Cereals / Cereales

Crop / Culture: Barley

Location/ Emplacement: Alberta

Title / Titre: INCIDENCE OF EYESPOT IN BARLEY IN ALBERTA, 1989

Name and Agency/ Nom et Organisation: SLOPEK, S.W.
Alberta Agriculture
Box 10, Olds, Alberta
TOM 1P0

LABUN, T.J.
Ciba-Geigy Canada Ltd.
820 - 26 Street N.E.
Calgary, Alberta T2A 2M4

METHODS Barley fields were surveyed for eyespot (Pseudocercosporella herpotrichoides). A total of fifty stems were collected from each field. Samples were collected just prior to swathing or shortly thereafter. The lowest two internodes of each stem were examined for the presence of eyespot lesions. The number of stems with one or more lesions present was noted. The survey area extended from Barrhead to Picture Butte, with the majority of surveyed fields located near Edmonton and Red Deer. Regression analyses were conducted to determine whether eyespot incidence was related to seeding date, target yield and location.

RESULTS: Eyespot was found in ninety percent of the barley fields surveyed. The average incidence of eyespot per field was 24.6%. Crop rotation appeared to have some effect on disese incidence (Table 1). Barley crops following canola had less eyespot (13.0%) than those following barley (26.8%) or wheat (32.2%). Twelve barley cultivars were surveyed. The most common cultivars were Leduc (15 fields surveyed), Harrington (11) and Heartland (5). The average incidence of eyespot per field was 36.4% for Harrington, 28.4% for Heartland and 22.8% for Leduc. There was no correlation between eyespot incidence and seeding date ($r^2 = 0.002$), target yield ($r^2 = 0.015$) or location ($r^2 = 0.010$). Anthracnose (Colletotrichum graminicola) was present in some of the survey fields. There was a high incidence of symptoms (9.6%) which resembled eyespot but were sufficiently different that these were not considered eyespot lesions. It is suspected that these are sharp eyespot lesions (Rhizoctonia solani, R. cerealis). Isolations are presently being conducted.

Table 1. Effect of crop rotation on incidence of eyespot in barley fields in Alberta.

1988 CROP	NO. OF FIELDS SURVEYED	NO. OF FIELDS WITH EYESPOT	EYESPOT INCIDENCE[1]			
			MIN.	MAX.	AVE.	S.E.
BARLEY	29	24	0	82	26.8	24.4
CANOLA	11	11	0	38	13.0	13.0
WHEAT	7	7	4	62	32.2	22.2
OATS	2	2	2	84	43.0	-
SUGAR BEETS	2	2	0	4	2.0	-
FALLOW	2	2	10	74	42.0	-
GRASS	1	1	6	6	6.0	-
TOTAL	54	49	0	82	24.6	24.4

1 - Percentage of stems infected in surveyed fields.

Crop/Culture: Barley

Location/Emplacement: Saskatchewan and bordering areas

Name and Agency/ Nom et Organisation:

Janet A. Weller, and Brian G. Rossnagel
Crop Development Centre
University of Saskatchewan

Title/Titre: Saskatchewan Barley Leaf Disease Survey, 1989

METHODS: 1989 was the third year of Lhe Saskatchewan Barley Leaf Disease Survey. Methods used were as described by Weller and Rossnagel (1988). Samples were obtained from 30 sites; 21 in Saskatchewan, 3 in Alberta, 3 in Manitoba, 2 in North Dakota and 1 in Montana.

RESULTS: Little disease occurred except at sites in the northern portion of the region where adequate moisture was received in 1988 and 1989 - Reaverlodge and Edmonton, Alberta; and Meadow Lake, Medstead, Shellbrook and Nipawin, Saskatchewan. The other areas were affected by the drought in 1988 and/or the dry period of July and August, 1989. A positive relationship was noted between disease severity and the susceptibility of the cultivar providing the barley stubble at the sites.

Spot-form net blotch (Pyrenophora teres f. maculata) was again the most common foliar disease. It occurred in moderate to heavy amounts at 5 sites. Light infections occurred at 8 sites. Trace infections were difficult to distinguish when spot blotch (Cochliobolus sativus) and net-form net blotch (Pyrenophora teres f. teres) were also present. Scald (Rhynchosporium secalis) occurred at one site in heavy amounts, one in moderate amounts, four in light amounts and at ten in trace amounts. Spot blotch occurred at one site in moderate amounts, four in light amounts and twenty-three in trace amounts. Net-form net blotch occurred in light amounts at three sites and as a trace at eighteen sites. Septoria (Septoria spp.) occurred in light amounts at two sites and as a trace at twelve sites. Other diseases noted in non-threatening amounts included stem rust (Puccinia graminis f.sp. tritici), leaf rust (Puccinia hordei), powdery mildew (Erysiphe graminis), halo spot (Selenophoma donacis), smuts (Ustilago hordei and U. nuda), ergot (Claviceps purpurea) and bacterial infections (species unknown). Signs of viral infection were not common and Russian wheat aphids were not found.

At non-Saskatchewan sites, spot-form net blotch, the most common barley foliar disease in Saskatchewan in our 3-year survey, was not a problem in 1989 except at Edmonton. Alberta sites tended to show more scald. United States and Manitoba sites were dry and tended to demonstrate spot blotch infections.

Reference: Weller, J.A. and Rossnagel, B.G. 1989. Can. Plant Dis. Surv. 69: 29.

Crop / Culture: Barley

Location / Emplacement: Manitoba and Saskatchewan

Name and Agency / Nomet Organisation:
P.L. Thomas
Agriculture Canada
Research Station
195 Dafoe Road
Winnipeg, Manitoba R3T 2M9

Title / Titre: BARLEY SMUT SURVEY, 1989

METHODS: In July, **1989, 178** barley fields were surveyed for Ustilago hordei, U. nigra and U. nuda in Manitoba and Saskatchewan. The northern area was covered by a route from Winnipeg-Saskatoon-Prince Albert-Swan River-Winnipeg and the southern area in a one-day trip north of Winnipeg and a route (thanks to J. Nielsen) from Winnipeg-Leader-Elstow-Winnipeg. 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 70% of the fields examined. The average level was 0.8%. The highest incidence of smut observed in any one field was 10% U. nuda in six-row barley near St. Eustache, Manitoba.

COMMENTS: The over-all level of infection (0.8%) was similar to that for the survey of **1988.** This probably reflects the continued warm, dry conditions in **1988,** during the time when the seed for **1989** was infested/infected, and therefore may mean that low levels of smut will be observed again in barley in **1990.**

TABLE 1. Incidence of smut on barley, **1989**

Province	Crop	% fields affected			Mean % infected plants
		U. hordei	U. nigra	U. nuda	
Manitoba	2-row	**6**	**19**	63	**0.2**
	6-row	**17**	**17**	**73**	**1.0**
Saskatchewan	2-row	11	**5**	**41**	**0.1**
	6-row	33	**7**	**70**	1.3

Crop/Culture: Barley

Location/Emplacement: Southeastern Manitoba

Title/Titre: BARLEY LEAF DISEASES IN MANITOBA IN 1989

Name and Agency/ Nom et Organisation:
E. Mueller and A. Tekauz
Agriculture Canada
Research Station
195 Dafoe Road
Winnipeg, Manitoba R3T 2M9

METHODS: Twenty-five barley fields were surveyed in southeastern Manitoba on July 20 and July 26 to assess leaf disease incidence and severity. Fields were chosen at random along the survey routes. Severity was rated visually in both the upper and lower crop canopies by examining plants along an inverted V transect about 50 m long and using a four-point scale: trace (<5% leaf area damaged); slight (5-15%); moderate (16-40%); and severe (41-100%). Representative leaf samples were collected for subsequent pathogen identification. This was done by surface sterilizing infected leaf tissue pieces and placing these in moist chambers to promote sporulation.

RESULTS AND COMMENTS: Of the fields surveyed, 21 were six-rowed and 4 two-rowed. Growth stage at time of sampling was 73-85 (Zadoks scale). No difference in disease severity was apparent between the two barley types. Severity in the upper canopy (top two leaves) was rated as trace in 28% of fields, slight in 60%, moderate in 12% and severe in none. In the lower canopy disease levels were somewhat higher: trace - 20%; slight - 36%; moderate - 36%; and severe - 8%. The 44% of fields with moderate to severe leaf disease on lower leaves likely reflected the frequent and heavy rainfall earlier in the growing season (June), while the relatively low levels on upper leaves resulted from the subsequent very dry conditions during the month of July. The low levels of disease on upper leaves suggest that minimal yield loss resulted from leaf diseases in southeastern Manitoba in 1989. Two pathogens were isolated from leaf lesions - Pyrenophora teres (net blotch) and Cochliobolus sativus (spot blotch); both were widespread and found in 72% and 84% of fields respectively. The enhanced incidence of spot blotch may have been a reflection of the high temperatures prevailing during late June and the month of July.

Crop/Culture: Barley and Spring Wheat

Location/Emplacement: Manitoba

Title/Titre: DISEASES DETECTED IN SAMPLES SUBMITTED TO THE MANITOBA AGRICULTURE PLANT PATHOLOGY LAGORATOKY IN 1989

Nameand Agency/ Nomet Organisation:
R.G. Platford
Manitoba Agriculture
Plant Pathology Labordtory
Agricultural Services Complex
201-545 University Crescent
Winnipeg, Manitoba
R3T 5S6

METHODS: One hundred and thirty-eight samples of spring wheat and 114 samples of barley submitted by agricultural representatives and growers in Manitoba were analyzed for presence of disease.

RESULTS AND COMMENTS:

Wheat: In the 138 samples of wheat examined, 13 were diagnosed with common root rot (Cochliobolus sativus, Fusarium spp.), 8 with barley yellow dwarf (barley yellow dwarf virus), 3 with septoria leaf blotch and glume blotch (Septoria spp.), 2 with flame chlorosis (virus-like organisms), 1 with Fusarium head blight (Fusarium spp.), 1 with take all root rot (Gaeumannomyces graminis), 1 with wheat streak mosaic virus disease, 63 with environmental stress. The large number of wheat samples showing symptoms of stress from low soil moisture and high temperatures were mainly from the southwest region, south and west of Brandon and the Central region from Plumas, Gladstone, Carman and areas south of Carman. There was also a large number of samples (46) which displayed symptoms of herbicide injury.

Barley: In the 114 barley samples, damage related to environmental conditions was detected in 20 samples. Cool spring soil conditions and a prolonged period of hot, dry weather in July and August were the main environmental problems. Flame chlorosis (virus-like organism) became more prominent in 1989 and was found in 17 samples. In most cases damage was less than 10% but the problem is spreading and becoming more severe. The majority of infected fields were in Western Manitoba but a few fields were detected in Eastern Manitoba near Niverville and Glenlea. Barley yellow dwarf virus disease was found in 7 samples. Leaf diseases included net blotch (Drechslera teres), spot blotch (Cochliobolus sativus) and scald (Rhynchosporium secalis) and were found in 24 samples. Infection levels were highest in the eastern region, where yield losses as high as 30% were estimated. Common root rot (Cochliobolus sativus, Fusarium spp.) was detected in 13 samples but the loss in most cases was less than 5%. Herbicide injury was detected in 16 samples and in one field resulted in a total crop loss. Smut was found in 4 samples. Rust (Puccinia graminis) was detected in 2 samples. In 14 samples, no disease and no typical stress symptoms could be detected.

Crop/ Culture: Barley, Winter Wheat

Location / Emplacement: Prince Edward Island

Title / Titre: SURVEY OF ROOT AND CROWN ROT ORGANISMS IN CEREALS AS AFFECTED BY CROP SEQUENCES

Name and Agency Nomet Organisation:
CELETTI, M.J.
P.E.I. Potato Marketing Commission
c/o Agriculture Canada, Research Station
P.O. Box 1210, Charlottetown, P.E.I. C1A 7M8

JOHNSTON, H.W., KIMPINSKI, J. and PLATT, H.W.
Agriculture Canada, Research Station
P.O. Box 1210, Charlottetown, P.E.I. C1A 7M8

MATERIALS AND METHODS: The purpose of this study was to monitor the incidence of crown and root rot pathogens of cereals in crop sequences. Thirty barley and winter wheat plants were sampled early, mid, and late during the 1988 growing season from 4 commercial fields each of the following crop sequences: clover-potato-barley, ryegrass-potato-barley, potato-pea-barley, and potato-pea-winter wheat. Each plant was rated for crown and root rot (0 = healthy: 5 = crowns and roots completely rotted causing plant death). Disease severity was calculated for each plot using the following formula:

$$\text{Disease Severity} = \frac{\sum \left(\text{No. plants in disease category} \times \text{No. value of category}\right)}{\text{Total no. of plants} \times 5} \times 100$$

Fungal pathogens were isolated from crown and root tissue. Nematode and fungi were also isolated from soil collected early and late in the growing season.

RESULTS AND COMMENTS: Moderate crown and root rot severity was observed in the cereal fields investigated during 1988. *Rhizoctonia solani* was prevalent in cereal crowns but not in roots, and soil populations averaged 5.7 colony forming units (cfu)/50 g dry soil and tended to be highest in fields following potato-pea sequences (Table 1). *Bipolaris sorokiniana* and *Fusarium graminearum* were isolated infrequently from crown and roots of both barley and winter wheat. *Fusarium sambucinum* and ***F. avenaceum*** isolated from 8.5% and 12.8% of crowns respectively and tended to be highest in winter wheat. Stunt nematode (*Tylenchorhynchus* sp.) were isolated from soil of both winter wheat and barley, and population levels were highest in soil of barley following ryegrass-potato and potato-pea sequences. Severity of crown and root rot of barley was positively and significantly correlated (P=0.05) with incidence of *R. solani* in crown and roots, *B. sorokiniana* in crowns, and population levels of stunt nematodes in soil. Stunt nematodes have been isolated from soil around roots of cereals grown on P.E.I., however their role in the crown and root rot complex has not been established.

Table 1. Mean incidence and soil population levels of crown and root pathogen isolates from cereals in 1989 following different crop sequences.

	Rhizoctonia solani			*Bipolaris sorokiniana*		*Fusarium sambucinum*			*Fusarium avenaceum*			*Fusarium graminearum*			Stunt	Disease
Sequence[1]	Crown %	Root %	Soil[2]	Crown %	Root %	Crown %	Root %	Soil[3]	Crown %	Root %	Soil[3]	Crown %	Root %	Soil[3]	Nematode no./kg	Severity (0-100)
Rg–Pot–B	38.3	1.1	3.3	2.5	0.0	4.2	0.3	207	12.5	0.3	145	2.5	0.0	47	2468	34.5
Cl–Pot–B	27.5	1.4	3.0	1.7	0.0	7.5	0.3	593	10.8	0.3	46	0.0	0.0	30	931	35.3
Pot–P–B	45.6	3.0	8.9	4.4	6.7	5.6	1.8	1349	8.9	0.4	72	0.0	0.0	19	3421	36.7
Pot–P–WW	35.8	1.7	7.6	0.8	0.6	16.7	1.1	1254	19.2	2.2	138	1.7	0.0	0	995	34.3
Mean	36.9	1.8	5.7	2.4	1.8	8.5	0.9	851	12.8	0.8	100	1.0	0.0	24	1941	33.7

[1] Rg = Ryegrass, Pot = Potato, B = Barley, Cl = Clover, P = Pea, WW = Winter Wheat.
[2] Colony forming units/50 g dry soil.
[3] Colony forming units/g dry soil.

Crop / Culture: Barley, Oats, Triticale, and Wheat

Location / Emplacement: Maritime Provinces

Name and Agency/ Nom et Organisation:
JOHNSTON, H.W. and R.A. MARTIN
Agriculture Canada, Research Station
P.O. Box 1210, Charlottetown, P.E.I. C1A 7M8

Title / Titre: CEREAL DISEASE PROFILE IN THE MARITIME PROVINCES - 1989

METHODS: Surveys of the cereal producing areas of New Brunswick, Nova Scotia, and Prince Edward Island were conducted during the summer of 1989. Isolations of pathogens were made to confirm disease identities as required. Some 50 commercial fields in total were examined in all three Provinces with the majority of winter wheat fields being located in the Annapolis Valley of Nova Scotia. No commercial fields of triticale were located and all observations of this crop were from research plots. Milling wheat analysis were conducted by the Kentville Research Station.

WEATHER CONDITIONS: Cereal production was generally better than average in the Maritime Provinces in 1989 with high yields reported. In Prince Edward Island this was due to early seeding dates and suitable weather patterns. Temperatures in August were higher than normal and this, coupled with rainfall patterns during infection periods, resulted in harvest commencing about 10 days earlier than normal with completion in mid-September during good weather conditions. In Nova Scotia and New Brunswick, weather patterns were close to long term averages and with similar planting and harvest dates compared to previous years. Survival of fall seeded cereals was good in Nova Scotia and New Brunswick but poor in Prince Edward Island because of ice sheeting.

BARLEY: The foliar diseases, net blotch and scald incited by *Pyrenophora teres* and *Rhyncosporium secalis*, respectively, were the diseases of concern on spring barley. On Prince Edward Island, net blotch appeared to be the more significant as scald lesioning did not progress, probably due to the relatively dry warm weather which was present in 1989. Barley crops in New Brunswick illustrated more scald than net blotch symptoms. Scald appears to becoming a more significant disease in this area and is noted to be of greater significance now than in past years. In Nova Scotia, barley diseases were less severe than normal. Neither scald nor net blotch appeared to be yield appeared to be yield limiting as leaf spotting became severe only late in the season. Severe scald symptoms were limited to individual farms in eastern Nova Scotia and this was related to dates of planting and local weather patterns. Fusarium head blight was not reported as a problem in barley. Symptoms could be found more frequently on 6-row than 2-row cultivars, albeit all at low levels. Common root rot was observed in all areas but not observed as a problem of greater significance than is normally associated with barley.

WHEAT: Winter wheat crops were of above average yield and quality where winter survival was good. Good growing conditions resulted in low disease levels with the exception of powdery mildew (*Erysiphe graminis* f.sp. *tritici*) which was of increased incidence and severity. Damage by mildew was frequently reported as the cause of downgrading of milling wheat. Blackpoint or smudge was also the cause of downgrading of milling winter wheat but to a lesser extent than mildew. Fusarium head blight severity was much reduced in 1989 compared to 1988; nevertheless, tombstoning remained high and was the cause of some downgrading from milling to feed quality. Winter wheat following winter wheat were more heavily infected with take-all (*Gaeumannomyces graminis*). Leaf and glume blotch (*Septoria nodorum*) were also more severe in the absence of an adequate rotation. Stripe (*Cephalosporium gramineum*) was found at several locations in the Annapolis Valley at levels considered detrimental to yield. Leaf and glume blotch was found on all winter wheat cultivars but not to significant levels. Snowmolds were widespread but did not appear to be damaging to survival.

Spring wheat crops were not subjected to the normally severe fusarium head blight symptoms due to advantageous weather conditions, however the disease was observed at low levels in all areas of the Maritimes. Powdery mildew was less noticeable primarily due to a greater percentage of the crop being planted to the feed wheat cultivar Belvedere, which has greater resistance and is produced at lower nitrogen fertility levels than the

milling cultivars Ketapwa and Max. These milling cultivars were severely affected by powdery mildew and all milling crops required fungicide applications for mildew control. Leaf and glume blotch was widespread on all spring wheat cultivars but did not become severe until very late in the summer. Loose smut was noticeable on susceptible cultivars, especially where seed treatments had not been applied.

OATS: Septoria speckled leaf blotch (Septoria avenae) was the only foliar disease of consequence on oats in the Atlantic Provinces and the oat crop generally was above normal in yield and quality. In a number of instances on Prince Edward Island fusarium head blight was observed to be quite prominent on hulless oats compared to normal hulled oat cultivars. In all three Provinces, BYDV was observed more frequently than in the last ten to fifteen years.

TRITICALE: Only limited numbers of observations were carried out but this crop was quite healthy with low levels of foliar diseases and less fusarium head blight than normally associated with this species.

Crop / Culture: Downy Brome (Bromus tectorum L.) and Japanese Brome (Bromus japonicus Thunb.)

Location / Emplacement: Southwestern Saskatchewan

Title / Titre: OCCURRENCE OF Ustilago bullata Berk. ON WEEDY ALIEN ANNUAL Bromus SPECIES IN CEREALS AND FORAGES

Name and Agency / Nom et Organisation:
Brian J. Douglas
Eruditus Technologies Inc.
127 Green Meadow Rd.
Regina, SK
S4V OA7

METHODS: During July to September in 1988 and 1989, 195 fields were surveyed for the Occurrence of U. bullata on downy brome and 8 fields of Japanese brome were surveyed. Generally these two weed species have a patchy distribution in fields. The survey was conducted by counting the number of plants showing obvious smut symptoms in a maximum of ten patches per field. Downy brome has rapidly invaded crop and forage land in southwestern Saskatchewan during the last 10 *years* and is a major weed across 31 rural municipalities, while Japanese brome is less widespread and tends to occur in cooler/ wetter areas of the region, particularly at higher elevations. These weeds occur in a range of crops and habitats across southwestern Saskatchewan including winter and spring wheat, fall rye, crested wheatgrass, smooth brome, alfalfa and native rangeland areas.

RESULTS AND COMMENTS: Downy brome infected with U. bullata was found in 45 of the 195 fields surveyed (23%) and infected Japanese brome was found in 4 of the 8 fields surveyed (50%). Within an individual patch or field, the infection level ranged from 5 to 100%. On an individual plant basis, all infected plants had 100% of the spikelets exhibiting smut symptoms and seed production in all infected plants was reduced to zero. Both these annual bromes reproduce exclusively by seed, and U. bullata appears to effectively regulate population density under field conditions. The density of the weed! infestations ranged from 1 plant/sq. m to over 1500 plants/sq. m in the fields surveyed. These surveys represent the first recorded occurrence of U. bullata on downy brome and Japanese brome in Saskatchewan. In spite of the reported wide host range of U. bullata, the smut was not evident on any grass species occurring in conjunction with downy brome and Japanese brome in all fields surveyed.

REFERENCE: Fischer, G.W. 1940. Host specialization in the head smut of grasses, Ustilago bullata. Phytopathology 30: 991–1017.

Crop / Culture: Oat

Location/ Emplacement: Manitoba

Name and Agency / Nom et Organisation:
J. Chong
Agriculture Canada
Research Station
195 Dafoe Road
Winnipeg, Manitoba R3T 2M9

Title / Titre: OCCURRENCE AND VIRULENCE OF OAT CROWN RUST IN HANITOBA IN 1389

METHODS: The occurrence of oat crown rust (causal agent Puccinia coronata f. sp. avenae) in Manitoba was determined by frequent examination of farm fields or stands of wild oat (Avena fatua L.), from early July to late August. Rust samples were collected mainly from wild oat and from rust nurseries located near Woodmore, Brandon, Morden, and Dauphin. The rust nurseries were comprised of susceptible lines with no known crown rust resistance genes, isogenic lines with resistance genes Pc38, Pc39, Pc55, Pc63, Pc64, and Pc68, and the cultivars Fidler and Dumont.

Collections of crown rust were established on Makuru oat in the greenhouse. After sporulation, a single-pustule isolate was isolated from each collection. The single pustule-derived isolates were then inoculated to a set of 19 isoqenic lines containing the resistance genes Pc35, Pc38, Pc39, Pc40, Pc45, Pc46, Pc48, Pc50, Pc54, Pc55, Pc56, Pc58, Pc59, Pc60, Pc61, Pc62, Pc63, Pc64, and Pc67, for virulence combination identification. The isolates were also inoculated to the cultivar Dumont.

RESULTS AND COMMENTS: For the second consecutive year, the incidence of oat crown rust was one of the lightest reported in Manitoba in recent years. The prolonqed hot and dry conditions durinq July and August restricted the development of the rust. Only trace levels of infection were found on wild oat and on oat in farm fields and rust nurseries in late Auqust.

To date one hundred and fifty single-pustule isolates, comprising 50 virulence combinations, have been established. Isolates with virulences to qene Pc46 (11.4%) or to both qenes Pc35 and Pc46 (16.8%) were the most common, but there was also an alarminq abundance of different isolates with virulences to both qenes Pc38 and Pc39. The latter isolates were first detected in low number (0.01%) in Manitoba in 1987 (Chong, 1988). In 1989 thirty-two isolates (21.3% of isolates) with virulences to plants with both qenes Pc38 and Pc39 have been identified. These isolates were hiqhly variable in virulence and were also virulent to other Pc qenes (Table 1). Twenty-eight of these isolates were also virulent on Dumont, which carries Pc38, Pc39, plus a third unidentified gene for crown rust resistance.

The recent widespread use of oats with resistance qenes Pc38 and Pc39 has exerted selective pressure on the Manitoba rust population causing a major shift in virulences to these genes. If the trend of increased virulence to this gene combination continues, significant crop losses are likely in the near future, because all the rust resistant cultivars currently grown in Manitoba rely on these genes for crown rust protection. Oats with complex resistance are being developed at the Winnipeq Research Station.

REFERENCE

Chong, J. 1988. Virulence and distribution of Puccinia coronata in Canada in 1987. Can. J. Plant Pathol. 10: 348-353.

Table 1. Isolates of Puccinia coronata with virulences to the gene combination of Pc38 and Pc39 and Dumont in Manitoba in 1989.

Virulence combination (susceptible Pc genes, Dumont)	No. of isolates	% of isolates
38,39,55,63	1	0.7
38,39,46,55,63	3	2.0
38,39,46,55,Dumont	2	1.3
38,39,55,63,Dumont	5	3.4
35,38,39,55,63,Dumont	2	1.3
38,39,40,55,63,Dumont	3	2.0
38,39,40,55,64,Dumont	3	2.0
38,39,55,56,63,Dumont	1	0.7
35,38,39,46,55,63,Dumont	2	1.3
35,38,39,50,55,63,Dumont	1	0.7
35,38,39,55,63,67,Dumont	1	0.7
38,39,40,54,55,63,Dumont	1	0.7
38,39,40,55,63,64,Dumont	1	0.7
35,38,39,40,46,55,63,Dumont	1	0.7
35,38,39,40,55,63,67,Dumont	1	0.7
35,38,39,46,55,59,63,Dumont	1	0.7
38,39,40,55,60,63,64,67,Dumont	2	1.3
35,38,39,40,55,59,60,63,67,Dumont	1	0.7
Total	32	

Crop / Culture: Spring Wheat and Spring Barley

Location / Emplacement: Central Saskatchewan

Title / Titre: DISEASE SURVEY OF IRRIGATED CEREALS IN SASKATCHEWAN IN 1989

Name and Agency / Nomet Organisation:

KINDRACHUK, C.R. and DUCZEK, L.J.
Research Station, Agriculture Canada
107 Science Crescent
Saskatoon, Saskatchewan
S7N 0X2

(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 by collecting 40 plants from 10 sites in each field. All of the fields were irrigated by a center pivot system. Sampling began 10 m inside the outside wheel track of the pivot and a diamond pattern was followed with each collection site being 10 m 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-Barratt 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. 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 19–21 (G.S. 14–24), July 24–26 (G.S. 61–77) and August 14–15 (G.S. 83–87).

RESULTS: The average foliar disease rating in spring wheat for each of these periods was 0.1, 2.7 and 4.6, respectively, while in spring barley it was 0.1, 2.8 and 5.1, respectively. A rating of 5.1 indicated the upper leaves to be free of disease symptoms while the middle leaves showed 10–15% symptoms and the bottom leaves showed at least 50% symptoms. The average rating for common root rot for spring wheat was 2.6, 9.2 and 21.4 percent, respectively, for the three collection times while for spring barley it was 1.9, 12.7 and 20.2 percent, respectively. Take-all was suspected in one barley field at a level of 8% and also in three wheat fields at levels of 8, 10 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 August 22. The average head discoloration (glume blotch symptoms) for wheat was 0.8%; 3.0% of the kernels exhibited smudge/black-point symptoms. Although there were no pink kernels, 2% of the kernels in one field had tombstone appearance. The average head discoloration found in the barley fields was 0.01% and only 1% of the kernels had blackpoint/smudge symptoms. Loose smut occurred in several fields at levels less than 1% affected plants. Determination of the causal agents associated with diseased tissue found on internodes, leaf, glume and seed samples has yet to be done.

Crop / Culture: Wheat

Location/ Emplacement: Manitoba

Name and Agency / Nom et Organisation:
J. Gilbert and A. Tekauz
Agriculture Canada
Research Station
195 Dafoe Road
Winnipeg, Manitoba R3T 2M9

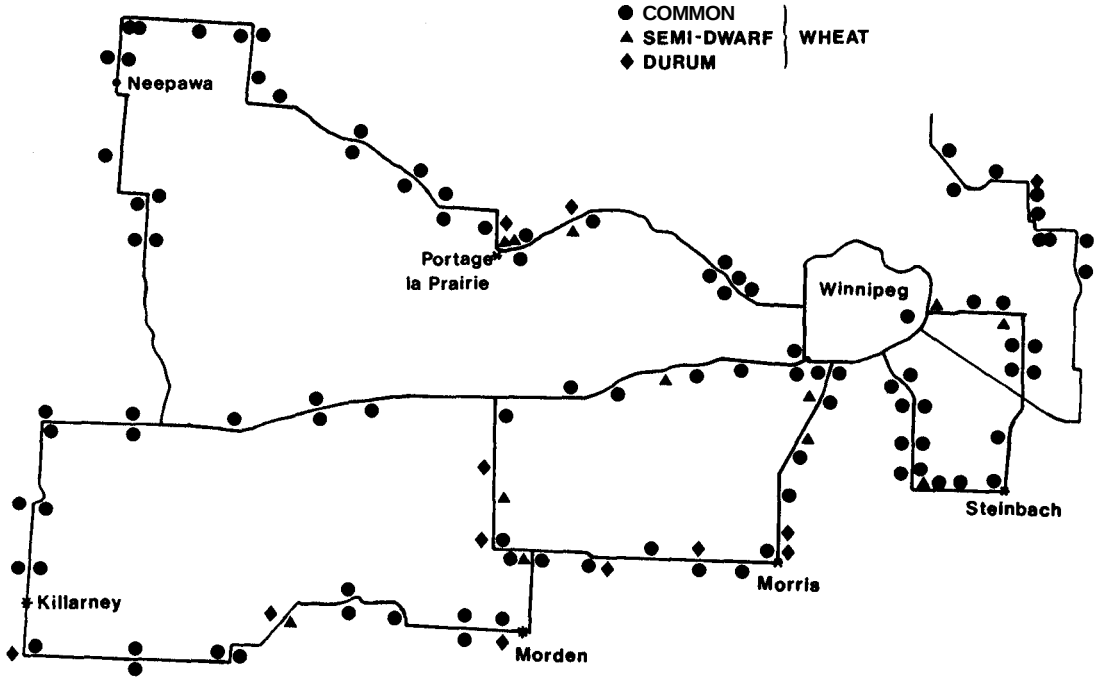
Title / Titre: FOLIAR PATHOGENS OF SPRING WHEAT IN MANITOBA IN 1989

METHODS: One hundred and twenty-four fields of wheat (100 common, 12 durum, and 12 semi-dwarf) in southern Manitoba were surveyed from 20-26 July 1989 for foliar pathogens (Fig. 1). Fields were selected at random along the survey routes. Growth stage was recorded and the severity of foliar disease was categorized as 0, TR, 1, 2, 3, or 4, with 4 describing dead leaves, 3 severely affected, 2 moderately, and 1 lightly affected. Infected tissue was collected, and was subsequently surface sterilized and placed in moist chambers for 4-5 days to induce sporulation to facilitate pathogen identification.

RESULTS AND COMMENTS: Maturity of plants at sampling ranged from water ripe to early dough (GS 71-83). Most were in the medium to late milk stage (GS 75-77). Disease levels ranged from 0 to 1 on the flag leaves and from 1 to 2 on lower leaves.

Cochliobolus sativus (spot blotch) was isolated from 79.8% of the fields sampled, while the incidence of tanspot (Pyrenophora tritici-repentis) was 54.8%. Both spot blotch and tanspot were widespread throughout the survey area. Septoria leaf blotch (Septoria nodorum, Septoria avenae f. sp. triticea) was found in 35.4% of fields. It was also widespread but less frequent to the south and west of the survey area. Septoria nodorum blotch was more common than septoria avenae blotch, 31.5% and 9.7% respectively. Glume blotch (S. nodorum) was isolated from heads of wheat in 2 fields just west of Steinbach. Trace levels of leaf rust were observed in 24 (19.4%) fields, mostly south of Winnipeg.

Fig. 1 Wheat fields surveyed for foliar pathoqens in 1989.



Crop / Culture: Spring Bread Wheat

Location/Emplacement: Province of Quebec

Title / Titre: SURVEY OF SPRING BREAD WHEAT DISEASES IN THE ST-HYACINTHE REGION IN 1989

Name and Agency / Nom et Organisation:
DEVAUX, A.
Service de recherche en phytotechnie
M.A. P. A. Q.
C.P. 480, St-Hyacinthe
Quebec J2S 7B8

METHODS: Ten fields of two spring bread wheat cultivars were surveyed for leaf, root, and head diseases in the St-Hyacinthe region, southwestern Quebec in 1989. The intensity of foliar diseases was assessed on 10-20 plants at 10 sites chosen along a W transect across each field surveyed. A dozen plants at each site were pulled out during the dough development stages to check for symptoms of take-all. Leaf diseases were evaluated before heading as percentage leaf area affected on the whole plant and, after heading, on the top leaves only using the Horsfall and Barratt grading system[1]. Head blight was assessed as the percentage of visibly infected spikelets on 50 heads chosen at random at each site.

RESULTS AND COMMENTS: Table 1 presents the minimum - maximum percentage disease intensity recorded before and after heading. Before heading tan spot (Pyrenophora tritici-repentis) was observed only in three fields where stubbles from the previous year's wheat crop remained on the soil surface. After heading, Septoria leaf blotch (Septoria nodorum) was observed in trace quantities and was mixed with tan spot lesions. Powdery mildew (Erysiphe graminis) was observed both before and after heading in four of the five fields of cultivar Katepwa. Leaf rust (Puccinia recondita) was observed only late in the season in six fields. Take-all (Gaeumannomyces graminis) was not observed on the samples surveyed. Fusarium head blight (Fusarium graminearum) was observed in all the fields surveyed and was generally more severe on the cultivar Max.

Table 1. Prevalence and intensity of spring bread wheat diseases in the St-Hyacinthe region of Quebec in 1989.[1]

Cultivar	Growth Stages[2]	% minimum - maximum disease intensity				
		Leaf spots	Powdery mildew	Leaf rust	Head blight	
					Heads	Spikelets
Max	40 - 49	0-3.7	0	0	-	-
	75 - 83	4-29.0	0	0-2.0	0.15-5.42	0.05-0.84
Katepwa	40 - 49	0-0.6	0-2.7	0	-	-
	75 - 83	2.2-5.8	0-5.5	0-0.2	0.33-2.07	0.18-0.33

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

Crop / Culture: Wheat

Location/ Emplacement: Saskatchewan

Name and Agency/ Nom et Organisation:
G. D. JESPERSON
Saskatchewan Agriculture and Food
Soils and Crops Branch
Regina, Saskatchewan, S4S 0B1

Title / Titre: SUMMARY OF WHEAT DISEASE DIAGNOSES FOR SAMPLES SUBMITTED TO THE SASKATCHEWAN AGRICULTURE CROP PROTECTION LABORATORY

The Crop Protection Laboratory of Saskatchewan Agriculture and Food examined 198 wheat samples submitted for disease diagnosis in 1989. A summary of diagnoses is provided in the table. Note that the percentages add to over 100 because more than one disease was often present on individual samples. Common root rot was the most common disease diagnosis, followed by Septoria leaf spot. Early season weather conditions were favorable for leaf spotting, but dry conditions over much of the province beginning mid July limited development of foliar diseases to below normal levels. Environmental damage, primarily due to heat and drought stress was common. Numerous samples with physiological disorders such as abnormal stem and head bending were also received. Wheat streak mosaic virus was confirmed on winter wheat or spring wheat adjacent to winter wheat from three separate locations in southern Saskatchewan.

Table. Diseases and disorders diagnosed by the Crop Protection Laboratory in 1989 wheat crops.*

Disease or disorder	Percentage of samples affected
Common root rot (Cochliobolus sativus, Fusarium spp.)	49
Septoria spp.	23
Physiological problems	13
Heat or drought stress	12
Herbicide damage	8
Tan spot (Pyrenophora tritici-repentis)	6
Sooty molds (Alternaria spp., Cladosporium spp.)	3
Ascochyta tritici leaf spot	3
Seedling blight (Cochliobolus. sativus, Fusarium spp.)	3
Anthracnose (Colletotrichum graminicola)	2
Wheat streak mosaic	2
Loose smut (Ustilago tritici)	1
Take-all root rot (Gaeumannomyces graminis var. tritici)	1
Snow mold (Fusarium nivale)	1

* Based on 198 samples

Crop / Culture: Wheat/oat/barley

Location / Emplacement: Manitoba and eastern Saskatchewan

Name and Agency / Nomet Organisation:
J.A. Kolmer, D.E. Harder
Agriculture Canada
Winnipeg, Manitoba R3T 2M9

Title / Titre: OCCURRENCE OF CEREAL RUSTS IN WESTERN CANADA IN 1989

METHODS: Fields of cultivated oats and wheat were examined throughout the qrowing season in Manitoba and eastern Saskatchewan for wheat leaf rust, wheat stem rust, and oat stem rust. Barley stem rust observations were made in non-inoculated rust nurseries and some commercial fields.

RESULTS AND COMMENTS: Wheat leaf rust (Puccinia recondita f. sp. tritici) was first observed in southern Manitoba during the first week of July. Cool and dry conditions prevailed over the prairie region during spring and early summer, delaying the initial arrival and spread of wheat leaf rust in this region. Rust infections were heavy on susceptible cultivars in the Red River Valley, and were light on commercial fields throughout southern Manitoba and southeastern Saskatchewan. Leaf rust did not spread as far into central and northern Saskatchewan as in previous years due to the cool and dry conditions. Yield losses to leaf rust in *1989* in western Canada are expected to be minimal due to resistant cultivars and environmental conditions. Wheat stem rust (Puccinia graminis f. sp. tritici) was not observed on susceptible lines in trap nurseries in southern Manitoba until late July. Hot dry weather reduced infection intensities, and all resistant spring wheat cultivars remained unaffected. There were no reports of stem rust in winter wheat. However, some barley cultivars (e.g. Ellice) in rust nurseries became heavily infected, and damaqing levels of infection were observed in some commercial fields of Argyle and Duke barley. All the barley cultivars indicated carry the T-gene for stem rust resistance, and there appeared to be interactions with the stressful environmental conditions of *1989* to produce the higher infections. There were no changes of virulence in the stem rust populations. Infections of oat stem rust (P. graminis f. sp. avenae) remained light in *1989* due to the hot dry weather and the widespread use of resistant cultivars.

Crop / Culture: Wheat and barley

Location/ Emplacement: Manitoba

Name and Agency / Nom et Organisation:
S. Haber
Aariculture Canada
Research Station
195 Dafoe Road
Winnipeg, Manitoba R3T 2M9

Title / Titre: FLAME CHLOROSIS, A NEW VIRUS-LIKE DISEASE OF CEREALS IN MANITOBA: 1989 SURVEY

BACKGROUND: In 1985, a novel disease described as "flame chlorosis" (FC) was observed in spring barley near Newdale, Manitoba (1). Symptoms were striking and distinct from those of any other reported disease of cereals. In 1986 and 1987 scattered diseased plants were identified in a small number of barley fields, within 50 km of the original Newdale site. The disease has been shown to be soil-transmitted and associated with a novel cytopathology and a specific set of double-stranded (ds) RNA species (1). In 1988, FC of barley was identified at many more locations near Newdale and at several locations outside the Newdale region. In 1989, spring wheat with FC symptoms was observed and found to have dsRNA species and cytopathology similar to those associated with the disease in barley.

METHODS: Flame chlorosis is readily diagnosed in the first month of seedlinq qrowth by its striking and characteristic leaf symptoms (1). Surveys were conducted between June 7 and 23 in the barley-growing regions north and west of Brandon, and in the Red River Valley south and east of Winnipeg. FC plants and symptomless specimens from the field were transplanted into pots and subsequently maintained in qrowth cabinets (1). Plants whose later-emerging leaves also displayed typical FC symptoms were recorded as disease-positive. A representative sampling of FC-positive as well as symptomless control plants was further analyzed by electron microscopy and dsRNA analysis to confirm the diagnosis of flame chlorosis.

RESULTS AND COMMENTS: Locations where more than 0.1% of plants showed FC symptoms, and FC symptoms were subsequently confirmed in later-emerging leaves, are shown in Fiq. 1. In 1989, virtually all of the approximately 70 fields of wheat or barley in the surveyed area north and west of Brandon that were examined thoroughly had at least trace levels of FC. It is significant that FC was recorded at a few sites in eastern Manitoba in both barley and wheat, because surveys done before 1988 had failed to find the disease in this region. Flame chlorosis is increasing in frequency in western Manitoba, and probably spreading to other areas of the province. While disease levels were below thresholds of economic damage in almost all fields where FC was identified in either wheat or barley, continuous cultivation with cereals may enable disease levels to increase to the point where they cause losses in direct proport-ion to the percentaqe of diseased plants in the field. This situation was observed in two fields near Newdale in 1985 and 1987. Flame chlorosis surveys will be conducted in future years to monitor progress of the disease.

REFERENCE

1. Haber, S., W. Kim., R. Gillespie and A. Tekauz. 1990. Flame Chlorosis: a new, soil-transmitted, virus-like disease of barley in Manitoba, Canada. J. Phytopathol. (in press).

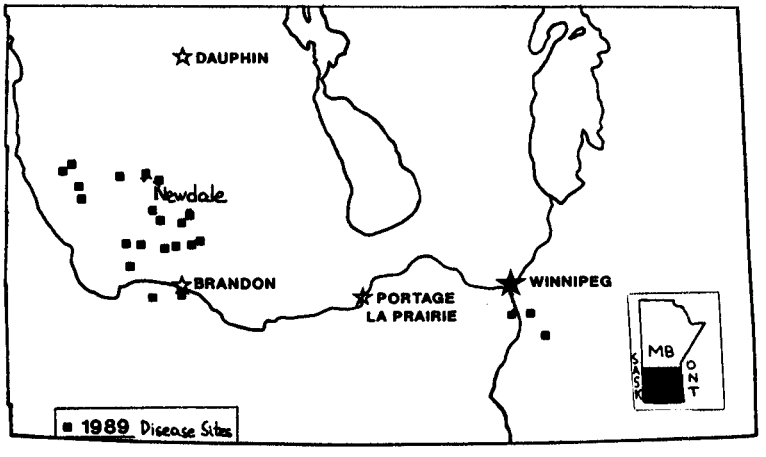


Figure 1. Sites in Manitoba where flame chlorosis affected more than 0.1% of barley or wheat plants in the field.

Crop / Culture: Wheat

Location/ Emplacement: Manitoba

Name and Agency Nomet Organisation:
L.S.L. Wong and A. Tekauz
Agriculture Canada
Research Station
195 Dafoe Road
Winnipeg, Manitoba R3T 2M9

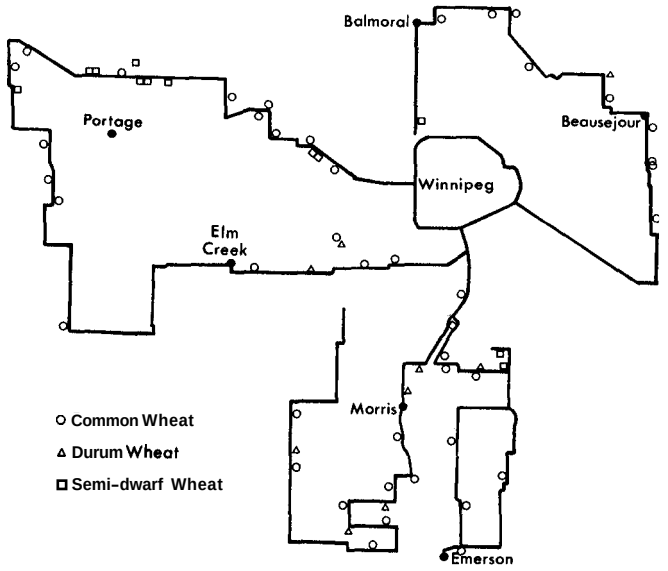
Title / Titre: OCCURRENCE OF FUSARIUM HEAD BLIGHT IN MANITOBA IN 1989

METHODS: One hundred and three wheat fields were examined for Fusarium head blight between July 26 and August 10, 1989. Twelve heads were sampled for the presence and identification of Fusarium species from an area of about 50 x 30 m at the edge of each field. Crop developmental stages at the time of sampling ranged from early milk to hard dough.

RESULTS AND COMMENTS: Fusarium head blight was found in 63% of fields examined. It occurred in 55% (42 of 76) of common, 91% (10 of 11) of durum and 75% (12 of 16) of semi-dwarf wheat fields (Fig. 1). Severity levels ranged from trace to 10% (average 1%) with higher levels occurring in durum wheat fields. The generally low severity of Fusarium head blight in 1989 was probably the result of low levels of precipitation in July. F. graminearum, F. poae and F. sporotrichioides were the species isolated most frequently (Table 1).

Table 1. Distribution of Fusarium species in common, durum and semi-dwarf wheat fields in Manitoba in 1989.

	No. wheat fields			
Fusarium spp.	Common	Durum	Semi-dwarf	Total
F. graminearum	14	6	2	22
F. poae	13	3	4	20
F. sporotrichioides	17	7	6	30
F. culmorum	0	1	5	6
F. equiseti	2	0	3	5
F. acuminatum	4	0	0	4
F. avenaceum	1	0	0	1



Fig, 1. Location of wheat fields testing positive for Fusarium head blight in 1989.

Crop/Culture: Wheat

Location/Emplacement: Province of Quebec

Name and Agency/ Nom et Organisation:
DEVAUX, A.
Service de recherche en phytotechnie
M.A. P.A.Q.
C.P. 480, St. Hyacinthe
Quebec J2S 7B8

Title/Titre: OCCURRENCE OF WHEAT DISEASES IN QUEBEC IN 1989

The incidence of wheat diseases was examined at six different regions of Quebec in late July and early August in 1989. Fusarium head blight was low to moderate in most regions. Powdery mildew (Erysiphe graminis) was moderate to severe on susceptible cultivars only in southwestern Quebec. Leaf spots caused by Pyrenophora tritici-repentis mixed in the later part of the season with Septoria norodum were widespread as usual in all regions. However, their intensities were only moderately severe at the late dough stages. Glume blotch (Septoria nodorum) occurred only in trace quantities at Lennoxville and at Quebec City area. Leaf rust (Puccinia recondita) was light to severe at the late dough stages in southwestern Quebec and at the lake St-John area. Ergot (Claviceps purpurea) was moderately severe on six cultivars at Ste-Rosalie in southwestern Quebec and also on triticale cultivars at St-Eugene in the lake St-John area. Take-all (Gaeumannomyces graminis) and loose smut (Ustilago nuda) were observed in trace amounts in all the regions. A physiological leaf spot occurred suddently from moderate to severe quantities, after heading on the cultivar Max, when a period of hot sunny weather was followed by much cooler temperatures in the St-Hyacinthe region. Most fields of winter wheat were severely affected by winterkill probably due to the large amount of rainfall in the fall of 1988.

Crop/Culture: Wheat

Location/Emplacement: Prince Edward Island

Name and Agency/ Nom et Organisation:
CELETTI, M.J.
P.E.I. Potato Marketing Commission
c/o Agriculture Canada, Research Station
P.O. Box 1210, Charlottetown, P.E.I. C1A 7M8

Title/Titre: INCIDENCE OF ROOT ROT ORGANISMS, ROOT ROT SEVERITY, AND TAKE-ALL IN WINTER WHEAT FOLLOWING CEREAL AND LEGUME ROTATION CROPS

JOHNSTON, H.W. and J. KIMPINSKI
Agriculture Canada, Research Station
P.O. Box 1210, Charlottetown, P.E.I. C1A 7M8

MATERIALS AND METHODS: The purpose of this study was to determine the incidence of root and crown rot organisms affecting winter wheat, cv. Borden following different previous crops. Thirty winter wheat plants were sampled three times during 1989 from 4m x 6m plots previously planted with red clover, lupins, peas, barley, and oats in 1988. Plants were washed under tap water, assessed for take-all symptoms, and rated for crown and root rot (0 = healthy and 5 = crowns and roots completely rotted causing death). Disease severity was calculated using the following formula:

$$\text{Disease severity} = \frac{\sum \left(\text{No. plants in disease category} \times \text{No. value of category} \right)}{\text{Total no. of plants} \times 5} \times 100$$

Soilborne pathogens were isolated from crowns and roots from all sample dates.

RESULTS AND COMMENTS: Crown and root rot (Table 1) was moderate in winter wheat regardless of the crop grown previously. Take-all symptoms were observed in all plots, particularly in winter wheat following barley. Incidence of white heads was also highest in winter wheat following barley. White heads were significantly correlated (P=0.05) with the frequency of take-all observed on crown and root tissue. Rhizoctonia solani, Fusarium avenaceum, and F. sambucinum were isolated most frequently from crowns and the incidence tended to be slightly higher in winter wheat following oats in this study (Table 2). Rhizoctonia cerealis and F. graminearurn were isolated at low levels from all plots. Root and crown root severity was positively correlated with the incidence of take-all, and levels of F. avenaceum and F. sambucinum isolated from roots. preliminary results from this study indicate previous crop can influence the incidence of soilborne cereal pathogens in succeeding winter wheat crops grown on P.E.I..

Table 1. Crown and root rot disease severity, and incidence of take-all and white heads in winter wheat in 1989 following clover, lupins, peas, oats, and barley.

Previous Crop (1988)	Disease Severity (1-100)	Take-all %	White Heads %
Clover	48.8	8.7	7.3
Lupins	50.7	2.1	6.8
Peas	48.8	2.1	6.2
Barley	53.2	20.4	18.6
Oats	48.6	6.2	9.5

Table 2. Incidence of crown and root rot pathogens in winter wheat in 1989 following oats, barley, lupins, peas, and clover.

previous Crop (1988)	Rhizoctonia solani		Rhizoctonia cerealis		Fusarium sambucinum		Fusarium avenaceum		Fusarium graminearum	
	Crown %	Root %	Crown %	Root %	Crown %	Root %	Crown %	Root %	Crown %	Root %
Clover	26.7	0.3	2.5	1.7	23.3	0.8	23.3	0.8	1.7	0.0
Lupins	22.5	0.8	2.5	0.8	30.0	0.3	30.0	1.1	0.8	0.0
peas	21.7	0.8	1.7	0.0	30.0	0.6	30.0	1.1	0.0	0.0
Barley	26.7	0.3	4.2	0.0	25.0	0.8	24.2	0.8	0.0	0.0
Oats	35.8	1.1	2.5	0.3	39.2	0.3	33.3	1.1	0.0	0.0

Crop / Culture: Winter Wheat

Location/Emplacement: Province of Quebec

Title / Titre: SURVEY OF WINTER WHEAT DISEASES IN THE ST-HYACINTHE REGION OF SOUTHWESTERN QUEBEC IN 1989

Name and Agency / Nom et Organisation:

DEVAUX, A.
Service de recherche en phytotechnie
M.A. P. A. Q.
C.P. 480, St-Hyacinthe
Quebec J2S 7B8

METHODS: Seven fields of winter wheat: one of Yorkstar, three of Monopol, and three of Karat, were surveyed for leaf, root, and head diseases in the St-Hyacinthe region of southwestern Quebec in 1989. Foliar disease intensity was assessed on 10-20 plants at 15 sites along a W transect across the field examined. Samples of 10 plants were pulled out at each site to assess for root and basal stem diseases in the laboratory. Leaf diseases were evaluated before and after heading at the growth stages shown in Table 1. Root, stem, and head diseases were evaluated when emergence of inflorescence was completed. Disease intensity of leaves were recorded as percentage leaf area affected on the whole plant before heading, but on top leaves only after heading using the Horsfall and Barratt grading system[1]. Root and basal stem diseases were assessed by recording the number of plants showing symptoms of necrosis. Head blight was assessed as the percentage head and spikelets infected on 50 heads chosen at random at each site.

RESULTS AND COMMENTS: Table 1 presents the minimum - maximum percentage disease intensity recorded for the diseases observed before and after heading. Before heading, tan spot (Pyrenophora tritici-repentis) was present in six of the seven fields and was more severe in those where wheat stubbles from last year's crop were present on the soil surface. Powdery mildew (Erysiphe graminis) was presently mostly at the booting stages and was most severe in two fields protected from the wind. Leaf rust occurred in one field of Karat and in one of Yorkstar at the late soft dough stages. Head blight (Fusarium graminearum) was most severe in one field of Karat and was not recorded in the Yorkstar cultivar. Take-all (Gaeumannomyces graminis) was observed in trace amounts in the seven fields. Stem necrosis due to Bipolaris sorokiniana and Fusarium sp. was present on less than 10% of the plants in four of the seven fields surveyed. Snow mold damage was not observed in the field surveyed but water and ice-encasement damage varied from 20% to 90% of the fields in southwestern Quebec.

Table 1. Prevalence and intensity of winter wheat diseases in the St-Hyacinthe region of southwestern Quebec in 1989.1

	% minimum - maximum disease intensity					
				Head blight		
Growth Stages[2]	Leaf spots	Powdery mildew	Leaf rust	Heads	Spikelets	Stem necrosis
Before heading*						
31	0-2.6	0-1.3	0	-	-	-
45	0-4.1	0-17.5	0	-	-	-
After heading**						
59	1.9-9.6	0-7.0	0	-	-	0-8.0
85	2.3-10.2	0-10.3	0-6.2	0-2.3	0-15.0	-

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

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

Crop / Culture: Cereals

Location/ Emplacement: Central Alberta

Name and Agency / Nom et Organisation:
D.D. Orr and L.J. Piening
Agriculture Canada
Research Station
Bag Service 5000
Lacombe, Alberta T0C 1S0

Title / Titre: CEREAL DISEASE SURVEY IN CENTRAL ALBERTA - 1989

METHODS: In early August 34 fields of barley, 13 fields of oats and 17 fields of spring wheat were surveyed in C.D. 8 in central Alberta. Fields were selected at random and were traversed in an inverted V. Plants were examined every 10 paces for visual disease symptoms. Four categories were used based on percent area diseased: trace $\leq$ 1%; slight $<$ 5%; moderate 5–25?; and severe $>$ 25%. In dealing with whole plant diseases (eg. take-all) the same categories would apply to the percent of plants infected in square metre samples.

RESULTS AND COMMENTS:

Weather: The 1989 growing season was characterized by frequent light rains and warmer than average temperatures, which resulted in high levels of leaf disease. Hail was widespread and devastating in the Lacombe-Clive area. Generally, yields were higher than average but quality was very low. The low quality was attributed to high disease levels and three weeks of rain between late August and mid-September. This resulted in only 5% of the barley crop grading malting quality and only 11% of the wheat grading No. 1, both down by two-thirds.

Two-Row Barley: Ten fields of two-row barley were surveyed. In this crop district the majority of these would be seeded to the cultivar Harrington. Ninety per cent of the fields were infected with net blotch (Pyrenophora teres) and scald (Rhynchosporium secalis). Scald was more severe than net blotch, with 56% of fields having flag leaves infected with $\geq$ 20% scald as compared to 22% for the same level of net blotch. Common root rot (Cochliobolus sativus and Fusarium spp.) occurred in 90% of the fields examined in mainly the trace category. Only one field was noted with a moderate level of root rot, in an area that appeared to be suffering from drought. Covered and loose smut (Ustilago hordei and U. nuda) were observed in only one field each, in trace amounts.

Six-Row Barley: Twenty-four fields of six-row barley were surveyed. Foliar disease incidence was about the same as in the 2-row barleys (83% of the fields), but the level was lower and there were fewer fields rating $\geq$ 20% disease on the flag leaf. There were only 20% in this category for scald and none for net blotch. One field near Rimbey had 100% scald infection on the penultimate leaves and 50% on the flag, resulting in a significant yield loss. Loose smut was noted in 30% of the fields, all in trace amounts. Covered smut was present in 38% of the fields, two of these rating levels of 1% infection. One field west of Blackfalds had up to 75% of the upper leaves affected by a physioloqical leaf blackening, a condition that would result in yield loss. Two fields were noted with 1% scald infection on the heads, these had low infections (1-5%) of scald on the flag leaves. Common root rot was found in all of the fields that could be rated but only one of these was in the slightly diseased category.

Oats: Oats continues to be the most disease free cereal in Central Alberta, but this year suffered from higher levels of blast than usually seen. All fields surveyed showed blast symptoms and the majority rated 5% or higher of the florets aborted. Septoria leaf blotch (Septoria avenae) occurred in all fields examined. More than 10% of the flag leaves were infected in one quarter of these fields. There was an increased incidence of barley yellow dwarf along the eastern border of C.D. 8, one field of which had a 10% level of infection.

Spring Wheat: Septoria leaf spot (Septoria complex) was present in every wheat field surveyed, with 65% of them rating $\geq$ 10% of the upper leaves infected. Glume blotch (Septoria nodorum) was present in 24% of the fields, but only one rated as high as 10% of the heads infected. Common root rot was recorded in 71% of the fields, mainly in the trace category. One field rated slightly diseased. Powdery mildew (Erysiphe graminis) was present in about half of the wheat fields, divided equally into the trace and slight categories. Both stem melanosis (Pseudomonas cichorii) and leaf rust (Puccinia recondita) were rarely found this summer. Each disease occurred in one field at trace levels. Take-all (Gaeumannomyces graminis), however, occurred frequently, and at high levels. Fifty-three percent of all wheat fields surveyed had take-all, with two of these rating 5% infection. Both of these fields were within an area 25 km east of Innisfail.

Crop / Culture: Cereals

Location/Emplacement: Saskatchewan

Name and Agency / Nom et Organisation:
C. Kirkham and B. Berkenkamp
Agriculture Canada
Research Station
P.O. Box 1240
Melfort, Saskatchewan SOE 1A0

Title / Titre: CEREAL DISEASES IN NE SASKATCHEWAN IN 1989

METHODS: Disease surveys were conducted in crop districts 5b, 8a, 8b, and 9a during the period of August 9–21, *1989.* Fields were surveyed at random in each crop district, and samples were obtained by walking diagonally into each field surveyed and selecting one plant every 10–15 paces until a total of ten plants had been pulled. Samples were then evaluated for diseases according to the visual symptoms expressed on the plant. Root rot readings were based on a scale where 0 = healthy, 2 = trace, 5 = moderate, and 10 = severe damage according to lesions found on the subcrown internode. All other diseases were recorded as an estimate of the percentage of leaf or stem area affected. Results for each disease were totaled and averaged over the number of samples and fields surveyed to give the disease index. Number of fields affected over the total number of fields surveyed gave the percentage of fields affected.

RESULTS AND COMMENTS:

Wheat: Fifty-eight wheat fields were surveyed within the four crop districts mentioned previously. Root rot (Cochliobolus sativus and Fusarium spp.) was the most widespread disease occurring in 100 percent of the fields surveyed with a disease index of 2.74. The disease incidence of root rot in crop District 8a was over 30 percent higher than in the other 3 crop districts. Foliar diseases occurred at very low levels, tan spot (Drechslera tritici-repentis) was found in 79 percent of the fields, but had a disease index of less than 2. Septoria leaf spot (Septoria spp.) and leaf rust (Puccinia recondita) were also found at levels of less than 2, but in 56 and 34% of the fields respectively. Powdery mildew (Erysiphe graminis) was found in levels of less than 1 and in only 10% of fields surveyed.

Table 1. Severity and prevalence of wheat diseases

Crop District	No. fields	Disease index/% fields affected: Root rot	Septoria	Leaf rust	Powdery mildew
5b	15	1.6/67	1.2/67	3.8/60	<0.1/7
8a	9	3.8/100	<0.9/67	<0.7/44	<0. 1/22
8b	17	2.6/76	1.2/53	<0.2/41	<0.2/24
9a	17	3.9/82	<0.8/47	<0.1/6	0/0
Total or average	58	1.1/79	1.0/57	1.2/35	<0.1/12

Barley: Fifty-one barley fields were surveyed to establish severity and prevalence of diseases. Common root rot (Cochliobolus sativus and Fusarium spp.) was present in every field surveyed at trace levels. Net blotch (Pyrenophora teres) was the most commonly encountered leaf disease with 98% of the fields affected and a disease index of less than 5. Other diseases such as scald (Rhynchosporium secalis), speckled leaf blotch (Septoria passerinii), powdery mildew (Erysiphe graminis) had disease indices of less than 1 and occurred in a very low percentage of the fields. Loose smut (Ustilago nuda) was not found among the sampled plants but was noted in 3 fields in crop district Bb, 5 fields in crop district 9a, and 1 field in crop district 5b.

Table 2. Severity and prevalence of barley diseases

Crop district	No. fields	Disease index/% fields affected						
		Root rot	Net blotch	Scald	Septoria	Powdery mildew	Leaf rust	Stem rust
5b	13	3.6/100	4.7/92	<0.1/39	<0.1/15	<0.1/8	1.6/15	<0.1/31
8a	12	3.7/100	3.5/100	<0.6/17	<0.1/16	0/0	0/0	<0.1/33
8b	13	3.6/100	3.8/100	<0.1/15	0/0	0/0	0/0	<0.1/46
9a	13	3.4/100	6.0/100	<0.7/54	<0.1/31	<0.1/8	0/0	<0.1/15
Total or average	51	3.6/100	4.5/98	<0.4/32	<0.1/16	<0.4/4	<0.4/4	<0.1/24

Oats: A total of 13 oat fields were surveyed with root rot (*Fusarium* spp.) and Septoria blotch (*Septoria avenae*) being found in every field. Disease indices for both diseases were less than 3. Blast was the only other abnormality noted on the oats and it was found in 76% of the fields with a disease index of 1.9.