Cereals / Cereales

Crop / Culture: Barley

Location / Emplacement: Manitoba

Title / Titre: 1991 SURVEY FOR FOLIAR DISEASES OF BARLEY IN MANITOBA

Name and Agency / Nom et Organisation:

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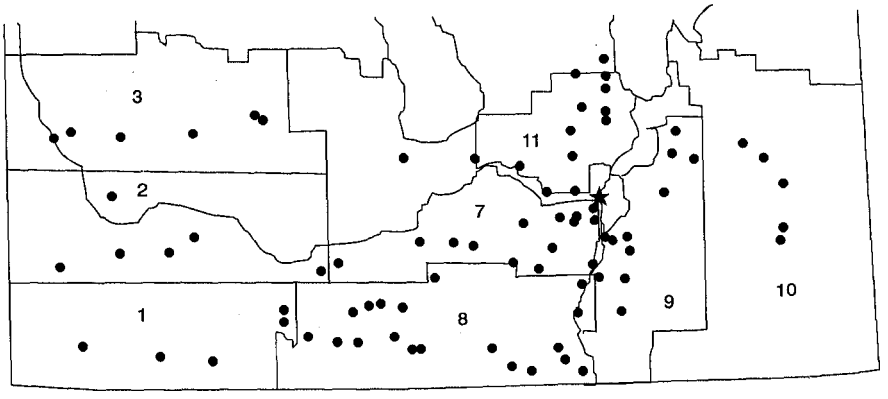
METHODS: Between 23 July and 2 August, 81 barley fields in Manitoba were sampled for foliar disease incidence and severity. Fields were selected at random every 10-20 km along the survey routes, depending on availability and crop frequency. At each site, about 10 plants were examined along a diamond-shaped transect 25 m long per side. Disease levels were estimated visually in both the upper (top two leaves) and lower canopies using a four-point scale: trace (<5% leaf area affected); slight (5-15%); moderate (16-40%); and severe (41-100%). Leaves with symptoms were collected and kept in paper envelopes for subsequent pathogen identification and disease confirmation. Infected leaf pieces were surface sterilized and placed in petri dish moist chambers to promote pathogen sporulation.

RESULTS AND COMMENTS: Leaf spotting was evident in all 73, six-rowed and 8, two-rowed fields examined (Fig. 1). Disease severity levels were higher than found in 1988-90, due to abundant rain in May, June and July. In most fields upper leaves were rated slight, but in 29% levels were moderate or severe; lower leaves in 80% of fields were moderately or severely infected. More fields with higher levels of disease were found in the eastern half of the surveyed area, but sampling was also more intense here. Lower rainfall in the south-western region in the previous few years, compared to other regions, likely depressed inoculum levels and contributed to reduced disease development. *Pyrenophora teres* (net blotch) and *Cochiobolus sativus* (spot blotch) were each isolated from >95% of fields. Occasionally, one or the other predominated, but in most instances both were common. *Septoria passerinii* (speckled leaf blotch) was found in 37% of fields, a higher proportion than normal, while *Rhynchosporium secalis* (scald) was detected in one field. Powdery mildew was observed in many fields but was not rated. Yield losses in some fields were estimated at 30-40%; average losses due to leaf spots were likely 15%.

Figure 1. Location of barley fields sampled for foliar disease in Manitoba in 1991.



Crop / Culture: Barley

Location/ Emplacement: Saskatchewan

Title / Titre: Saskatchewan Barley Disease Survey, 1991

Name and Agency / Nom et Organisation:

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METHODS: A province wide survey was conducted in 134 barley fields between late milk and early dough growth stages. Random fields were surveyed by assessing disease on a sample of 10 plants at least 20 paces from the field edge. Diseases such as smut, ergot, take-all, and viruses were estimated for the percent incidence in either the plant sample or over the entire field. Common root rot was estimated by counting the number of plants in the sample that had lesions covering more than 50% of the sub-crown internode. Rust diseases were evaluated on the basis of both severity and infection type as described in the Cereal Methodology Manual (1986) published by CIMMYT. The remaining foliar and leaf spot diseases were assessed on a 0–9 scale described by Saari and Prescott (1975), and modified by Couture (1980). Samples of diseased leaf tissue were plated to determine the causal agents of leaf spots. Dry leaves cut into 4 cm long segments were washed for one hour and disinfected for one minute with 0.5% sodium hypochlorite. These were plated on water agar containing 100 mg/L streptomycin sulfate and 50 mg/L vancomycin hydrochloride and incubated for one week under a mixture of black light, black-blue light, and cool white fluorescent light for 12 hours alternating light and dark at 20 C.

RESULTS AND COMMENTS: There were 87 two-row and 47 six-row barley fields surveyed. The distribution by crop districts, severity, and prevalence of the diseases are shown in Table 1. The netted-form of net blotch was the most prevalent disease being observed in 90% of the fields at severe levels. The spot-form of net blotch was found in 8% of the fields and it occurred at trace to moderate levels and only in central Saskatchewan. Scald occurred in the northern and eastern crop districts in 20% of the fields and ranged from light to moderately severe. Spot blotch was identifed as a minor leaf disease. Severe common root rot was found in 87% of the fields. The north-east and east-central regions had high levels of powdery mildew being observed in 20% of the fields. Barley stem rust was only found in trace levels in 14% of the fields and only in the eastern areas of the province. Other diseases present were loose and covered smut, leaf rust, take-all, BYDV, bacterial blight, and ergot.

Four oats fields were also examined. The average disease rating for leaf spots was 3.3 and these were caused by Septoria avenae and Pyrenophora avenae. Ten percent of the plants sampled were infected with severe symptoms of common root rot and 10–15% of the plants had crown rust.

Observations were recorded on previous crop in 117 fields in both the barley and wheat disease surveys in 1991 (Table 2). The two most common rotations were summerfallow followed by a cereal and cereal followed by a cereal. Only 13% of the fields had cereals following an oilseed crop. Thirteen of the 15 fields using a cereal-oilseed rotation were located in crop districts 5A, 5B, 6A, 8B, and 9A which are located in east-central and northern growing areas of Saskatchewan. There were no clear associations between previous crop, current crop, and the average leaf spot or common root rot ratings.

REFERENCE:

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Table 1 Distribution, severity, and prevalence of barley diseases in Saskatchewan fields surveyed between late milk to early dough stages in 1991.

Crop District	No. Fields	Net blotch (net)	Net blotch (spot)	Spot blotch	Scald	Common root rot %	Smut %	Leaf rust	Stem rust	Powdery mildew	BYDV %	Ergot %	Take all %	Bacterial blight
1A	3	6.5/2*	-	2.0/1	-	24/3	-	-	5 MS/1	TR/3	-	-	-	-
1B	4	7.5/4	-	1.0/2	-	27/4	-	-	TR/3	-	-	-	5.0/2	-
2A	1	-	-	-	-	20/1	-	-	-	-	-	-	-	-
2B	7	7.1/7	-	-	7.0/1	39/5	TR/2	-	TR/1	-	2.0/1	-	TR/1	-
3AN	0	- **												
	-	-	-	-	-	-	-	-	-	-	-	-		
3As	3	5.8/2	-	-	4.0/1	20/3	-	-	-	-	-	-	-	-
3BN	3	8.3/3	-	-	-	35/2	-	-	-	-	-	-	-	-
3BS	1	7.0/1	-	-	-	10/1	-	-	-	-	0.1/1	-	-	-
4A	0	-	-	-	-	-	-	-	-	-	-	-	-	-
4B	1	6.0/1	-	-	-	40/1	-	-	-	-	-	-	-	-
5A	9	6.2/6	3.5/2	2.8/3	7.5/1	30/9	0.5/2	TR/7	TR/6	5.9/3	-	TR/2	9.0/1	TR/2
5B	17	5.6/15	TR/1	-	2.5/7	29/17	10.0/1	TR/7	TR/3	4.8/10	-	-	-	-
6A	9	6.7/8	TR/1	6.0/1	-	65/9	-	-	TR/2	TR/2	-	-	-	-
6B	7	7.3/6	6.3/3	-	-	40/7	1.3/3	-	-	TR/1	1.0/1	-	-	-
7A	4	7.0/2	3.0/2	-	-	20/3	-	-	-	-	1.5/2	-	-	-
7B	4	7.7/3	5.0/2	-	-	38/4	-	-	-	-	-	-	-	-
8A	11	6.4/11	-	-	0.4/4	17/7	-	-	-	0.8/2	-	-	-	-
8B	27	7.1/27	-	-	0.4/4	37/26	-	-	TR/3	1.6/6	-	-	-	1.0/2
9A	23	6.0/23	-	-	2.4/9	24/15	-	-	TR/2	W 3	-	-	-	-
9B	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Average or total	134	6.7/121	3.0/11	3.0/7	3.5/27	30/117	2.4/10	TR/14	TR/19	1.7/30	1.2/5	TR/2	4.7/4	1.0/2

* average disease rating (0–9 scale after Couture 1980) / number of fields affected
** not observed or not recorded

Table 2 Effect previous crop on the average leaf spot and common root rot ratings of wheat and barley grown in Saskatchewan in 1991.

Previous crop	Current crop	No. of fields	Leaf spot rating (0–9 scale)	Common root rot (%)
Summerfallow	@real	53	6.5	22
	Barley	22	6.7	34
	meat	31	6.3	14
Cereal	Cereal	48	6.4	20
	Barley	19	6.9	30
	wheat	28	6.3	12
Oilseed	@real	15	7.3	24
	Barley	9	7.8	23
	meat	6	6.5	26
Alfalfa	Barley	1	0.0	0

Crop / Culture: Wheat and Barley

Location / Emplacement: Manitoba and eastern Saskatchewan

Title / Titre: 1991 SURVEY OF FLAME CHLOROSIS IN MANITOBA AND EASTERN SASKATCHEWAN

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BACKGROUND: Surveys for flame chlorosis (FC), a soil-borne, virus-like disease of spring cereals (1), have documented its spread and apparent intensification since it was first observed in western Manitoba in 1985 (1–3). Until 1988 FC was observed only in barley, but has since been confirmed in wheat and oat (3). However, up to 1990, levels of infection sufficient to cause crop losses were observed only in barley. Starting from the base established with the 1990 survey, the annual FC surveys monitor the epidemiological trend of the disease. The 1991 survey also examined areas of Manitoba and eastern Saskatchewan not covered in earlier surveys.

METHODS: As noted in earlier reports (1,2), FC is readily diagnosed between the seedling and 4-node stages of growth on the basis of striking and characteristic symptoms. In field workshops held 1991–06–11 and –12 near Minnedosa and Winnipeg, respectively, agricultural survey personnel were shown how to diagnose FC and record survey data using the surveying method described in last year's report (2).

Specimens of FC plants from each field where the diseasewas observed were forwarded promptly to the Plant Pathology Laboratoryof Manitoba Agriculture to confirm the diagnosis (2). Specimens which could not be diagnosed with certainty as FC-positive based on visual symptoms were tested for FC-specific RNA using a dot-blot assay developed at Agriculture Canada, Winnipeg Research Station (4). In addition, approximately one tenth of all specimens diagnosed as FC-positive on the basis of visual symptoms was also tested by the dot-blot assay to confirm reliability.

RESULTS AND COMMENTS: The region roughly bounded by Brandon, Neepawa, and Shoal Lake continues to be the area where FC is most prevalent and most likely to occur at levels sufficient to cause crop losses (Fig. 1). The results of the 1991 survey also reinforce earlier observations that the eastern Red River Valley constitutes a second regionwith relatively high FC levels. No FC was found at any of the sites examined in south-central Manitoba, the region that lies between the two principal FC areas. The 1990 survey identified several new FC locations (Dauphin, south of Brandon, south Interlake), and FC was observed at more sites and at higher levels in these areas in 1991. The area around Beausejour in eastern Manitoba recorded FC for the first time in 1991.

The 1991 FC survey in eastern Saskatchewan was the first systematic effort to monitor the disease beyond the borders of Manitoba, and followed from the 1990 discovery of FC in western Manitoba within a few km of the Saskatchewan border. No FC was observed at 50 sites (3 barley, 47 wheat fields) in eastern Saskatchewan within a 60 km-wide strip bordering Manitoba from approximately 49°30' to 51°15' N.

As recently as 1990, FC was principally a disease of barley. In the 1990 survey (2,3), FC was found at only trace levels in the small number of wheat fields where it was detected at all. In 1991, by contrast, several fields in both eastern and western Manitoba were observed where FC was at levels sufficient to cause crop losses. A trend to higher FC levels in wheat, if it continued, would raise considerably the threat posed by FC to cereal grain cultivation in Manitoba. In 1991, specimens of green foxtail (*Setaria viridis* L.) with FC-like symptoms and FC-specific RNA were found near Winnipeg (Haber and Harder, unpublished). This raises an additional concern that grassy weeds are FC hosts and thus might constitute reservoirs of inoculum.

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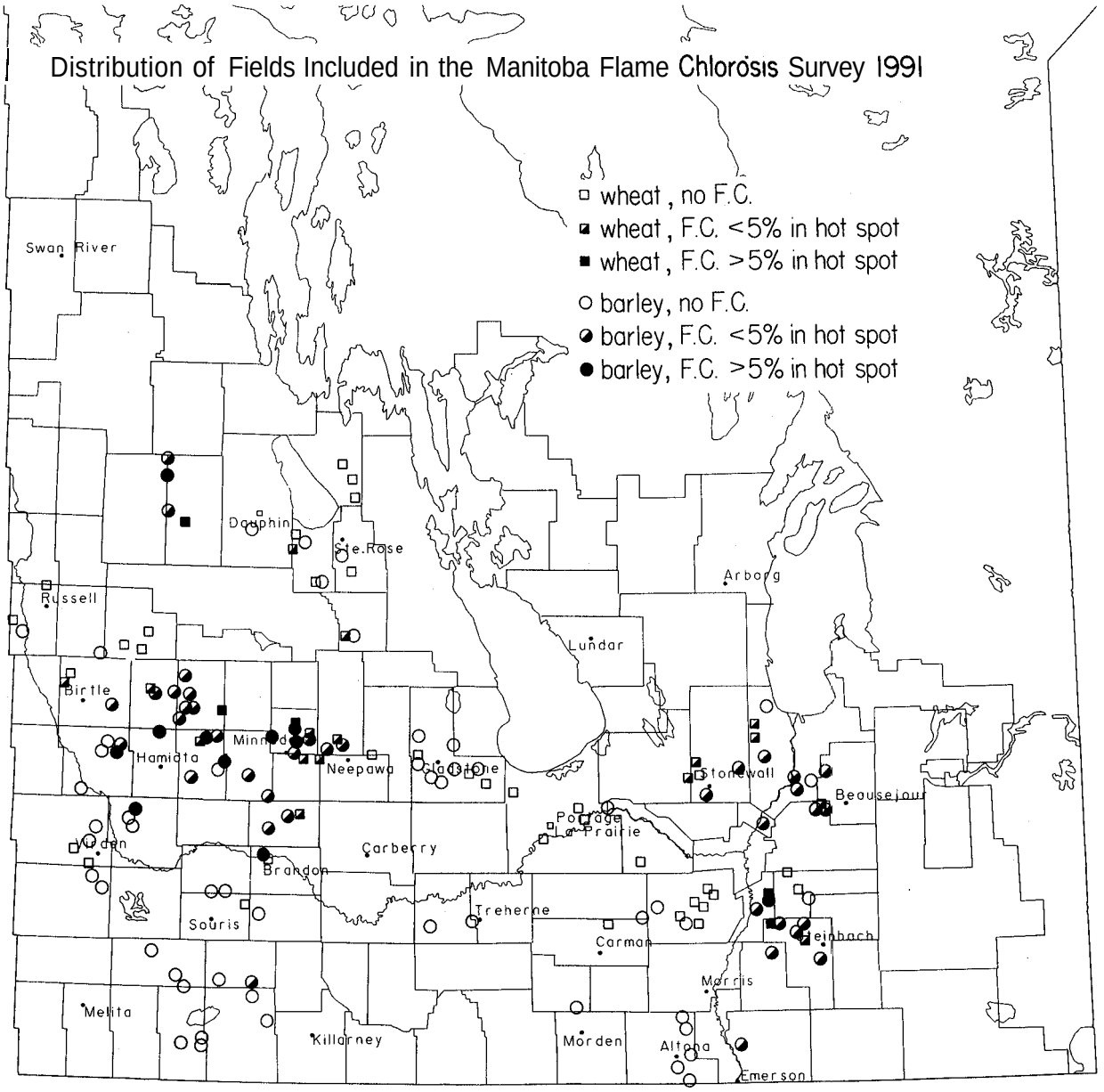
1. Haber, S., W. Kim, R. Gillespie and A. Tekauz. 1990. Flame Chlorosis: a new soil-borne, virus-like disease of barley in Manitoba, Canada. J. Phytopathology 129(3):245–256.
2. Haber, S. and R. G. Platford. 1991. 1990 survey of flame chlorosis in Manitoba. Can. Plant Dis. Surv. 71(1):79–80.
3. Haber, S., D. 3. S. Barr and R. G. Platford. 1991. Observations on the distribution of flame chlorosis in Manitoba and its association with certain zoosporic fungi and the intense cultivation of cereals. Can. J. Plant Pathol. 13(3): (in press).
4. Haber, S., D. A. Wakarchuk, S. E. Cvitkovitch and G. Murray. 1991. Diagnosis of flame chlorosis, a novel, virus-like disease of cereals by detection of disease-specific double-stranded RNA with digoxigenin-labelled RNA probes. Plant Dis. (submitted).


Distribution of Fields Included in the Manitoba Flame Chlorosis Survey 1991
wheat, no F.C.
wheat, F.C. <5% in hot spot
wheat, F.C. >5% in hot spot
barley, no F.C.
barley, F.C. <5% in hot spot
barley, F.C. >5% in hot spot
Swan River
Dauphin
Ste.Rose
Russell
Arborg
Lundar
Birtle
Hamiota
Neepawa
Gladstone
Stonewall
Beausejour
Portage la Prairie
Carberry
Brandon
Souris
Treherne
Carman
Morris
Melita
Killarney
Morden
Altona
Emerson

Crop / Culture: Barley, Oat, and Wheat

Location / Emplacement: Manitoba and Saskatchewan

Title / Titre: CEREAL SMUT SURVEY, 1991

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METHODS: In July 1991, cereal crops were surveyed for Ustilago hordei, U. nigra, U. nuda, U. tritici, U. avenae, and U. kolleri in Manitoba and Saskatchewan. The northern area was covered by a route from Winnipeg-Saskatoon-Prince Albert-Swan River-Winnipeg and the southern area by trips north and south of Winnipeg and a route (thanks to G. Hamilton and N. Howes) from Winnipeg-Swift Current-Kindersley-Winnipeg. Fields were selected at random at approximately 15 km intervals, depending on the frequency of the crops in the area. An estimate of the percentage of infected plants (i.e. plants with sori) was made while walking an ovoid path of approximately 100 m in each field. Levels of smut greater than trace were estimated by counting plants in a 1 m^2 area at at least two sites on the path. U. nuda and U. nigra were differentiated by observing germinating teliospores with a microscope.

RESULTS: See Table 1. Smut was found in 52% of the fields of barley, 11% of the common wheat, 61% of the durum and 10% of the oat. The average levels were 0.2% for barley, 0.1% for durum wheat and trace for common wheat and oat. The highest incidence of smut observed was 5% loose smut of barley in one field near Gronlid, Saskatchewan.

COMMENTS: The incidence of smut in cereals continues to decline, reflecting the drought of recent years. The relatively moist conditions in 1991 will not have an impact until the seed infected in that year is grown out. It will be interesting to see how fast the levels of smut rebound in cultivars with fair or poor resistance, e.g. in barley and durum wheat.

Table 1. Incidence of smut in cereals in Manitoba and Saskatchewan in 1991.

Crop	No. fields	Smut species	% Fields affected		Mean % infected plants	
			MB	SK	MB	SK
Common wheat	212	U. tritici	13	9	tr*	tr
Durum wheat	72	U. tritici	64	61	0.1	0.1
Oat	29	U. avenae, U. kolleri	10	10	tr	tr
Barley	148	U. nuda	49	44	0.1	0.2
		U. hordei	7	13	tr	0.1
		U. nigra				

*tr = less than 0.1%

Crop / Culture: Barley, Oats and Wheat

Location / Emplacement: Central Alberta

Title / Titre: CEREAL DISEASE SURVEY IN CENTRAL ALBERTA, 1991

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METHODS: Disease incidence and severity levels were sampled in *40* cereal fields in central Alberta (CD 8) in early August. Fields were selected randomly at intervals of approximately 10 km and plants were examined every 10 paces in an inverted "V". Leaf diseases were rated on the percent leaf area affected. Head and systemic diseases were rated as a percent of plants affected in square meter samples. Root diseases were rated as the average severity of the disease in 10 plant samples.

RESULTS:

Weather: Central Alberta began the crop year with good soil moisture reserves but spring rains delayed seeding in May and rains in June delayed spraying of herbicides. In July there were severe hail-storms, and a short dry spell stressed crops that were shallow rooted as a result of the early rains. Crops also suffered from competition by weeds as control was very poor, especially for wild oats. Consequently, barley yields and quality were poor. Wheat yields were generally good.

Barley: All seven 2-row barley fields examined had net blotch (Pyrenophora teres) and in five of these there was more than 10% disease on the flag leaf and more than 50% disease on the penultimate leaf. Scald (Rhynchosporium secalis) occurred in four fields but in low amounts. Common root rot (Cochliobolus sativus and Fusarium spp.) was also present in four fields, but only one was rated moderately diseased. Loose smut (Ustilago nuda) was present in very low amounts in two fields and ergot (Claviceps purpurea) was present in one field.

All but one of the 17, 6-row barley fields examined had net blotch but at levels of $\leq$10% disease on the top two leaves. Scald was found in 65% of the fields but again at low levels except for two fields with 25-75% disease on the penultimate leaf. Common root rot was present in 65% of the fields but at very low levels. Loose smut was present at trace levels in four fields and at 1% in one field. Bacterial blight (Xanthomonas campestris) was present in three fields in the centre of the surveyed area.

Oats: Blast was present in each of the seven oat fields examined, generally at levels $>$ 10%. Barley yellow dwarf virus was present in four fields at low levels. Septoria leaf blotch (Septoria spp.) occurred at low levels in four fields but at 50% damage on the penultimate leaf of one field.

Wheat: Septoria leaf blotch was present in all nine wheat fields examined. Disease levels were generally $\leq$5% on the flag leaf, and $\geq$10% on the penultimate leaf. Stem melanosis (Pseudomonas cichorii) and ergot were present in one field each and common root rot in six. Root rot levels were low except for one field which was rated moderately diseased. Take all (Gauemannomyces graminis) was present in five fields, three of these with 5-10% of the plants diseased.

Crop / Culture: Oat

Location/Emplacement: Manitoba and eastern Saskatchewan

Title/Titre: OCCURRENCE OF OAT RUSTS IN WESTERN CANADA IN 1991

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METHODS: The occurrence of oat crown rust (causal agent Puccinia coronata Cda. f. sp. avenae Eriks.) and oat stem rust (causal agent P. graminis Pers. f. sp. tritici Eriks.) in Manitoba and eastern Saskatchewan was determined by frequent examination of farm fields or stands of wild oat (Avena fatua L.) from late June to mid-August. Rust samples were collected from wild oat, cultivated oat, and uniform rust nurseries located near Beausejour, Brandon, Morden, Shoal Lake, and Woodmore, in Manitoba, and near Indian Head in Saskatchewan.

RESULTS AND COMMENTS: Crown rust was first observed in trace amounts in susceptible oat on June 28 in southern Manitoba. Conditions were favourable for the development of the disease due to the abundance of moisture in July. By early August, crown rust was widespread in southern Manitoba; 100% severity levels were commonly observed in wild oat, while in commercial fields severities ranged from 10–40%. This indicates that the resistance gene combination Pc38 and Pc39 in the currently recommended cvs. Dumont, Riel, and Robert, still offered some protection to the crown rust population, but is becoming less effective. Crown rust was light in eastern Saskatchewan in 1991.

To date, 29 of the 59 isolates identified from the rust collections in 1991 were races with virulences to both genes Pc38 and Pc39. However, the most significant finding of the 1991 Manitoba survey was the detection of virulence to Pc68, a gene that has been immune to all Canadian crown rust isolates since its isolation from an Avena sterilis accession in 1982; several isolates with virulences to both Pc68 and Pc38 were obtained from a resistant trap nursery located near Beausejour, Manitoba. This is of concern because gene Pc68 is at advanced stages of incorporation into cvs. Dumont and Robert in the Winnipeg breeding program. The detection of virulence to both Pc38 and Pc68 would necessitate that other resistance gene(s) be used in combination with Pc68 to provide longer term effectiveness.

In contrast to crown rust, oat stem rust was light in the eastern prairies in 1991 and all the oat cultivars currently recommended for the region remained resistant to the predominant races of the stem rust population.

Crop / Culture: Wheat

Location! Emplacement: Manitoba

Title / Titre: OCCURRENCE OF FUSARIUM HEAD BLIGHT IN MANITOBA IN 1991

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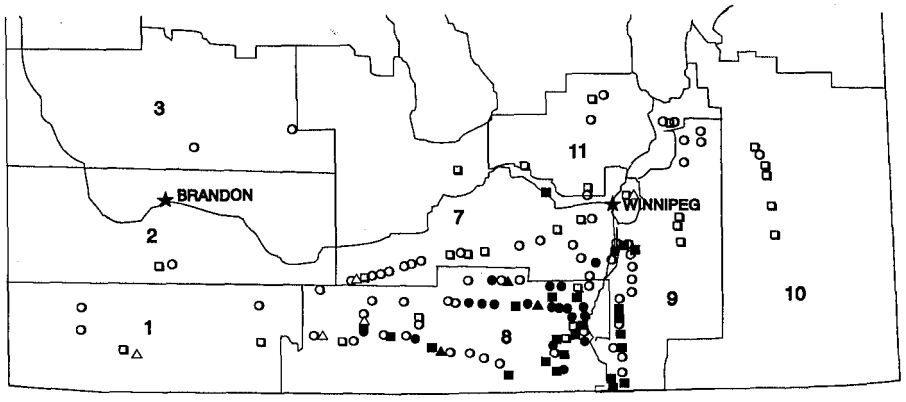
METHODS: One hundred and eighty-five wheat fields throughout Manitoba were surveyed for Fusarium head blight between July 23 and August 2, 1991 by sampling an area about 20 x 20 m at the edge of each field. Ten heads were collected at each site to confirm and identify the Fusarium species present.

RESULTS AND COMMENTS: At sampling, the crop developmental stage ranged from medium milk to hard dough. Fusarium head blight was found in 78% of wheat fields examined and occurred throughout Manitoba (Fig. 1). It was found in 75% (83 of 111) of common, 67% (8 of 12) of durum and 85% (53 of 62) of semi-dwarf wheat fields. The severity ranged from trace (47 fields) to 50% heads infected. There were more common wheat fields having high severity levels in 1991 than in previous years. Generally, severity levels in common wheat were similar to those for the other two wheat types. The severely infected wheat fields were found primarily in crop district 8 (south-central Manitoba). F. graminearum was the pathogen species isolated most frequently (Table 1).

Table 1. Distribution of Fusarium species in common, durum and semi-dwarf wheat fields in Manitoba in 1991.

Fusarium spp.	No. wheat fields			
	Common	Durum	Semi-dwarf	Total
F. graminearum	80	6	50	136
F. culmorum	9	1	5	15
F. acuminatum	2	4	1	7
F. [illegible]	1	0	3	4
F. oxysporum	0	1	3	4
F. avenaceum	1	0	3	4
F. equiseti	0	0	2	2

Fig. 1. Occurrence of Fusarium head blight in fields of common (○), durum (△) and semi-dwarf (□) wheats in eight Manitoba crop districts in 1991. Open symbols = less than 10% severity. Filled symbols = 10-15% severity.



Crop / Culture: Wheat

Location / Emplacement: Manitoba

Title / Titre: FOLIAR PATHOGENS OF SPRING WHEAT IN MANITOBA IN 1991

Name and Agency / Nom et Organisation:

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METHODS: One hundred and ninety-one fields of wheat (113 common, 16 durum, 61 semi-dwarf, and 1 utility) in southern Manitoba were surveyed for foliar pathogens from 10 July to 2 August 1991. Crop developmental stages were recorded at time of sampling and severity of disease on upper and lower leaves was categorized as 0, TR, 1, 2, 3 or 4, with 4 describing dead leaves and 1 lightly affected. Infected leaf samples were collected at each site for subsequent pathogen/disease identification. Lesions from leaf tissue were surface sterilized and placed in moisture chambers for 5–7 days to induce sporulation to facilitate pathogen identification.

RESULTS AND COMMENTS: The locations of fields surveyed is shown in Fig. 1. Plant maturity for samples collected 10–16 July ranged from GS 57–73 (Zadoks et al. scale). Plants of later collected samples ranged from GS 75–85. Abundant rain in late spring and early summer caused widespread leaf-spotting in 1991 in Manitoba. Disease severity levels ranged from Tr-4 on flag leaves with the majority in the light or moderate (1 or 2) category. Most lower leaves had moderate to severe (2–3) levels, or, in later collected samples were already dead. Cochliobolus sativus (spot blotch), Septoria nodorum and S. avenae f. sp. triticea (Septoria leaf blotch) were isolated from 88.5%, 62.8%, and 60.7%, respectively, of fields across the surveyed area (Table 1), but disease levels were most severe in crop reporting districts 7–11 in the Red River Valley. C. sativus was isolated from a high percentage of fields in 1989, 1990, and 1991, but the incidence and severity of S. nodorum, and in particular S. avenae f. sp. triticea, increased substantially over the same time period. S. tritici was isolated from eight fields, four of which were in the Miniota region. Pyrenophora tritici-repentis (tan spot) was isolated from 50.8% of fields which represents a lower percentage than in 1989 or 1990. Fields with the most severe levels of tan spot were distributed uniformly across the surveyed area, in contrast to the distribution of spot blotch and Septoria leaf blotch. Disease severity caused by S. nodorum, S. avenae f. sp. triticea and C. sativus was highest on HRS and CPS wheats, whereas durum wheats were more severely affected by P. tritici-repentis.

Table 1. Frequency of diseases identified in 191 wheat fields in Manitoba in 1991.

Wheat class	Disease: Septoria leaf blotch 'nodorum'	Septoria leaf blotch 'avenae'	Septoria leaf blotch 'tritici'	Tan spot	spot blotch
Common	71	67	6	62	102
Semi-dwarf	43	36	1	20	53
Durum	6	12	1	14	13
Utility	0	1	0	1	1
Total	120	116	8	97	169
Fields (%)	62.8	60.7	4.2	50.8	88.5

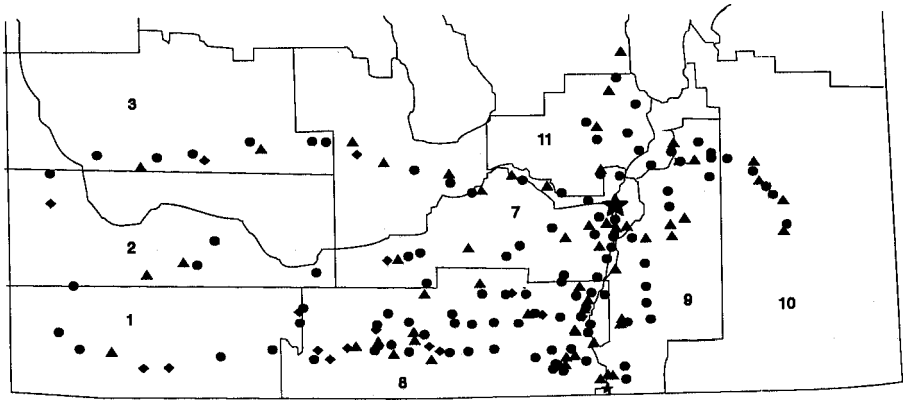

Fig. 1. Crop districts and locations of common (●), durum (◆), semi-dwarf (▲), and utility (★) wheat fields surveyed for foliar pathogens in 1991.

Crop / Culture: Wheat

Location/ Emplacement: Manitoba, Saskatchewan

Title / Titre: LEAF RUST ON WHEAT IN THE EASTERN PRAIRIES IN 1991

Name and Agency/ Nomet Organisation:

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METHODS: Fields of cultivated wheat were examined throughout the growing season in Manitoba and eastern Saskatchewan for leaf rust.

RESULTS AND COMMENTS: Leaf rust was first observed on June 11 in spring wheat fields in southeastern Manitoba. By the last week in June leaf rust was present in light to trace amounts in spring wheat fields throughout southern Manitoba. Leaf rust severities were very high by the end of July throughout Manitoba due to the early arrival of rust, and the abundant rainfall in the previous two months that provided excellent conditions for rust to increase. In Manitoba and eastern Saskatchewan fields of the cultivars Katepwa, Neepawa, and Biggar had leaf rust severities from 50-100%, resulting in the loss of flag leaves before the heads had completed grain filling. An average yield loss of 10% in these cultivars was expected due to leaf rust. The cultivars Roblin, Laura, Columbus, Pasqua, and the American semi-dwarf Marshall were resistant to leaf rust, although these cultivars also had higher leaf rust severities than in past years due to the high inoculum pressure.

Crop / Culture: Wheat

Location / Emplacement: Saskatchewan

Title / Titre: Saskatchewan Wheat Disease Survey, 1991

Name and Agency / Nom et Organisation:
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METHODS: A province wide survey was conducted in 254 wheat fields between late milk and early dough growth stages. Random fields were surveyed by assessing disease on a sample of 10 plants at least 20 paces from the field edge. Diseases such as smut, ergot, take-all, and viruses were estimated for the percent incidence in either the plant sample or over the entire field. Common root rot was estimated by counting the number of plants in the sample that had lesions covering more than 50% of the sub-crown internode. Rust diseases were evaluated on the basis of both severity and infection type as described in the Cereal Methodology Manual (1986) published by CIMMYT. The remaining foliar and leaf spot diseases were assessed on a 0-9 scale described by Saari and Prescott (1975), and modified by Couture (1980). Samples of diseased leaf tissue were plated to determine the causal agents of leaf spots. Dry leaves cut into 4 cm long segments were washed for one hour and disinfected for one minute with 0.5% sodium hypochlorite. These were plated on water agar containing 100 mg/L streptomycin sulfate and 50 mg/L vancomycin hydrochloride and incubated for one week under a mixture of black light, black-blue light, and cool white fluorescent light for 12 hours alternating light and dark at 20 C. On the basis of sporulation estimates were made on the importance of each fungal species.

RESULTS AND COMMENTS: There were 215 hexaploid and 39 durum wheat fields surveyed. The distribution by crop districts, severity, and prevalence of the diseases are shown in Table 1. The most prevalent diseases were leaf spots (92% of the fields moderately infected), common root rot (75% severely infected), and leaf rust (52% ranging from trace to severe). Leaf rust caused moderate levels of infection in 29 fields of hexaploid wheat in crop districts 3 and 4 but was not observed at all in 28 durum fields. Take-all occurred in 19% of the fields which were all in the southern crop districts. The incidence of take-all in the fields ranged from less than 1% up to 20%. Other diseases observed at low levels in less than 10% of the fields were powdery mildew, glume blotch, smut, ergot, BYDV, and bacterial blight. In the south-east corner of the province, seven cases of wheat streak mosaic virus was noted in trace amounts. Drought stress was evident in crop district 9. Also, it was observed that the awned hexaploid wheat CV. Laura was more resistant to leaf spotting (disease rating=6.0 in 3 fields) than the non-awned cultivars (disease rating=7.2 in 6 fields).

Pyrenophora tritici-repentis and Septoria nodorum were the predominant fungal species causing leaf spots (Table 2). S. tritici was present in signficant proportions in some crop districts (5 and 6) whereas S. avenae f. sp. triticea was rarely observed. In durum wheats, P. tritici-repentis was responsible for more than 90% of leaf spotting. In hexaploid wheats, the distribution of fungi was variable with crop districts and regions in the province. S. nodorum and P. tritici-repentis were observed in equal proportions in the south-east corner of the province (crop districts 1 and 2) and less than 10% of the lesions involved other pathogens. In the south-western and west-central crop districts (3, 4, and 7), there was a higher proportion of P. tritici-repentis as compared to S. nodorum. Crop districts 5 and 6 in central-east Saskatchewan had leaf spots caused by P. tritici-repentis (48%), S. nodorum (25%). and S. tritici (27%). S. nodorum was the most prevalent pathogen in the north.

REFERENCE:

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

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

Table 1. Distribution, severity, and prevalence of wheat diseases in Saskatchewan fields surveyed between flowering and early dough stages in 1991.

Crop District	No. Fields	Leaf spot	Leaf rust	Common root rot%	Powdery mildew	Glume blotch	Ergot %	Smut %	*Take all%*	BYDV %	Bacterial blight
1A	8	3.2/8*	1-60 MS/6	15/7	-	Iw4	Iw3	1.011	6.916	-	-
1B	7	2.6/7	1-60 MS/5	19/5	-	TR/2	TR/2	-	3.514	-	1.7/3
2A	7	2.2/5	10-20 MR/6	17/4	-	4.0/2	TR/2	-	21.2/5	-	-
2B	9	3.8/9	1-10 MR/4	14/8	-	4.0/1	-	3.0/2	4.6/3	-	-
3AN	1	3.0/1	-	-	-	-	-	-	-	-	-
3As	0	- **	-	-	-	-	-	-	-	-	-
3BN	22	4.4/22	10-40 MR/3	17/17	-	0.1/1	-	0.3/8	0.6/11	0.1/2	-
3BS	19	4.6/17	5-40 MS/2	29/15	-	0.1/2	-	1.0/2	1.0/8	-	-
4A	5	3.013	1-40M/5	15/4	0.1/1	-	-	-	0.4/4	-	-
4B	11	3.7110	-	28/4	3.5/1	-	-	1.0/1	0.1/3	-	-
5A	34	2.6/25	TR/25	14/31	0.1/2	TR/3	TR/2	-	9.9/4	-	-
5B	6	7.4/6	-	23/6	-	-	-	-	-	-	-
6A	8	6.2/7	2 S/6	33/6	-	-	-	1.0/1	-	-	-
6B	13	5.6113	5R -10M/5	10/6	-	TR/1	-	-	-	-	-
7A	7	5.1/7	TR/7	0/7	-	TR/1	-	1.0/1	-	-	-
7B	3	8.3/3	-	20/3	-	-	-	-	-	-	-
8A	22	3.1/21	TR/8	11/15	0.6/6	-	-	-	-	-	-
8B	38	4.9/38	TR/33	21/28	TR/12	TR/4	-	-	-	-	-
9A	34	4.6/34	1MS/18	15/24	TR/5	-	-	-	-	-	-
9B	0	-	-	-	-	-	-	-	-	-	-
Average or total	254	4.61236	IMR-60MS /133	18/190	0.8/27	0.9121	TR/9	1.2116	5.4/48	0.1/2	1.7/3

* average disease rating (0-9 scale after Couture 1980) / number of fields affected

** not observed or not recorded

Table 2. Estimation of the percentage of leaf-spot fungi on leaf samples of hexaploid heat collected in Saskatchewan in 1991.

Crop district	No. of samples	% of leaf-spot fungi			
		Septoria nodorum	S. tritici	S. avenae f. sp. triticea	Pyrenophora tritici-repentis
1A	8	50	4	0	46
1B	6	47	8	0	45
2A	4	60	0	2	38
2B	5	28	1	0	71
3B	22	24	1	0	75
4A	1	1	0	0	99
4B	3	63	0	0	37
5A	13	22	32	0	46
5B	6	9	25	0	66
6A	7	24	10	0	66
6B	6	45	42	0	13
7A	1	1	10	0	89
7B	1	0	0	0	100

Table 3. Estimation of the percentage of leaf-spot fungi on leaf samples of durum wheat collected in Saskatchewan in 1991.

Crop district	No. of samples	% of leaf-spot fungi			
		Septoria nodorum	S. tritici	S. avenae f. sp. triticea	Pyrenophora tritici-repentis
1B	1	10	0	0	90
2B	1	20	0	0	80
3B	17	7	0	0	93
4A	1	0	0	0	100
4B	5	1	0	0	99
7A	2	2	0	0	98

Crop / Culture: Cereals

Location / Emplacement: Maritime Provinces

Title / Titre: OCCURRENCE AND SEVERITY OF CEREAL DISEASES IN THE MARITIME PROVINCES - 1991

Name and Agency / Nom et Organisation:

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METHODS: Cereal fields and experimental plots in the cereal production districts of New Brunswick, Nova Scotia, and Prince Edward Island were examined for foliar disease during July and August for plantings conducted during the normal planting period in early-mid May. Diseases also were recorded in September and October for fields planted in late May and June.

RESULTS: Weather Conditions: Spring arrived early in the Maritimes in 1991 and the first part of the seeding period in early May was suitable for field work and most cereals were planted earlier than normal. This early planting, coupled with warmer and drier weather than usual in June and July resulted in very little foliar disease on spring cereals in all three Maritime Provinces. Survival of fall seeded cereals was good in New Brunswick and Prince Edward Island but Nova Scotia crops experienced more winter kill than normal. Yields of winter cereals were higher than normal where survival was good.

Disease observations: Disease severities on early planted crops did not warrant use of foliar fungicides as a general rule with the exception of milling wheats where high nitrogen levels were utilized on mildew susceptible cultivars. While diseases were severe in late planted crops, when the diseases did occur, it was too late to spray as crops were approaching maturity and beyond the recommended time for fungicide applications. Commencing in early September, weather conditions deteriorated and the Maritimes experienced rains with a frequency which did not permit grains to dry in the field. Late seeded barley, oats, and wheat crops in many instances were not harvested until late October when quality of the harvest had been lost.

Harvest of soybeans and lupins also experienced delays and in many instances seed harvested had moisture levels too high for safe storage. Most late harvested soybean and lupin seed was systematically infected with field fungi and once in storage, quickly degenerated if not immediately dried to a safe moisture level.

This period of wet harvest weather emphasized the importance of early seeding to ensure the crops mature in August. and early September when drying conditions tend to be superior to those of late September and October. It also emphasized the value of grain driers and of grain producers having such facilities available to them in wet harvest seasons.

Diseases occurring in the experimental cereal plots or fields throughout the Maritimes tended to be those characteristic of the region, i.e. mildews, *Septoria* incited leaf and glume blotches, smuts, scald, and the Pyrenophora-Bioplaris complex on barley crops. In most instances, foliar disease ratings were less than 5% of the leaf area observed and did not show a sufficient range of severities to identify lines with superior disease resistance, Very little head blight incited by *Fusarium* spp. were observed in either experimental plots or fields. Diseases were severe in experimental plots only when artificial moisture regimes were utilized.

Crop / Culture: Oat

Location / Emplacement: Province of Quebec

Title / Titre: DISEASES OF OAT CROPS IN QUEBEC IN 1991

Name and Agency / Nom et Organisation:

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METHODS: Most experimental sites of cereals in Quebec were visited from mid-July to mid-August for disease severity assessments. At each visited site, diseases were identified and assessed in a number of oat lines and cultivars. Growth stages of plants at time of assessments ranged from medium milk to soft dough.

RESULTS: Speckled leaf blotch (**Stagonospora** avenae) was widespread through crop districts in the province and was the most severe disease this year. Its overall severity was intermediate. Severity was more in the east than in the west and reached its highest level in the Lake Saint-Jean area. Infection in the Eastern Townships was lower than usual.

Crown rust (Puccinia **coronata**) did not occur extensively and was more or less restricted to the southwest part of the Province. There it was the most important disease on susceptible cultivars that were moderately infected. Traces of the disease were found elsewhere.

As usual, stem rust (——— **graminis**) was apparently not present this year.

Severity of yellow dwarf (Barley Yellow Dwarf Virus) was moderate in the various regions evaluated. Virus symptoms were not always conspicuous because of an unusual soil drought which confused the disease picture.

Crop / Culture: Wheat

Location / Emplacement: Province of Quebec

Title / Titre: OCCURRENCE OF WHEAT DISEASES IN QUEBEC IN 1991

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METHODS: The incidence of wheat diseases was recorded on many different cultivars of spring wheat at ten locations in the six regions surveyed in Quebec in 1991. **Fusarium** head blight (F. graminearum) was seen only in trace amounts at all locations except in the Lake St. John's region. Leaf rust (**Puccinia** recondita) was severe on susceptible cultivars in all locations except at La Pocatiere and St. Eugene where it was moderately severe. Mixed leaf spot infections of Pyrenophora **tritici-repentis** and **Septoria** nodorum were widespread as usual in all regions but varied from low to moderate infections except at Deschambault where it was severe on susceptible cultivars like Laura, Mondor, and Norseman. Powdery mildew (**Erysiphe** graminis) was seen only in trace amounts at St. Hyacinthe and low amounts at Lennoxville on susceptible cultivars like Columbus, Norseman, Kennyon, and Lancer. Glume blotch (Septoria **nodorum**) was noted on spikes in low amounts only at Deschambault. Loose smut was observed in low quantities in the Montreal and Quebec City regions. Ergot (Claviceps **purpurea**) and Take-all (Gaeumanomyces **graminis**) were seen in trace amounts mostly in the Quebec City and Lake St. John regions. Winterkill was very severe in most winter wheat fields in southwestern Quebec.

Crop / Culture: Winter Wheat

Location / Emplacement: Province of Quebec
Region of St. Hyacinthe

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Title / Titre: SURVEY OF WINTER WHEAT DISEASES IN *1991*

METHODS: Eight fields - two of cultivars Absolvent, Augusta, and Karat, and one of Perlo and Ruby were surveyed for leaf, root, and head diseases. Foliar diseases were assessed before and after heading on *10-20* plants at *10* sites on a W transect in the field examined. Samples of *10* plants were pulled out at each site to assess for root and basal stem diseases just after heading. Disease severity of leaves were recorded as percentage leaf area affected on the whole plant before heading, but on flag leaves only after heading using the Horsfall and Barratt grading system[1]. Stem necrosis was assessed as the percentage stems showing necrosis after removal of the leaf sheath of the basal portion. Head blight was measured as the percentage of heads and spikelets visually infected on *50* heads chosen at random at four different sites in the field.

RESULTS AND COMMENTS: Table *1* shows the minimum-maximum percentage disease intensity for the diseases recorded before and after heading. Before heading, tan spot (*Pyrenophora* ***tritici-repentis***) was observed in all of the eight fields with a maximum of *2.3%* of leaf surfaces affected in the cultivar Karat. Powdery mildew (***Erysiphe graminis***) was low on the leaves before and after heading with a maximum of *2.1%* at heading on cultivar Augusta and *1.4%* after heading on Absolvent. Leaf rust (*Puccinia* ***recondita***) was observed only after heading on all cultivars except Absolvent and Ruby with maximum leaf infection of *2.8%* on cultivar Augusta. Stem necrosis due mostly to ***Bipolaris sorokiniana*** and some ***Fusarium*** spp. was observed mostly as a slight stem necrosis in six of the fields with a maximum of *38.7%* on stems of Augusta. Head blight (***Fusarium graminearum***) was very low except in one field of Karat where *16.4%* heads and *3.1%* spikelets were infected. However, one field of Absolvent, one of Augusta, and one of Ruby showed no infections. In other fields, infections varied from *0.07%* to *0.1%* infected spikelets. Take all (*Gaeumannomyces graminis*) was found in trace amounts in fields of Absolvent, Karat, and Perlo. ***Fusarium*** stem rot was found in trace amounts only in a field of cultivar Augusta.

Table *1.* Prevalence and intensity of winter wheat diseases in the St. Hyacinthe region in *1991.*

Growth Stages[1]	Percent Minimum-Maximum Disease Intensity[2]					
	Leaf spots	Powdery mildew	Leaf rust	Stem necrosis	Head Blight Heads	Head Blight Spikelets
Before heading*						
31	*2.1-2.3*	*0-0.7*	*0*	-		
51	*2.3-2.3*	*0-2.1*	*0*	-		-
After heading**						
80	2.3-4.0	*0-1.4*	*0-2.8*	*0-38.7*	0-16.4	*0-3.1*

[1] Horsfall and Barratt grading system. *1945.* Phytopathology *35 (8)*: *655* (Abstr.).
[2] Zadoks *et al.* Growth stages of cereals. *1974.* Weed Res. *14 (6): 415-421.*

*Disease assessment on all the leaves.
**Disease assessment on flag leaves only.

Crop / Culture: Spring Wheat

Location / Emplacement: Province of Quebec
Region of St. Hyacinthe

Title / Titre: SURVEY OF SPRING WHEAT DISEASES IN 1991

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METHODS: Three fields of the cultivar Max, two of Laura and Messier, and one of Ankra, Celtic, Columbus, and Roblin were surveyed for leaf, root, stem, and head diseases at Zadoks et al. growth stages 47, 59, and 77. The intensity of foliar diseases was assessed on 10-20 plants at 10 sites along a W transect in the fields. Samples of 10 plants were pulled out at each site at ZGS 77 to note stem and root diseases. Leaf diseases were evaluated before and at heading as a percentage leaf area affected on the whole plant using the Horsfall and Barratt grading system[2]. After heading, only the flag leaves were assessed. Head blight was measured as the percentage of heads and spikelets lesioned on 50 heads chosen at random at four different sites in each field.

RESULTS AND COMMENTS: Table 1 shows the minimum-maximum percentage disease severity recorded at growth stages 47, 59, and 77. At heading, tan spot (Pyrenophora tritici-repentis) was observed in all the fields with a maximum intensity of 3.2% leaf area affected on cultivars Columbus, Laura, Messier, and Max. Powdery mildew (Erysiphe graminis) was observed on Columbus, Laura, and Messier with a maximum intensity of 1.2% infected leaf area. After heading, tan spot was mixed with Septoria leaf spot (Septoria nodorum) and affected a maximum of 21.1% of the surfaces of flag leaves of cultivar Max and from 3.1. to 18.3% of flag leaves of the other cultivars. Powdery mildew affected up to 1.6% of leaf surfaces of cultivar Laura, and leaf rust (Puccinia recondita) up to 18.3% of those of Ankra. Slight stem necrosis caused by Bipolaris sorokiniana and some Fusarium spp. on basal portion of stems affected up to 22.8% of stems of cultivar Max and only 2.8% of Celtic. In other cultivars infections varied from 5.1% to 18.9%. Fusarium head blight (F. graminearum) was noted on all cultivars except Laura with a maximum of 0.4% infected spikelets on cultivar Columbus. Take-all and Fusarium stem rot were observed only in trace amounts in fields of the cultivars Messier and Max respectively.

Table 1. Prevalence and intensity of winter wheat diseases in the St. Hyacinthe region in 1991.

Growth Stages[1]		Percent Minimum-Maximum Disease Intensity[2]					
		Leaf spots	Powdery mildew	Leaf rust	Stem necrosis	Head Blight Heads	Head Blight Spikelets
Before heading:	47*	0-2.3	0.0	0-012	-	-	-
Heading:	59*	1.6-2.3	0-1.1	0	-	-	-
After Heading:	77**	3.1-21.1	0-1.6	0-18.3	2.9-22.8	0-3.6	0-0.4

[1] Zadoks et al. Growth stages of cereals. 1974. Weed Res. 14 (6).
[2] Horsfall and Barratt grading system. 1945. Phytopathology 35 (8): 655 (Abstr.).

*Disease assessment on all the leaves.
**Disease assessment on flag leaves only.