by indexing results from 1991 samples. Budwood samples for indexing were collected in August from an additional thirty-six trees.

The number of little cherry infected trees has remained steady for the past several years. Penticton remains the most affected area.

Ornamentals / Plantes ornementales

CROP: Greenhouse Ornamentals and Vegetables

LOCATION: Alberta

NAME AND AGENCY:
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TITLE: TOMATO SPOTTED WILT VIRUS SURVEY IN ALBERTA - 1992

INTRODUCTION: A survey of commercial greenhouse crops for both the lettuce and impatiens strains of tomato spotted wilt virus (TSWV) was carried out in Alberta during July and August by Brooks Diagnostics Ltd. and the Alberta Special Crops and Horticultural Research Centre. Laboratory confirmation of the presence of the virus and the specific serotype was carried out by Brooks Diagnostics Ltd.

METHODS: Twenty greenhouses representing approximately 20% of the total commercial greenhouse area in the province were surveyed, including 11 tomato houses, 6 ornamental houses, and 3 houses that grew both ornamentals and tomatoes in the same season. The houses were selected on the basis that they grew plants known to be potential hosts of TSWV. The survey area ran from Medicine Hat to Calgary and Edmonton. Foliage samples were collected from each house and consisted of one leaf from each of 50 plants per house. Plants were sampled if they exhibited symptoms that resembled those of tomato spotted wilt or, alternatively, when a group of symptomless plants was encountered, leaves were collected at random from within the group. When tomato crops without symptoms were encountered, 50 leaves were sampled from throughout the entire house, with at least one leaf coming from each planted row. The collected leaves were composited into consecutive groups of five for ELISA testing.

RESULTS: The results are summarized in Table 1. Both the impatiens and lettuce strains of TSWV were found during the survey. The presence of the virus was limited to ornamental houses or to houses that grew both ornamentals and vegetables. TSWV was not found in any tomato houses; however, it was found on tomato plants in three operations that were growing both ornamentals and vegetables.

COMMENTS: Tomato spotted wilt occurred at economically significant levels in 2 of the 20 greenhouses surveyed. One grower who had the disease in his operation and grew a number of different tomato cultivars commented that hybrids, such as Ultragirl and Fantastic, had the highest incidence and severity of the disease. Other cultivars, such as Tiny Tim, appeared to be free of symptoms.

ACKNOWLEDGEMENTS: We gratefully acknowledge the assistance of Ms. Susan Sims for surveying greenhouses and collecting plant material during this survey, and Ms. Alma Henrickson for technical assistance in the ELISA testing. We are indebted to Dr. Donald MacKenzie, Agriculture Canada, Vancouver, for supplying the antisera used to test for and characterize the serotypes (strains) of TSWV.

This project was funded, in part, by the National Research Council of Canada, through the IRAP Technology Enhancement Program.

Table 1. Incidence of tomato spotted wilt virus in twenty commercial greenhouses in Alberta - 1992.

Greenhouse category	No. houses surveyed	No. houses with TSWV	TSWV strain	Host Plant
Ornamental	6	2	Lettuce	Chrysanthemum
Ornamental1 Vegetable	3	3	Impatiens impatiens	New guinea
				Impatiens
				Amaryllis
				Dahlia
				Tomato
			Lettuce	Nlew guinea impatiens
				Impatiens
				Pepper
				Tomato
				Chickweed
Tomato (Vegetable)	11	0	n/a	n/a

CROP: Trees, Elm

LOCATION: Manitoba

NAME AND AGENCY:
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TITLE: INCIDENCE OF DUTCH ELM DISEASE IN MANITOBA IN 1992

METHODS: Results are based on 2,363 samples of American elm, *Ulmus americana* and Siberian elm, *Ulmus pumila* submitted to the Crop Diagnostic Centre from a survey conducted by the Manitoba Department of Natural Resources. Trees were selected for sampling and submissions to the laboratory on the basis of presence of wilted brown leaves and brown staining of the vascular tissues. All samples submitted were cultured on potato dextrose agar medium and incubated for 7 days at 20°C. Fungal identifications were done after 7 days.

RESULTS AND COMMENTS: Branch samples were submitted to the Manitoba Agriculture Crop Diagnostic Centre for culturing. The results of the survey are presented in Table 1. Tree removals are also included as this indicates the total effect of Dutch Elm Disease (DED) in the areas sampled. In many areas where DED is prevalent only a few samples are taken to confirm presence of DED and surrounding elms with similar symptoms of trees with more than 50% of the crown dead were marked for removal. The sampling results do not give a full indication of the impact of DED in rural Manitoba as sampling and tree removals are concentrated in cities, towns and municipal parks and in areas which have a cost sharing agreement with the Manitoba Department of Natural Resources.

Ninety-five percent (95%) of elms sampled were infected with DED caused by *Ophiostoma ulmi* (Ceratocystis *ulmi*). There were 1,149 trees in Winnipeg which were either confirmed in the laboratory as having DED or were highly suspect of being diseased. In addition, 2,011 were classified as hazard trees (ie. more than half dead from disease or other causes) and marked for removal. The 5,847 trees marked for removal in 1992 is virtually identical to last years number of 5,853.

There were less trees marked for removal in the Brandon (78%), Western (-33%), and Eastern (-60%) regions in 1992. There was an increase in trees marked for removal in the Interlake (7%) and Central regions (28%). DED is now almost completely co-existent with the range of native American elm in Manitoba, except for elm trees in the Northwest part of the province North of Dauphin.

Dothiorella dieback (Dothiorella *ulmi*) was found in 32 samples of American elm and Verticillium wilt (*Verticillium* spp.) was found in 28 samples of American elm.

Symptoms of DED did not occur until mid July in most areas of Manitoba in 1992. This is about a month later than normal. Abnormally cool spring and summer weather delayed the initial appearance of symptoms. The delay in appearance of symptoms effectively shortened the survey period **by** close to a month which may have resulted in fewer trees being sampled in 1992 than in 1991.

The control program is keeping the elm tree losses from DED to a very low level of increase in urban centres. The 15 year average for tree losses from DED in Winnipeg is about 2%. The rate of disease loss is much higher in rural areas where there is a reduced or absence of a control program.

Table 1. Incidence of dutch elm disease in Manitoba in 1992.

AREA	TREES SAMPLED		TREES DISEASED		% INFECTED		TREES MARKED FOR REMOVAL		PERCENT CHANGE
	1991	1992	1991	1992	1991	1992	1991	1992	
Winnipeg	1151	1246	1078	1149	94	92	5853	5847	0
Brandon	4	63	3	62	75	98	1111	247	-78
Interlake	172	152	165	126	96	83	515	551	7
Central	538	613	501	601	93	98	3070	3943	28
Eastern	51	113	45	108	88	96	2614	1055	-60
Western	34	176	33	176	97	100	2559	1725	-33
Total	2056	2363	1825	2222	94	95	15722	13368	-15

Instructions to authors

The Canadian Plant Disease Survey is published twice a year, presenting articles on the occurrence and severity of plant diseases in Canada Topics of interest include development of methods of investigation and control, including the evaluation of new materials Original information, review papers and compilations of practical value to plant pathologists are accepted

Peer reviewed articles and brief notes are published in English or French Address the manuscript and all correspondence to Ms Rosalyn McNeil, Research Program Service, Research Branch, Agriculture Canada, Ottawa, Ontario K1A 0C6 Signatures of authors and the director of the establishment where the work was carried out should be supplied

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Figures should be planned to fit, after reduction, into one column (maximum 84 x 241 mm) or two columns (maximum 175 x 241) Trim them or add crop marks to show only essential features Mount figures grouped in a plate tightly together, with no space between them Provide a duplicate set of unmounted photographs and line drawings Identify figures by number, author's name, and abbreviated legend

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L'Inventaire des maladies des plantes *au* Canada est publié deux fois par année et contient des articles sur l'incidence et la gravite des maladies des plantes au Canada. Les articles portent surtout sur la mise au point de nouvelles méthodes d'investigation et de lutte comportant l'evaluation de nouveaux materiaux. Nous acceptons aussi des données de premiere main, des comptes rendus critiques de publications et les compilations qui peuvent etre utiles aux phytopathologistes.

Les comptes rendus critiques et les courts resumes sont publiés en anglais et en français. Adresser le manuscrit et toute la correspondance à mademoiselle Rosalyn McNeil, Service aux programmes de recherches, Direction generale de la recherche, Agriculture Canada, Ottawa (Ontario) K1A 0C6. Vous dever aussi nous faire parvenir la signature des auteurs et du directeur de l'établissement où le travail a **ete** effectué.

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