Cereal diseases in Prince Edward Island, 1987

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A disease survey of Prince Edward Island indicated little change in the profile of diseases of wheat, oats, and barley compared to previous surveys. Disease severity was in general low, in part due to relatively dry environmental conditions on P.E.I. in 1987. Septoria leaf and glume blotch were the major diseases on both spring and winter wheat. Septoria leaf blotch was predominate on oats though significant levels of avenacea leaf blotch were also observed. Net blotch, and to a lesser extent scald, were predominate on barley. One field of barley did have a very severe infestation of speckled leaf blotch.

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Une enqubte menée à l'Île-du-Prince-Édouard sur les maladies du ble, de l'avoine et de l'orge n'a pu démontrer de changement important du profil de ces maladies par rapport aux donnees recueillies lors d'enqubtes précédentes. Les conditions relativementsèches qu'a connues l'Île-du-Prince-Édouard en 1987 ont été partiellement responsables du faible degré de gravité de la plupart des maladies. La tache septorienne des glumes et des feuilles a été la principale maladie retrouvée sur le blé de printemps et d'hiver. Chez l'avoine, c'est la tache septorienne qui a predomine, bien qu'on ait aussi observe des taux significatifs de rayure des feuilles. Les principales maladies de l'orge ont été la rayure réticulée et, à un degré moindre, la tache pale. On a observe une très grave infestation de tache septorienne dans un champ d'orge.

Introduction

Previous surveys of grain diseases in Prince Edward Island were from the summers of 1976 and 1977 (Clough and Johnston, 1978a,b). Since then there have been changes in production technology such as the development of intensive management, the introduction of winter wheat, and a decline in oats as a feed crop. New cultivars have also been introduced, some with enhanced disease resistance, and there has been the introduction of foliar fungicides. The following survey of cereals in Prince Edward Island was conducted in 1987 on pure stands of barley, oat, and spring and winter wheat, to determine the incidence and severity of major cereal diseases.

Materials and methods

Seventy one commercial cereal fields (30 barley, 15 winter wheat, 14 spring wheat, and 12 oat) were randomly selected to represent all growing areas of Prince Edward Island. In barley, 40 percent of the fields were planted with the cultivar Leger; other barley cultivars were Birka, Micmac, and Rodeo. Valor and Borden were the main winter wheat cultivars (5 fields of each) while Max was the most common spring wheat cultivar in the survey. Among the oat cultivars, Tibor, a hulless oat cultivar, was the most common. Four fields had an unknown oat cultivar.

Field assessments were conducted using an inverted "W" pattern, covering an area of 25 x 25 m, located 25 m away from the road and neighbouring fields. A total of fifty tillers or plants were collected from the assessment area, and rated at each growth stage.

Seedling blight was estimated at Zadoks Growth Stage (ZGS) 20 (Zadoks *et al.*, 1974) using a 0 to 4 scale: 0–no symptoms; 1–slight discolouration; 2–discolouration obvious; 3–lesions present; 4–roots badly damaged or dead. Incidences of other diseases such as smuts and take-all were visually assessed during field sampling.

Fields were rated for foliar disease symptoms at ZGS 20 (tillering), ZGS 31 (stem elongation, first node detectable), ZGS 55 (half of inflorescence emerged), and ZGS 73 (early milk). One rating was made at ZGS 85 (soft dough) for head diseases of wheat. Both foliar and head disease ratings were made using the Horsfall-Barratt rating system (Horsfall and Cowling, 1978). The first ratings were taken from leaf 3, except for wheat, at ZGS 20, which was rated on both the 3rd and 4th leaves. At ZGS 73, ratings were made on leaf 2 for oats and barley, leaf 1 for spring wheat, and leaves 1 and 2 for winter wheat. Leaves were counted from the head down. Only 14 of the 15 winter wheat fields were evaluated at ZGS 20. In order to confirm the identity of certain leaf spot diseases, it was often necessary to perform pathogen isolation or to induce sporulation on moist filter paper. On barley leaves, brown to black spots which did not produce spores or mycelium were considered to be a physiological disorder (Clark *et al.*, 1979).

Results and Discussion

Most of the cereals were sown during early to mid May. While the mean daily temperatures were similar to the 78 yr average during the growing season, May through August, there was lower than average rainfall (Table I). While June precipitation was 76% above normal, precipitation in May, July, and August was 49%, 90%, and 43% below normal. Hours of bright sunshine were 15.3% above normal for the growing season.

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Table 1. Climatic Data, Charlottetown, P. E. I., 1987.

	May	June	July	August
Mean Daily Temperature	9.5	14.3	19.5	18.0
78-yr Average	(9.2)	(14.8)	(18.9)	(18.5)
Rainfall	39.9	138.2	7.8	49.0
78-yr Average	(78.4)	(78.6)	(77.8)	(86.0)
Mean Daily Maximum	14.9	18.8	24.3	23.0
Mean Daily Mean	4.1	9.7	14.7	12.9
Sunshine (Bright)	240	230	285	277
78-yr Average	(204)	(222)	(246)	(227)

The lower precipitation, and longer hours of bright sunshine may both have been responsible for reductions in duration of leaf wetness which may have resulted in low overall disease development.

While seedling blight was evident in nearly all fields examined the severity was very low (Table 2). The mean field ratings never exceeded a rating of 1, with many fields exhibiting only a slight trace of root rot symptoms. The major diseases observed in 1987, incidence and severity, are presented in Table 2.

Winter wheat:

Stands of winter wheat were generally of very good quality. Observations of fields in the middle of April, shortly after snow melt, were made to estimate winter kill and snow mold damage. The snow cover was adequate during the previous winter and there was little frost in the ground. The usual mid winter thaw, which is often related with ice sheeting and winter kill did not occur. As a result of these factors winter kill occurred only in a few areas. Snow mold was present in most fields but damage was significant at only two sites where it affected from 5 to 10 percent of the plants. Pink snow mold, as incited by *Fusarium nivalis* (Fr.) Ces. was the most frequent species identified.

Only two foliar diseases were of major importance in 1987: septoria leaf blotch, caused by *Septoria* sp., and powdery mildew, caused by *Erysiphe graminis* DC. ex. Merat.

Septoria leaf blotch symptoms appeared early in the season. At the first rating, it was found in 100% of fields surveyed with an overall average severity of **4.4** percent. Septoria leaf blotch moved slowly from the lower to upper leaves; severity averaged only 0.6 percent on ZGS 31, and increased to the peak of 11.4 percent at ZGS 73. At this point, the disease was present in all fields and the leaf area infected ranged from 10 to 23 percent, in 65% of the fields. Levels of septoria glume blotch were somewhat lower than septoria leaf blotch, being above 5 percent in only six fields, with an average severity of only 4.8%. Septoria glume blotch was observed in only 80% of fields surveyed.

Severity levels of powdery mildew remained relatively low, at an average of less than 3%. However, in two fields in the western part of P.E.I., severity reached 19.3 and 10.3 percent at ZGS 55, on Borden and Valor, respectively.

Ascochyta leaf spot, a new disease in the Maritime provinces, caused by *Ascochyta tritici* Hori & Enj., was observed in four fields. Typical symptoms of ascochyta leaf spot were irregular spots which were light in colour with a dark border. Only a small number of spots related to ascochyta leafspot were found. There was also one minor case of tan spot, incited by *Pyrenophora tritici-repentis* (Died.) Drechs, identified at ZGS 73. Several fields were affected by take-all. However, take-all was not widespread, nor severe in 1987. Fusarium head blight, incited by *Fusarium graminearum* Schwabe was not a problem in 1987.

Spring wheat:

Septoria leaf blotch, *Septoria* sp. was the only important disease on spring wheat. The disease, although widespread in 71% of fields, was not severe at the initial rating, which corresponded with a low disease severity at the second rating of winter wheat. Dry conditions at this time were probably responsible for arresting disease development. After the initial assessment, the severity of septoria leaf blotch increased to an average level of 10.9 and 15.5 percent, respectively, at the final two assessments with 100% incidence. In some individual fields, levels greater than 30 percent were observed at later growth stages. Severity levels varied widely within each cultivar and may have been a reflection of management inputs, such as the application of foliar fungicide.

Powdery mildew, *E. graminis,* was not important on spring wheat, except for one field planted with the cultivar Opal, where it reached 40.5 percent of leaf area at ZGS 55. This cultivar is very susceptible to powdery mildew. Max spring wheat was, in 1987, classified as resistant to powdery mildew. Powdery mildew was observed on Max wheat in 1988.

Spot blotch, incited by *Cochliobolus sativus* Ito & Kurib (*Bipolaris sorokiniana* Sacc. in Sorok.) and tan spot, incited by *P. tritici-repentis,* were observed only once. Very low incidence of loose smut, incited by *Ustilago tritici* (Pers.) Rostr. was observed in some fields.

Barley:

Net blotch incited by *Pyrenophora teres* Drechs., scald incited by *Rhynchosporium secalis* (Oud.) J.J. Davis, and speckled leaf blotch, incited by *Septoria* sp. (Sacc.), were the three most common diseases of barley, though they were observed in quite different patterns. Scald was present in up to 90% of fields, but the hot and dry weather seemed to have prevented its development on the upper foliage toward the end of the season. Except for ZGS 31, scald ratings were always below one percent, indicating a lack of development or progression up the plant.

Net blotch was present in all fields at some time during the season although several fields exhibited only trace amounts. Net blotch showed a slow and steady progression from each sampling date and reached a peak in severity of 3.0 percent

Table 2. Incidence and severity of cereal diseases at various growth stages (Zadoks Growth Stages) on P.E.I., 1987.

Disease	Incidence and Severity (%)									
	Growth Stage 20		Growth Stage 31		Growth Stage 55		Growth Stage 73		Growth Stage 85	
	*Severity	Incidence**	Severity	Incidence	Severity	Incidence	Severity	Incidence	Severity	Incidence
WINTER WHEAT DISEASES										
Seedling blight	0.4	93	–	–	–					
Septoria blotch	4.4	100	0.6	87	3.4	100	11.4	100	–	–
Powdery mildew	0.4	64	1.5	67	2.4	47	1.2	67	–	–
Sooty mold	0	0	0	0	0	0	0.1	33	–	–
Septoria head	–	–	–	–	–	–	–	–	4.8	80
Powdery mildew head	–	–	–	–	–	–	–	–	0.6	33
Fusarium head	–	–	–	–	–	–	–	–	0.2	40
SPRING WHEAT DISEASES										
Seedling blight	0.1	93	–	–	–	–	–	–	–	–
Septoria blotch	0.3	71	1.0	93	10.9	100	15.5	100	–	–
Powdery mildew	0.0	14	0.0	21	2.9	7	0.9	7	–	–
Sooty mold	0	0	0	0	0	0	0.1	7	–	–
Septoria head	–	–	–	–	–	–	–	–	6.8	86
Powdery mildew head	–	–	–	–	–	–	–	–	1.3	7
Fusarium head	–	–	–	–	–	–	–	–	0.2	14
BARLEY DISEASES										
Seedling blight	0.2	93	–	–	–	–	–	–		
Net blotch	0.2	60	1.2	83	2.3	86	3.0	77		
Scald	0.5	70	1.6	90	0.5	63	1.0	70		
Speckled leaf blotch	0.1	3	0.2	23	0.1	17	3.4	63		
Spot blotch	0.2	10	0.1	3	0.1	23	0.4	37		
Physiological spot	0.4	10	0	0	0.4	27	0.1	7		
Halo spot	0	0	0	0	0.1	10	0.1	13		
OAT DISEASES										
Seedling blight	0.1	33	–	–	–	–	–	–		
Septoria leaf blotch	0.1	42	0.3	67	6.0	83	12.9	92		
Avenacea leaf blotch	0.1	17	1.4	58	0.8	42	4.8	17		

*Overall percent leaf area infected estimated with the Horsfall-Barratt rating system (severity), except for root rot which is 0-4 scale where 0 is symptom free.

**Incidence: percent of fields surveyed with the disease present.

at ZGS 73. The severity of this disease varied greatly from field to field, probably as a result of the use of fungicides or the crop grown during the previous season. Severity on Leger barley varied from trace amounts to 16.8%, at the ZGS 73 assessments. While net blotch levels were probably too low to cause a significant yield loss in most fields, four fields were above 10 percent at the last two sampling dates.

At the last rating (ZGS 73) severity of net blotch was surpassed by that of speckled leaf blotch, which reached an average of 3.4 percent. This, relatively uncommon disease in the region, which was found at low levels throughout the season, seemed to have rapidly increased by ZGS 73. This outbreak may have been on account of the unusually hot weather late in the season. A level of 55 percent was seen in one field of Leger, and four other fields had levels ranging from 5 to 12 percent. Given favourable climatic conditions, this disease may have the potential to be destructive in certain years.

Other diseases were also present, however, both incidence and severity were low. Spot blotch, incited by *B. sorokiniana*, and halo spot, incited by Selenophoma *donacis* var. *stomaticola* (Baeumler) Sprague & A.G. Johnson, were observed in a few fields at ZGS 55 and 73. Incidence of the two diseases was 37% and 13%, respectively, at ZGS 73 while severity in the infected fields was only 1% and 0.5%, respectively. Scattered powdery mildew lesions were observed in four fields of Leger. Leaf rust incited by *Puccinia hordei* Otth was identified on one occasion. Loose smut, incited by *Ustilago nuda* (Jens.) Rostr., was observed in several fields. No instances of viral diseases were observed.

Oat:

Oat diseases consisted essentially of septoria leaf blotch, incited by Septoria avenae Frank, and avenacea leaf blotch, incited by Pyrenophora avenae Ito & Kuribayashi. Septoria leaf blotch was insignificant at the first two ratings but jumped to 6.0 and 12.9 percent by ZGS 55 and 73, respectively, and affected 92% of fields. Three fields had severity levels in excess of 30 percent. Avenacea leaf blotch was observed in up to 58% of fields but was important only in one, where severity exceeded 50%. No viral infections were observed, and there was a single possible case of bacterial blight.

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