Oilseeds and special crops / Oleagineux et cultures speciales

Crop/Culture: Canola

Location/Emplacement: Manitoba

Title/Titre: DISTRIBUTION, PREVALENCE AND INCIDENCE OF CANOLA DISEASES IN 1991

Name and Agency/ Nom et Organisation:
C.G.J. van den Berg[1], R.G. Platford[2] and S. R. Rimmer[1]
[1] Department of Plant Science
University of Manitoba
Winnipeg, Manitoba R3T 2N2
[2] Manitoba Agriculture
Agricultural Services Complex
Winnipeg Manitoba R3T 5S6

Methods: Two surveys were conducted in Manitoba. During the first, 69 fields of Brassica napus and three of B. rapa (syn. B. campestris) were surveyed in the southern crop districts in the third week of August. During the second, 37 fields of B . napus and four fields of B. rapa were surveyed in the northern crop districts in the fourth week of August. The presence of diseases was noted in each field. For each field, disease incidence was determined on a sample of 50 plants. In addition, 142 samples of canola were submitted for analysis to the Manitoba Agriculture Plant Pathology Laboratory by agricultural representatives, growers and representatives of agribusiness.

Results: Sclerotinia stem rot, caused by Sclerotinia sclerotiorum, was observed in 85 of 113 fields (Table 1, Figure 1). Affected fields were found in all crop districts. Disease incidence was low in most fields but reached 64% in one. Mean incidence ranged from 3 to 7% in the western crop districts (1-5), and from 11 to 17% in the eastern crop districts. Morrall et al. (1984) found that disease incidence multiplied by 0.5 equalled the yield loss. Based on this relationship, the average yield loss caused by S. sclerotiorum was about 2% in the western crop districts and 6% in the eastern crop district.s.

Blackleg, caused by Leptosphaeria maculans, was found in 61 fields (Table 1; Figure 1). Blackleg was found in all crop districts. Mean incidence ranged from 7% in crop district 7 to 21% in crop district 3. In comparison to 1990, mean incidence decreased in crop district 1, 2 and 6, but increased in all others. Blackleg symptoms observed within any field were variable. Even in fields with low incidence, a few, small plants could often be found with severe cankers.

Foot rot (Fusarium spp., Rhizoctonia solani) was observed in 23 fields distributed throughout Manitoba (Table 1). Incidence was less than 10% in all fields. A trace of aster yellows (aster yellows mycoplasma) was observed in seven fields, distributed among several crop districts. Staghead (Albugo candida) was observed in one field in each of Crop Districts 3 and 4. Incidence was 2% in both fields. Black spot (Alternaria spp.) was observed in one field in each of Crop Districts 3 and 9 and two in Crop District 4. White leaf spot (Pseudocercosporella capsellae) was observed in one field of Crop Districts 3 and 6, and in two fields of Crop Districts 4 and 5. Affected fields were located at higher elevations close to the Riding Mountain National Park.

The results of identification of specimens submitted to the Manitoba Agriculture Plant Pathology Laboratory are presented in Table 2. Blackleg was the major disease problem. Herbicide injury, found in 67 samples was primarily attributed to spray tank contamination where sulfonylurea-type herbicides had been previously used in the tank prior to spraying canola fields.

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

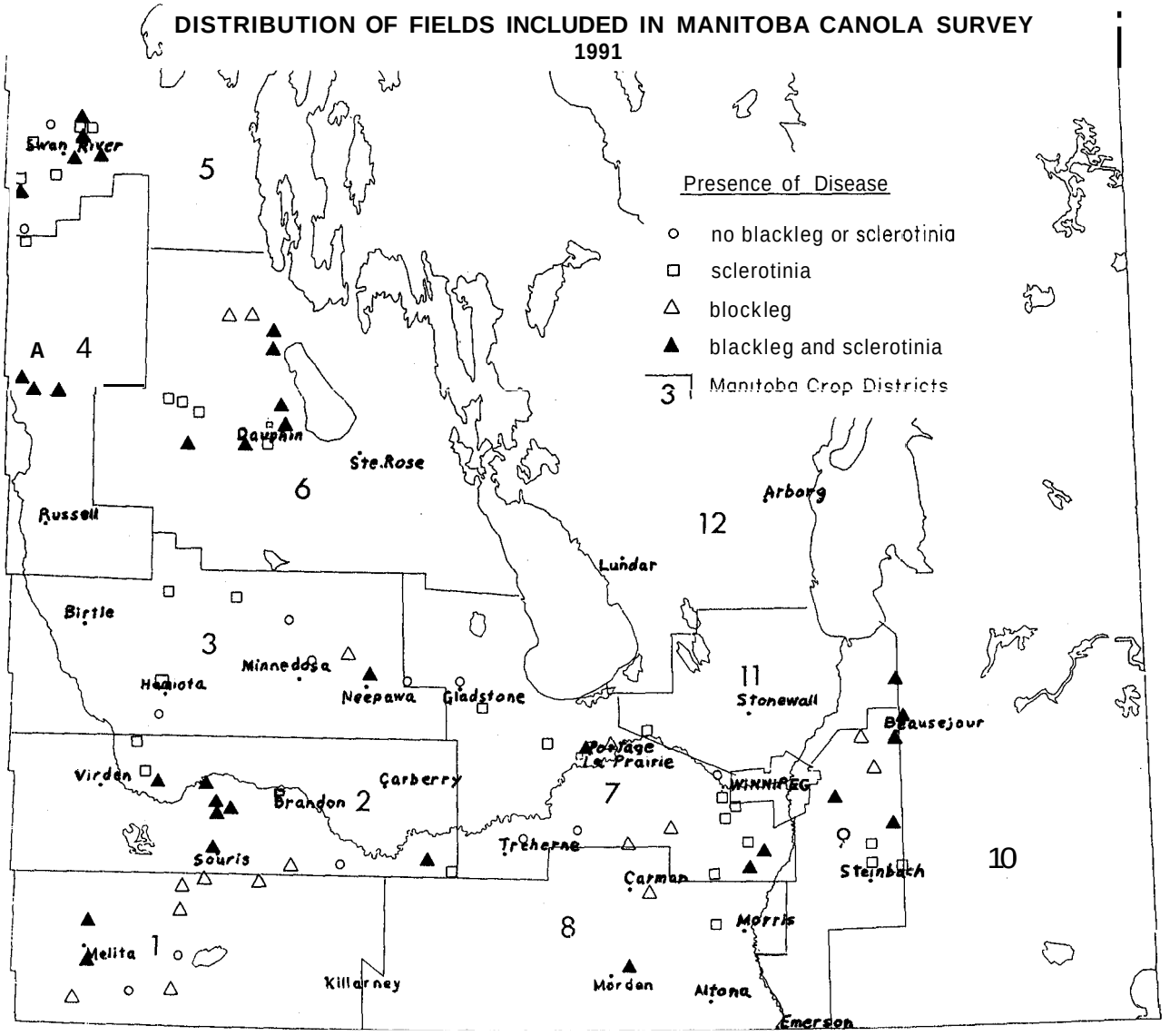
Table 1. Prevalence and incidence of major canola diseases by crop district in Manitoba in 1991

Crop district	No. of fields sampled	No. of affected fields				Range of incidence	
		Sclerotinia	Blackleg	Footrot	Aster Yellows	Sclerotinia	Blackleg
1	8	4	8	–	3	t-6	2-36
2	11	9	8	–	–	2-12	2-16
3	8	4	2	2	1	t-14	4-38
4	6	4	5	–	1	4-10	4-32
5	19	14	8	4	1	t-20	t-34
6	16	13	13	2	–	2-40	t-38
7	23	17	6	6	2	t-36	2-16
8	6	6	3	–	2	4-36	4-20
9	16	14	8	9	3	t-64	2-30
Total	113	85	61	23	13		

t = present in the field at a trace level, not detected in the 50 plant sample.

Table 2. Summary of specimens submitted to the Manitoba Agriculture Plant Pathology Laboratory

DISEASE	PATHOGEN	NUMBER OF SAMPLES
Blackleg	Leptosphaeria maculans	23
Root Rot	Rhizoctonia solani	8
Downy mildew (early infection on leaves)	Peronospora parasitica	6
Stem rot	Sclerotinia sclerotiorum	5
White leaf spot	Pseudocercosporella capsellae	3
Herbicide injury		67
Nutrient deficiency	sulphur deficiency	10
Environmental stress		6


DISTRIBUTION OF FIELDS INCLUDED IN MANITOBA CANOLA SURVEY
1991
Presence of Disease
no blackleg or sclerotinia
sclerotinia
blockleg
blackleg and sclerotinia
Manitoba Crop Districts
Swan River
5
A
4
Dauphin
Ste.Rose
6
Russell
Arborg
12
Lundar
Birtle
3
Minnedosa
Hamiota
Neepawa
Gladstone
11
Stonewall
Beausejour
Portage la Prairie
WINNIPEG
Virden
Carberry
Brandon
2
7
9
10
Souris
Treherne
Carman
Steinbach
Morris
8
Melita
1
Killarney
Morden
Altona
Emerson

Crop / Culture: Canola

Name and Agency / Nom et Organisation: HARRISON, L.M.
Alberta Agriculture
Regional Crops Laboratory
Fairview, Alberta
TOH 1L0

Location / Emplacement: Northern Alberta

Title / Titre: CANOLA DISEASES IN THE PEACE RIVER REGION IN 1991

METHODS: In August **1991, 47** randomly selected canola fields were surveyed for major diseases in the Peace River region. Canola production in **1991** was approximately **800,000** acres **(323,700** hectares).

The root rot complex, which is the most important disease, was rated for severity on a 0-4 scale as described in **1990 (1).** Each field was sampled as in previous years,

RESULTS AND COMMENTS: Spring weather conditions were wet and conducive to disease development. However, the weather changed in mid summer and became extremely hot and dry causing drought stress in most districts. Diseases were prevalent in most fields but incidence was generally low. The most prevalent disease was the root rot complex which was found in all **47** fields surveyed (Table **1).** The disease incidence ranged from **64** to **100%** with a mean of **93.7%.** Root rot severity ranged from **0.68** to **3.16** with a mean rating of **1.49.** Prevalence of sclerotinia stem rot was low, as in **1990,** due to hot and dry weather in late June and July. Incidence ranged from **2** to **24%.** Alternaria black spot was observed in **87%** of fields where disease levels were generally low ranging from **2** to **56%.** Prevalence of foot rot and avirulent blackleg was higher than in previous years with **98%** and **87%** respectively. Virulent blackleg was not observed in any fields surveyed. Incidence of avirulent blackleg increased from **4.3%** in **1990** to **21.7%** in **1991.** Other diseases observed were white rust (staghead), grey stem, aster yellows, herbicide damage, hail damage and pod drop from drought and heat stress. Insect damage from lygus bugs, thrips and root maggots was also observed.

REFERENCE: **1.** Harrison, L.M. and J. Loland, **1991.** Canola disease survey in the Peace River region in **1990.** Can. Plant Dis. Survey. **70** (1): **100.**

Table 1. Prevalence and incidence of diseases of canola in the Peace River region in **1991.**

Disease	Prevalence (% fields infested)	Incidence % Mean	Incidence % Range
Root Rot (*Rhizoctonia, Pythium, Fusarium*)	**100**	**93.7**	**64-100**
Black Spot (*Alternaria* **spp.**)	**87**	**15.3**	**2-56**
Foot Rot (*Rhizoctonia, Fusarium*)	**98**	**46.2**	**2-96**
Stem Rot (*Sclerotinia sclerotiorum*)	**40**	**3.0**	**2-24**
Avirulent Blackleg (*Leptosphaeria maculans*)	**87**	**21.7**	**2-76**

Crop / Culture: Canola

Location/ Emplacement: Alberta

Title / Titre: BLACKLEG OF CANOLA SURVEY IN ALBERTA - 1991

Name and Agency/ Nomet Organisation:

EVANS, I.R., Plant Industry Division, Alberta Agriculture, Edmonton, Alberta;
KHARBANDA, P.D., Alberta Environmental Centre, Vegreville, Alberta;
HARRISON, L., Regional Crop Laboratory, Alberta Agriculture, Fairview, Alberta;
KAMINSKI, D., Horticultural Research Center, Brooks, Alberta.

INTRODUCTION AND METHODS:

A fourth annual province-wide survey for virulent blackleg (Leptosphaeria maculans) of canola was carried out this summer. The survey, co-ordinated by the Crop Protection Branch, Alberta Agriculture has done by municipal fieldmen, Alberta Agriculture staff and Agriculture Canada seed inspectors. Diagnostic assistance was available from plant pathologists at Brooks, Fairview, and Vegreville.

The survey by the municipal fieldman was usually based on inspecting one commercial field for every 2,000 ha of canola grown in a municipality or district. Agriculture Canada seed inspectors checked all canola fields intended for pedigreed seed for the presence of blackleg. Alberta Agriculture staff also followed up on the crop rotations in 47 fields where virulent blackleg had been confirmed in the canola crop in 1989. All 67 municipalities and districts in the province co-operated in this survey. Each field was sampled as previously described (1, 2, 3).

RESULTS AND COMMENTS:

In the eastern Alberta municipalities, in census divisions 7 and 10 (3), up to 50% of canola fields had infestations of virulent blackleg. Disease incidence was generally 10% or less except when canola had been planted within two years of the previous canola crop. A few such fields showed disease incidence between 25 and 50%. In the County of Flagstaff where the fieldman did an extensive survey, virulent blackleg was confirmed in 208 of 417 canola fields surveyed (49.9%). Infection levels in this county were frequently between 10 and 20% whereas crop yields in infested fields were reported as fair to good.

A follow-up survey was done on 47 randomly selected fields in which virulent blackleg had been confirmed on canola in 1989. In each instance, depending on the municipal policy, the grower had been informed about the presence of virulent blackleg or issued a notice prohibiting the growing of canola for four years in that field. Enforcement also depended on municipal policy. In 1990 no canola was grown in these fields, but in 1991 one grower planted canola and virulent blackleg developed on the main stems of 30% of the plants.

Agriculture Canada seed inspectors did not find virulent blackleg in *any* of a total of 620 pedigreed canola fields totalling over 11,600 hectares.

Southern and western Alberta remain relatively free of virulent blackleg with only a few scattered fields reported to be infested. No virulent blackleg has been found in the Peace where about a third of the provincial crop is grown (4).

REFERENCES:

1. Evans, I.R., P. Kharbanda, L. Harrison, D. Kaminksi, 1991. Blackleg of canola survey in Alberta - 1990. Can. Plant. Dis. Surv. 71: 98-99.

2. Evans, I.R., P. Kharbanda, L. Harrison, D. Kaminski, 1990. Blackleg of canola survey in Alberta - 1989. Can. Plant. Dis. Surv. 70: 63-64.

3. 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.

4. McGee, D.C. and G.A. Petrie. 1978. Variability of Leptosphaeria maculans in relation to blackleg of oilseed rape. Phytopathology 68: 625-630.

Crop / Culture: Canola

Location / Emplacement: British Columbia

Name and Agency / Nom et Organisation: MacDonald, L.S.
B.C. Ministry of Agriculture, Fisheries and Food
17720 - 57th Avenue
Surrey, B.C.
v3s 4P9

Title / Titre: 1991 CANOLA DISEASE SURVEY IN BRITISH COLUMBIA

METHODS: The main purpose of the survey was to determine if virulent blackleg (Leptosphaeria maculans) had been introduced into the Peace River region of British Columbia. Root rot and other diseases were recorded if they were observed. The survey was conducted from September 9 - 12 and on October 7 in the Peace River region. Every Brassica napus and every third B. campestris field were surveyed. Sampling was done by walking 30 m into a field and then starting an inverted W pattern. Ten plants were pulled and examined for diseases every 30 m for a total of 50 stems per field. Canola stems with lesions resembling blackleg were collected from 60 fields for analysis by cultural methods (1) at the provincial plant diagnostic lab, and monoclonal antibody testing by Dr. P. Ellis, Agriculture Canada Research Station, Vancouver, B.C. Root rot ratings were based on a severity index of 0-4 where 0 = no disease, 1 = a few lesions on taproot, 2 = coalesced lesions on taproot, 3 = girdling lesions on taproot (not wirestem) and 4 = completely girdled taproot (like wirestem).

RESULTS AND COMMENTS: There were 126 fields surveyed totalling 9700 ha out of 48 000 ha grown in 1991. Eleven of the fields were B. napus. None of the collected samples had severely girdled stems, Virulent blackleg was not detected in this survey and has not been detected in previous surveys of the B.C. Peace River region. The weakly virulent strain of blackleg was detected in 21 fields, only one of which was B. napus, Root rot (Rhizoctonia solani) was present in all surveyed fields. All fields were examined after swathing so that root rot ratings would be at the highest level for the year. The average rating for all fields was 1.85 with field averages ranging from 0.2 to 3.8. There was no pattern to the severity of root rot and the district averages ranged from 1.4 to 2.2.

Alternaria black spot and staghead (Albugo candida) were each present in 3 fields. The low incidence may be due in part to the timing of the survey which was after swathing, and often after harvest. Sclerotinia stem rot was less prevalent this year with 2% of fields with infected plants compared to 33% in 1989. Overall, stand conditions were poorer than normal due to dry conditions during the early part of the growing season.

Table 1. Prevalence of diseases in canola fields in the B.C. Peace River region in 1991

Disease	% Fields Infested
Avirulent Blackleg (L. maculans)	16.7
Root Rot (Rhizoctonia)	100
Sclerotinia Stem Rot (Sclerotinia sclerotiorum)	2
Staghead (Albugo candida)	2
Black Spot (Alternaria spp.)	2

1. McGee, D.C. and G.A. Petrie. 1978. Variability of Leptosphaeria maculans in relation to blackleg of oilseed rape. Phytopathology 68: 625 - 630.

Acknowledgement: Many thanks to J. Dobb, G. Jesperson, G. Carter, K. Nickel, K. Murphy, K. Tosczak, M. Barliszen, D. Coates and other Peace River staff for assistance in the survey.

Crop / Culture: Canola

Location / Emplacement: Central Alberta

Name and Agency / Nomet Organisation: K.L. Conn and J.P. Tewari
Department of Plant Science
University of Alberta
Edmonton, Alberta
T6G 2P5

Title / Titre: SURVEY OF ALTERNARIA BLACKSPOT AND SCLEROTINIA STEM ROT OF CANOLA IN CENTRAL ALBERTA IN 1991

METHODS: Fifty fields of canola were surveyed in central Alberta during the third week of August. Thirty-seven of these fields were of Brassica campestris and 13 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 Alternaria brassicae, percent areas of siliques covered with lesions were determined using an assessment key (Conn et al., 1990). Fields with between 0 and 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: Every field surveyed had alternaria blackspot. Percent areas of siliques covered with lesions ranged from a trace to 10% (Fig. 1). If the fields with trace levels are set to 0%, then the mean for the 50 fields was 1.3%. This low-level of infection was likely due to the hot and dry weather during the latter part of July and early part of August in central Alberta. The percentage of stems with sclerotinia stem rot ranged from a trace to 70% (Fig. 2). If the fields with trace levels are set to 0%, then the mean for the 50 fields was 8.3%. Infection occurred at the base of stems about 50% of the time. Sclerotinia stem rot did not appear as early this year as in the oast two years but progressed quickly in the latter part of August due to wet conditions.

During this survey the presence or absence of some other diseases was also noted. Staghead caused by Albugo candida, aster yellows caused by MLO, and gray stem caused by Pseudocercosporella capsellae were observed in many of the fields surveyed.

ACKNOWLEDGEMENT: 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: 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(1):19-22.

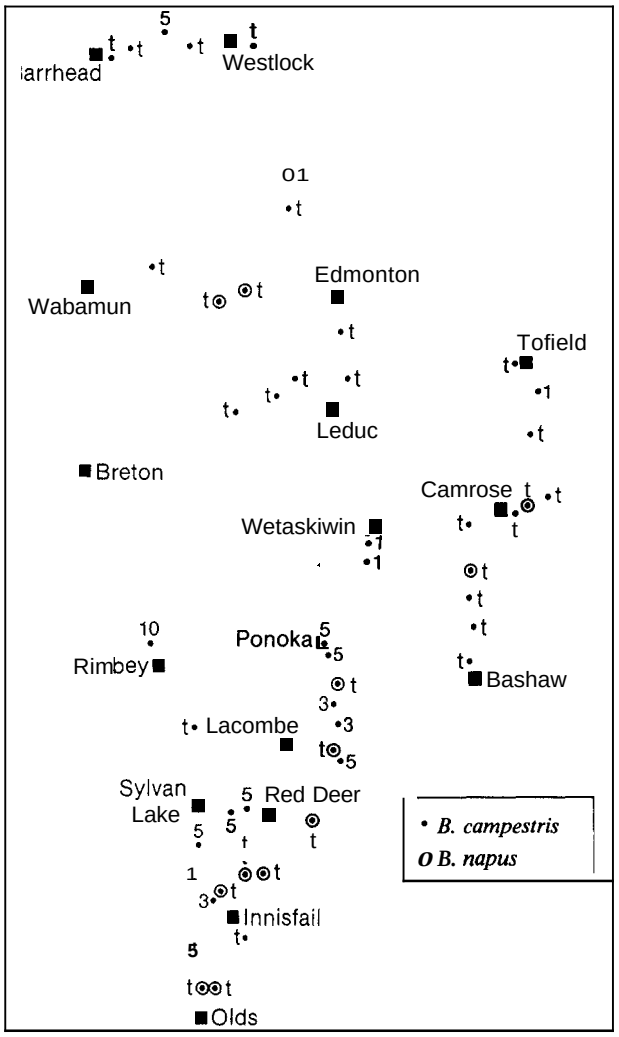


Figure 1. Locations of fields in central Alberta surveyed for alternaria blackspot in 1991. The numbers represent percent areas of siliques covered with lesions. Fields with between 0 and 1% infection were categorized as having trace (t) levels.

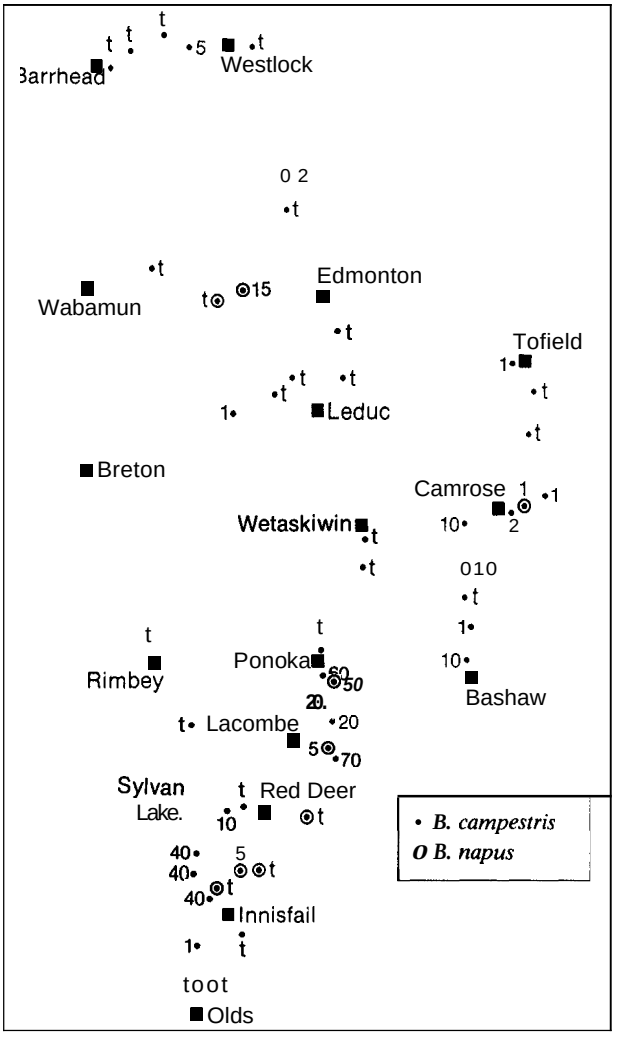


Figure 2. Locations of fields in central Alberta surveyed for sclerotinia stem rot in 1991. The numbers represent percent of stems with symptoms. Fields with between 0 and 1% infection were categorized as having trace (t) levels.

Crop / Culture: Canola

Location / Emplacement: Saskatchewan

Name and Agency / Nom et Organisation:

C. Kirkham
Agriculture Canada Research Station
P.O. Box 1240
MELFORT, Saskatchewan S0E 1A0

Title / Titre: CANOLA DISEASES IN N.E. SASKATCHEWAN, 1991

METHODS: Sixty-seven canola fields were surveyed between July 31 and August 9, 1991, in Saskatchewan Agriculture Crop Districts 5b, 8a, 8b and 9a. Fields were chosen at random and sampled by collecting one plant at each of ten sites located on a diagonal transect. Diseases were identified by leaf or stem symptoms, and the severity was recorded as an estimated percentage area affected. Root rot and blackleg were assessed on a scale of 0 = healthy, 2 = trace, 5 = moderate and 10 = severe. Results were averaged over the total number of samples and fields, and the disease index, an estimate of severity, was calculated for each disease. The percentage of fields affected was calculated for an estimate of prevalence.

RESULTS AND COMMENTS: The severity and prevalence of canola diseases in the four crop districts surveyed are shown in Table 1. Blackspot (*Alternaria* spp.) which is usually present in most rapeseed growing areas, was found at trace levels in each crop district. The most common symptom was leaf spotting. Conditions were favorable for the development of blackleg (*Leptosphaeria maculans*), which was found mainly on the stems. It was most prevalent and severe in Crop District 8b where some fields, mainly of the cultivar Westar, had extensive girdling of the stems and were lodged quite badly; this probably caused major yield losses. White rust (*Albugo candida*) of leaves was most widespread in crop District 9a, though at: very low levels. Staghead, which is caused by the same fungus as white rust, was found in only two fields. Stem rot (*Sclerotinia sclerotiorum*) was found at negligible levels in each crop district, but in many instances the disease was just beginning to develop, so the low levels may not reflect severity and losses at. harvest. Aster yellows (MLO) was of minor importance, being observed mainly around the edges of a few fields and only occasionally among the sampled plants. Root rot, which is usually present at low levels, was not found.

Table 1. Severity and prevalence of canola diseases in 1991

Crop district	Number of fields	Disease index/% fields affected				
		Blackspot	Blackleg	White rust	Stem rot	Aster yellows
5b	12	3.8/100	1.6/83	1.3/8	0.1/17	0.5/8
8a	13	3.0/100	0.4/62	0.2/23	0.1/23	0.5/8
8b	19	1.4/89	2.5/95	0.2/26	0.5/16	<0.1/5
9a	23	3.3/96	1.0/65	0.7/43	0.2/26	0.9/17
Total or average	67	2.9/96	1.4/76	0.6/25	0.2/27	0.5/10

Crop / Culture: Lentil

Location / Emplacement: Manitoba

Title / Titre: DISEASES OF LENTIL IN SOUTHERN MANITOBA IN 1991

Name and Agency / Nom et Organisation:

Buchwaldt, L. and C.C. Bernier
Department of Plant Science
University of Manitoba
Winnipeg, Manitoba R3T 2N2

Platford, R.G.
Manitoba Agriculture
Agricultural Services Complex
201-545 University Crescent
Winnipeg, Manitoba R3T 5S6

Methods: In 1991, 52 lentil fields were surveyed for anthracnose by the Department of Plant Science, University of Manitoba. Samples of 15-50 plants from each field were rated for the disease and percent anthracnose was calculated as follows: 100 x [(no. of plants with few small stem lesions x 1) + (no. of plants with larger lesions on some of the stems x 2) + (no. of plants with severe lesions on all stems x 3), divided by total number of plants in the sample x 31. Samples from another 67 lentil fields were diagnosed at the Manitoba Agriculture Plant Pathology Laboratory.

Results: Locations of the 52 lentil fields in the survey are shown in Figure 1 with symbols indicating the level of anthracnose. In the southern Manitoba Red River Valley area the level of disease was high: 52-100% in 8 fields around St. Jean Baptiste, and 20-100% in 15 fields between Rosenort and Morris. One field south of Morden had 44% anthracnose and one field at Graysville had 18%. High levels of anthracnose, between 60 and 90%, were also found in 4 fields in the area west of Portage la Prairie. Levels of anthracnose were generally lower in the northwest of Manitoba; 3 fields around Minnedosa had 0-27% anthracnose and 5 fields in the Dauphin-Roblin area had 0-20% disease, while 4 other fields had 60-100%. Further north between Ethelbert and Fork River 3 fields had 0-30% anthracnose and 7 fields between Benito and Bowsman had only 0-2% infection. The high levels of anthracnose can be attributed to abundant rainfall during the growing season as well as to frequent planting of lentil in areas such as Rosenort-Morris-St. Jean Baptiste, Portage-Bagot and Dauphin. Low levels of sclerotinia stem rot (*Sclerotinia sclerotiorum*) were recorded in a few fields, but ascochyta blight (*Ascochyta fabae* f. sp. *lentis*) and other diseases were not detected in the plant samples.

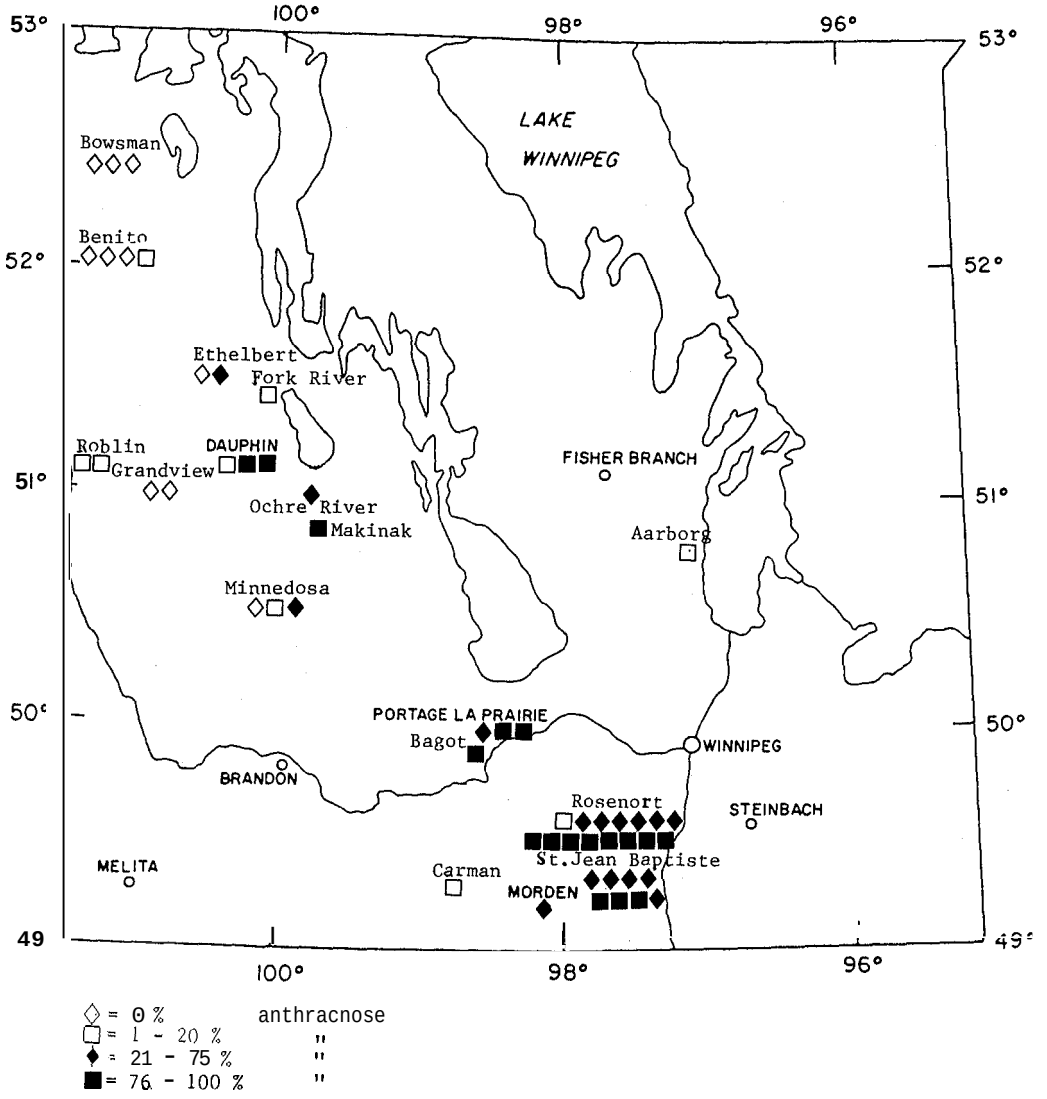
The development of anthracnose was followed closely in 6 fields near Rosenort. The first symptoms were detected on June 18 in a lentil plot which had been seeded on lentil stubble. One week later the first symptoms were detected in commercial crops on lentil plants with 3-5 internodes. The disease developed rapidly and had reached 100% in 4 of the 6 fields by July 19.

The results of identification of specimens submitted to the Manitoba Plant Pathology Laboratory are presented in Table 1. The most commonly diagnosed disease was anthracnose which was detected in 32 samples. In many of the samples the level of disease approached 100%.

Table 1. Summary of Diseases Diagnosed on Lentil Samples Submitted to the Manitoba Agriculture Plant Pathology Laboratory in 1991 -- 67 samples.

DISEASE	PATHOGEN	NUMBER OF SAMPLES
Anthracnose	Colletotrichum truncatum	32
Ascochyta blight	Ascochyta fabae f. sp. lentis	9
Root rot	Fusarium spp.	5
Sclerotinia stem rot	Sclerotinia sclerotiorum	2
Botrytis stem rot	Botrytis spp.	3
Herbicide Injury		10
Nutrient Deficiency		4
Environmental stress	deep seeding, excess moisture	2

Figure. 1. Distribution of lentil fields in Manitoba Affected by Anthracnose in 1991



Crop/Culture: Lentil

Location/Emplacement: Saskatchewan

Title/Titre: DISEASES OF LENTIL IN SASKATCHEWAN IN 1991

Name and Agency/ Nom et Organisation:

R.A.A. MORRALL, J.R. THOMSON, S.J. BOND, J.L. DOWNING, J. MAY-MELIN and D.K. THOMPSON.
Department of Biology,
University of Saskatchewan,
Saskatoon, Saskatchewan, S7N 0W0.

METHODS: Anthracnose of lentil caused by Colletotrichum truncatum (Schwein.) Andrus and W.D. Moore was reported for the first time in Saskatchewan in 1990 (3). The principal objective of the present study was to determine the prevalence of anthracnose in the province. However, during field surveys aswchyta blight. [Ascochyta fabae Speg. f. sp. lentis Gossen et al.], sclerotinia stem rot [Sclerotinia sclerotiorum (Lib.) de Bary, botrytis stem and pcd rot [Botrytis sp.] and root rot [Fusarium spp. and Rhizoctonia sp.] were also assessed.

Early in the growing season occasional inspections of lentil crops were made during the course of other work., In the period July 22-August 22 all major lentil producing regions were visited and 109 crops were inspected. Generally every fifth lentil crop observed while driving through a district was surveyed. During an inspection two observers walked at least 100 m through the crop and made a subjective assessment of the severity of each disease as absent, trace, slight, moderate or severe. When symptoms were uncertain, specimens were taken back to the laboratory and checked microscopically, often after incubation for 24 hours in a moist chamber. Also, 15 plant samples suspected of being infected with anthracnose were received for diagnosis frm growers in July and August.

After harvest a few plant residue and seed samples were received from growers for testing. seed samples were surface-disinfected for 10 min. in 0.6% NaOCl, plated on Bacto-Difco potato dextrose agar amended with 25 ppm ampicillin and 25 ppm streptomycin sulphate and incubated at room temperature for 10 days before pathogen colonies were counted. Two commercial seed testing companies provided information on the number and origin of samples from the 1991 crop which had tested positive for anthracnose and on the range of infection levels with ascochyta.

An attempt was made to relate the occurrence of anthracnose to cropping practices. Twenty-five growers in whose crops anthracnose had been detected *and* 15 in whose crops anthracnose had not been detected were contacted. Information was obtained about the crop rotation of the field in question, as well as the crops *grown* in adjacent fields in 1990.

RESULTS AND COMMENTS: The growing season was marked by relatively late seeding due to cool wet soils, excessive rainfall in most areas in May and June and relatively dry weather in a few areas frm early July onwards. The 109 fields surveyed were distributed among 11 Saskatchewan Crop Districts (Fig. 1) but not in proportion to lentil acreages in the districts.

Anthracnose was observed for the first time on June 13 in the Zealandia area (Crop District 6B), where the disease was first reported in 1990 (3). This was only about one month after planting, whereas previously the disease had not been observed in the field on lentil seedlings. Anthracnose was found in 47 (43%) of the crops surveyed and was generally more severe in Crop Districts 3B-N, 5A, 6B and 8B (Table 1). Of the 15 plant samples submitted by grmers, 6 were infected with anthracnose; however, none of these came from areas where the disease was not detected in the field survey. To the *end* of November, only 17 seed samples tested either in *our* laboratory or by commercial companies were positive for anthracnose. Most *shmed* only 0.25% infection, but two samples showed 1.75% infection. Infected seed was detected from several locations not included in the field survey (Fig. 1).

The survey *showed* that anthracnose of lentil was more widely distributed in Saskatchewan than reported in 1990 (3) and, indeed, was present in most mjor areas of production (Fig. 1). Only a small proportion of crops were severely diseased and overall losses were probably low. In the Zealandia area, where anthracnose appeared early, dry weather after early July restricted disease development and reduced losses. However, the destructive potential of the disease is illustrated not only by previous reports frm Manitoba (2) and Saskatchewan (3), but also by the experience of one farmer in 1991 who harvested 900 kg/ha frm an infested field but *2000* kg/ha frm a relatively disease-free crop less than 0.5 km away.

In the 40 crops tested there was no clear relationship between the presence of anthracnose and the length of crop rotation or the crops grown in adjacent fields in 1990 (Table 2). Most infested crops were in fields either on short rotations or adjacent to 1990 lentil residues. Hmever, four moderately or severely diseased crops were in fields in which lentil had not be grown for more than 4 years and which were not adjacent to 1990 lentil residues. This suggests that the anthracnose fungus m y survive for lengthy periods in soil and be capable of substantial aerial dissemination; hmever, there is an urgent need to clarify mechanisms of transmission of the pathogen.

Ascochyta blight was found in most crop districts and in over 55% of all crops (Table 1). The high levels of this disease were in marked contrast with those found in the last general provincial survey of lentil diseases in 1988 (1) and were undoubtedly due to the wet conditions in May and June. Levels of ascochyta in some 1000 seed samples tested commercially by the end of November ranged from 0% to 61% with a mean of *about* 5% *and* only about 10% of the samples testing 0%. The levels of seed-borne infection were considerably higher than in the previous four years (R.A.A. Morrall, unpublished).

Botrytis pod and stem rot and sclerotinia *stem* rot were *each* found in about 17% of the crops surveyed. However, they were at sufficiently high levels to cause yield losses in only a few cases (Table 1). Trace levels of root rots were observed in a few crops but a severe infestation occurred in *one* field in Crop District 8A.

ACKNOWLEDGEMENTS: The financial assistance of the Saskatchewan Pulse Crop Development Board and the Western Grains Research Foundation is gratefully acknowledged. We appreciate the assistance of Neil Whatley and a number of growers for providing samples and of Janet Paisley (Newfield *Seeds*) and Marilyn French (Saskatchewan Wheat Pool) for providing data from seed testing. Technical assistance was provided by Rosanne Beaule.

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2) Morrall R.A.A., R.J. Gibson and C.C. Bernier. 1990. Anthracnose of lentil in Manitoba in 1989. *Can.* Plant Dis. Survey 70: 79.
3) Morrall R.A.A. and E.A. Pedersen. 1991. Discovery of lentil anthracnose in Saskatchewan in 1990. *Can.* Plant Dis. Survey 71: 105-106.

Table 1. Severity of four major diseases in lentil *crops* inspected in Saskatchewan in 1991.

Crop District**	Total No. Crops	No. of crops in five severity categories* for four diseases																			
		ANTHRACNOSE					ASCOCHYTA BLIGHT					BOTRYTIS POD & STEM ROT					SCLEROTINIA STEM ROT				
		Ab	Tr	Sl	Mo	Se	Ab	Tr	Sl	Mo	Se	Ab	Tr	Sl	Mo	Se	Ab	Tr	Sl	Mo	Se
2B	14	11	1		2		4	1	2	7		14					13	1			
3B-N	18	12	2		3	1	6	5	3	2	2	1	1	3	2	2	1	4	2	1	1
5A	10	5		3	2		3		4	2	1	9			1		9	1			
5B	1	1					1					1					1				
6A	1		1							1					1		1				
6B	29	9	7	7	3	3	1	5	7	6	1	24	2	3			23	4	2		
7A	14	1	1	1	1		2	7	1	4		11	2		1		11	2		1	
8A	7	6		1			4	1			2	5				2	6				1
8B	8	2	3		3		6	2				7			1		5		2	1	
9A	3	3					3					3					3				
9B	4	2		1	1		3	1				4					4				
Total	109	62	15	13	15	4	47	24	16	17	5	89	7	7	4	2	90	10	5	3	1

* Ab = Absent; Tr = Trace; Sl = Slight; Mo = Moderate; Se = Severe.
** See Fig. 1 for location of *crop* districts.

Table 2. Distribution of lentil *crops* in Saskatchewan in 1991 in relation to anthracnose infection and cropping practices.

Anthracnose Severity Class	No. of fields in *each* category						
	No. years *since* previous lentil or pea *crop* in the field					Crops in adjacent fields in 1990	
	1	2	3	4	>4	No lentil	Lentil
Absent	1	1	2	3	8	7	8
Trace	1						1
Slight		2	1	2	5	1	9
Moderate	1	2	2		6	5	6
severe		1	1	1		1	2

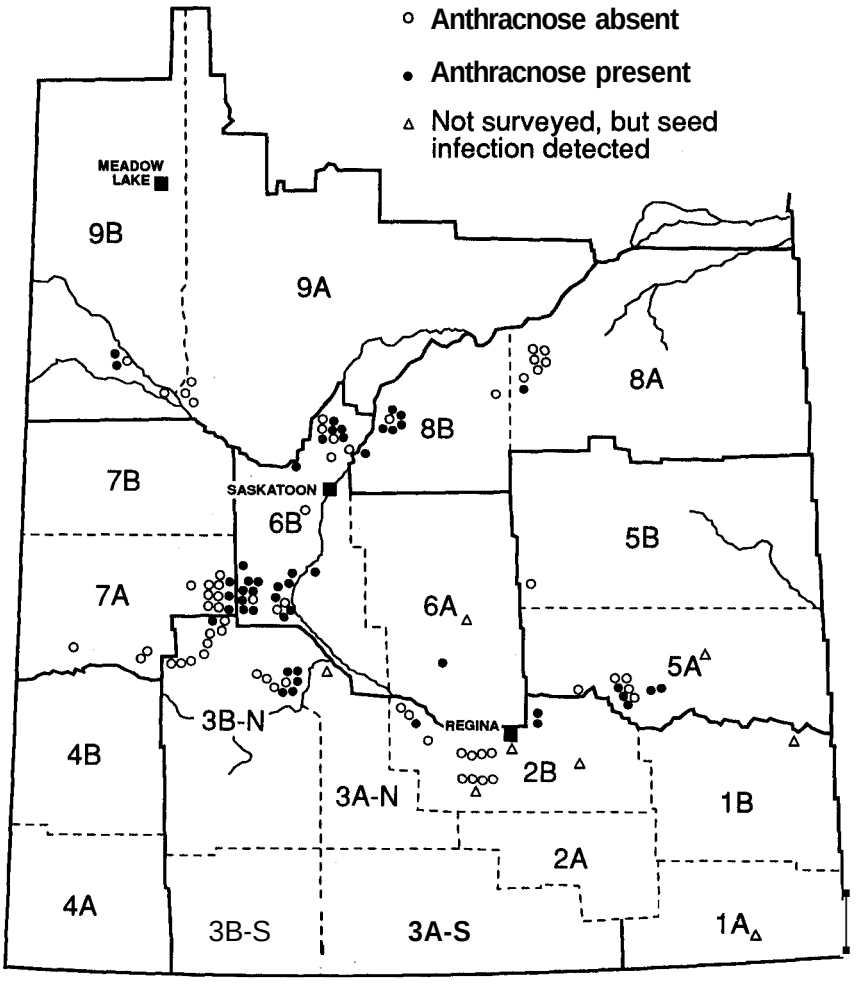


Figure 1. Map of Saskatchewan crop districts showing lentil crops surveyed and where anthracnose was found in 1991.

Crop / Culture: Flax

Location/ Emplacement: Manitoba

Title / Titre: SURVEY OF FLAX DISEASES IN MANITOBA IN 1991

Name and Agency / Nomet Organisation:
RASHID, K. Y.
Agriculture Canada Research Station
P. O. Box 3001
MORDEN, Manitoba
ROG 1JO

PLATFORD, R. G.
Manitoba Agriculture
Agricultural Services Complex
201-545 University Crescent
Winnipeg, Manitoba
R3T 5S6

Methods: A total of 50 flax fields were surveyed in southern Manitoba in 1991. Five fields were surveyed on July 17, four on July 30, 18 on August 20, 17 on August 28, and six on September 5. 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 and severity of each disease were recorded. In addition, 12 samples of flax were submitted for analysis to the Manitoba Agriculture Plant Pathology Laboratory by agricultural representatives and growers.

Results: 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, caused by Fusarium oxysporum f. sp. lini was observed in two fields; 1% infected plants were found in one field and less than 1% in the other.

Pasmo, caused by Septoria linicola was the most common disease in 1991. Pasmo was observed in 84% of the fields surveyed with incidence ranging from trace to 100% infected plants (Table 1). The severity also varied amoung the different fields surveyed and ranged from trace to greater than 50% of stem area covered with lesions. The fungus Alternaria linicola was frequently encountered with pasmo infections.

Rust, caused by Melampsora lini, was not observed in any of the 50 fields surveyed nor on the 30 rust differential lines planted at Morden and Portage la Prairie. Aster yellows (mycoplasma-like organism) was observed in two fields at trace levels. Chlorosis, stunting and premature ripening, caused by water-logging in flooded areas, was observed in several fields in southern Manitoba.

Of the 12 samples submitted to the Manitoba Agriculture Plant Pathology Laboratory 3 showed pasmo (Septoria linicola), 1 aster yellows (mycoplasma-like organism), 1 root rot (Fusarium spp.), 3 environmental stress and 4 herbicide injury.

TABLE 1. Incidence and severity of pasmo on flax in southern Manitoba in 1991.

No. of Fields	Incidence*	Severity$
8 (16) @	0	0
9 (18)	Trace	less than 1%
9 (18)	1-5%	1%
8 (16)	5-20%	1-5%
8 (16)	20-40%	5-10%
7 (14)	20-40%	5-20%
1 (2)	100%	10-50%

* Incidence is the percentage of infected plants in each field

$ Severity is estimated as the percentage of stem area infected.

@ Values in brackets are percentages of fields surveyed.

Crop / Culture: Flax

Location / Emplacement: Saskatchewan

Name and Agency / Nom et Organisation:

C. Kirkham
Agriculture Canada Research Station
P.O. BOX 1240
MELFORT, Saskatchewan **S0E** 1A0

Title / Titre: FLAX DISEASES IN N.E. SASKATCHEWAN, 1991

METHODS: Twenty-three flax fields were surveyed between July 31 and August 9, 1991, in Saskatchewan Agriculture Crop Districts 5b, 8a, 8b and 9a. Fields were chosen at random and sampled by collecting one plant at each of ten sites located on a diagonal transect. Diseases were identified by symptoms, and the severity of each disease recorded as the estimated percentage of leaf, stem or root area affected. Results were averaged over the number of samples and fields, and the disease index, an estimate of severity, was calculated for each disease. The percentage of fields affected was calculated for an estimate of prevalence.

RESULTS AND COMMENTS: Flax plants were generally quite healthy with relatively low levels of disease found (Table **1**). Pasmo (Septoria linicola) was fairly widespread, but was found only at trace levels. Root rot (several fungi) although more widespread than in 1990, was found at very low disease severity. Traces of aster yellow (MLO) were noted along the edges of three fields in Crop District 8a, but it was not found among the sampled plants. Green bugs were quite prominent in Crop District 5b, however at the time of the survey, we were unable to predict the damage.

Table **1.** Severity and prevalence of flax diseases in 1991

Crop district	Number of fields	Disease index/% fields affected	
		Root rot	Pasmo
5b	5	0.1/40	2.9/100
8a	8	0.6/50	0.8/63
8b	7	>0.1/29	0.6/57
9a	3	0/0	3.2/100
Total or average	23	0.2/30	1.9/80

Crop / Culture: Field Pea and Field Bean

Location / Emplacement: Manitoba

Title / Titre: DISEASES ON FIELD PEA AND FIELD BEAN IN SOUTHERN MANITOBA IN 1991

Name and Agency/ Nomet Organisation:
ZIMMER, R. C.
Agriculture Canada Research Station
P. O. Box 3001
Morden, Manitoba ROG 1JO

PLATFORD, R. G.
Manitoba Agriculture
Agricultural Services Complex
201-545 University Crescent
Winnipeg, Manitoba R3T 5S6

FIELD PEA

Method: Thirty-nine fields were examined in 1991. Eleven were surveyed on June 18, 14 on July 17 and 14 on August 13. The fields were located in the areas marked on the map in Figure 1. This year the survey pattern in each field followed an inverted V, the point of the V being approximately 100 m into the field. At approximately 20 m intervals, 5-10 plants were. examined for diseases. The diseases were identified by symptoms and the severity of each disease recorded. In addition to the field surveys, samples were submitted by producers and agricultural representatives to the Manitoba Agriculture Plant Pathology Laboratory for examination. Diagnosis was based on visual examination for symptoms and culturing on artificial media.

Results: Damage due to numerous and heavy rains in southern Manitoba, especially in the Morden, Winkler, Plum Coulee, Altona and Morris areas was substantial in some fields.

Mycosphaerella blight (Mycosphaerella pinodes) was present in 9 of 11 fields at light levels on the lower foliage on June 18, in the Morden, Winkler, Plum Coulee and Roland areas. By July 17 mycosphaerella blight was severe in all 14 pea fields surveyed; the area surveyed, similar to that surveyed on June 18, included also the area around Portage la Prairie. In addition to mycosphaerella blight, light to moderate downy mildew (Peronospora viciae) and bacterial. blight (Pseudomonas pisi) were found in the Carman-Elm Creek-Portage la Prairie areas. The third survey, carried out August 13, covered the area west of Morden to Cartwright, north to Neepawa, Westbourne and Bagot. Mycosphaerella blight was light around Cartwright but was severe near Westbourne. Bacterial blight was light in a field at Manitou and moderate in a field near Miami. Also, sclerotinia stem rot was found in a field near Winkler. By August 13 powdery mildew was abundant on the green upper foliage in most fields, in which the crops were nearing maturity, and in late-sown fields.

Of 20 samples of field pea submitted to the Manitoba Agriculture Plant Pathology Laboratory, 7 showed root rot caused by Fusarium spp. and Rhizoctonia solani, 3 mycosphaerella blight, 1 downy mildew (Peronospora viciae) and 2 powdery mildew (Erysiphe polygoni). There were also 7 samples that showed herbicide injury.

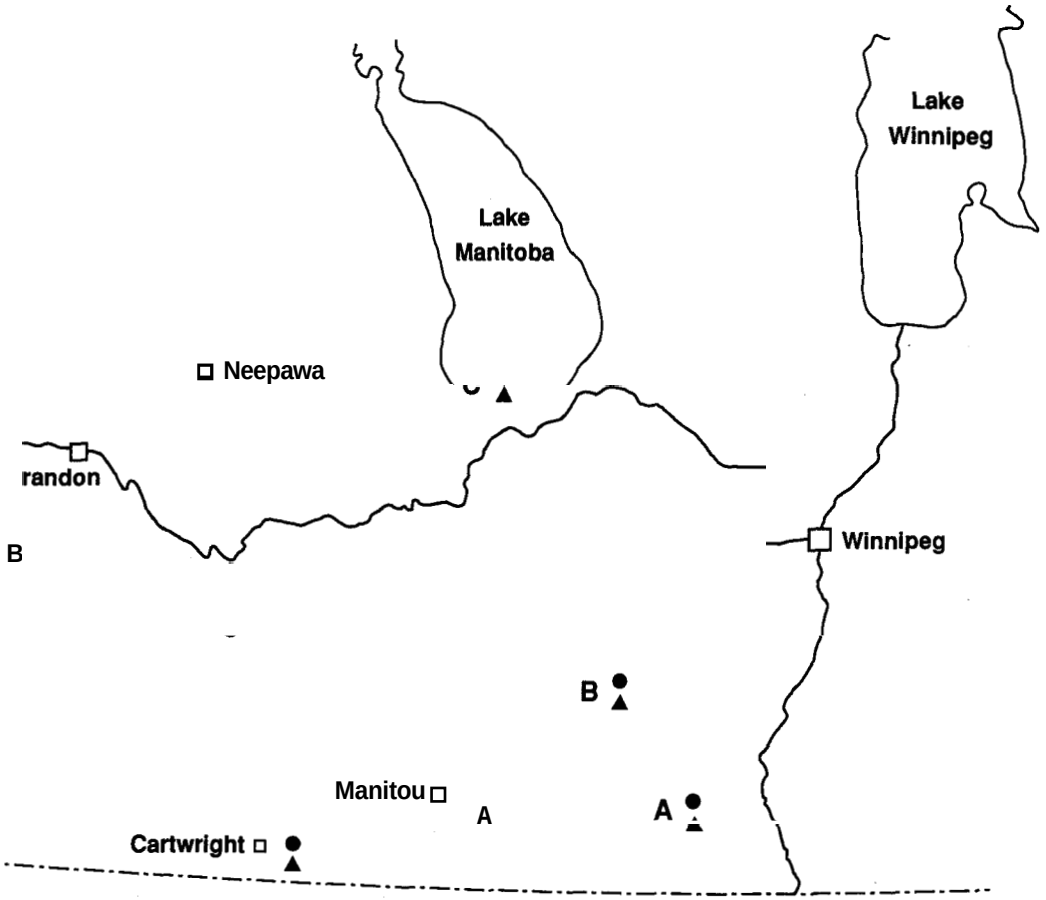
FIELD BEAN

Two surveys were carried out in 1991. In mid-June, 10 fields in the Morden-Graysville area were examined. No root rot symptoms were visible on the above-ground parts of the plant; however, superficial rust-coloured areas were common on the hypocotyl below the soil surface. This would not have affected growth or yield. By mid-July, foliar bacterial infection was present in each of 26 fields examined. Severity ranged from light to severe. Common blight was the only bacterial blight disease found in commercial fields. In most of the fields, the foliage had not overgrown the. space. between the rows; in 3 fields in the Graysville area where the crop canopy had closed, the incidence of white mold (Sclerotinia sclerotiorum) was 10-25%

A field bean screening trial was located in the Graysville area. Bacterial blight was present at light to moderate severity on most of the 38 lines. Three lines were moderately affected and one was highly susceptible. Most infection was caused by common blight, but halo blight was also present. Virus diseases were almost totally absent. Although not conclusive, the overall survey results in 1991 suggest that seed infection could have been important in the incidence of bacterial blight in Manitoba.

Of the 15 samples of field bean submitted to the Manitoba Agriculture Plant Pathology Laboratory, 6 showed common blight, 3 root rot (Fusarium spp.), 2 white mold, and 4 herbicide injury.

FIGURE 1. General locations of field bean (O) and field pea (▲) fields surveyed for disease in Manitoba in 1991.



A = includes area around: Altona, Morden, Morris, Plum Coulee and Winkler;
B = includes area around: Elm Creek, Carman, Graysville, Miami, and Roland;
C = includes area around: Portage la Prairie, Westbourne and Bagot.

Crop/Culture: Pea

Location/Emplacement: Saskatchewan

Name and Agency/Nom et Organisation:

C. Kirkham
Agriculture Canada Research Station
P.O. Box 1240
MELFORT, Saskatchewan S0E 1A0

Title/Titre: PEA DISEASES IN N.E. SASKATCHEWAN, 1991

METHODS: Seventeen pea fields were surveyed between July 31 and August 9, 1991 in Saskatchewan Agriculture Crop Districts 8a, 8b and 9a. Fields were sampled by collecting one plant at each of ten sites located on a diagonal transect. Diseases were identified by symptoms, and the severity of each foliar disease was recorded as the estimated percentage leaf or stem area affected. Root rot and foot rot were assessed on a scale of 0 = healthy, 2 = trace, 5 = moderate and 10 = severe. Results were averaged over total number of samples and fields, and the disease index, an estimate of severity, was calculated for each disease. The percentage of fields affected was calculated for an estimate of prevalence.

RESULTS AND COMMENTS: Results of the survey are shown in Table 1. Mycosphaerella blight (*Mycosphaerella pinodes*) was found in every field surveyed at twice the level of the previous year. Powdery mildew (*Erysiphe polygoni*) was found at low levels, but this may have been due to the early timing of the survey; plots located at the Melfort Research Station did not develop high powdery mildew levels until two weeks after the survey. Foot rot (*Ascochyta* sp.) was found at trace levels in approximately two-thirds of the fields surveyed. Downy mildew (*Peronospora viciae*) was also found at low levels, but was mainly concentrated in Crop District 8b near Humboldt, Muenster and Lake Lenore. Ascochyta leaf spot (*Ascochyta pisi*) and root rot, usually found in trace amounts, were not found during this survey.

Table 1. Severity and prevalence of pea diseases, 1991

Disease	Severity %	Prevalence %
Mycosphaerella blight	11.9	100
Powdery mildew	3.1	30
Foot rot	1.3	60
Downy mildew	1.2	14

DISEASE	% OF FIELDS INFESTED	MEAN OF DISEASE INDEX*	RANGE OF DISEASE INDEX*
Downy mildew	20%	1.1	1–3
Rust	95%	1.8	1–4
Sclerotinia wilt	45%	1.2	1–2
Verticillium wilt	90%	1.4	1–4
Leaf spot (Septoria Alternaria)	46%	1.4	1–4
Stand	–	1.2	1–3
Vigour	–	1.3	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 levels. Index is based on disease incidence for downy mildew, sclerotinia wilt and verticillium wilt, and on disease severity measured as percent leaf area infected for rust and septoria leaf spot. Indexes for stand and vigour are based on 1–5 scale (1= very good and 5= very poor).

Crop/Culture: Sunflower

Location/Emplacement: Manitoba

Title/Titre: SURVEY OF SUNFLOWER DISEASES IN MANITOBA IN 1991

Name and Agency/Nom et Organisation:
Rashid, K. Y.
Agriculture Canada Research Station
P. O. Box 3001
Morden, Manitoba ROG 1JO

Platford, R. G.
Manitoba Agriculture
Agricultural Services Complex
201-545 University Crescent
Winnipeg, Manitoba R3T 5S6

Methods: A total of 57 sunflower fields were surveyed in southern Manitoba in 1991. Seven fields were surveyed on July 17, four on July 30, 17 on August 20, 16 on August 28, eight on August 29, and five on September 4. 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) and septoria leaf spot (Septoria helianthi) were measured as percent leaf area infected. A disease index was calcualted 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 Plant Pathology Laboratory by agricultural representatives and growers.

Results: The crop conditions were generally good with stand and vigour ranging from excellent to good. Rust was the most prevalent disease and was observed in 95% of fields surveyed. Rust severity in 1991 was lower than observed in previous years (1,2), and ranged from trace to 40% 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 5% to 40% leaf area infected.

The prevalence and incidence of verticillium wilt were high in 1991. The disease was observed in 90% of the fields surveyed with incidence ranging from trace to 5% infected plants in the majority of the fields. However, the highest disease incidence of 20-40% infected plants was observed in a few non-oil sunflower hybrids which are susceptible to this disease.

The prevalence and incidence of sclerotinia wilt were low in comparison to those observed in previous years (1,2). However the incidence of mid-stem infections was higher in 1991 than in previous years. Sclerotinia wilt/mid-stem infections were observed in 45% of fields surveyed with incidence ranging from 1% to 10% infected plants. A high incidence of sclerotinia wilt/mid-stem infections was observed in a few fields towards the end of the season. Sclerotinia head rot was not encountered in 1991 or in any of the disease surveys conducted in the last four years (1,2).

Downy mildew was observed at lower levels than in previous years (1). The disease occurred in 20% of the fields surveyed and the disease incidence ranged from trace to 2% in all infested fields except one with 30% infected plants.

Leaf spots caused by Septoria helianthi and Alternaria spp. were observed in 46% of the fields surveyed with severity ranging from trace to 10% leaf area infected. Traces of stem lesions (Phoma spp. and Phomopsis spp.) were observed in various sunflower fields towards the end of the season. Other diseases such as botrytis head rot (Botrytis spp.) and rhizopus head rot (Rhizopus spp.) were not encountered in this survey.

Of the 18 samples submitted to the Manitoba Agriculture Plant Pathology Laboratory, 1 showed sclerotinia wilt, 2 downy mildew, 1 rust, 1 septoria leaf spot and 1 alternaria leaf spot. One of the samples showed environmental stress from drought conditions. In addition to diseases, 12 of the samples were found to be affected by herbicide drift.

Reference: (1) Rashid, K. Y. and R. G. Platford. 1990. Survey of sunflower diseases in Manitoba in 1989. Can. Plant Dis. Surv. 70 (1): 85-86

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