Cereals / Céréales

Crop / Culture: Barley

Location / Emplacement: Saskatchewan (mainly), Manitoba, Alberta

Name and Agency / Nom et Organisation:
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Title / Titre: Saskatchewan Barley Leaf Disease Survey-, 1988

METHODS: Kits to grow and sample 20 barley genotypes, chosen to exhibit potential disease problems, were sent to cooperators. Cooperators included School of Agriculture volunteers, public and private researchers, and pedigreed seed growers. Cooperators were asked to plant the differential varieties on barley stubble and to return 5–10 representative diseased leaves during the flag leaf and soft-dough stages. Five sites were lost to drought. Samples were returned from 24 Saskatchewan (8 from the northwest, 4 from the northeast, 5 from the east-central and 7 from the west-central region), 2 Alberta (Olds and Edmonton) and 4 Manitoba (Winnipeg and 3 near Brandon) sites. Amounts of each disease were rated as trace (some lesions), light (lesion on each selected susceptible leaf), moderate (10–30% of the area affected) and heavy (>30% of the area affected). Diseases of primary interest to the survey are listed in Table 1.

RESULTS: Disease incidence was lower than in 1987, but traces of several diseases could be found at most sites. The northwest region and one east-central site demonstrated the highest disease incidence. The pattern of each disease occurrence is affected by moisture, temperature, time, previous cropping history and aggressiveness of the pathogen. In addition to the diseases summarized in Table 1, there were signs of viral diseases, insect damage and Fusarium spp. Trace amounts of Halo spot (Selenophoma donacis) were noted at a few sites and of powdery mildew (Erysiphe graminis) at one location.

Table 1. Occurrence of barley leaf diseases, Saskatchewan Barley Leaf Disease Survey, 1988

	Degree of infection			
Disease	Heavy	Moderate	Light	Trace
Spot-form net blotch (Pyrenophora teres f. maculata)	**2**	**6**	17	**3**
Scald (Rhynchosporium secalis)	**1**	**2**	8	**10**
Net-form net blotch (Pyrenophora teres f. teres)	**0**	**0**	**4**	17
Spot blotch (Cochliobolus sativus)	0	0	**3**	23
Septoria (Septoria spp.)	**0**	**0**	**4**	**22**
Leaf rust (Puccinia hordei)	0	0	0	7

Crop/Culture: Barley

Location/Emplacement: Manitoba, Saskatchewan and Alberta

Title/Titre: BARLEY SMUT SURVEY, 1988

Name and Agency/ Nom et Organisation:
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METHODS: In July, 1988, 271 barley fields were surveyed for Ustilago hordei, U. nigra and U. nuda in Manitoba, Saskatchewan and Alberta. The northern area was covered by a route from Winnipeg-Saskatoon-Lacombe-Peace River-Prince Albert-Swan River-Winnipeg and the southern area (except for southern Alberta) in a one-day trip south of Winnipeg and a route (thanks to J. Nielsen) from Winnipeg-Arcola-Nokomis-Biggar-Melfort-Russell-Riding Mountain. Fields of barley were selected at random at approximately 15 km intervals, depending on the frequency of the crop 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 75% of the fields examined. The average level was 0.1%. One field of six-row barley near Dunvegan, Alberta had 30% of plants with U. hordei infection.

COMMENTS: The over-all level of infection (0.7%) was less than half of that for the Manitoba-Saskatchewan survey of 1987. This probably reflects warmer, drier conditions in 1987, during the time when the seed for 1988 was infested/infected, and therefore may mean that even less smut will be observed in barley in 1989.

TABLE 1. Incidence of smut on barley, 1988

Province	Crop	% fields affected			Mean % infected plants
		U. hordei	U. nigra	U. nuda	
Manitoba	2-row	29	14	71	1.0
	6-row	23	34	74	1.1
Saskatchewan	2-row	21	10	46	0.2
	6-row	29	22	62	0.6
Alberta	2-row	13	0	75	0.1
	6-row	32	11	58	1.0

Crop/Culture: Barley

Location / Emplacement: Ontario

Name and Agency / Nom et Organisation:
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Title / Titre:

WINTER BARLEY DISEASE SURVEY IN ONTARIO, 1988

METHODS: winter barley was examined in commercial fields and cooperative trials in 1988 for damage and disease. Thirteen commercial fields of cv. OAC Halton and 19 fields of cv. OAC Acton were surveyed in southern Ontario (counties of Wellington, Waterloo, Brant, Oxford, Perth, Haldimand, Peterborough, Dufferin, Grey, Middlesex, Huron, Bruce, Halton and Kent). Cultivars Huron, OAC Acton, OAC Halton, and Elmira were rated in cooperative trials at Elora, Arkell, Woodstock, and Listowel. Damage and diseases were rated on 20 plants per field and on 3 to 6 replicate plots in cooperative trials rated on 20 plants per field and on 3 to 6 replicate plots in cooperative trials on a scale of 0 (no damage or disease) to 9 (most or all of the plant severely damaged or diseased). Winter survival and barley yellow dwarf were rated during the first week of May at Feeke's growth stage 2.0 in commercial fields and during the last week of May at Feeke's growth stage 10.0 in cooperative trials. Spot blotch, powdery mildew, scald, leaf rust, net blotch, and physiological leaf spot were rated at all locations during the last week of June at Feeke's growth stage 11.1.

RESULTS: The results are presented in Table 1. Low winter survival was characteristic of all cultivars. OAC Acton was very susceptible to powdery mildew. Scald was a major disease on all cultivars except Elmira. In the field, scald was more severe on OAC Halton than on OAC Acton, although in growthroom tests, both cultivars were equally susceptible to the seven races of scald identified in Ontario. The reaction of Huron and Elmira to Ontario races of scald has not been tested. Physiological leaf spot was especially severe on Elmira. Barley yellow dwarf was generally severe in early spring and on the lower third or more mature plants. Spot blotch, leaf rust, and net blotch were generally slightly to moderately severe on the lower third of all cultivars. Head diseases were not observed.

Table 1. Leaf damage and diseases on winter barley, Ontario, 1988.

	Commercial fields		Cooperative trials			
	Halton	Acton	Halton	Acton	Huron	Elmira
winter survival	4.0	4.3	4.1	4.3	4.3	5.2
Barley yellow dwarf	3.0	2.6	2.0	1.7	0.9	2.7
Spot blotch	1.2	1.3	1.3	1.4	2.1	0.4
Powdery mildew	0.0	5.2	0.0	5.9	0.3	0.0
scald	4.5	2.7	6.3	3.2	4.6	0.4
Leaf rust	1.5	1.9	1.3	2.5	1.6	0.9
Net blotch	1.6	1.6	1.3	2.0	1.3	1.3
Physiological leaf spot	0.8	0.2	2.2	0.3	2.2	6.5

Crop / Culture: Barley

Location / Emplacement: Ontario

Name and Agency / Nom et Organisation:
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Title / Titre: VIRULENCE OF RHYNCHOSPORIUM SECALIS IN ONTARIO TO BARLEY

METHODS: One hundred and sixty isolates of Rhynchosporium secalis, cause of scald in barley, were collected from diseased barley plants from 17 counties in southern Ontario in 1987 and 1988. Pure cultures were initiated from single conidia. Virulence of the isolates was tested against the scald resistance genes Rh2 (Atlas, C.I.4118), Rh2 + Rh3 (Atlas-46, C.I.7323), Rh4 (La Mesita, C.I.7565), $Rh^{2}4$ (Modoc, C.I.7566), Rh3 + Rh5 (Turk, C.I.14400), Rh4 + rh? (Trebi, C.I.936) and Rh9 (Abyssinian, C.I.668) and against cultivars OAC Acton and OAC Halton and the breeding line GW8614 which lack known genes for resistance to scald. Seedlings at the 2-leaf stage were sprayed with 0.4 mL of a suspension containing 2 x 10^5 conidia/mL, maintained in a dew chamber at 100% RH for 48 hours, and returned to the growth room for 12 days. Scald symptoms were rated on a scale of 0 (no disease) to 4 (total collapse of leaf). Disease scores of 0, 1, and 2 were classified as resistant and scores of 3 and 4 were considered susceptible.

RESULTS: All isolates were virulent to the commercial cultivars of winter barley (OAC Acton and OAC Halton) and to the advanced breeding line GW8614 (Table 1). when tested against specific genes for resistance to scald, all isolates were virulent to the $Rh^{2}4$ gene and none were virulent to resistance genes Rh2, Rh4, or the combination Rh2 + Rh3. The collection of isolates were divided into seven races distinguished by their virulence to three cultivars containing resistance genes Rh9, Rh3 + Rh5, and Rh4 + rh? The most common race (61% of isolates) was avirulent to these cultivars, but the other six races had virulence to one, two, or three of these genes or gene pairs.

Table 1. Virulence of isolates of Rhynchosporium secalis from Ontario, 1988

Race	Atlas Rh2	Atlas -46 Rh2 Rh3	La Mesita Rh4	Turk Rh3 Rh5	Trebi Rh4 rh?	Abyss- inian Rh9	Modoc $Rh^{2}4$	GW 8614	OAC Acton	OAC Halton	Isolates No.	Isolates %
1							S	S	S	S	98	61
2						S	S	S	S	S	21	13
3					S		S	S	S	S	21	13
4				S			S	S	S	S	2	1
5					S	S	S	S	S	S	9	6
6				S	S		S	S	S	S	3	2
7				S	S	S	S	S	S	S	6	4

S = susceptible reaction. Unmarked reactions were resistant.

Crop / Culture: Barley, Wheat, Ryegrass, Clover, Pea, Soybean, Potato

Location/ Emplacement: Prince Edward Island

Title / Titre: SURVEY OF COMMERCIAL FIELDS FOR VERTICILLIUM DAHLIAE IN SOIL ON P.E.I.

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MATERIALS AND METHODS: Soil samples were collected early and late in the growing season from 10 x 5 m plots established in a total of 145 commercial fields across Prince Edward Island during 1986, 1987, and 1988. Fields sampled in this survey included barley, wheat, Italian ryegrass, clover, pea, soybean, and potato. All fields had been planted with potatoes at least once in the past 3 years prior to sampling. Soil was sampled by inserting a soil probe 15 cm into the soil at 1 m intervals following an X pattern through the field plots. Fifteen grams of each soil sample were analysed for the presence of Verticillium dahliae microsclerotia following a wet sieve direct plating technique described by Huisman and Ashworth (1974).

RESULTS AND COMMENTS: Microsclerotia of V. dahliae were detected in soil samples from field plots representing all crops investigated (Table 1). Verticillium dahliae was detected in more field plots during 1988 than 1986 or 1987; however, the number of fields with detectable microsclerotia levels varied with the crop grown in the field. In 1987, environmental conditions were warm and dry which was optimum for V. dahliae germination and infection of susceptible plants. The decomposition of infested crop residue ploughed down in 1987, may have increased the number of microsclerotia released in soil and therefore increase the number of fields with detectable soil population levels observed in 1988. Although only a small area of each field was sampled and may not reflect the true proportion of fields infested with V. dahliae, results imply that this soilborne pathogen is spreading within and possibly among commercial fields on Prince Edward Island.

Table 1. Number of commercial fields with detectable soil population levels of V. dahliae microsclerotia during 1986, 1987, and 1988.

Crop	1986		1987		1988	
	No. Field sampled	No. Field infested	No. Field sampled	No. Field infested	No. Field sampled	No. Field infested
Barley	11	5	12	4	11	8
Wheat	5	2	5	1	4	1
Italian Ryegrass	4	2	4	0	4	3
Clover	7	3	7	3	4	3
Pea	4	1	4	1	Na	Na
Soybean	4	3	3	2	4	2
Potato	18	6	14	6	16	11
Total	53	22	49	17	43	28

REFERENCE:

Huisman, O.C. and L.J. Ashworth, Jr. 1974. Verticillium albo-atrum: Quantitative isolation of microsclerotia from field soils. Phytopathology 64: 1159-1163.

Crop / Culture: Barley, Winter Wheat, Ryegrass

Location! Emplacement: Prince Edward Island

Name and Agency / Nom et Organisation:

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Title / Titre: SOILBORNE PATHOGENS INFECTING BARLEY, WINTER WHEAT, AND RYEGRASS IN PRINCE EDWARD ISLAND

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MATERIALS AND METHODS: The purpose of this study was to determine the incidence of crown rot and soilborne pathogens associated with crown and root tissue of barley, winter wheat, and ryegrass grown on P.E.I.. Thirty plants were sampled early, mid and late during the 1986 and 1987 growing season from 4 fields each of barley underseeded with clover, barley, underseeded with ryegrass, winter wheat, and ryegrass. Each plant was rated for crown rot (0 = healthy; 5 = crowns completely rotted causing plant death). Nematode and fungal pathogens were isolated from crown, roots, and soil of the gramineaceous crops.

RESULTS AND COMMENTS: Crown rot incidence was high in all crops sampled during this investigation. Winter wheat and ryegrass had a higher incidence of crown rot than barley. Rhizoctonia solani and Fusarium avenaceum were isolated frequently from all gramineaceous crops particularly winter wheat and ryegrass. Bipolaris sorokiniana and **F.** crookwellense were isolated frequently from barley, particularly in fields underseeded with clover. The incidence of **F.** sambucinum was highest in winter wheat. Rhizoctonia cerealis and **F.** graminearum were isolated infrequently in all crops. Root lesion nematodes (Pratylenchus spp.) were the predominant endoparasitic nematodes isolated from roots of the graminaceous crops, however population levels were low. Barley tended to have higher nematode population levels in roots than ryegrass or winter wheat. Stunt nematodes (Tylenchorhynchus spp.) were the most common ectoparasitic nematode associated with graminaceous crops with winter wheat and ryegrass fields having the highest soil population levels. The pathogens involved with the crown rot complexes of the different graminaceous crops differ with each crop. Bipolaris sorokiniana, **F.** avenacewn, **F.** crookwellense, R. solani, and root lesion nematodes were associated with the crown and root rot complex of barley. In contrast, **F.** avenaceum, R. solani, and the stunt nematode may be involved with crown and root rot complex of winter wheat and ryegrass. The importance and role of each organism in the disease complex of the various graminaceous crops grown on P.E.I. requires further investigation.

Crop/Culture: Oats

Location/Emplacement: Quebec

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Title / Titre:

A SUMMARY OF DISEASES OF OATS IN QUEBEC IN 1988

METHODS: Most experimental sites of cereals in Quebec were visited from 13 July to 10 August. At each site, diseases were identified and assessed in a number of lines and cultivars. Growth stages at time of assessments ranged from medium milk to soft dough.

RESULTS: Speckled leaf blotch (*Septoria avenae* f.sp. *avenae*) occurred throughout the province and was the most important disease in the oat crop this year. Its severity was moderate in most growing areas and ranged from scattered at Ste. Anne de Bellevue (southwestern Quebec) to above average at La Pocatière (Lower St. Lawrence), and Normandin (Lake Saint-Jean).

Light to moderate infections of yellow dwarf (BYDV) were observed in most areas but only traces were found at Deschambault (Central Quebec). Severe cases were not detected.

Interaction of speckled leaf blotch with yellow dwarf was noticeable at Lennoxville (Eastern Townships). It caused more pronounced darkening of the foliage than either single disease. The overall severity was moderate.

Crown rust (*Puccinia coronata*) was virtually absent from most areas even southwestern Quebec where it is usually highly prevalent. At La Pocatière it was however the most severe disease in the crop and the most susceptible cultivars suffered very severe damage. A late infection occurred at Pintendre (Quebec City district).

Stem rust (*Puccinia graminis* f.sp. *avenae*) was not detected at any significant level.

Fusarium head blight (*Fusarium graminearum*) was found to a limited extent at Lennoxville and Pintendre.

Crop / Culture: Spring Wheat and Spring Barley

Location / Emplacement: Central Saskatchewan

Title / Titre: DISEASE SURVEY OF IRRIGATED CEREALS IN SASKATCHEWAN IN 1988

Name and Agency/ Nom et Organisation:

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(The support of the Saskatchewan Agriculture Development Fund is acknowledged.)

METHODS: The sites studied were located along the South Saskatchewan River and associated irrigation canals from Hague to Riverhurst. Twenty-one fields of spring wheat and 4 fields of spring barley were surveyed three times during the growing season for diseases by collecting 40 plants from 10 sites in each field. All of the fields were irrigated by a center pivot system except for one field which utilized a flood system. Sampling began 10m inside the outside wheel track of the pivot and a diamond pattern was followed with each collection site being 10m apart. Individual plants were rated for foliar diseases using a 0–9 scale (Couture, L. 1980. Can. Plant Dis. Surv. 60: 8–10). Common root rot was rated by scoring the percent discoloration present on subcrown internodes using the Horsfall-Barrett Grading System. At harvest time, the same fields were visited again to collect head samples. These were used to assess head and kernel discoloration. Representative samples of internodes, leaves, glumes and seeds were saved for examination and/or plating to determine causal agents.

RESULTS: Plant samples were collected on the following dates with growth stages (Tottman, D.R. and Broad, H. 1987. Ann. Appl. Biol. 110: 441-454) given in brackets: June 13–15 (G.S. 14–24), July 11–13 (G.S. 61–77) and July 25–26 (G.S. 83–87). The average foliar disease in spring wheat for each of these periods was 0.9, 1.5 and 3.2, respectively while in spring barley it was 0.1, 1.4 and 2.2, respectively. A rating of 3.2 indicates the upper and middle leaves to be free of disease symptoms while the lower leaves show 10% symptoms. On the first sampling date only one field of wheat exhibited limited leaf mottling symptoms. These symptoms were not observed later in the season. The average rating for common root rot for spring wheat was 3.0, 8.7 and 19.5 percent, respectively for the three collection times while for spring barley it was 4.9, 7.8 and 15.9 percent, respectively. Take-all is suspected in one barley field at a level of 8% and also in two wheat fields at levels of 8 and 16%, respectively. Positive identification of the causal agent has not been done yet. The disease, however, was not severe enough to kill the affected plants. Head samples were collected Aug. 17–19 from all 21 wheat fields; however, only two barley fields could be sampled as the other two had already been harvested. The average head discoloration (glume blotch symptoms) for wheat was 2%, and 1.4% of the kernels exhibited smudge/blackpoint symptoms. Pink kernels were found only in one wheat field at a level of 1%. The average head discoloration found in the two barley fields was 0.5% with no trace of smudge/blackpoint or pink kernels. Loose smut occurred in several fields at levels less than 1% affected plants. Determination of the causal agents of disease symptoms found on internode, leaf, glume and seed samples has yet to be done.

Crop / Culture: Spring bread wheat

Location/Emplacement: Southwestern Quebec

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Title / Titre:
SURVEY OF SPRING BREAD WHEAT DISEASES IN SOUTHWESTERN QUEBEC IN 1988

METHODS: Eighteen fields of six spring bread wheat cultivars were surveyed for leaf, root, and head diseases throughout the different regions of southwestern Quebec in 1988. Fpliar disease severity was assessed ON 10-20 plants at 10 sites along a W transect about 100 m long across the field. Samples of about 10 plants were taken from each site to assess for root diseases in the laboratory. Leaf diseases were evaluated before heading as percentage leaf area affected on the whole plant, and after heading on only the top leaves, using the Horsfall and Barratt grading system. Root diseases were assessed by using a scale from 0-9 (0 = healthy, 9 = severe). Head blight was assessed as the percentage infected spikelets on 50 heads chosen at random at each site.

RESULTS AND COMMENTS: Table 1 gives the minimum - maximum percentage disease incidence recorded before and after heading for the diseases observed throughout the season. Before heading tan spot (Pyrenophora tritici-repentis) was observed in all fields but came earlier and with more intensity in fields where wheat stubbles from the previous year's crop remained on the surface. After heading, the spots were a mixture of tan spot and septoria leaf blotch (Septoria nodorum) very difficult to differentiate by visual observation. Powdery mildew (Erysiphe graminis) was observed in all the fields of cultivars Katepwa and Columbus before heading but not on Max. Leaf rust (Puccinia recondita) was observed only in trace amounts on cv. Max very late in the season ~~all~~ was observed only in two fields: a trace amount in the cv., Max and a quite severe infection in one field of cv. Columbus where up to 0.5% of the plants were affected. Fusarium head blight was observed in all fields of cv. Max and Columbus but in only two fields of cv. Katepwa. Up to 3.0% infected spikelets were recorded in one field of the cv. Max. The four fields of cv. Katepwa which escaped from head blight infection had stopped flowering after the long drought period which prevailed in June and early July. This drought period is also responsible for the low intensity of the other diseases except powdery mildew.

Table 1. % infection range of three cultivars of spring wheat at eighteen sites before and after heading in southwestern Quebec in 1988.

Growth Stages*	% minimum - maximum disease severity				
	Leaf Spots	Powdery Mildew	Head Blight	Leaf Rust	Take-All
Max					
40 - 49	0.1-0.7	0	-	0	-
75 - 83	0.2-7.5	0	0.3-3.0	0-tr.	0-tr.
Katepwa					
40 - 49	0-1.9	0.6-3.0	-	0	0
75 - 83	2.1-9.8	0.6-3.0	0-0.2	0	0
Columbus					
40 - 49	0.1-2.6	1.6-6.2	-	0	-
75 - 83	1.7-11.3	1.6-3.2	0.3-1.2	0-0.5	

*Zadoks et al. growth stages.

REFERENCES:

1. Horsfall, J.G. and R.N. Barratt, 1945. An improved grading system for measuring plant diseases. Phytopathology 35(8): 655 (Abstr.)

2. Zadoks, J.C., T.T. Chang, and C.F. Konzak, 1974. A decimal code for the growth stages of cereals, Weed Res, 14(6): 415-421.

Crop / Culture: Wheat, Oat, Barley

Location / Emplacement: Central Alberta

Name and Agency / Nom et Organisation:
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Title / Titre: Cereal Disease Incidence in Central Alberta - 1988

WEATHER: Cereal crops in central Alberta suffered from poor germination; a result of the combination of low snow fall in the winter of 1987 - 1988 and almost no rainfall in April and May. The summer rains brought belated germination resulting in uneven crops and late germinating weeds. In spite of this, central Alberta recorded near normal crop yields and quality, and for barley bumper yields. Disease levels in the cereal crops were generally low.

METHODS: In early August cereal fields were selected at random in the central Alberta counties of Ponoka, Lacombe and Red Deer which form part of Census District 8. Fields were transversed in an inverted V and disease levels were noted by visible symptoms. Four categories were used based on percent leaf area of subcrown internode area diseased: trace < 1%; slight < 5%; moderate 5 - 25%; and severe > 25%. In dealing with whole plant diseases (e.g. take-all) the same categories were applied to the percent of plants infected in square metre samples.

SPRING WHEAT: Fourteen wheat fields were examined which represents about 1 field per 7500 acres sown. Common root rot (Cochliobolus sativus and Fusarium spp.) appeared in all fields but there was only 1 field in each of the slight and moderate categories. Septoria leaf blotch (Septoria spp.) occurred in 93% of the fields examined, but only 1 field exhibited a moderate amount of lesioning on the upper leaves. Powdery mildew (Erysiphe graminis) appeared in 50% of the fields examined, all of them in the trace or slight categories. Leaf rust (Puccinia recondita) occurred in low amounts in 64% of the fields but severely infected both the lower and upper leaves of one field just east of Lacombe. This was an unusual observation for our area as leaf rust is usually of minor importance here. Take-all (Gaeumannomyces graminis) infected 1/3 of the fields sampled but only at trace levels. Prematurity blight (Cochliobolus sativus and Fusarium spp.) was present in one field and stem melanosis (Pseudomonas cichorii) was present in three. Neither of these diseases exhibited more than trace levels of severity. Glume blotch (Septoria nodorum) was present in 21% of the fields, again only in trace to slight amounts.

OAT: Four oat fields were examined, representing 1 field for every 26,000 acres sown in the area. Oat is a very disease-free crop in our area. Blast is the major problem, with 100% of fields usually affected. Generally blast is quite mild in its symptoms and this year was no exception. Only 1 field had over 5% of the florets blasted, the rest had 1% or less. Septoria leaf blotch (Septoria avenae f. sp. avenae) occurred in 75% of the fields but only in trace amounts on the upper leaves.

BARLEY: Twenty-nine barley fields were examined, representing approximately 1 field for every 21,000 acres sown. Common root rot (Cochliobolus sativus and Fusarium spp.) was the most frequently encountered disease but the severity was very low with only 17% of the fields examined rating slight and the remainder (83%) rating clean to trace. Net blotch (Pyrenophora teres) was the most commonly encountered leaf disease with 93% of the fields exhibiting symptoms. Twenty-two percent of the fields had net blotch scores of moderate on the upper leaves and 2/3 of these were two-row barleys. This level of infection at the soft dough stage of development (GS 85) would likely result in loss of grain yield. Scald (Rhynchosporium secalis) was observed in 72% of the fields examined; 29% of these were rated as moderately diseased on the upper leaves. Over 80% of these fields were in the northern part of the area surveyed. Bacterial blight (Xanthomonas campestris) was observed in 2 fields, one each in the slight and trace categories. Barley yellow dwarf was observed in only one field this year - this may be partially due to the timing of the survey. Infected specimens could not be readily distinguished from naturally senescing plants. Powdery mildew (Erysiphe graminis) was present in 14% of the fields examined, with one field having moderate infection on the lower leaves. Loose and covered smut (Ustilago nuda and U. hordei) were observed in 28 and 24% of the fields examined. Each disease had one field in the slight category, the remainder in the trace category.

Crop / Culture: Wheat and barley

Location / Emplacement: Southern Alberta

Title / Titre: DCTECTION OF WHEAT STRIATE MOSAIC VIRUS IN FIELDS OF WHEAT AND BARLEY IN SOUTHERN AUBERTA

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METHODS: Results are based on samples submitted to the Lethbridge Research Station from 12 fields of wheat and 4 fields of barley. Diagnosis was based on leaf symptoms and a leaf dip preparation. A paired comparison of healthy and diseased plants was carried out in a late seeded field of Fielder soft white spring wheat to determine the effect of the virus on the yield components.

RESULTS AND COMMENTS: The presence of a rhabdovirus was confirmed in all the samples of wheat and barley. Examination of leaf dip preparations by transmission electron microscopy detected large numbers of rhabdovirus particles measuring 200–250 X 75 nm which corresponds to the dimensions of American wheat striate mosaic virus. Typically infected plants were often stunted and exhibited a fine, parallel, chlorotic streaking between the veins of the leaves which later developed into a general chlorosis or necrosis of the entire leaf. Observation by the authors and reports from district agriculturalists indicated that the disease was widespread throughout southern Alberta in hard red spring, soft white spring and durum wheat. In most fields the incidence of diseased plants ranged from 5 to 20%. Samples infected with the wheat striate mosaic virus were received from as far north as Drumheller. The yield of diseased plants of Fielder was only 73% of that of healthy plants. This reduction in yield was primarily due to a significant ($P = 0.001$) decrease in kernel weight. Other yield components such as tiller number and seed number per spike tended to be lower in diseased plants but the difference between healthy and diseased plants was not significant ($P = 0.05$).

Crop / Culture: Wheat and Oat

Location / Emplacement: Manitoba and eastern Saskatchewan

Name and Agency / Nom et Organisation:
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Agriculture Canada

Title / Titre: Occurrence of Cereal Rusts in Western Canada in 1988

METHODS: Fields of cultivated wheat and oats were examined throughout July in Manitoba and Saskatchewan for wheat leaf rust, wheat stem rust, and stem and crown rust of oats. Samples of rust were obtained from wheat, cultivated oats, wild oats, and wild barley.

RESULTS: Wheat leaf rust (causal agent Puccinia recondita f. sp. tritici) was first observed June 9 in winter wheat at Portage la Prairie, MB. By June 22, despite extremely hot and dry weather, the disease had become widespread in light amounts on spring wheat throughout southern Manitoba and parts of adjacent Saskatchewan. In fields around Dauphin, MB. leaf rust was observed in light amounts in the first week of July. In mid-Suly little or no leaf rust was observed in many fields in the Red River Valley which had been subjected to intense heat and drought stress. However, by the end of July heavy amounts of leaf rust were found on susceptible cultivars at Portage la Prairie, MB., Brandon, MB., Dauphin MB., Indian Head, SK., and Melfort, SK. Fields of late planted Katepwa and Neepawa cultivars near Yorkton, SK. and Dauphin, MB. were observed to have moderate amounts of leaf rust on the flag leaves. Yield losses to leaf rust in these fields may be expected as the rust infections were present before the completion of anthesis and grain filling. Wheat stem rust (Puccinia graminis f. sp. tritici) was observed in the second week of June in southern Manitoba. However the disease did not progress beyond trace amounts in western Canada due to the hot, dry weather and the use of resistant cultivars. Only trace amounts of oat crown rust (P. coronata) and oat stem rust (P. graminis f. sp. avenae) were observed due to the drought conditions and use of resistant cultivars.

Crop / Culture: Wheat and Barley

Location / Emplacement: Manitoba

Title / Titre: Incidence of Plant Diseases in Wheat and Barley in Manitoba in *1988*

Name and Agency / Nom et Organisation:

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METHODS: Results based on samples of wheat and barley submitted to the Plant Pathology Laboratory and field examinations.

RESULTS:

Wheat Wheat yields were severely reduced in much of southern Manitoba because of the drought conditions of *1988.* The most severely affected area was in the Central region bordered by Plum Coulee, Altona and Morden. Yields were reduced up to 50%. The leaf diseases Septoria leaf blotch (Septoria spp.), and tan spot were not a problem in *1988* in most areas as a result of predominantly dry weather, (exception Dauphin area). Leaf rust developed late in July and was quite prevalent in fields near Portage, Dauphin and Swan River. Based on foliar fungicide trials in the Dauphin area yield reductions due to leaf rust were less than *10%.* Barley yellow dwarf virus was found in several fields near Minnedosa and Portage. A newly described virus like disease, Flame chlorosis, was detected at low levels in several wheat fields near Portage. Common root rot (Cochliobolus sativus and Fusarium spp.) was found in 30% of samples submitted to the Manitoba Agriculture, Plant Pathology Laboratory. Environmental stress damage (ie) low soil moisture, high temperatures, was detected in *24%.*

Problems Encountered on Wheat in Manitoba [1] in *1988*

Disease	Percentage of Fields
Common root rot and seedling blight	30
Leaf rust	8
Septoria complex	*5*
Tan spot	*3*
Barley yellow dwarf	*6*
Storage fungi	*5*
Environmental stress	*24*
Herbicide injury	*11*
Insect damage	*5*

1 Based on *102* samples submitted to Manitoba Agriculture, Plant Pathology Laboratory

BARLEY The incidence of leaf diseases on barley was less in *1988* than normal. Environmental stress was the main cause of yield loss and in the central region south of Winnipeg yields were severely reduced. The estimated yield reduction was 36%. Table 2 presents results of analysis of samples submitted to the Manitoba Agriculture, Plant Pathology Laboratory. The barley yellow dwarf virus disease was again high in *1988* but thg yield reduction was less than in *1987,* rapid maturation of crop reduced potential for yield loss. Flame chlorosis, a newly described virus like disease, was found in samples from 4 fields in the Minnedosa area of southwestern Manitoba in a few fields up to *20%.* Net blotch (Pyrenophora teres) was generally low but was diagnosed in *6* sample5 of 13%. Yield loss from net blotch was less than 5%. Herbicide injury symptoms were diagnosed in one sample.

Table 2: 1988 Barley Disease Problems in Manitoba[1]

Disease	Percentage of Fields
Virus diseases	20
Common root rot	16
Net blotch	13
Environmental stress	42
Herbicide injury	2

[1] Based on 45 samples submitted to the Manitoba Agriculture, Plant. Pathology Laboratory

Crop / Culture: Wheat

Location/Emplacement: Southern Manitoba

Name and Agency / Nom et Organisation:

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Title / Titre: Incidence Of Fusarium Head Blight In Manitoba Spring Wheat In 1988

METHODS: Twenty-five wheat fields were sampled for Fusarium head blight (FHB) on August 3 and 5, 1988. One survey route extended south of Winnipeg to Rosenfeld; the second northeast of Winnipeg to Lac du Bonnet. Fields were selected at random along the survey routes. FHB was identified visually by sampling an area of about 50 x 30 m near the edge of each field. Disease levels were categorized as trace when < 0.5% of heads were infected. Heads were collected at each location for identification of any Fusarium spp. present.

RESULTS AND COMMENTS: Nineteen of the fields sampled were bread wheats and six were of semi-dwarf type. No durum fields were encountered along the survey routes. Crop maturity at the time of sampling ranged from late milk to hard dough. FHB at trace disease severity was detected in only one field. This was of semi-dwarf type and located at the eastern periphery of Winnipeg, near the junction of highways #100 and #15. The region northeast of Winnipeg received somewhat more rain in 1988 than the Red River Valley where drought conditions prevailed. In 1987 FHB had been most prevalent and severe in the Red River Valley south of Winnipeg. The general lack of rain likely curtailed the development of FHB in southern Manitoba in 1988. Yield loss, quality downgrading and mycotoxicological problems associated with FHB were therefore not a factor in wheat production in southern Manitoba this year. Evaluation of all Fusarium spp. present on (mainly) symptomless heads has not been completed at this time. F. graminearum was isolated from kernels and glumes from the one field where FHB was identified.

Crop / Culture: Wheat

Location / Emplacement: Province of Quebec

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Title / Titre: INCIDENCE OF WHEAT DISEASES IN QUEBEC IN 1988

The development of many of the common wheat diseases was affected this year by a long drought period in June and early July. Fusarium head blight (F. graminearum) was observed mostly on later seeded plots which flowered in July after the drought. Powdery mildew (Erysiphe graminis) was favored by the dry condition early in the season and was moderate to severe on susceptible cultivars in southwestern Quebec. Leaf spots (Pyrenophora tritici-repentis mixed with Septoria nodorum) were widespread as usual during the late dough stages in only moderate quantities. Glume blotch (Septoria nodorum) was observed in low quantities in the Eastern Townships and in trace amounts in the Quebec City area. Leaf rust (Puccinia recondita) was light to moderate only in the Eastern Townships, Deschambault, and Quebec City regions. Take-all (Gaeumannomyces graminis), ergot (Claviceps purpurea), and loose smut (Ustilago nuda) were observed in only trace amounts throughout the province.

Crop / Culture: Winter Wheat

Location / Emplacement: Saskatchewan

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Title / Titre: Foliar Disease Survey Of Winter Wheat In Saskatchewan, 1988

METHODS: In 1988, 84 winter wheat fields (cultivar Norstar) were included in a disease survey. Three sampling trips were taken across Saskatchewan, the first from 10 May to 31 May, the second from 7 June to 23 June, and the third from 30 June to 13 July. Many fields were too ripe for meaningful rating or had been harvested for grain or baled for feed by the third sampling date.

RESULTS: In fields in the brown soil zone, no disease was observed at the first two sampling dates. In the third sampling period all fields visited had moderate leaf spot and glume blotch symptoms. On average, less than 1% of the flag leaf was affected: disease was much more severe on the middle and lower leaves. Leaf rust was present in trace amounts in 25% of fields sampled in late June.

No disease was found in fields in the dark brown soil zone at first sampling. By the second sampling date, 70% of the fields had symptoms of leaf spot, mostly restricted to middle and lower leaves. Trace amounts of leaf rust were found in 25% of these fields, primarily in the extreme eastern part of the province.

Trace amounts of powdery mildew and leaf spotting diseases were found on lower leaves in 30% and 40% of the fields surveyed in the black soil zone in late May. At the second sampling date powdery mildew and leaf spotting diseases were restricted to middle and lower leaves in 45% and 100% of the fields sampled. Leaf rust was found in trace amounts in 10% of the fields.

Septoria nodorum was isolated with much greater frequency than Pyrenophora tritici-repentis from foliar lesions collected from the brown and dark brown soil zones. The reverse was true for samples from the black soil zone.

Crop/Culture: Winter wheat

Location/Emplacement: Southwestern Quebec

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Title/Titre: SURVEY OF WINTER WHEAT DISEASES IN SOUTHWESTERN QUEBEC IN 1988

METHODS: Four fields of the cultivar Augusta, two of Monopol, and two of Frederick were surveyed for leaf, root, and head diseases in eight different localities of the county of Ste. Hyacinthe in Southwestern Quebec in 1988. Foliar disease severity was assessed on 10-20 plants at 15 sites along a W transect about 200 m long across the field. Samples of about 10 plants were taken at each of the sites to assess for root and basal stem diseases in the laboratory. Leaf diseases were evaluated at the Zadoks et al. growth stages 31, 45, 59, 75, and 85. Root, stem, and head diseases were evaluated at growth stage 59. Disease levels on leaves were recorded as percentage leaf area affected on the whole plants before heading and on top leaves only after heading, using the Horsfall and Barratt grading system. Root and basal stem disease severity was assessed using a scale from 0-9 (0 = healthy, 9 = severe). Head blight was assessed as the percentage of infected spikelets on 50 heads chosen at random at each site.

RESULTS AND COMMENTS: The range of infection obtained for Fusarium head blight, stem necrosis due to Bipolaris sorokiniana or Fusarium sp., Take-all (Gaeumannomyces graminis) and at five growth stages for leaf spots (mixture of Pyrenophora tritici repentis and Septoria nodorum) and powdery mildew (Erysiphe graminis) are presented in Table 1. Before heading tan spot was observed in all the fields whereas afterwards the spots were a mixture of Septoria and Pyrenophora very difficult to differentiate. Heaviest and earliest infections of tan spot was observed in the three fields where wheat stubbles from last year's wheat crop remained on the soil surface. Powdery mildew was present on the three cultivars and only five fields at growth stage 31 before heading. The eight fields were infected at growth stage 45, and after heading, infection of top leaves did not go beyond 5% of the leaf surface area. Leaf rust (Puccinia recondita) was observed only very late in the season on the three cultivars in five fields. Head blight (Fusarium graminearum) was observed only in trace quantities in three fields where flowering occurred after the drought period in June. Basal stem necrosis was usually slight and superficial except in two fields of the cultivar Augusta where 1-2% stems showed a more severe infection. Take-all was observed only in trace amounts in two fields. The very long drought period in June and early July explains the low incidence of most of the diseases except for powdery mildew.

Table 1. % infection of diseases of winter wheat at eight sites and five growth stases in southwestern Quebec in 1988.

	% minimum - maximum disease severity				
Growth Stages*	Leaf Spots	Powdery Mildew	Head Blight	Leaf Rust	Stem Necrosis
Before heading**					
31	1.1-2.3	0-3.2	-	-	-
45	2.1-2.3	0.3-5.7	-	-	-
After heading***					
59	0-1.8	0-1.8	-	-	0-11.0
75	0-1.2	1.2-2.3	-	-	-
85	2.3-6.5	0.3-4.7	0-tr.	0-2.9	-

*Zadoks et al growth stages.
**Disease assessment on whole plants.
***Disease assessment on top leaves only.

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1. Horsfall, J.G. and R.W. Barratt. 1945. An improved grading system for measuring plant diseases. Phytopathology 35(8): 655 (abstr.).

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Crop / Culture: Cereals

Location/ Emplacement: Southern Alberta

Name and Agency / Nom et Organisation:

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Title / Titre: CEREAL DISEASES DIAGNOSED AT THE SOUTHERN ALBERTA REGIONAL CROP LABORATORY

In 1988, the Regional Crop Laboratory at the Alberta Special Crops and Horticultural Research Center received 100 cereal specimens for disease diagnosis. The diagnoses are listed in Table 1. Note that numbers of disease within columns exceed the total number of specimens for that crop because some specimens had more than one disease. The non-pathogenic disorders affecting barley, durum, and hard red spring wheat were primarily related to drought. On winter wheat, the feeding injury of the brown wheat mite, Petrobia latens (Muller), was the predominant non-pathogenic disorder.

Table 1. Summary of cereal specimens diagnosed, January 1 - October 26, 1988.

	Barley	Durum	HRSW	Soft Wheat	Winter Wheat	Others	Total
Total No. of Specimens	33	12	36	5	8	6	100
Fungal Diseases	24	1	11	5	4	3	48
Glume Blotch (a)			6	1			7
Spot Blotch (b)	5		2				7
Common Root Rot (b)	4	1	2	2		2	11
Net Blotch (c)	4						4
Powdery Mildew (d)	2			1	1		4
Leaf Rust (e)	2			1	1		4
Scald (f)	2						2
Sooty Mold (g)	2						2
Covered Smut (h)	2						2
Fusarium Root Rot (i)	1		1		1		3
Take-All (j)					1		1
Ergot (k)						1	1
Viral Diseases	8	1	5	1			15
Barley Stripe Mosaic	5						5
Barley Yellow Dwarf	2						2
Wheat Streak Mosaic		1		1			2
Undetermined	1		5				6
Bacterial Diseases						2	2
Non-Pathogenic Disorders	12	13	28	2	4	3	62

(a) Septoria nodorum
(b) Bipolaris sorokiniana
(c) Drechslera teres
(d) Erisyphe graminis f.sp. hordei, E. graminis f.sp. tritici
(e) Puccinia hordei, P. recondita
(f) Rhynchosporium secalis
(g) Alternaria spp., Cladosporium spp.
(h) Ustilago hordei
(i) Fusarium culmorum
(j) Gaeumannomyces graminis var. tritici
(k) Claviceps purpurea

Crop / Culture: Cereals

Location / Emplacement: Prince Edward Island
New Brunswick
Nova Scotia

Name and Agency / Nom et Organisation:
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Title / Titre: CEREAL DISEASE PROFILE IN THE MARITIME PROVINCES - 1988

WEATHER CONDITIONS: In general, moisture was adequate in the early portion of the growing season. Mid to late season moisture levels significantly contributed to the development and progression of most foliar and head diseases. Temperatures were normal.

BARLEY: Scald, incited by Rhyncosporium secalis, was primarily associated with early seeded barley fields and was not a serious problem in 1988. Symptoms of scald tended to be restricted to the lower foliage and did not progress up the plant to any great extent.

Net blotch, incited by Pyrenophora teres, was the predominate foliar disease of spring barley throughout the region. The 1987 production year was very dry and resulted in the production of seed with a low incidence of P. teres. This may have been partially responsible for a relatively slow development and progression of net blotch symptoms in 1988, until later stages of growth when rainfall levels increased and promoted disease progression. Yield loss attributed to net blotch was more likely associated with the 2-row cultivars than with the 6-row cultivars.

Fusarium infection of barley heads, by Fusarium graminearum, has not been a problem in previous years, as relates to yield loss, however in 1988 a number of fields were identified in which fusarium head blight was severe. Six-row cultivars appeared to be more susceptible than 2-row cultivars.

SPRING WHEAT: While the 1987 spring wheat crop was not adversely affected by disease, with very low disease severity, as a result of unusually dry weather, the general severity of disease on the 1988 crop was more normal for the Maritime Region.

Powdery mildew, incited by Erysiphe graminis, was a more important disease in 1988 than in previous years. The cultivars Vernon and Max which were resistant up until 1988, were infected, in some instances to severe levels due to the overcoming of effective resistance. The overcoming of resistance occurred throughout the Maritime Region. Other cultivars such as Ketepwa which lacks resistance reported severe disease levels. Milling wheat cultivars which are produced at high nitrogen fertility levels were treated routinely with a fungicide for powdery mildew control. Under these conditions, little disease was observed due to the effectiveness of the fungicides utilized in milling wheat production.

Septoria leaf blotch and septoria glume blotch, incited by Septoria nodorum, were recorded at moderate to severe levels throughout the region. Reports of widespread severe septoria glume blotch in some areas of New Brunswick and Prince Edward Island were actually related to an infestation of the wheat midge which caused head discolouration similar to that of septoria glume blotch.

Fusarium head blight was the leading yield and quality reducing disease in all three provinces. The disease, incited by Fusarium graminearurn, was particularly destructive in eastern Prince Edward Island and parts of New Brunswick where more rainfall was recorded than normal for the later part of the growing season. Yield losses were significant in some areas. Fusarium head blight resulted in lower grades for milling wheats with a large number of seed lots being downgraded as a result of tombstone kernel levels.

WINTER WHEAT: Winter wheat was subjected to the same diseases as spring wheat but the severity was lower due primarily to earlier crop maturity. The 1988 disease profile and severity was similar to previous years. Snow molds were not as severe and winter survival was good, in part a result of adequate snow cover, and the absence of the customary mid-winter thaw and associated ice sheeting. Milling winter wheat cultivars are susceptible to powdery mildew, incited by E. graminis, but these

cultivars are produced with protection provided via foliar applied fungicides, and thus powdery mildew was not a serious yield limiting disease. In fields where foliar fungicides were not applied, the disease was yield limiting.

The severity of fusarium head blight did not approach that associated with spring wheat. While the crop was not disease free, severity was in general low.

SPRING TRITICALE: This crop was observed only in New Brunswick where fusarium head blight was very severe and resulted in high levels of mycotoxin contamination.

~~OATS~~: Speckled leaf blotch, incited by Septoria avenae, was the only foliar disease of any consequence on oats throughout the Maritime region. This was consistent with reports of previous years.