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 *(Albugo candida)* 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.

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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.

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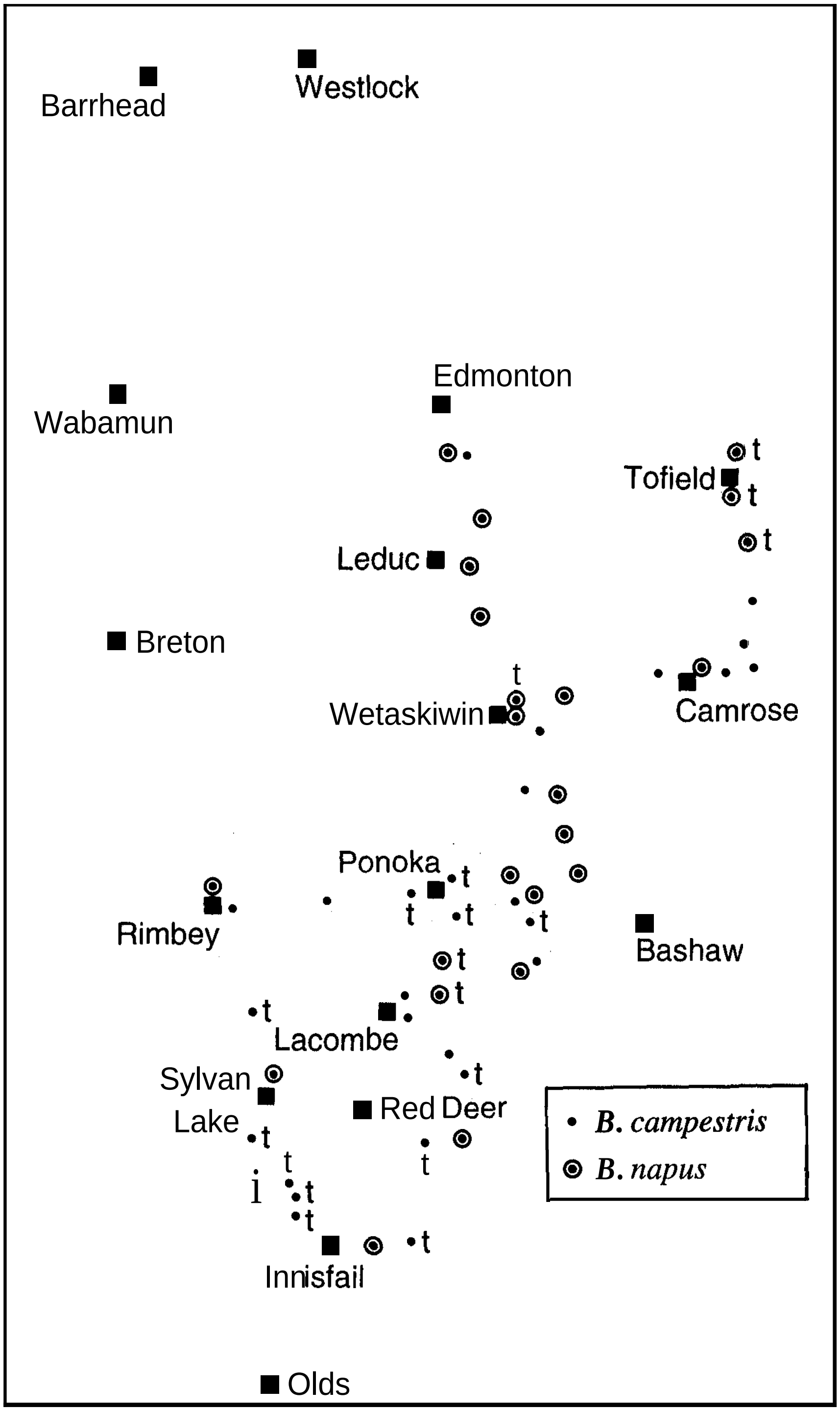

Figure 1. Locations of fields in central Alberta surveyed for alternaria blackspot in 1992. The numbers represent percent areas of siliques covered with lesions. Locations without numbers had 0% infection. Fields with 0 to less than 1% infection were categorized as having trace (t) levels.

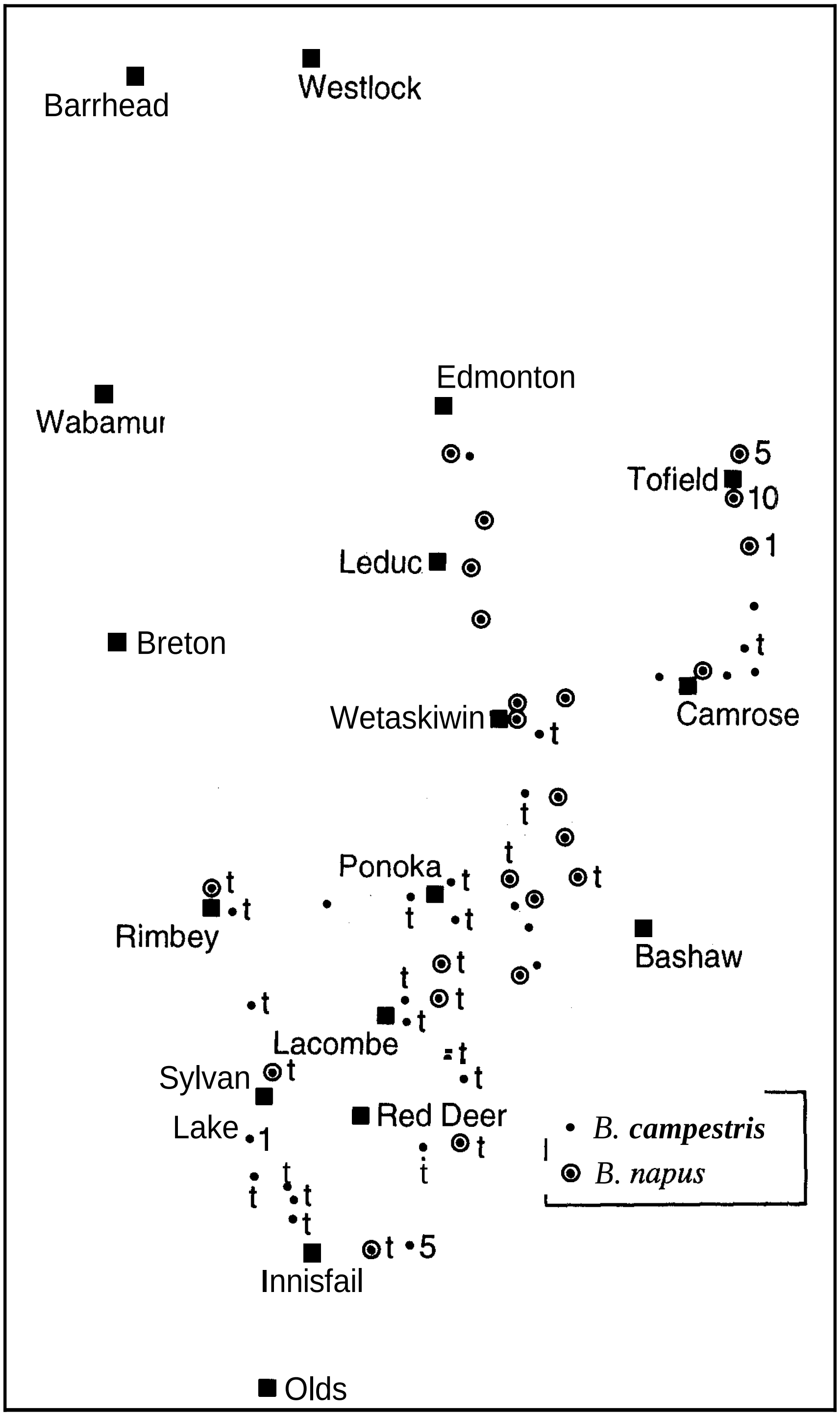

Figure 2. Locations of fields in central Alberta surveyed for sclerotinia stem rot in 1992. The numbers represent percent of stems with symptoms. Locations without numbers had 0% infection. Fields with 0 to less than 1% infection were categorized as having trace (t) levels.

CROP: Canola

LOCATION: Alberta

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

INTRODUCTION AND 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.

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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 *(Sclerotinia sclerotiorum)* 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.

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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

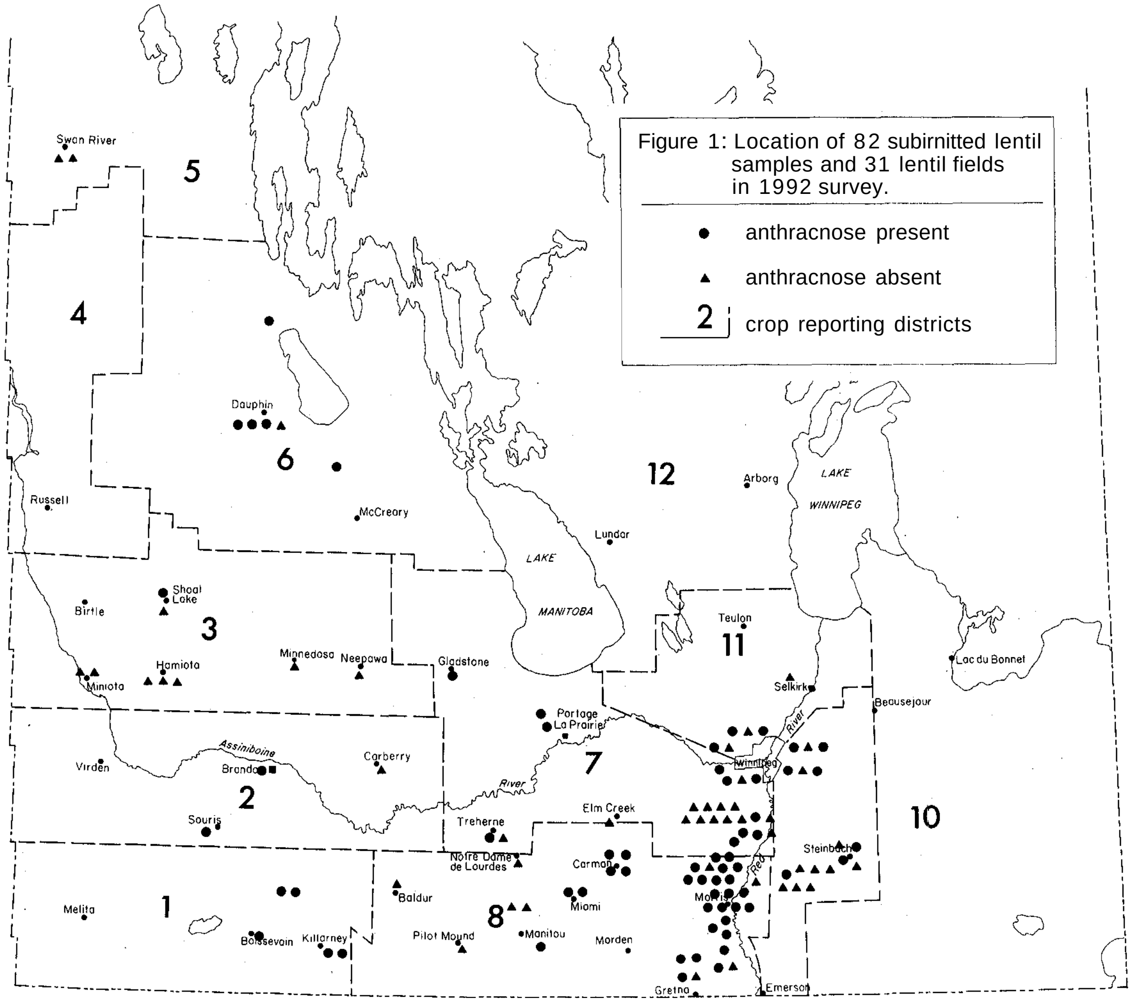

Figure 1. Map of Manitoba showing origin of the 82 submitted lentil samples and the 31 lentil fields in the survey. ● = anthracnose present, A = anthracnose absent.

CROP: Lentil

LOCATION: Central Saskatchewan

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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.

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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 1 m^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.

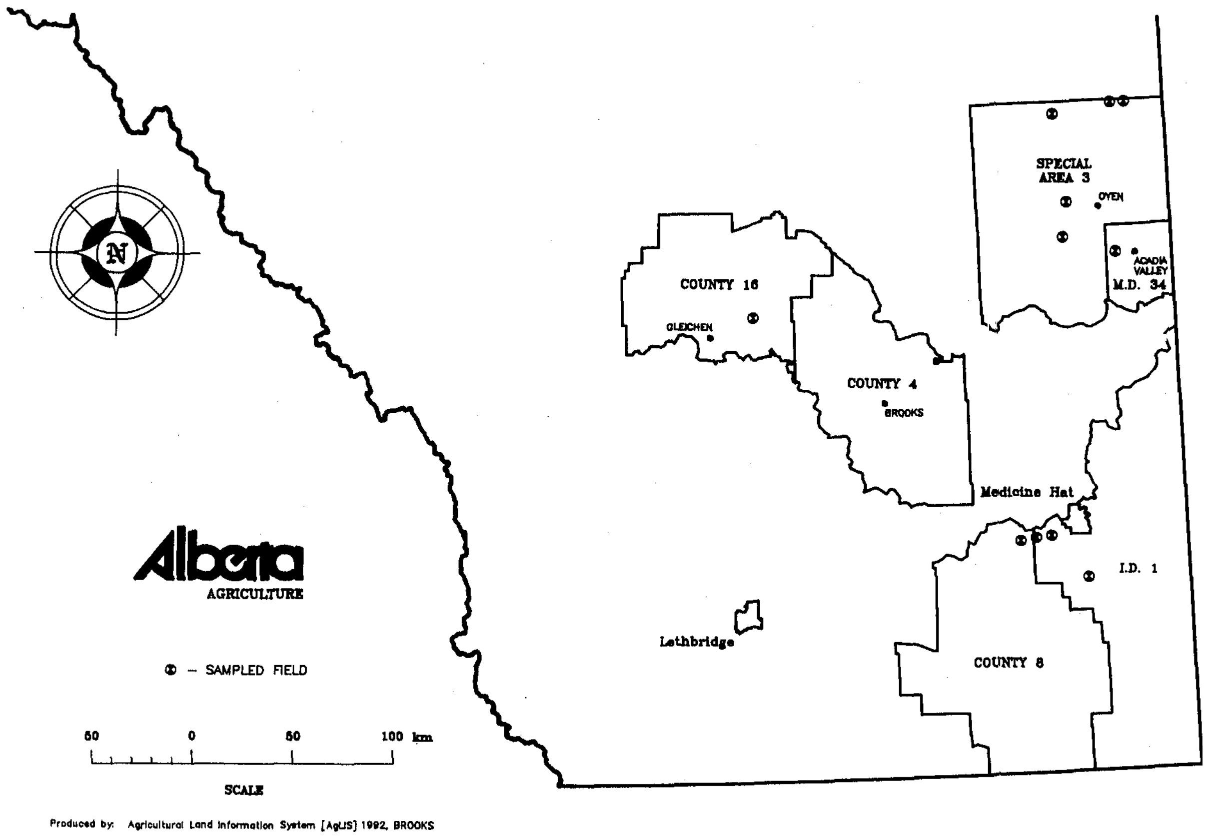

Fig. 1 Districts in southern Alberta and locations of lentil fields surveyed for diseases in August, 1992.

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. Higlhest 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

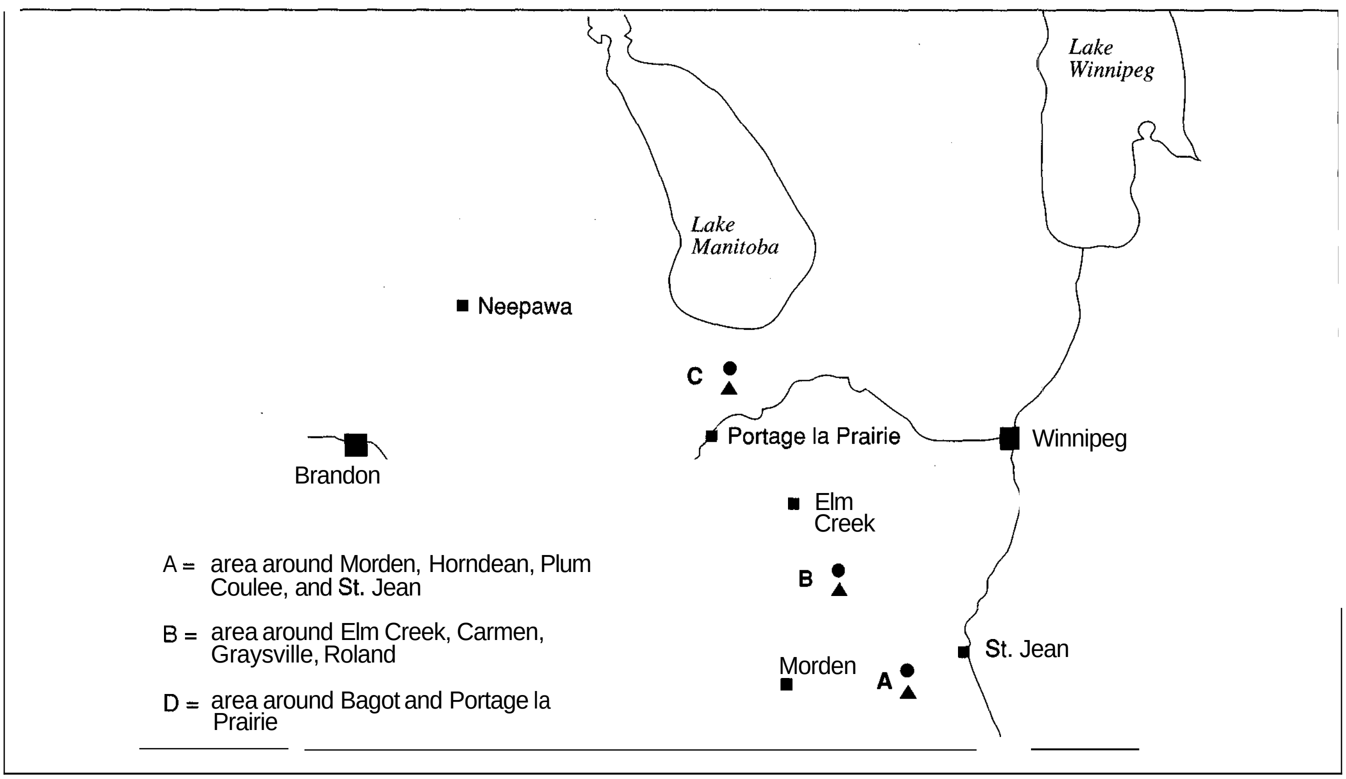

Figure 1. General locations of field bean (o) and field pea (A) fields surveyed for disease in Manitoba in 1992.

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 (x10^2)		*Pythium* (x10^2)	
	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	Roots		Leaves			Roots		Leaves		
Farmer	Second 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.

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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

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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.

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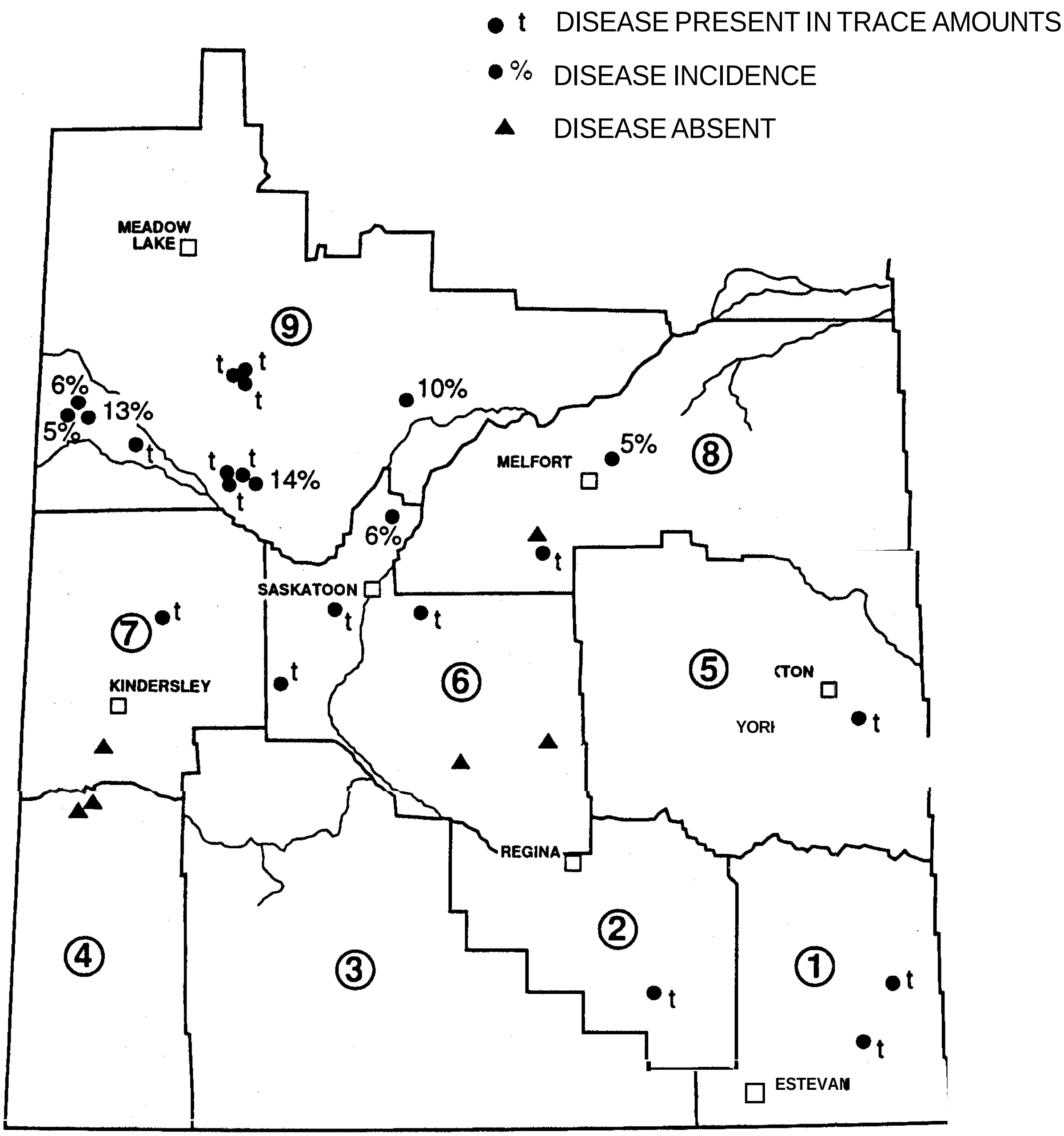

Fig. 1. Map of Saskatchewan crop districts showing location of sunola crops surveyed in 1992 and percent incidence of infection with *Sclerotinia sclerotiorum*.