Cereals / Cereales

CROP: Cereals

LOCATION: Maritime Provinces

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TITLE: CEREAL DISEASE PROFILE IN THE MARITIME PROVINCES - 1992

Weather Conditions: Winter conditions were in general not conducive to survival of winter wheat crops. Temperatures were low and snow cover often poor. Ice sheeting was a serious problems in many fields. The spring and summer conditions were more conducive to the production of small grain cereals. The May planting period was characterized by normal temperatures and below average rainfall. Moisture levels were variable with most areas being average through June, as were the temperature means. Conditions in July were about 3°C below normal, while in some locations rainfall was dramatically up over the long term mean. In PEI the July rainfall was twice normal levels. Temperatures returned to normal levels in August and while rainfall in Nova Scotia was well below average, PEI levels were still twice the 30 year average.

Barley: Weather conditions from planting to mid-season did not promote rapid development of the two most common foliar diseases, net blotch and scald, incited by *Pyrenophora teres* and *Rhynchosporium secalis* respectively. Net blotch was at low levels in Nova Scotia and New Brunswick. In PEI net blotch severity was low until after heading when severity increased rapidly to moderate levels. On PEI significant scald was not apparent until after heading when the disease progressed rapidly. In general the severity of scald was greatest on six row cultivars compared to two row cultivars, although there were variations. This was particularly evident in one experimental trial where several of the two row cultivars had the highest scald levels. When severe disease symptoms did occur, these were in general at a late growth stage and impact on yield was low, and excellent yields were obtained. Fusarium head blight, incited by *Fusarium graminearum* and other species, was not a problem in 1992, and there were only a few incidences of loose smut, incited by *Ustilago nuda*, being a problem.

Wheat: The severe winter conditions resulted in wide-spread winter killing of winter wheats. In general weather conditions were favourable for spring wheat production and yields were consistently above average. Septoria leaf and glume blotch, incited by *Sepforia nodorum*, were not serious problems and symptoms developed later in the season than normal. Powdery mildew, incited by *Erysiphe graminis* f.sp. *tritici*, was not a significant problem in most areas. The decline in production of mildew susceptilble winter wheats due to winter kill coupled with less production of milling wheat, which requires high nitrogen fertility, contributed to the lowered importance of this disease. Late season weather conditions were favourable for harvest, while fusarium head blight, incited by *Fusarium graminearum* and other species, was not a serious problem, only isolated heads displayed symptoms. Loose smut, incited by *Ustilago tritici*, was found on susceptible cultivars such as Max, but generally only at low incidence levels. Most seed is treated with fungicides which keeps the incidence low. Take-all, incited by *Gaeumannomyces graminis,* was noted only in isolated patches in a few fields.

Oats: Speckled leaf blotch, incited by *Sepforia avenae,* was the only major disease recorded on this crop and severity was below the long term average. Some BYDV was present and several suspected but isolated cases of bacterial blight were noted. Crown rust, incited by *Puccinia coronata*, was found to be more common than usual, in central Prince Edward Island, but remained at levels which would not cause significant yield loss.

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Manitoba

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TITLE: SURVEY FOR FOLIAR DISEASES OF BARLEY IN MANITOBA, 1992

METHODS: Barley fields in southern Manitoba were surveyed for foliar disease incidence and severity between July 20 and August 14, 1992. The 122 fields were selected at random every 10-20 km along the survey routes depending on crop frequency and availability. At each site 10 or more plants along a diamond-shaped transect 25 m long per side were examined for symptoms. Disease levels were estimated visually in both the upper (flag and flag-1 leaves) and lower canopies using a four-point scale: trace (<5% leaf area affected): slight (5-15%); moderate (16-40%); and severe (41-100%). Leaf samples were collected and subsequently surface-sterilized and placed in petri dish moist chambers to promote pathogen sporulation to aid in disease identification.

RESULTS AND COMMENTS: Moist and very cool conditions characterized the growing season in much of Manitoba in 1992. Foliar diseases were evident in most fields, and one or more pathogens were isolated from all but one of the 110 fields of 6-row and 12 fields of 2-row barley sampled (Fig. 1). Most fields were in the milk to soft dough stage when examined. Disease severities on upper leaves were mainly in the slight (62% of fields) or trace categories (30%) and on lower leaves were slight (48%) or moderate (36%). These levels suggest that damage to barley from foliar diseases was relatively low in 1992. Early observations indicated, however, that disease levels in fields re-cropped to barley were considerably higher than in fields where rotation had taken place; this and the delayed crop maturity in 1992 suggest that in such fields some loss would have occurred. *Pyrenophora teres* was the predominant pathogen isolated from leaf samples (found in 99.2% of fields); in contrast to previous years, the incidence of *Cochliobolus sativus* was considerably lower (53.5%). *Rhynchosporium secalis* was detected in 9% of fields (a higher level than normal), primarily in western regions. By contrast, *Septoria passerrinii* was isolated from only 4% of fields, a considerably lower proportion than found in 1991. *Colletotrichum graminicola* was isolated from one field near Fraserwood in the Interlake region, and appeared to be responsible for the small leaf spots observed. Based on symptomatology, the predominant foliar disease of barley in Manitoba in 1992 was the net form of net blotch, caused by *P. teres* f. *teres.*

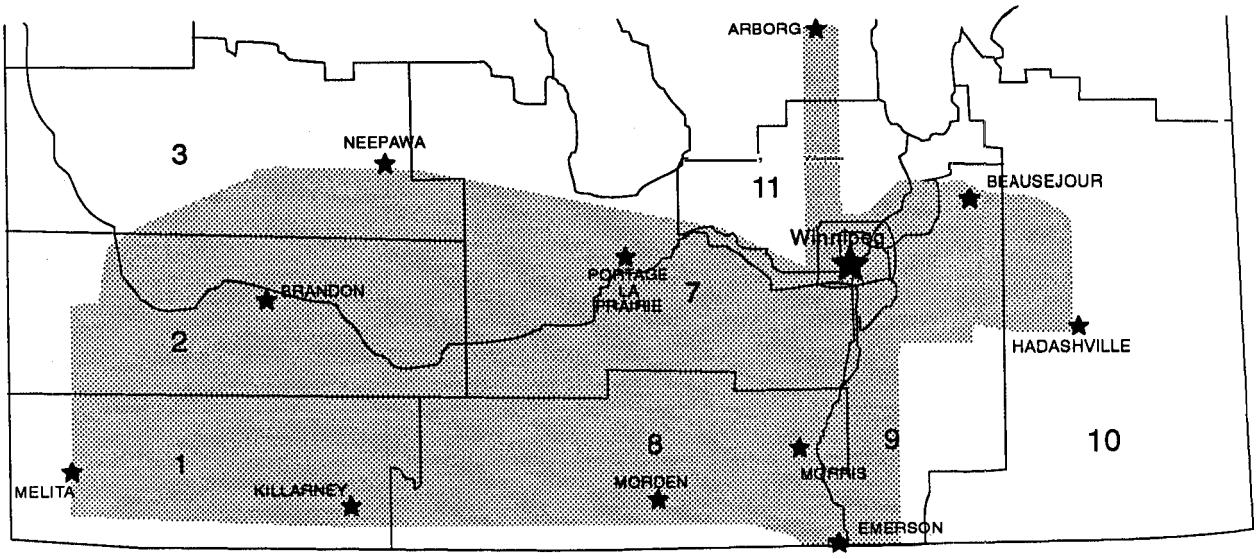

Figure 1. Area of Manitoba sampled for foliar diseases of barley in 1992.

CROP: Barley, *Hordeum vulgare* L.

LOCATION: Saskatchewan and central Alberta

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TITLE: SASKATCHEWAN/CENTRAL ALBERTA BARLEY DISEASE SURVEY, 1992

METHODS: A barley disease survey was conducted in 102 fields in Saskatchewan and 33 fields in central Alberta between flowering and early dough growth stages. Random fields were assessed for the diseases present in a minimum sample of 10 plants taken 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 based on those described by Saari and Prescott (1975) and 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. Three pieces were placed in a petri dish 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. When enough leaf material was available, two plates were done for each sample. On the basis of sporulation and visual symptoms on the leaf surface, estimations were made on the importance of the causal agents, *Pyrenophora teres* (spotted and netted types) and *Bipolaris sorokiniana.*

RESULTS AND COMMENTS: There were 87 two-row and 47 six-row barley fields surveyed. The distribution, severity, and prevalence of diseases by crop districts are shown in Table 1. Leaf spots and common root rot were the most prevalent diseases and were found in more than 87% of the fields. The most important foliar disease was net blotch which occurred in 98% of fields at light to severe levels. Trace to moderate levels of scald occurred in 39% of the fields. Scald was most severe in the northern crop districts of Saskatchewan and crop districts bordering on central Alberta and Saskatchewan. Smuts were found at trace to moderate levels in 16% of the fields. There was no leaf rust, and stem rust was only found in one field. Low levels of powdery mildew, barley yellow dwarf virus, ergot, take-all, and bacterial blight were rarely found.

A summary of the most prevalent diseases showed that two-row barleys had more severe leaf spots, scald, and common root rot infections than the six-row barleys (Table 2). Leaf spots and common root rot were present in at least 90% of the fields of two- and six-row barley. However, scald was seen in 57% of the six-row barley fields and only in 33% of the two-row barley fields. Smut was more severe and more prevalent in the six-row barleys. Leaf samples from 14 fields of six-row barley showed that the net form of net blotch (*P. feres* f. *teres)* was the most important leaf spot occurring in 12 samples while spot blotch *(B. sorokiniana)* occurred in 3 samples. Leaf samples from 28 fields of two-row barley indicated that the net form of net blotch occurred in 24 samples, the spot form of net blotch (*P. teres* f. *maculata*) in 6 samples, and spot blotch in 8 samples.

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Observations were recorded on previous crop in both the barley and wheat disease surveys in 1992 (Table 3). The most common rotations were a cereal crop followed by a cereal (44%), summerfallow followed by a cereal (31%), and an oilseed followed by a cereal (21%). Four percent of the fields were zero or minimum-till cereals. Leaf spot diseases appeared to be more severe in zero-till fields and in continuous cereals. However, the average leaf spot ratings in the various rotations were similar when the results from 1991 and 1992 were combined. Common root rot was more severe in barley than wheat but there was no clear association with crop rotation.

REFERENCES

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2. 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 barley diseases in Saskatchewan and Alberta fields surveyed between milk to early dough stages in 1992.

Crop district	No. fields	Net blotch	Scald	CRR %	Smut %	Leaf rust	Stem rust	Powdery mildew	BYDV %	Ergot %	Take-all	Bacterial blight %
SASKATCHEWAN												
1A	4	3.014 *	TR/1	5614	1.013	-					TR/1	
1B	3	2.613	TR/1	3713		-					TW	
2A	1	2.0/1		3011		-						
2B	1	5.011		45/1		-						
3A	0	**				-						
3B	4	6.414		28/3		-						
4A	1	5.011		2011		-						
4B	2	6.5/2		2512	TR/1	-					TR/1	
5A	5	3.2/5	TW2	1814	TR/1	-						
5B	6	4.916	TW3	1516	TR/1	-						
6A	3	5.013		3813		-						
6B	9	4.419	TW2	3118	1.312	-				0.02/1	-	
7A	3	7.313		25/2		-			0.01/1			
7B	2	5.012	5.011	40/2		-						
8A	21	3.7120	3.6/10	31/19	1.012	-	1R/1			-	-	
8B	23	5.1121	1.014	23/20		-				-	-	
9A	9	5.619	1.815	4319	0.0512	-		2.012		-	-	
9B	5	7.015	4.0/1	3813		-				-	-	
ALBERTA												
5	1	6.0/1	5.0/1	1011		-						
8	32	5.3131	5.9122	8/25	TR/10	-				TW2	-	TR/1
Average or total	135	4.711 32	2.7153	3011.17	0.5122	-	1R/1	2.0/2	0.01/1	0.0213	TW3	TR/1

* Average disease rating (0-9 scale after Couture 1980)/number of fields affected.
** Not observed or not recorded.

Table 2. Distribution and severity of the prevalent diseases of two- and six-row barleys in Saskatchewan and Alberta in 1992.

Crop district	Row type	No. fields	Net blotch	Scald	CRR %	Smut %
SASKATCHEWAN						
1	2	2	5.512 *	TR/1	5912	
	6	5	3.515	TR/1	3815	1.013
2	2	2	3.512		3812	
	6	0	**			
3	2	4	5.714		2813	
	6	0				
4	2	3	5.513		2313	TR/1
	6	0				
5	2	7	6.217	2.513	2017	TR/1
	6	4	2.914	TR/2	11/4	TR/1
6	2	7	5.317		2716	
	6	5	4.215	TR/2	3815	1.312
7	2	5	6.215	5.011	3314	
	6	0				
8	2	24	5.0123	2.819	26123	1.011
	6	20	4.2118	1.6110	24116	1.011
9	2	9	6.617	4.0/1	46/7	0.512
	6	5	3.615	1.815	2215	
ALBERTA						
5	2	1	6.011	5.011	1011	
	6	0				
8	2	13	6.0112	6.7110	10111	TR/1
	6	10	4.6119	5.1112	6/14	TR/10
Average or total	2	77	5.5173	3.7126	291619	0.416
	6	56	3.8156	1.8132	23149	1.4/17

* Average disease rating (0-9 scale after Couture 1980)/number of fields affected.
** Not observed or not recorded.

Table 3. Effect of previous crop on leaf spot and common root rot ratings of wheat and barley grown in Saskatchewan in 1992.

Previous crop	Current crop	No. of fields		Leaf spot rating (0-9)		Common root rot (%)	
Summerfallow	Cereal	60	(113)*	5.1	(5.8)	21	(22)
	Barley	25	(47)	4.7	(5.7)	25	(30)
	Wheat	35	(6)	5.3	(5.9)	16	(15)
Cereal	Cereal	84	(131)	5.3	(5.9)	18	(19)
	Barley	26	(45)	5.5	(6.2)	20	(25)
	Wheat	58	(86)	5.1	(5.7)	16	(14)
Oilseed	Cereal	41	(56)	4.3	(5.8)	23	(24)
	Barley	11	(20)	4.7	(6.3)	29	(26)
	Wheat	30	(36)	3.8	(5.2)	17	(22)
Zero-till cereal	Cereal	6		5.8		23	

* Numbers in parentheses are totals or averages of 1991 and 1992.

CROP: Barley, Oat and Wheat

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: STEM RUSTS OF CEREALS IN WESTERN CANADA IN 1992

METHODS: Surveys of barley, oat, and wheat fields for stem rust incidence and severity were conducted in Manitoba and eastern Saskatchewan in July and August 1992. Samples for race identification were also obtained from field plots and trap nurseries in the four western provinces.

RESULTS AND COMMENTS: In the prairie region of Canada, the stem rusts of wheat, oat, and barley were very light in 1992. All recommended wheat cultivars are resistant to stem rust, therefore no losses are expected in commercial production. However, little rust appeared in susceptible plots in nurseries. In commercial barley fields, the maximum infection levels were 1-2%, with no losses. All oat cultivars recommended for the rust area of the prairies are resistant to stem rust, but only light infections were observed on wild *Avena fatua*. In the Okanagan Valley of British Columbia, there were reports of near total crop failure in at least one field of barley (cv. Duke) due to stem rust. Samples were received at the Winnipeg Research Station (courtesy of G. Jesperson). To date no important changes in virulence of any of the stem rusts have been detected.

CROP: Barley, Oat and Wheat

LOCATION: Manitoba and Saskatchewan

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TITLE: CEREAL SMUT SURVEY, 1992

METHODS: In July 1992, cereal crops were surveyed for *Ustilago hordei, U. nigra, U. nuda, U. tritici, U. avenae,* and *U. kolleri* in Manitoba and Saskatchewan. The area was covered by a route from Winnipeg-Swift Current-Kindersley-Yorkton-Prince Albert-Swan River-Winnipeg and one day trips north and south of Winnipeg. Fields were selected at random at approximately 15 km intervals, depending on the frequency of the crops in the area. An estimate of the percentage of infected 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 51% of the fields of barley, 20% of the common wheat, 77% of the durum, and 23% of the oat. The average levels were 0.4% for barley, 0.1% for durum wheat and common wheat, and trace for oat. The most smut observed at any one site was 7% loose smut and 5% covered smut in one field of barley near Swan River, Manitoba.

COMMENTS: The amount of smut in cereals remains relatively low, reflecting the low moisture levels of recent years. The increase of smut in common wheat is due to an increase in production of susceptible semi-dwarf cultivars.

Table 1. Incidence of smut in cereals in Manitoba and Saskatchewan in 1992.

Crop	No. fields	Smut species	% Fields affected		Mean % infected plants	
			MB	SK	MB	SK
Common wheat	256	*U. tritici*	28	14	0.2	0.1
Durum wheat	43	*U. tritici*	57	81	*0.2*	0.1
Oat	39	*U. avenae*	7	25	tr*	0.1
		U. kolleri	*0*	13	*0*	0.1
Barley	185	*U. nuda*	60	35	0.3	0.1
		U. hordei	9	6	0.1	tr
		U. nigra	9	14	0.2	0.1

* tr = less than 0.1%

CROP: Oat, *Avena sativa* L.

LOCATION: Quebec

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TITLE: A SUMMARY OF DISEASES ON OAT CROPS IN QUEBEC IN 1992

METHODS: Most experimental sites of cereals in Quebec were visited at least once from mid-July to mid-August. At each visited site, diseases were identified and their severity assessed in a number of oat lines and cultivars. Plant samples were also collected at random from field crops at various locations in the Eastern Townships and in the Lower St. Lawrence region in August. They were tested in the laboratory for PAV-BYDV using ELISA technique. Growth stages of plants at the times of assessment or sampling ranged from medium milk to medium dough.

RESULTS AND COMMENTS: The disease picture was somewhat modified when prevailing weather conditions differed notably from the normal situation. The most drastic changes to the growth season occurred in July when the precipitation record was more than twice the long term average. At the same time, the monthly average temperature dropped nearly 3° C.

Moderate levels of speckled leaf blotch (*Stagonospora avenae)* were observed although its occurrence was general. The disease developed later in the season than it usually does, resulting in lower records. The Lac Saint-Jean region was the most affected in the province.

At locations where crown rust (*Puccinia coronata)* is usually found, small amounts were detached. The highest severity occurred as usual in the south-west part of the province but light symptoms only were recorded. The disease was absent or limited to traces elsewhere.

Stem rust (*Puccinia graminis*) appeared to be absent as is usually the case in the province.

Foliage symptoms of yellow dwarf (Barley Yellow Dwarf Virus) were found throughout the province up to moderate levels in general and moderate to severe in the north-west crop district. Infection appeared to have come late. The experimental oat lines Q.O. 615.6 consistently showed somewhat severe symptoms. Tolerant cultivars released from the former Agriculture Canada breeding program at Sainte-Foy displayed their advantage. Fifty-five percent of plant samples were tested positive for PAV-BYDV (they were not tested for MAV). There was a general increase in aphid populations which were much higher than normal.

An outbreak of oat blast was highly noticeable. Its occurrence was common. Hot temperature at the time of tillering may be partly responsible for this. BYDV iinfection also is one of the known causes of this disease. The resulting damage of blasted florets was more severe than foliage diseases in many fields. Some naked oat cultivars such as AC Hill and AC Percy were more severely affected than others.

Although of limited importance, smut diseases (*Ustilago* spp.) appear to be on the increase in farmers fields. This is likely the result of a tendency of lessening seed treatment quality as well as of a general decrease in use of seed treatments.

CROP: Oat, *Avena sativa* L.

LOCATION: Manitoba and eastern Saskatchewan

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TITLE: CROWN RUST OF OAT IN WESTERN CANADA IN 1992

METHODS: Surveys for oat crown rust incidence and severity were conducted in Manitoba and eastern Saskatchewan from early July to late August 1992. Crown rust samples were obtained from wild oat *(Avena fatua* L.) in field surveys and from susceptible oat lines grown in uniform rust nurseries located near Beausejour, Brandon, Emerson, Morden, and Shoal Lake, Manitoba. For virulence phenotype (race) identification, rust collections were established on a susceptible cultivar, Makuru. Twenty single-gene oat lines, carrying Pc35, Pc38, Pc39, Pc40, Pc45, Pc46, Pc48, Pc50, Pc54, Pc55, Pc56, Pc58, Pc59, Pc60, Pc61, Pc62, Pc63, Pc64, Pc67, and Pc68, were used as differentials.

RESULTS AND COMMENTS: Crown rust of oat was first observed in trace amounts in susceptible oat in southern Manitoba on July 14. The unusually moist conditions and low temperatures during the growing season restricted the development of the rust and kept infections light in most parts of the province. By mid-August levels of crown rust infections generally ranged from light to moderate in wild oat and susceptible oat in rust nurseries, and light in commercial oat fields. In 1992 crown rust was not found west of Virden, Manitoba.

To date, 47 of the 140 single-pustule isolates identified from the rust collections were virulence phenotypes that can attack the presently recommended cvs. Dumont, Riel, Robert, AC Marie, and the newly released AC Belmont. These cultivars rely mainly on genes Pc38 and Pc39 for crown rust resistance. Another important finding of the 1992 survey is the detection of virulence to crown rust resistance gene, Pc68. For the second year, phenotypes with combined virulences to this gene and other Pc genes were isolated from resistant traps grown in the rust nurseries. Pc68 was isolated from wild *Avena sterilis* in 1982, and is being used in oat breeding programs in Winnipeg and Ottawa to enhance the resistance in the current well-adapted cultivars with Pc38 and Pc39. For longer term effectiveness, it is imperative that Pc68 be used in combination with other effective resistance gene(s), in addition to Pc38 and Pc39.

CROP: Spring Wheat

LOCATION: Quebec

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TITLE: DISEASES OF WHEAT IN QUEBEC IN 1992

METHODS: The incidence of diseases was recorded on different lines and cultivars of spring wheat at ten localities in the seven regions surveyed in Quebec in 1992. Disease severity assessments was made during the late milk to soft dough stage.

RESULTS AND COMMENTS: Powdery mildew *(frysiphe graminis)* was observed mostly at St. Hyacinthe and Lennoxville with a moderate infection on susceptible cultivars. Infections were very low at Deschambault, Normandin, and St-Eugene. It was not observed at Ste-Rosalie, Ste-Anne de Bellevue, and Pintendre.

Leaf spots caused mostly by *Pyrenophora tritici-repentis* and mixed later in the season with *Septoria nodorum,* were as usual widespread throughout the province. The overall severity was intermediate at all locations with maximum intensity at Deschambault.

Glume blotch *(Septoria nodorum)* occurred as usual mostly at Lennoxville where its severity was low. It was also observed in trace amounts at Deschambault.

Leaf rust *(Septoria nodorum)* occurred as usual mostly at Lennoxville where its severity was low. It was also observed in trace amounts at Deschambault.

Leaf rust (*Puccinia nodorum)* occurred late in the season on susceptible cultivars mostly at St-Hyacinthe and Deschambault. Its overall intensity was moderate. It occurred only in trace amounts at other localities.

Fusarium head blight *(Fusarium graminearum)* varied from low to severe at St-Hyacinthe and Ste-Rosalie. Severity was low to moderate in the Drummondville, Sherbrooke, and Quebec City regions, and very low at other locations. Loose smut (*Ustilago tritititici*) was seen mostly in low quantities on the cultivars Max and Casavant.

Take-all *(Gaeumannomyces graminis)* did not occur extensively being restricted to the northern region in low quantities. It occurred in only three fields at St-Hyacinthe with low and moderate infections.

Barley Yellow Dwarf virus was observed only at St-Hyacinthe on winter wheat cultivars where winter survival was very low again this year.

CROP: Spring Wheat

LOCATION: Quebec

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TITLE: SURVEY OF SPRING WHEAT DISEASES IN 1992

METHODS: Sixteen wheat fields (1 of Aquino, 1 of Celtic, 1 of Glenlea, 2 of Laura, 1 of Laval-19, 5 of Max, 2 of Messier, 2 of Norseman, and 1 of Roblin) were surveyed for diseases at Zadoks et al. growth stage[1] 31, 59, 77, and 85. The intensity of foliar diseases was assessed on plants observed at 10 sights along a W transect in the fields. Samples of 10 plants were pulled out at each sight at ZGS 77 to note stem and root diseases. Leaf diseases were noted up to heading as a percentage grading system[2]. After heading, the flag leaves only were assessed. The number of heads, as well as the number of spikelets per head, showing symptoms of *Fusarium* head blight were counted on rows of 50 heads at four different sites in each field.

RESULTS AND COMMENTS: Table 1 gives the minimum-maximum percent disease severity recorded before and after heading. At heading, learf diseases were low: tan spot *(Pyrenophora tritici-repentis*) was seen only in trace amounts except for one field of cultivar Max with a maximum of 0.5% flag leaf area affected. Powdery mildew (*Erysiphe graminis)* was observed on only three cultivars with a maximum of 1.2% leaf area affected on Roblin. After heading, leaf spots increased gradually affecting a maximum of 4.7% leaf area of flag leaves at ZGS 77, and up to 8.0% at ZGS 85. Powdery mildew was observed only on Roblin with a maximum infection of 4.0% flag leaf area. Leaf rust (*Puccinia recondita*) was very low even at ZGS 85. Slight stem necrosis caused by *Bipolaris* sp. and *Fusarium* sp. on basal portion of stems was seen on up to 21.7% of stems of cultivar Max and from 0-10% on all the other cultivars. *Fusarium* head blight *(F. graminearum*) affected all cultivars with less than 1% infected heads except on Norseman with 2.9%, Max with 4.5% and the maximum on Celtic with 6.9% (52.0% infected spikelets). Take-all *(Gaeumannomyces graminis)* was observed with less than 1% infected plants in a field of Max and one of Messier. However from 10-15% of the plants in one field of Laval 19 were affected.

Table 1. Prevalance and intensity of spring wheat diseases in the St-Hyacinthe region in 1992.

		Percent minimum-maximum disease intensity[2]						
							Head blight	
Growth Stages[1]		Leaf spots	Powdery mildew	Leaf rust	Stem necrosis	Take-all	Heads	Spike-lets
Before heading*		0-2.6	0-0.5	0				
Heading**	59	0-0.5	0-1.2	0				
After Heading**	77	tr.-4.7	0-3.5	0-tr				
	85	0.7-0.8	0-4.0	0-tr.	0-21.7	0-15.0	0.1-6.9	1.0-52.0

1 Zadoks *et al.* Growth stages of cereals. 1974. Weed Res. 14(6).
2 Horsfall and Barratt grading system. 1945. Phytopathology 35 (8):635 (Abstr.).
* Disease assessment on all the leaves.
** Disease assessment on flag leaves only.

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba

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TITLE: FOLIAR DISEASES OF SPRING WHEAT IN MANITOBA IN 1992

METHODS: Surveys for diseases of spring wheats were conducted in southern Manitoba between 9 July and 14 August 1992. Leaves were collected from 187 fields (136 common, 13 durum, 38 semi-dwarf) between heading and soft dough stages of development. 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. Samples of diseased leaf tissue were surface sterilized and placed in moisture chambers for 5-7 days to promote pathogen sporulation and confirm disease identification.

RESULTS AND COMMENTS: Abundant rain and cool temperatures throughout the growing season promoted leaf-spotting diseases in fields across the surveyed area in 1992 (Fig 1). One or more pathogens were isolated from all but one of the fields. Disease severity levels were light (1) on upper leaves and moderate (2) on lower leaves in samples collected in July. In later-collected samples upper leaves had moderate (2) and lower leaves moderate to severe (2-3) levels. Lower leaves had senesced in many late-surveyed fields. The pathogens, *Septoria nodorum,* S. *tritici,* and *S. avenae* f. sp. *triticea* (septoria leaf blotch complex), *Pyrenophora tritici-repenfis* (tan spot), and *Cochliobolus sativus* (spot blotch) were isolated from 82.9%, 73.8%, and 53.5% of fields, respectively (Table 1). The prevailing conditions may have favoured development of *S. tritici* and reduced incidence of *C. sativus* compared to other years. *Septoria triticiwas* widespread in Manitoba for the first time in 5 years, but incidence and severity of *C. sativus* was lower than in 1989-1991. *Septoria tritici* was not isolated from durum wheat. Incidence of *Septoria* diseases has increased steadily from 34% in 1989, 45% in 1990, 61% in 19911, to more than 80% in 1992. The increase is most likely due to higher rainfall in the past 2 years in combination with conservation tillage practices. The cool moist summer also favoured development of tan spot which was found at higher levels than in 1991.

Table 1. Frequency of diseases identified in 187 wheat fields in Manitoba in 1992.

Wheat type	Septoria leaf blotch			Tan spot	spot blotch
	'nodorum'	*'avenae'*	*'fritici'*		
Common	90	38	50	98	71
Semi-dwarf	28	12	9	28	23
Durum	9	4	0	12	6
Total	127	54	59	138	100
Fields (%)	67.9	28.9	31.6	73.8	53.5

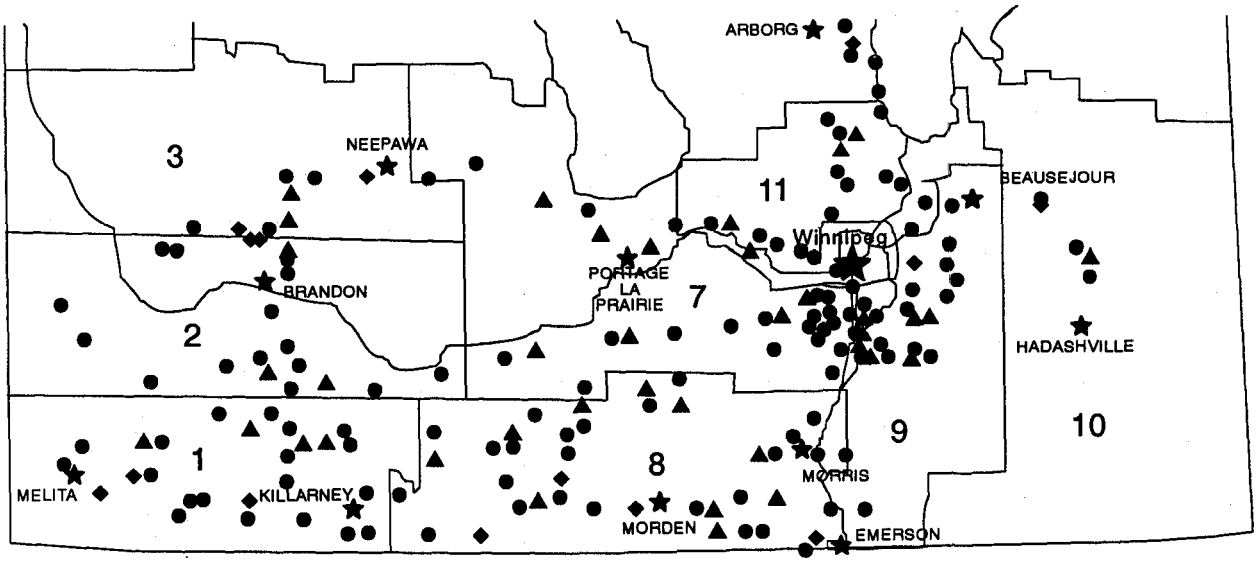

Fig. 1. Crop districts and locations of common (●), durum (◆), and semi-dwarf (▲) wheat fields surveyed for foliar pathogens in 1992.

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Manitoba

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TITLE: OCCURRENCE OF FUSARIUM HEAD BLIGHT IN MANITOBA IN 1992

METHODS: A survey for fusarium head blight (FHB) in spring wheat fields was conducted in southern Manitoba between 29 July and 14 August 1992. Heads were examined in 100 fields (68 common, 5 durum, 32 semi-dwarf) between watery-ripe and soft dough stages of development. The percentage of heads affected with blight was estimated in each field. Glumes and kernels from sampled heads were surface sterilized and incubated on 15% V8 juice agar for 5-7 days to confirm diagnosis and for species identification.

RESULTS AND COMMENTS: Fusarium head blight was found in 36% of wheat fields examined but did not occur as far west or east as in 1991 (Fig. 1). It was found in 34% of common, 35% of semi-dwarf, and 40% of durum wheat fields. Severity ranged from trace to 4% of heads infected and was lower than that found in the past two years. Severity levels in all wheat classes were similar. As in past years the more severely infested fields were found in crop district 8, and *F. graminearum* was the principal causal species (Table 1).

Table 1. Distribution of *Fusarium* species in common, durum and semi-dwarf wheat fields in southern Manitoba in 1992.

	No. wheat fields			
Fusarium spp.	Common	Semi-dwarf	Durum	Total
F. graminearum	19	11	2	32
F. crookwellense	2	5	1	8
F. culmorum	3	2	1	6
F. avenaceum	1			1
F. poae		1		1
F. equiseti			1	1

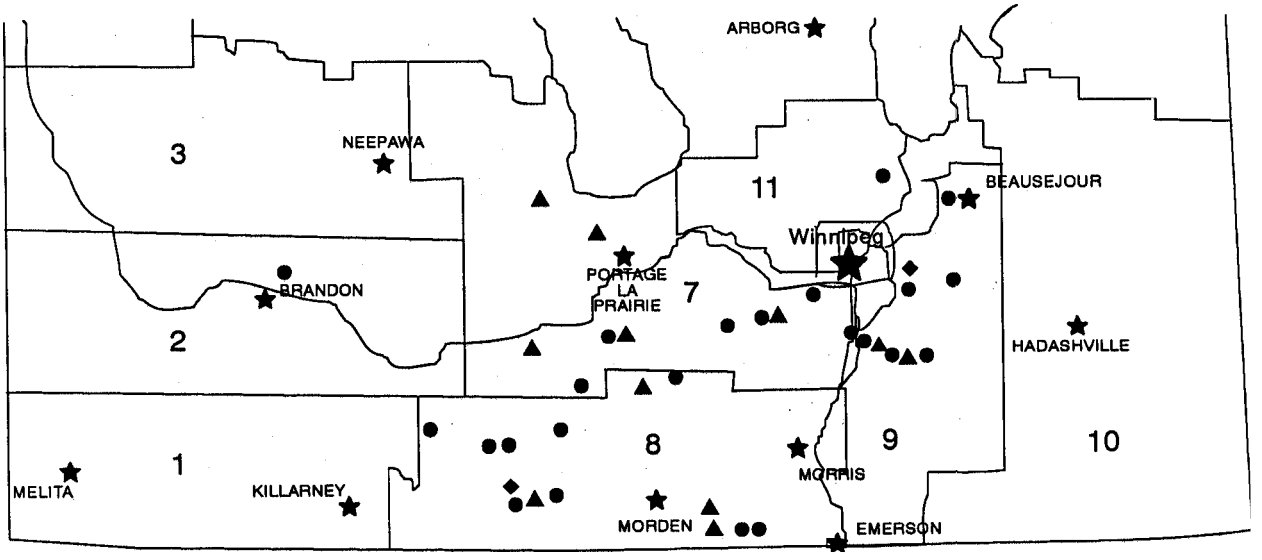

Fig. 1 Crop districts and locations of common (●), durum (◆), and semi-dwarf (▲) wheat fields positive for fusarium head blight in 1992.

CROP: Wheat and Barley

LOCATION: Manitoba & eastern Saskatchewan

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TITLE: 1992 SURVEY OF FLAME CHLOROSIS IN MANITOBA AND EASTERN SASKATCHEWAN

BACKGROUND: Surveys for flame chlorosis (FC), a soil-borne, virus-like disease of spring cereals (1-3), have documented its spread and apparent intensification since it was first observed in western Manitoba in 1985 (1). Until 1988 FC was observed only in barley, but it has since been confirmed in wheat and oat (3), triticale (6), and two grassy weed species (7). Starting from the base established with the 1990 survey, the annual FC surveys monitor the epidemiological trend of the disease. The 1992 survey sought to examine areas of Manitoba and eastern Saskatchewan not covered in earlier surveys to determine whether FC was spreading to areas outside the main disease centres in western Manitoba and the Red River valley south of Winnipeg.

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. Agricultural survey personnel familiar with the visual diagnosis of FC recorded survey data using the surveying method described previously (2).

Specimens of FC plants from fields where the disease was observed were forwarded promptly to the Plant Pathology Laboratory of Manitoba Agriculture to confirm the diagnosis (2). About one tenth of putative FC-positive specimens and those specimens which could not be diagnosed with certainty as FC-positive on the basis of visual symptoms were tested by dot-blot assay for FC-specific RNA (4) to confirm reliability.

RESULTS AND COMMENTS: Earlier surveys (2,5) contained no reports of FC in barley and wheat in southcentral and extreme southwestern Manitoba. The 1992 survey indicates that this is because the disease is absent (cf. map) or present at extremely low levels in this area, an observation consistent with the hypothesis of a link between FC and high frequencies of continuous cereal cultivation (3). The area south of Ashern in the northwest Interlake region recorded FC for the first time in 1992.

The 1992 FC survey in eastern Saskatchewan continues the systematic effort begun in 1991 to monitor the disease beyond the borders of Manitoba, following from the 1990 discovery of FC in western Manitoba within a few km of the Saskatchewan border. No FC was observed at 42 sites (7 barley, 35 wheat fields) in eastern Saskatchewan within a 50-80 km-wide strip bordering Manitoba from approximately 49° 30'N to 51° 50'N.

The extension of the FC host range to a grassy weed species noted in the 1991 survey (5) was strengthened in 1992 with the demonstration that barnyard grass (*Echinochloa crusgalli*

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L.) as well as green foxtail *(Setariaviridis* L.) were hosts of the agent that caused **FC** in barley and wheat (7). **A** more extensive FC host range among monocot species, might increase the threat posed by FC to cereal grain cultivation in certain parts of Manitoba.

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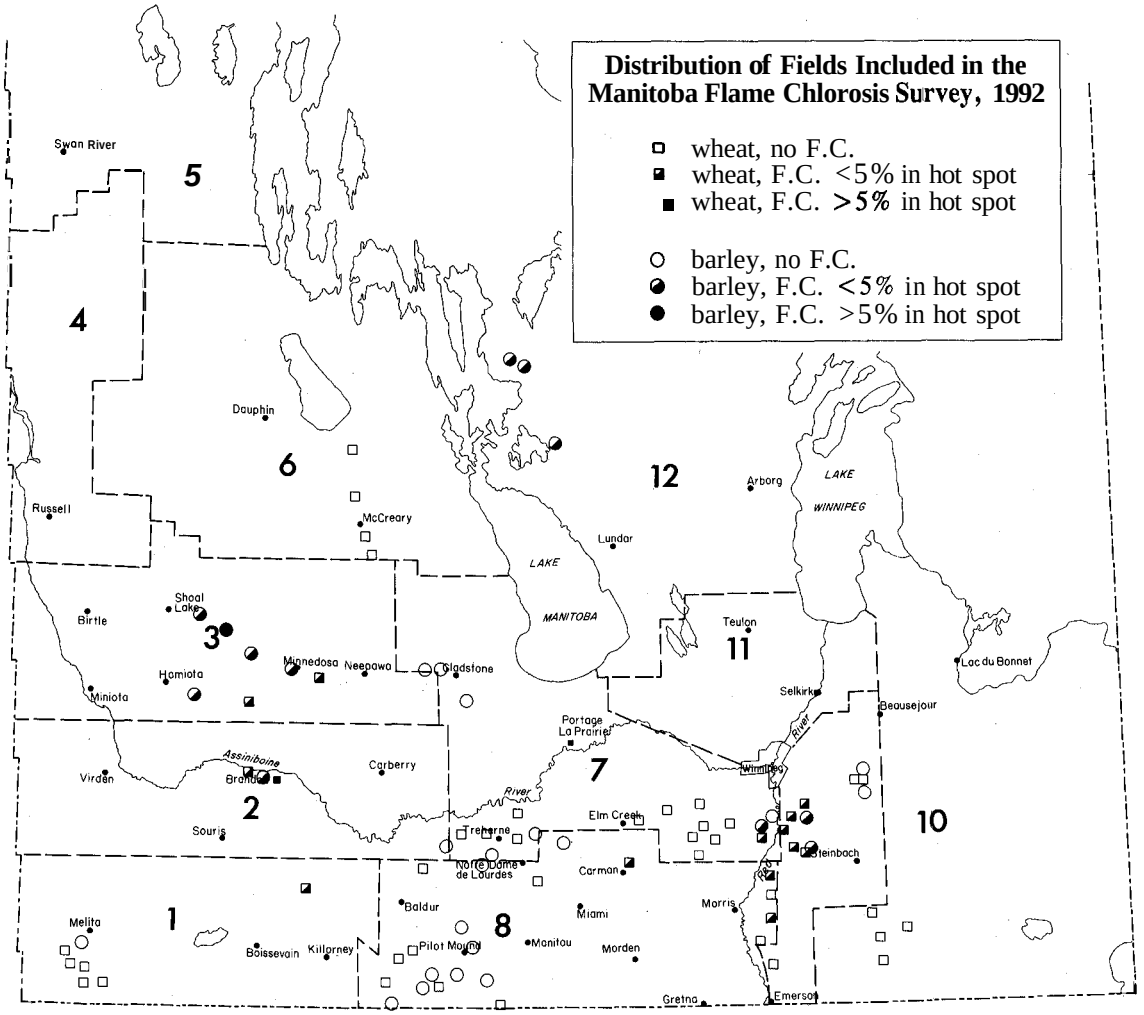

CROP: Wheat, *Triticum aestivum* L.

LOCATION: Saskatchewan and central Alberta

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TITLE: SASKATCHEWAN/CENTRAL ALBERTA WHEAT DISEASE SURVEY 1992

METHODS: A province wide survey of Saskatchewan was conducted in 220 wheat fields between flowering and early dough growth stages. Fifteen wheat fields were surveyed in the area of Lacombe, Alberta. Disease was assessed in random fields on a sample of 10 plants taken 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 based on those described by Saari and Prescott (1975) and 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. Three pieces were plated on water agar containing 100 mg/L streptomycin sulfate and 50 mg/L vancomycin hydrochloride. When enough leaf tissue was available, two plates were done for each sample. The plates were 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 on the leaf surface, estimates were made on the importance of the following causal agents: *Septoria nodorum*, S. *tritici*, *S. avenae* f. sp. *triticea,* and *Pyrenophora tritici-repentis. Bipolaris sorokinina* was noted on some samples but did not appear to be a significant pathogen.

RESULTS AND COMMENTS: There were 211 hexaploid and 24 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 (99% of the fields lightly to moderately infected), common root rot (65% of the fields with severely infected1 plants), glume blotch (trace levels in 40% of fields), and leaf rust (trace to moderate infections in 32% of fields). Low levels of powdery mildew were observed in 10% of fields surveyed. These fields were mainly in the eastern and northern crop districts of Saskatchewan but higher severities were observed in five fields around Lacombe. Take-all occurred in 7% of the fields and smuts in 6%. The incidence of take-all in these fields ranged from less than 1% to a high of 10%. In the southeast corner *of* Saskatchewan, 12 cases of wheat streak mosaic virus were noted. Low moisture levels in the spring and early summer and cool growing temperatures resulted in highly stressed and late developed crops in most areas of Saskatchewan.

In central Alberta, aphids were present in 40% of the fields examined and occurred in higher numbers than normally seen. Ergot *(Clavicepspurpurea)* and eyespot *(Pseudocercosporella herpotrichoides)* were found in trace amounts in four and five fields, respectively, in crop district 8. The incidence of take-all *(Gaeumannomyces graminis)* appeared to be increasing compared to previous years and was mixed with eyespot infections.

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Pyrenophora tritici-repentis was the major leaf spotting pathogen on hexaploid wheat except in crop districts 2A and 4A where *Septoria nodorum* was more important (Table 2). *S. tritici* was less common and *S. avenae* f. sp. *triticea* was not found. The distribution of fungi was variable throughout the regions of the province. The percentage of *P. tritici-repentis* was less in the southeast corner of Saskatchewan (crop districts 1 and 2). Higher percentages of *S. tritici* were isolated from leaf samples collected from central Saskatchewan (crop districts 5, 6, and 7). In durum wheats, *P. tritici-repentis* was the most important leaf spotting pathogen (Table 3). It represented 90% or more of the leaf spotting fungi in 22 of the 24 durum fields.

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Table 1. Distribution, severity, and prevalence of wheat diseases in Saskatchewan and Alberta fields surveyed between milk and early dough stages in 1992.

Crop district	No. fields	Leaf spot	Leaf rust	CRR %	Powdery mildew	Glume blotch	Ergot %	Smut %	Take-all %	BYDV %	Bacterial blight	WSMV (%)	Eye spot (%)
SASKATCHEWAN													
1A	10	2.8/10*	TR-MSI7	43/10		TR/1		1.014	10.012	-	TR/1	1.012	-
1B	5	2.715	1MS/4	1415								TR/4	-
2A	2	2.512	TR-MS/2	1812									
2B	4	2.414	TR-MS/2	28/4				TR/1				TR/2	
3A	0	**											
3B	34	5.4134	1-40MS/8	23117		TR/22		TR/3	TR/7				
4A	6	6.416	1-20MS/4	1513		TR/6		TR/1	TR/1		-	-	-
4B	7	2.3/7	1MS/1	2815		TW2			1.0/1				
5A	15	4.1115	TW4	23110		TR/1						TR/4	-
5B	16	5.5/15	TR/1	1015	TR/3			1.0/1					
6A	7	5.4/7		1815	TR/1	TR/1				TR/2	-	-	-
6B	16	6.8116	TR/3	1919	TR/1	0.815		0.0111			-	-	-
7A	6	5.7/6	TR/1	2012		TR/2		TR/1			-	-	-
7B	10	5.2/10		19110		TW6		TR/1		TR/1	-	-	-
8A	27	3.7126	1R-5MR/7	19/22	0.518	2.2/15					-	-	-
8B	26	4.5125	1W24	19119	0.1/2	0.4/13					-	-	-
9A	17	5.5117	TR-MS/6	17111	1.5/3	2.0/8		0.0111			-	-	-
9B	12	3.4/12	TR/1	2717		TR/4					-	-	-
ALBERTA													
5	3	6.0/3	5M/1	012	4.512	2.0/3							
8	12	4.8/12	1R/1	3110	4.013	0.5/4	TW4		2.0/7	-	TR/1	-	TR/5
Average or total	235	4.5/232	1R-40MS /77	19/158	1.4/23	0.6/93	TR/4	0.3/14	2.6118	TR/3	TR/2	0.3/12	TR/5

* 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 wheat collected in Saskatchewan in 1992.

Crop district	No. of samples	% of leaf-spot fungi		
		Septoria nodorum	*S. tritici*	*Pyrenophora tritici-repentis*
1A	9	45	2	53
1B	5	40	22	38
2A	2	90	0	10
2B	4	19	4	77
3BS	15	41	6	53
3BN	5	26	1	73
4A	2	53	7	40
4B	3	23	0	77
5A	15	28	17	55
5B	16	16	19	65
6A	7	18	16	66
6B	14	27	12	61
7A	5	14	7	79
8B	11	38	10	52
9A	16	34	3	63
9B	10	36	8	56

Table 3. Estimation of the percentage of leaf-spot fungi on leaf samples of durum wheat collected in Saskatchewan in 1992.

Crop district	No. of samples	% of leaf-spot fungi		
		Septoria nodorum	*S. tritici*	*Pyrenophora tritici-repentis*
1A	1	5	5	90
2B	1	20	0	80
3BS	11	7	0	93
3BN	5	3	0	97
4A	2	35	0	65
4B	3	7	0	93
8B	1	1	0	99
9A	1	0	0	100

CROP: Wheat. *Triticum aestivum* L.

LOCATION: Eastern Prairies

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TITLE: WHEAT LEAF RUST IN THE EASTERN PRAIRIES IN 1992

METHODS: Trap nurseries and commercial farm fields in southern Manitoba and eastern Saskatchewan were surveyed for leaf rust incidence and severity from June to August, 1992.

RESULTS AND COMMENTS: Wheat leaf rust was first detected in 1992 during the second week of June, in winter wheat plots at Portage, Manitoba. However, the lack of southerly winds in June and July reduced the initial amount of inoculum and slowed the general rate of leaf rust increase. By the first week of July, leaf rust was present only in trace amounts at scattered locations throughout southern Manitoba. By the second week of August, leaf rust had increased to moderate severity levels in fields of Katepwa, Neepawa, and Biggar in southern Manitoba. Yield loss due to leaf rust was possible in late planted fields of these cultivars. Leaf rust levels were very low in fields of the resistant cultivars Roblin, Columbus, Pasqua, and Grandin. The severity of leaf rust infection on susceptible cultivars was significantly lower in eastern Saskatchewan. Only trace levels of rust could be found north of Regina. Losses were not expected in this area.