Cereals / Cereales

CROP: Barley and Wheat

LOCATION: Alberta, Central

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TITLE: CEREAL DISEASE SURVEY IN CENTRAL ALBERTA, 1994

METHODS: Cereal crops were randomly selected approximately every 10 km in Alberta Census District 8 (north central Alberta). This area encompassed Sylvan Lake and Rimbey on the west, Bashaw on the east and was bordered north and south by Ponoka and Lacombe respectively. Fields were traversed in an inverted V, with analysis of 5 plants taking place at 3 locations. Leaf diseases were scored on a 0–9 scale where 9 = more than 50 percent leaf area diseased (PLAD) on each of the upper, middle and lower leaf canopies. Common root rot (CRR) was assessed on a 0–4 scale where 1 = trace and 4 = severe. Other diseases were rated as a percent of the field infected.

RESULTS AND COMMENTS: The results are presented in Table 1. Thirty-one fields of barley were examined, 23 of which were 6-row and 8 2-row. Net blotch (*Pyrenophora teres*) and scald (*Rhynchosporium secalis*) were present in all barley fields with net scoring higher PLAD than scald. Scald PLAD was higher in 2-row barley then 6-row, reflecting the fact that the susceptible cultivar Harrington is the main 2-row barley grown in this area. The lower levels of CRR in 2-row barley reflect Harrington's intermediate resistance to this disease. Ten fields of wheat were also examined. The incidence and severity of take-all (*Gaeumannomyces graminis*) appears to be increasing, with 7 fields having an average severity of 4.6% being noted. Leaf rust was not scored in the fields examined.

TABLE 1. Disease of barley and wheat in north central Alberta in 1994.

	Average disease rating/number of fields affected					
Crop	Scald 0-9	Net 0-9	CRR 0-4	Loose smut %	Head Scald %	Physiological spot 0-9
Barley						
6-Row	2.9123	4.7123	0.8116	1/3	114	311
2-Row	4.518	4.918	0.415	111	1/1	–
Crop	Septoria 0-9	Powdery mildew	CRR 0-4	Take-all %	Kernal Blast %	Glume Blotch %
Wheat	5-/	pr/1	1.3/6	4.6/7	111	1/2

pr = present

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Manitoba

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TITLE: FOLIAR AND HEAD DISEASES OF BARLEY IN MANITOBA IN 1994

METHODS: Fields of barley in southern Manitoba were surveyed for foliar and head disease incidence and severity between July 18 and August 11, 1994. The 76 fields (59 six-rowed, 17 two-rowed) were selected at random along the survey routes depending on crop frequency and availability. Disease incidence and severity were assessed on 10 or more plants along a diamond-shaped transect about 50 m long begun a few paces from the field edge. Disease levels were estimated in both the upper (flag and penultimate leaves) and lower crop canopies using a five category scale: 0 (no visible symptoms), trace (<5% leaf area affected), slight (5—15%), moderate (16—40%) and severe (41—100%). Samples of infected leaves were collected at all sites for subsequent pathogen isolation and identification. Leaves were stored in paper envelopes for two months prior to placing small surface-sterilized leaf sections in Petri dish moist chambers to promote sporulation. When symptoms of fusarium head blight (FHB) were present, counts of four sub-samples totalling at least 100 heads were made to determine severity.

RESULTS AND DISCUSSION: Moisture generally was plentiful throughout southern Manitoba in 1994 while temperatures were somewhat cooler than normal. These conditions were conducive to the development of both foliar and head diseases in barley. Leaf spot symptoms were evident in all fields sampled (Fig. 1). Severity levels on upper leaves were trace to slight in 66% of fields and moderate or severe in 34%. On lower leaves, these severities were found in 17% and 83% of fields, respectively. This suggests that yield losses of 10—20% could be expected in about one third of fields. As observed in 1993, disease severity levels were considerably higher in fields that had likely been re-planted to barley, in comparison to fields where barley straw and stubble were not evident. *Pyrenophora teres* was the predominant pathogen and net blotch was diagnosed in all fields sampled; *Cochliobolus sativus* (spot blotch) was found in 67%, *Rhynchosporium secalis* (scald) in 16% and *Septoria* spp. in 28%. Scald was more prevalent than usual, likely the result of the cool moist conditions; it was found primarily in western regions. However, severity of scald generally was low. Symptoms of FHB, ie, either spikelets with orange-pink coloured *Fusarium* sporodochia, or with an overall mid- to dark brown discoloration were observed in 58% of barley fields. Severity ranged as high as 41% of heads infected. Trace to 5% severity levels were found in 25% of fields, 6 to 20% in 20% and above 21% in 13%. Pathogenic species determinations have yet to be done, but in 1993 barley head samples of similar appearance yielded primarily *F. graminearum*.

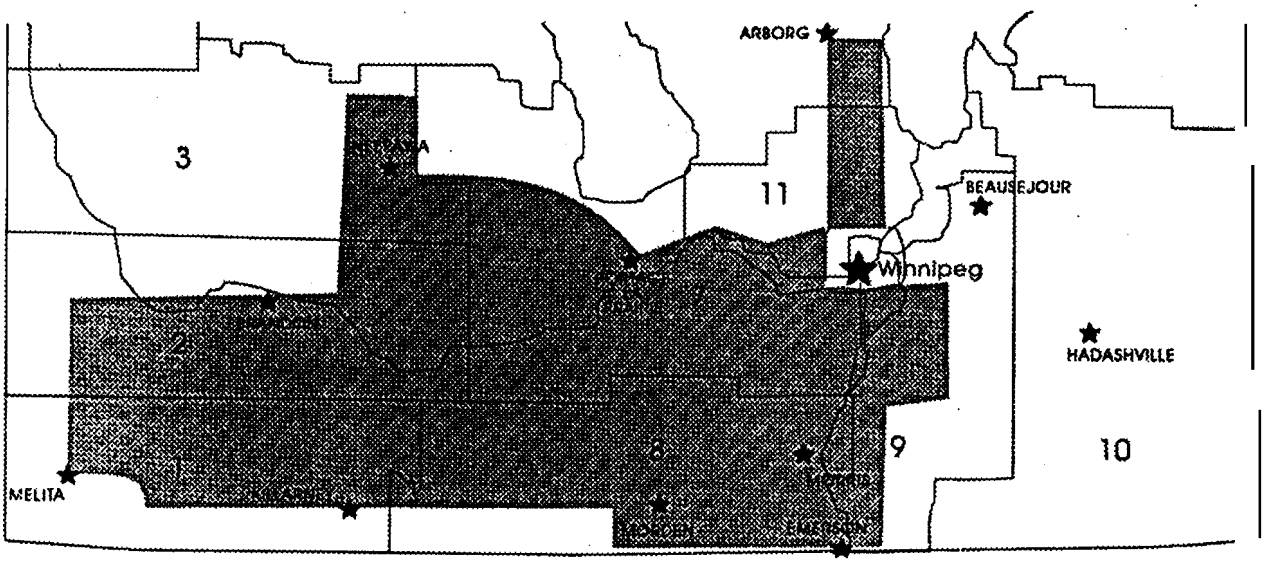

FIG. 1. Outline of the area of southern Manitoba surveyed for foliar and head diseases of barley in 1994.

CROP: Barley and Wheat

LOCATION: Manitoba

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TITLE: FLAME CHLOROSIS IN MANITOBA IN 1994

METHODS: Wheat and barley fields in regions of Manitoba that had previously been systematically surveyed for flame chlorosis (FC) were again surveyed for disease in 1994 (4).

RESULTS AND COMMENTS: Flame chlorosis, a soil-borne, virus-like disease of spring cereals has been monitored in Manitoba since it was first observed in western Manitoba in 1985 (3). In 1994, overall incidence of FC was lower than at any time since 1988. Areas near Niverville in the Red River Valley that had had relatively high disease incidences since 1988 (3,4) appeared disease-free in 1994. In western Manitoba, FC was observed in a few barley fields west of Hamiota, and the proportions of affected plants were lower than in recent years. A novel "whiteline" FC was observed in two barley fields south of Shoal Lake. Examinations of cytopathology (1) of whiteline-affected barley leaves, as well as detection of FC-RNA by hybridization to specific probes (5) confirmed that the whiteline disease was a new and distinct manifestation of infection with the FC virus-like agent (2).

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CROP: Barley, Oat and Wheat

LOCATION: Manitoba and Saskatchewan

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TITLE: CEREAL SMUT SURVEY, 1994

METHODS: In July 1994, cereal crops were surveyed for *Ustilago hordei, U. nigra, U. nuda, U. tritici, U. avenae* and *U. kolleri* in Manitoba and Saskatchewan. The area was covered by routes from Winnipeg-Swift Current-Rosetown-Yorkton-Winnipeg (thanks to N. Howes and G. Hamilton) and Winnipeg-Yorkton-Prince Albert-Swan River-Winnipeg, as well as one day trips north and south of Winnipeg. Fields were selected at random at approximately 15 km intervals, depending on the frequency of the crops in the area. An estimate of the percentage of infected plant (ie, plants with sori) was made while walking an ovoid path of approximately 100 m in each field. Levels of smut greater than trace were estimated by counting plants in a 1 m^2 area at at least two sites on the path. *U. nuda* and *U. nigra* were differentiated by observing germinating teliospores with a microscope.

RESULTS: See Table 1. Smut was found in 63% of the fields of barley, 18% of the common wheat, 45% of the durum, and 2% of the oat. The average levels were 0.5% for barley, 0.1% for durum wheat, trace for common wheat and 0.1% for oat. Two Manitoba fields of barley had high levels of smut: 10% loose in one near Minnedosa and 2% loose, 1% false loose and 7% covered in one near Brookdale.

COMMENTS: Although no data is available, increased use of seed-treatment fungicides is suspected as one cause of the relatively low levels of smut found in recent years.

TABLE 1. Incidence of smut in cereals in Manitoba and Saskatchewan in 1994.

Crop	No. Fields	Smut Species	% Fields affected		Mean % of infected plants	
			MB	SK	MB	SK
Common wheat	168	*U. tritici*	23	13	0.1	tr*
Durum wheat	55	*U. tritici*	36	49	tr	0.1
Oat	50	*U. avenae*	0	5	*0*	tr
		U. kolleri	*0*	5	*0*	0.3
Barley	176	*U. nada*	69	51	0.4	0.3
		U. hordei	5	6	0.1	0.1
		U. nigra	5	*2*	tr	tr

• tr = less than 0.1%

CROP: Barley, Oat and Wheat

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: STEM RUSTS OF CEREALS IN WESTERN CANADA IN 1994

METHODS: Surveys of fields and nurseries of barley, oat and wheat for incidence and severity of stem rust (*Puccinia* graminis Pers. f.sp. *tritici* Eriks. and E. Henn. and *P.* graminis f. sp. avenae Eriks. and E. Henn.) were conducted in Manitoba in July and August, 1994. Samples for race identification were obtained from fields and trap nurseries in the four western provinces.

RESULTS AND COMMENTS: The incidence of stem rust on all three cereals in 1994 was one of the lightest on record in the prairie region. All oat and wheat cultivars recommended for the rust area are resistant to stem rust, and no losses were expected. Infections of susceptible lines in nurseries also were lower than normal, with maximum levels of 10% for wheat stem rust and 2% for oat stem rust. Infections of wild oat also were light. In commercial barley fields, maximum levels of infections were less than 1%, with no losses. About 20—30% infection levels developed on wild barley later in fall. An increased number of collections from cultivated and wild barley were rye stem rust (*P.* graminis f.sp. *secalis* Eriks. and E. Henn.).

For wheat stem rust, race TPM, which has been the predominant race collected from lines of susceptible wheat in nurseries, declined in prevalence. Races QFC and QCC were the main races collected from wheat, and race QCC predominated in collections from cultivated barley and wild barley. In oat stem rust, races NA27 and NA29 predominated. These races are differentiated only by virulence or avirulence to gene *Pg15*.

CROP: Barley, Oat, Wheat

LOCATION: Maritime Provinces

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TITLE: CEREAL DISEASES IN THE MARITIME PROVINCES - 1994

METHODS: This survey of cereal diseases was based on observations by the authors and discussions with cereal specialist from the Maritime Provinces. When required isolation of pathogens were made to confirm identification of disease symptoms. The summary presented describes all cereal production areas in the Maritimes, both commercial and research.

RESULTS AND COMMENTS: Weather conditions: The weather patterns in the Maritime Provinces in 1994 were diverse, between locations and over the duration of the growing season. Early weather conditions were very conducive to plantings of spring cereals, as a result of which a large portion of the acreage was planted in early May. Conditions deteriorated during the mid to late May period, with considerable periods of wet and cool weather developing. Prince Edward Island, Nova Scotia and southern parts of New Brunswick were wet through out June turning dry in early July and continuing through to mid September. The northern portions of New Brunswick did however remain relatively wet throughout the entire season. While with late planted fields moisture was a yield limiting effect, much of the early planted crop did not appear to be overly effected by the low rainfall. The low moisture may have reduced severity for some diseases resulting in off-setting yield and quality effects.

Survival of winter wheats were good in most areas, although there were some poor areas particularly on western Prince Edward Island. Where winter survival was not limiting, yields and quality of winter wheat was good.

Barley: Predominate diseases throughout the region were net blotch and scald, incited by ***Pyrenophora teres*** and ***Rhyncosporium secalis***, respectively. While scald occurred sporadically throughout the entire region it was generally only at low levels outside of the central to northern New Brunswick area. In this latter area scald was at moderate to severe levels in some fields of six row barleys. While the severity of net blotch did not appear to be as high as in some years, use of foliar applied fungicides to research plots did have significant positive yield response benefits. This may have indicated that in a moisture stress situation low levels of disease may have greater yield reduction effects than when moisture is not limiting.

Other diseases of barley were present but there were no reports of a field being severe enough to warrant special attention. Fusarium head blight symptoms, incited by ***Fusarium graminearum***, were identified but at very low levels, as was loose smut, incited by ***Ustilago hordei.*** Common root rot, incited by *Fusarium* spp. and ***Bipolaris sorokiniana***, was observed however incidence and severity were below normal which may have been a reflection of the dry weather conditions during latter growth stages. Powdery mildew, incited by ***Erysiphe gramines*** f.sp. ***hordei*** was only observed in significant amounts at one location, on several cultivars under evaluation. Symptoms of spot blotch, incited by B. *sorokiniana*, were observed but as with many of the other diseases incidence and severity were both low.

Wheat: In general the dry conditions in the region were not conducive to the severe development of foliar disease in wheat. Leaf and glume blotch, incited by ***Phaeospharia nodorum (Septoria nodorum),*** was present throughout the region but with the exception of northern New Brunswick disease levels were not high. Similarly powdery mildew, incited by *Erysiphe graminis* f.sp. *tritici*, was not a problem in 1994. The low levels of powdery mildew

observed were in part due to the high percentage of the acreage being planted to more resistant cultivars, and the use of foliar applied fungicides on susceptible cultivars to limit disease development. Fusarium head blight, incited by ***Fusarium graminearum***, was observed in most fields but weather conditions were dry enough in most areas of the region to limit the symptom development. On Prince Edward Island, the harvest of the more susceptible cultivars, such as Roblin and Max, some times required cleaning to remove tombstone kernels in order to achieve milling quality. Several fields of Roblin and Grandin in northern areas of New Brunswick did exhibit the beginnings of a moderate yield and quality limiting situation, but milling quality was achieved through combine adjustments to remove tombstone kernels.

Take-all, incited by ***Gaeumannomyces graminis***, occurred most frequently in cereal-cereal rotations which are not common in the region. In general rotations used in the Maritimes do not enhance the development of take-all. Loose smut was a minor problem, as much of the cereal seed used was treated with an appropriate fungicide seed treatment or originated from a treated field.

In general yields of spring wheats ranged from poor in Nova Scotia to normal to above normal in much of Prince Edward Island and New Brunswick.

Oats: Speckled leaf blotch, incited by ***Phaeospharia avenae (Septoria avenae),*** was the only foliar disease of consequence on oats in the Maritime Provinces. This is consistent with other years. No reports of severe infection by other fungal pathogens or viruses were reported or noted in **1994.**

CROP: Oat

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: CROWN RUST OF OAT IN WESTERN CANADA IN 1994

METHODS: Surveys for oat crown rust (caused by *Puccinia coronata* Cda. f. sp. ***avenae*** Eriks.) incidence and severity were conducted in southern Manitoba from early July to mid-August, and in eastern Saskatchewan in mid-August. Crown rust collections were obtained from wild oat ***(Avena fatua*** L.) and commercially grown oat in field surveys, and from susceptible and resistant oat lines grown in uniform rust nurseries. Rust nurseries were composed of susceptible lines, single-gene lines with resistance gene *Pc48* or *Pc68*, lines with resistance genes *Pc38*, *Pc39* and *Pc68* combined, and common cultivars Dumont and Robert (both have resistance genes *Pc38* and *Pc39*). The nurseries were located near Arborg, Brandon, Emerson, and Morden, Manitoba, and Indian Head, Saskatchewan. Rust collections were increased on the susceptible cv. Makuru in the greenhouse. One single-pustule isolate, established from each collection, was evaluated for virulence phenotype (race), using 18 backcross oat lines, each carrying a different gene (*Pc35*, *Pc38*, *Pc39*, *Pc40*, *Pc45*, *Pc46*, *Pc48*, *Pc50*, *Pc54*, *Pc56*, *Pc58*, *Pc59*, *Pc60*, *Pc61*, *Pc62*, *Pc63*, *Pc64*, or *Pc68*) for resistance to crown rust as differential hosts.

RESULTS AND COMMENTS: Crown rust in oat was more severe and widespread in Manitoba in 1994 than 1993, making this the worst outbreak of the disease in recent years. In early July, rust severities ranged from trace amounts to 50% in wild oat and susceptible oat lines, and trace amounts to 20% in cultivars with resistance genes *Pc38* and *Pc39* in nurseries. Most of the infections were found on lower leaves. Oat crown rust increased rapidly in the following weeks, particularly in the Red River Valley, and by late July moderate to heavy infections (up to 100% severities) were found in wild oat and susceptible oat lines in the nurseries, and light to heavy infections (up to 60% severities) in cultivars with *Pc38* and *Pc39* in nurseries and farm fields in southern Manitoba. One late-sown field of Robert oat had infections up to 100% severities at the early milk stage, and likely suffered significant losses to crown rust. In 1994, crown rust also was widespread in eastern Saskatchewan. Infections in wild oat generally ranged from light in some locations to heavy in other locations in mid-August. However, in Saskatoon rust severities of up to 100% were observed (Dr. B. Rossnagel) by late July in plots of susceptible oat cultivars.

To date, 140 single-pustule isolates have been isolated from collections of susceptible oat lines and wild oat and 100 virulent phenotypes have been identified. Seventy isolates, comprising 47 virulent phenotypes, were virulent to lines having both genes *Pc38* and *Pc39*. All the currently recommended cultivars, ie, Dumont, Riel, Robert, AC Belmont, AC Marie, and AC Preakness, rely mainly on these **two** genes for crown rust protection. In 1994, for the first time, an isolate with virulence to the gene combination *Pc38*, *Pc39* and *Pc68* was isolated from oat in Manitoba. Cultivars with this gene combination are being developed at the Winnipeg Research Centre.

CROP: Oat, ***Avena sativa*** L.

LOCATION: Quebec

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TITLE: OUTLINE OF DISEASES OF OATS IN QUEBEC IN 1994

METHODS: Most experimental sites of cereals and a number of farmers fields in Quebec were visited at least once in the period from mid-July to mid-August. At each visited site, diseases were identified and their severity assessed in all oat lines and cultivars grown there. Selected plant samples were also collected from field crops at various locations and were examined in the laboratory. Plant growth stage at the time of assessment or sampling ranged from medium milk to medium dough.

RESULTS AND COMMENTS: The monthly average temperatures in May, July and August were nearly normal and the one in June was about 2°C above normal. Most drastic changes to the growth season occurred in the precipitation records: they were 15% above normal in June, **95%** in July and **40%** in August. Hours of sunshine were down by **10%** in July.

Moderate and usual levels of speckled leaf blotch (***Stagonospora avenae)*** were observed and its occurrence was general. In the Eastern Townships, infections were unusually below average. On the contrary, severities recorded in the Saint-Hyacinthe region were higher than elsewhere.

As in 1993, crown rust (*Puccinia coronata*) was found more extensively than usual, as it was detected at most sites. The highest severity occurred, as, usual in the south-west part of the province and symptoms were such that it was the most important disease there and significant damage was caused. All lines and cultivars tested at Ste-Anne-de-Bellevue had severe symptoms, up to maximum leaf coverage in some instances.

Stem rust (Puccinia *graminis*) presence was not noticed at any site visited this year, as is usually the case.

Foliage symptoms of yellow dwarf (Barley Yellow Dwarf Virus) were somewhat limited in their occurrence and were more or less limited in severity. They were up to moderate levels in the Eastern Townships. Infection appeared to have come late in most areas and did not cause much damage.

Oat blast (white empty florets) was noticeable to a limited extent at a number of sites. No site in particular was showing more disease than others.

At La Pocatière, a large number of smutted panicles (*Ustilago* spp.) were found among plants that were showing yellow dwarf symptoms; very few such smutted panicles were present in plants not showing yellow dwarf symptoms. This particular phenomenon was not observed elsewhere. In farmers fields, the smut diseases are still a concern in general. It might be related partly to a limited efficacy of seed treatments currently performed in the industry.

Finally, scab or head blight (*Fusarium* spp.) was found regularly in visited sites. Its severity was low but its occurrence was widespread. This disease is seldom found in oats. Isolations on agar media confirmed the presence of *Fusarium graminearum* as the causal agent. More scab was observed in naked than in covered oat cultivars.

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Saskatchewan

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TITLE: SASKATCHEWAN CEREAL ROOT DISEASE SURVEY, 1994

METHODS: Twenty-two fields of wheat and one of barley were surveyed for the presence of take-all and common root rot in the irrigated area of Outlook, Saskatchewan and the dryland area of crop production of Willowbrook, Saskatchewan. Fields were sampled between soft to hard dough growth stages. Disease was assessed on a sample of 25 random plants taken at least 20 paces from the field edge. Another sample of 15 selected plants exhibiting disease symptoms was collected from 10 fields that showed severe stunting, whiteheads, or large areas with dead plants. A root disease rating was calculated based on the percentage of severely diseased plants (at least 50% discoloration from lesions on the subcrown internode) from the total sampled in a field.

The subcrown internodes, crowns, and lower stems of the collected plants were plated for identification of C. ***sativus,*** red ***fusarium,*** and Gaeumannomyces ***graminis*** var. tritici as root pathogens. The tissues were washed for one hour under running water, dried, disinfested with 1% silver nitrate for 1 minute, rinsed three times in sterile distilled water, drained, and then placed on a semi-selective medium for G. ***gramininis*** var. *tritici* modified from Juhnke et al. (1984). This was a PDA based media containing 100 mg/L streptomycin sulfate, 500 mg L-DOPA (L-B-3,4-dihydroxylphenylalanine) and 10 mg dichloran. Other inhibitory chemicals were omitted. Plates were incubated at 20°C in the dark. The presence of red ***Fusaria*** and C. ***sativus*** was recorded at 10 days and of G. ***graminis*** var. ***tritici*** at 14 days.

RESULTS AND COMMENTS: The average root disease rating in the 23 fields surveyed was 30%. The platings from random plant samples showed that, on average, 33% of the plants were infected with G. ***graminis,*** 23% with red *Fusaria*, and 18% with C. *sativus*. The additional samples collected from areas of the fields with severe disease symptoms indicated that 40% of these were infected with G. ***graminis,*** 27% with ***Fusarium***, and 10% with C. ***sativus.***

A comparison between the two areas suggested that Outlook had higher levels of disease and more infections caused by G. ***graminis*** and C. ***sativus*** than Willowbrook (Table 1). A mixture of take-all and prematurity blight was probably responsible for the poor wheat crops in the Willowbrook area in 1994 and the previous few years, whereas at Outlook take-all was the primary disease, followed by prematurity blight and common root rot. Both areas had high levels of take-all in 1993 (Bailey et al. 1993).

Disease ratings were correlated with isolations of G. ***graminis*** (r = 0.37) and C. *sativus* (r = 0.38) but less so for *Fusarium* (r = 0.19). There was a small negative correlation for isolations of G. ***graminis*** and ***fusarium*** (r = -0.11) but a strong association of isolations of G. ***graminis*** and ***C. sativus*** (r = 0.69). There was no association between isolations of *Fusarium* and C. *sativus* (r = -0.03).

TABLE 1. Disease rating and percentage of plants infected with G. ***graminis*** var. ***tritici***, red *Fusarium*, and C. *sativus* from the irrigated area of Outlook and the dryland area of Willowbrook in central and eastern Saskatchewan.

Location	Sample	No. fields	Disease rating %	% Plants infected ± S.E.*		
				C. graminis	Red *Fusaria*	***C. sativus***
Outlook	random	13	43 ± 1.1	39 ± 4.6	25 ± 7.Q	24 ± 5.4
Willowbrook	random	10	15 ± 4.6	26 ± 3.4	20 ± 4.6	9 ± 3.3
Outlook	selected	4		49 ± 14.6	25 ± 17.1	26 ± 11.0
Willowbrook	selected	6		35 ± 9.5	28 ± 9.2	0 ± 0.0

* S.E. = standard error of mean

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CROP: Wheat, bread

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: WHEAT LEAF RUST IN THE EASTERN PRAIRIES IN 1994

METHODS: Wheat fields, uniform nurseries of known cultivars and breeding lines in Manitoba and eastern Saskatchewan were surveyed for incidence and severity of leaf rust in June, July, and August.

RESULTS AND COMMENTS: In 1994 the initial observation of leaf rust was on winter wheat at Carman, Manitoba on June 19. Warm and dry weather in the eastern prairies during the latter half of June and first week of July slowed development of the leaf rust epidemic. In the second week of July leaf rust was found at trace levels on spring wheat throughout southern Manitoba. **By** the first week of August in the Red River Valley of Manitoba leaf rust infections levels on the moderately resistant cultivar Katepwa had reached 40%, and were up to 10% on the more resistant cultivar Roblin. Susceptible winter wheats had infection levels up to 100% in southern Manitoba. Levels of leaf rust infections on spring wheat were very light in other areas of southern Manitoba and eastern Saskatchewan. Yield losses were not expected in these areas.

CROP: Wheat

LOCATION: Manitoba

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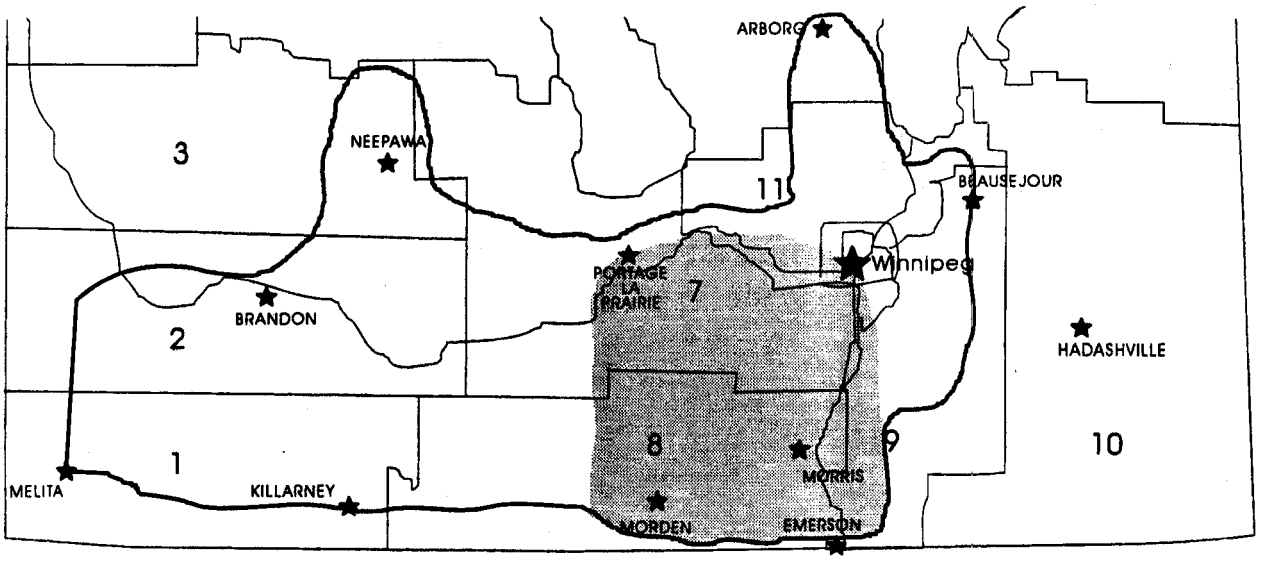
TITLE: OCCURRENCE OF FUSARIUM HEAD BLIGHT IN MANITOBA IN 1994

METHODS: A survey for fusarium head blight (FHB) in spring wheat fields was conducted in southern Manitoba between 20 July and 11 August 1994. Heads were examined in 166 fields (113 common, 15 durum, 38 semi-dwarf) between watery-ripe and medium dough stages of development. The percentage of heads affected with FHB was estimated in each field. Kernels from sampled heads were surface sterilized and incubated on potato dextrose agar under continuous cool white light for 5-7 days to promote pathogen sporulation to confirm diagnosis and to aid in Fusarium species identification.

RESULTS AND COMMENTS: Southern Manitoba again experienced an epidemic of FHB second in severity only to that of 1993. Blighted heads were found in wheat fields throughout the surveyed area (Fig. 1). Severity in most fields ranged from trace to 10% of heads infected west of Portage la Prairie. The more severely infested fields (10 to 70% heads affected) were found in the Red River Valley and adjacent regions in crop districts 7 and 8 (Fig. 1). Severity levels in all wheat classes were similar (Table 1). Fusarium *graminearum* was the principal causal species accounting for >95.0% of isolations from common and semi-dwarf cultivars and 67% of isolations from durum wheats. Fusarium *avenaceum* was the second most commonly isolated species, especially from durum cultivars. The predominant species in the Red River Valley was F. *graminearum*. F. *avenaceum* and F. *poae* were more commonly isolated from wheat fields in the southwestern part of the province.

TABLE 1. Fusarium species isolated from spring wheat in southern Manitoba in 1994.

Wheat type	No. of Fields surveyed	*Fusarium* spp. (%)		
		F. *graminearum*	F. *avenaceum*	Other
Common	113	97.3	1.7	1.0
Semi-dwarf	38	98.3	1.2	0.5
Durum	15	67.0	25.8	7.3



Region of Manitoba with most severely infected fields

Area surveyed

FIG. 1. Crop districts surveyed for fusarium head blight in Manitoba in 1994.

CROP: Wheat

LOCATION: Manitoba

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TITLE: LEAF SPOT DISEASES OF SPRING WHEAT IN MANITOBA IN 1994

METHODS: Surveys for foliar diseases of spring wheats were conducted in southern Manitoba between 18 July and 10 August 1994. Leaves were collected from 141 fields (102 common, 13 durum, 26 semi-dwarf) between heading and soft dough stages of development. Severity of disease on upper and lower leaves was categorized as 0, trace (TR), 1, 2, 3 or 4, with 4 describing dead leaves and 1 lightly affected. Samples of diseased leaf tissue were surface sterilized and placed in moisture chambers for 5-7 days to promote pathogen sporulation and disease identification.

RESULTS AND COMMENTS: Weather conditions in 1994 favoured leaf spot disease development. Severity levels for leaf spot diseases on the upper leaves of wheat were light in July (TR-1), and moderate (2) in August. On lower leaves levels were moderate to severe (3-4) throughout the survey period. Incidence of septoria leaf and glume blotch caused by ***Septoria nodorum*** was high in all wheat classes (Table 1, Fig. 1). High levels of S. *tritici*, speckled leaf blotch, were observed on common and semi-dwarf cultivars for a third consecutive year over much of the surveyed region (Fig. 1). On durum cultivars levels of S. *tritici* were low, and incidence of *Cochliobolus sativus*, spot blotch, and *Pyrenophora tritici-repentis*, tan spot, high. Tan spot was most prevalent in western Manitoba (Fig. 1). The highest incidence of S. ***avenae*** f. sp. *triticea* in several years was recorded in 1994, but severity was low. ***Septoria*** species accounted for 67% of the pathogenic fungi isolated. While incidence of tan spot and spot blotch was high, severity levels remained low as indicated by the number of isolations, 17.3% and 15.6%, respectively.

TABLE 1. Frequency of leaf spot diseases identified in 141 wheat fields in Manitoba in 1994.

Wheat type	Disease				
	Septoria spp.			Spot blotch	Tan spot
	S. nodorum	***S. tritici***	***S. avenae***		
Common	78.4	69.6	**34.3**	67.6	58.8
Semi-dwarf	73.0	65.3	30.7	53.8	69.2
Durum	76.9	38.4	38.4	84.6	92.3
Total Fields	109	93	48	94	90
Field (%)	77.3	65.9	**34**	66.6	63.8
Isolations (%)	31.8	28.8	6.4	15.6	17.3

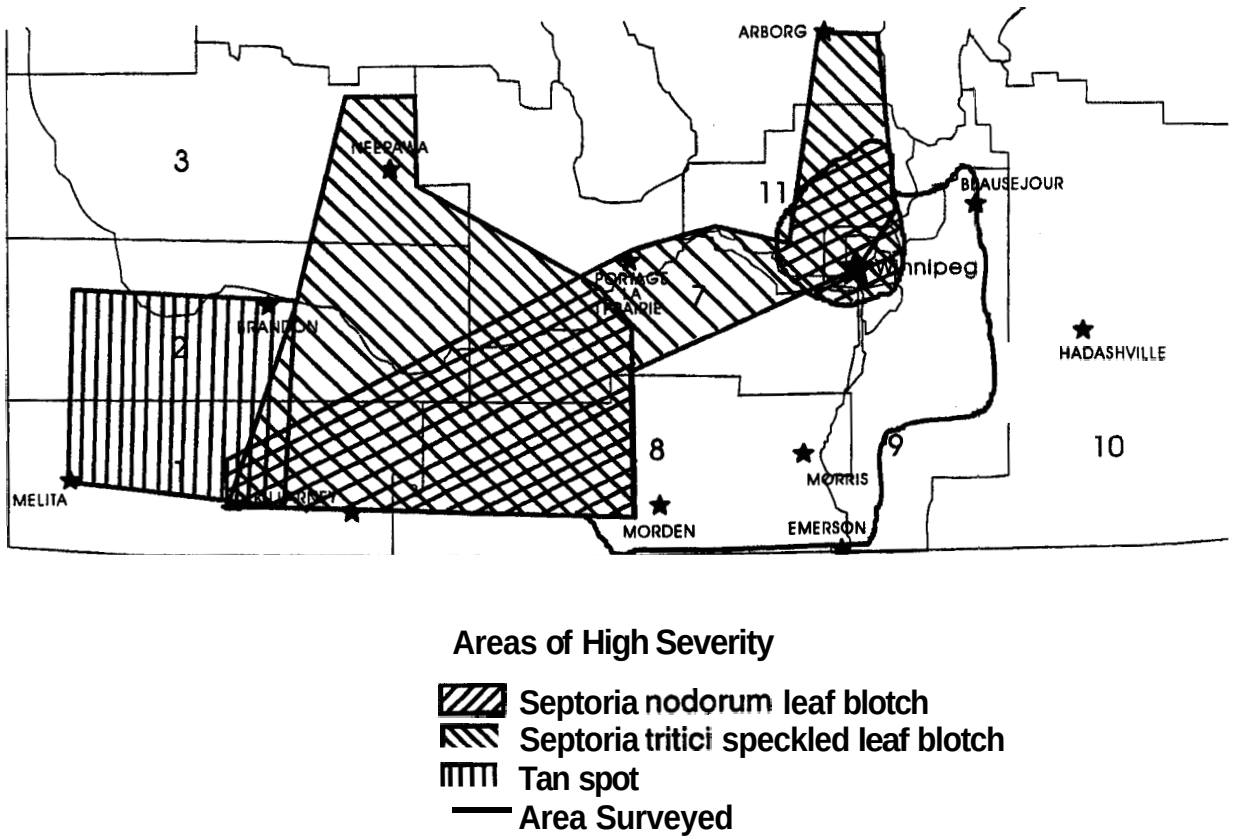

FIG. 1. Crop districts surveyed and distribution of foliar pathogens in Manitoba in 1994.

CROP: Wheat, common, *Triticum aestivum* L.

LOCATION: Quebec

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TITLE: OCCURRENCE OF CONTAMINATION OF WHEAT GRAIN BY THE ORANGE WHEAT MIDGE AND SEED MICROFLORA IN QUEBEC

METHODS: Six spring wheat fields were visited in Quebec in the summer of 1994. At each visited site, a few hundred spikes were collected at random and preserved in a cooler. Plant growth stage at the time of sampling was early to mid milk. All samples were frozen until further use in the laboratory. From each lot collected, 100 spikes were dissected and examined for presence of the orange wheat midge (*Sitodiplosis mosellana*). The number of larvae and the number of spikelets were counted in each spike. The remaining spikes were dried and threshed. To determine fungal and bacterial contamination of grain, representative sub-samples of 100 seeds (mostly immature) were plated on PCNB agar (for bacteria as a group and *fusarium* spp.) and on mannitol agar (for fungi as a group and *fusarium graminearum).* Prior to plating out, seeds were surface-sterilized for 30 sec in 70% ethanol and 2 min in 1% sodium hypochlorite. The number of seeds with colonies of the sought after microorganisms were counted after a 13-day incubation at room temperature. Single correlations (r) were calculated between incidence of orange wheat midge and seed contamination levels.

RESULTS AND COMMENTS: Data collected are shown in Table 1. Orange wheat midge larvae were found consistently in all samples examined. High percentages of infested spikes were recorded, with a maximum of 82% at Sainte-Anne-de-Bellevue. The incidence of infested spikes appeared to be favoured in warm locations compared to cooler locations such as La Pocatiere and Normandin. The number of larvae found per spike and per spikelet were higher than 4 and higher than 0.3 in half the samples.

TABLE 1. Records of incidence of orange wheat midge and seed contaminants in wheat samples collected at locations in Québec.

	Orange Wheat Midge incidence			Contamination of seeds (%)			
		Number of Larvae				*fusarium*	
Location	Infested spikes (%)	/spike	/spikelet	Bacteria Total	Fungi Total	spp.	*graminearum*
Ste-Anne Bellevue	82	4.5	0.32	99	37	2	2
Saint-Polycarpe	50	1.1	0.07	84	37	3	1
Sainte-Rosalie	88	5.2	0.32	61	34	3	3
Lennoxville	61	5.0	0.34	49	37	3	3
La Pocatière	58	2.2	0.14	40	58	2	1
Normandin	36	1.6	0.13	15	71	8	3

Coefficients of correlation between incidence of orange wheat midge and seed contamination levels are shown in Table 2. No correlation is significant at $P \leq 0.05$. The highest correlation found is between percentage of infested spikes and fungal contamination ($r=0.721$, $P=0.1056$). The low incidence of *Fusarium* fungi is probably due to the early sampling of plant material.

TABLE 2. Correlation between incidence of orange wheat midge and contamination of seeds in wheat collected in Quebec.

	Correlation (*r*) with seed contamination			
Orange Wheat Midge incidence	**Bacteria**	**Fung**	***Fusarium* spp.**	***F. graminearum***
Percentage of infested spikes	**0.601** *(0.2074)*	**0.721** *(0.1056)*	**0.668** *(0.1470)*	**0.151** *(0.7754)*
Number of larvae per spike	**0.270** *(0.6053)*	**0.608** *(0.2005)*	**0.410** *(0.4197)*	**0.580** *(0.228)*
Number of larvae per spikelet	**0.260** *(0.6182)*	**0.555** *(0.2531)*	0.348 *(0.4987)*	**0.613** *(0.1958)*

P values in parentheses.

CROP: Wheat

LOCATION: Quebec

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TITLE: DISEASES OF WHEAT IN QUEBEC IN 1994

METHODS: The incidence of the most common diseases of wheat was recorded on the different lines and cultivars of the regional and cooperative test plot trials grown in ten localities covering the wheat growing regions of Quebec. Disease severity assessments was made once during the late milk to soft dough stages. Fusarium head blight infection was assessed during a survey of nine farmers' fields distributed throughout the region of Saint-Hyacinthe (S.W. Quebec) by calculating the percentage heads and spikelets infected by the pathogen at the soft dough stage.

RESULTS AND COMMENTS: Powdery mildew (***Erysiphe graminis)*** was observed at only one locality of the Saint-Hyacinthe region (Saint-Cesaire) on the two bread wheat lines: QW.550.13 and QW.546.17.

Leaf spots (*Pyrenophora tritici-repentis*) mixed with ***(fhaeospharia*** *nodorum*) were as usual widespread in all regions but was most severe at Lennoxville and Saint-Simon.

Glume blotch ***(Phaeospharia*** nodorum) was observed at moderate intensities at Lennoxville and the northern regions of the Province.

Leaf rust (*Puccinia recondita*) was observed late in the season and most severe infections on the susceptible cultivars Ac Baltic, Algot, Belvedere, Consens, Mondor and Opal were noted at Saint-Simon and the northerly regions (Sainte-Foy, La Pocatière and Normandin).

Fusarium head blight (Fusarium *graminearum*) was again widespread this year due to the wet conditions that occurred during the flowering periods. Intensity of infections varied greatly not only from region to region but even within the same localities. The most severe infections were noted on the very susceptible cultivars at the Saint-Hyacinthe and Sainte-Foy regions. The infections levels noted in the nine fields surveyed in the Saint-Hyacinthe region was as follows: 7.2% and 4.6% spikelets (55.0% to 26.6% heads) on Ac Mimi, 1.2% and 3.0% spikelets (14.2% and 3.2% heads) on Celtic, 0.4% spikelets (3.3% heads) on Ac Baltic, 2.8% (22.3% heads) on Casavant, 0.5% spikelets (3.9% heads) on Aquino, 1.% spikelets (7.8% heads) on Maestro and 2.8% spikelets (19.4% heads) on QW.500.9.2. In winter wheat, the two fields surveyed showed 0.8% spikelets (8.3% heads) on Karat and 0.6% spikelets (4.5% heads) on Augusta.

Chlorotic fleck (physiological leaf spot) was widespread this year for the first time on leaves of spring wheat. Severe infection occurred at Lennoxville on all cultivars, moderate to severe infections on some cultivars at Sainte-Foy, low to moderate infections in south western regions of the province and absent in the northern regions (La Pocatiere and Normandin).

Other diseases observed at very low intensities were loose smut (*Ustilago tritici*), take-all ***(Gaeumannomyces graminis)*** and ergot (*Claviceps purpurea*).