CEREAL DISEASES ENCOUNTERED IN NEW BRUNSWICK IN 1960[1]

G. B. Orlob[2] and R. H. E. Bradley[3]

Abstract

Many of the more common cereal diseases were found to be present in New Brunswick during a survey in 1960. Only a few diseases, however, assumed a general distribution and a high density in the fields. First in importance were the two leaf spotting diseases on oats, Drechslera avenacea and Septoria avenae. On barley, Drechslera teres was widely distributed. Another group of diseases was present in several localities but disease ratings in the fields were too low to be of any great consequence. The following diseases would be in this category: barley yellow dwarf, halo blight, barley spot blotch, wheat glume blotch, powdery mildew, ergot, and different smuts and rusts. A third group was made up of diseases that were found in one locality only and infection was low, usually in the trace range.

Generally, losses from individual diseases were not serious. In oats, the average damage from all diseases was estimated to be about 5% for the province.

Introduction

A disease survey was carried out in 1960 to study the distribption and severity of cereal diseases as they occur in New Brunswick. Small grains, especially oats, are of considerable importance in the province. Their culture is concentrated along the St. John river valley, which is also the main potato growing area. During the summer of 1960 better than average growing conditions prevailed; favorable weather permitted timely planting while conditions in early summer favored good growth of the crop. August rainfall which was less than one inch, was much below normal, but this drought probably came too late to affect most of the grain crops. In all other months there was plentyof moisture to provide conditions for the development of foliage disease on small grains.

A total of 104 fields were examined throughout the province, particularly in the western, eastern and northern part. Surveys were conducted on four different occasions from June to August so as to follow the seasonal development of diseases. This survey was confined to rather general records on disease occurrence and more information is needed to understand the biology of New Brunswick's endemic cereal pathogens,

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[2] National Research Council Postdoctorate Fellow, Department of Biology, University of New Brunswick, Fredericton, N. B.

[3] Research Officer, Research Station, Fredericton, N.B,

I. OAT DISEASES

The main cereal crop in New Brunswick is oats, of which some 130,000 acres are grown annually. The most common varieties are Fundy, Ajax, and Abegweit, while various other varieties occupy little acreage. A total of 76 oat fields were surveyed.

A. Blast (non-parasitic)

Blasting of florets was seen in 40% of the fields but ratings generally did not exceed the trace to 1% range. In one field in Carleton county a moderate (30%) incidence was observed. Blasting may also develop following infection with barley yellow dwarf virus.

B. Red Leaf (barley yellow dwarf virus)

This disease was widely distributed throughout the province and was found in most (70%) fields by July 5, and in every field inspected on July 27. The often experienced concentration of yellow dwarf in widely spaced experimental plots was evident in nurseries at Fredericton. In several plots 10 to 30% infection developed, in another plot 40% of Clintland oats were infected. Other than this incidence, occurrence of yellow dwarf in farmers' fields was low and was within the trace range. Aphids of the Rhopalosiphum fitchii-padi complex were commonly found on oats early in the season, while Macrosiphum avenae Kirby was present in increasing numbers during late June and early July. Transmission experiments, incriminated both species as possible vectors.

C. Halo Blight (Pseudomonas coronafaciens)

Halo blight was widespread in plantings at the Experimental Station at Fredericton, affecting 25% of the oat plots on June 16. Another infected stand (15%) was found near Chatham in the eastern part of the province. In both instances foliage of infected plants developed only few lesions. The advance of drier weather seemed to have checked further spread of the disease.

D. Leaf Blotch (Drechslera avenacea)

Symptoms of leaf blotch appeared early and were found in all fields surveyed by July 5, with infection ranging from a trace to 80%, with 10% being more commonly encountered. Later in the season, leaf blotch continued to be prevalent, infecting up to 100% of the plants. Lesion development on individual infected plants was not severe (5 to 20% of the leaves) and no severe damage could be attributed to leaf blotch alone, After the appearance of Septoria the diseases could be separated only with difficulty, because both pathogens frequently infected the same plants and produced somewhat similar symptoms.

Although Drechslera victoriae has been reported from the province (1, 4), it was not encountered during the course of the present survey. D. avenacea and D. victoriae are difficult to distinguish on early infected oats in the seedling stage except through culture. Later, however, D. victoriae causes necrosis of the root system and lower nodes, while no such symptoms occur with D. avenacea (4).

E. Anthracnose (Colletotrichum graminicola)

In Westmorland county parts of a field exhibiting rather unthrifty growth were found to be slightly (5%) infected by C. graminicola. The disease seems generally to be associated with dry soils, low in fertility (2). Anthracnose was also found on several grasses (3).

F. Brown Stripe (Passalora graminis)

Like C. graminicola this fungus was more commonly found on different kinds of grasses, (3) although a trace infection was present in one oat field near Fredericton.

G. Speckled Leaf Blotch (Septoria avenae)

The two leaf spotting diseases incited by Drechslera avenacea and Septoria avenae were the most prevalent cereal diseases in the province, In contrast to D. avenacea, speckled leaf blotch appeared rather late and was not encountered in all localities before late July. Due to this delay and a somewhat less severe infection of the plants, damage was considered to be less than in previous years (1). The dry weather during August may have prevented extensive spread of the disease. Out of 20 fields inspected on July 27, 4 were lightly (trace to 15%) affected, 4 moderately (15 to 50%), and 12 severely (50 to 100%) affected. As in the case of D. avenacea most individual plants attacked by S. avenae showed a low to moderate degree (10 to 30%) of infection, All oat varieties in nurseries seemed equally susceptible to speckled leaf blotch.

H. Smuts (Ustilago avenae and U. kolleri)

Both loose and covered smut were found in trace amounts in 30% of the fields examined, One field near Hartland in the western part of the province had 1 to 5% infection. On this particular farm no seed treatment had been used for several years.

I. Rusts (Puccinia coronata, P. graminis f. sp. avenae)

Light infection of Rhamnus cathartica by the aecidial stage of P. coronata was seen at Fredericton and near Moncton. On oats, crown rust was found first in the eastern part of the province on July 27, which is about the normal date for its appearance (1). At this time the disease was still absent in all other parts of New Brunswick. By August 13, most fields in the eastern and central section of the province had been infected but only a few fields in western N.B. were invaded. Crown rust ratings were 50% for all fields with the foliage of infected plants generally being lightly (5%) affected.

Stem rust was not found in farmers' fields but was abundant in a late planted experimental plot at Fredericton.

II. BARLEY DISEASES

Barley is of minor importance in New Brunswick with only about 3,000 acres being grown annually. Standard varieties are Charlottetown 80 and Parkland, two-rowed barley being the more generally grown type. A certain proportion of barley is grown mixed with oats. The survey included 16 fields in eastern and western New Brunswick.

A. Yellow Dwarf (Barley yellow dwarf virus)

This disease was found in 90% of the barley fields, although the amount of infection seemed to be lower than in oats. In addition to the two common grain aphids found on oats, the corn leaf aphid, Rhopalosiphum maidis Fitch colonized barley and was shown to transmit some isolates of the virus.

B. Bacterial Streak (Xanthomonas translucens)

The presence of this disease was obvious in nurseries at Fredericton, where various varieties developed 5 to 10% infection, The occurrence of the disease seemed to be associated with plots of dense stand and vigorous growth which resulted in conditions favorable for infection and secondary spread of the organism. Bacterial streak was not found in farmers' fields,

C. Net Blotch (Drechslera teres)

Net blotch was the most common disease of barley. Like D. avenacea, net blotch appeared early in the season and increased in severity until the crop ripened. The disease incidence averaged 5% on July 5, and 20 to 60% infection was present on July 27. In two instances probably all plants in the fields were infected and leaf infections were severe (80%), so that considerable damage must have resulted. D. teres was more common on Hordeum distichon.

D. Spot Blotch (Bipolaris sorokiniana)

The fungus was isolated from its leaf spotting phase, although it was very likely present early in the season, causing seedling blight. Spot blotch was found in most fields of six-rowed barley. Infection up to 40% was noted in some experimental plots at Fredericton. In contrast to net blotch, spot blotch was more common on six-rowed barley.

E. Smuts (Ustilago nuda, U. nigra, U. hordei)

Although all three smut fungi were encountered in many localities, loose and semi-loose smut were the most common ones. On July 27, 5 out of 8 fields showed trace infection of these pathogens and one field had a 1% infection. Covered smut was found in 3 fields, 2 of them had trace infections, and in one field 1% of the plants were infected,

F. Rust (Puccinia hordei)

Leaf rust was found in trace amounts in 2 fields in Carleton County where a few widely scattered pustules were observed on some plants.

III. WHEAT DISEASES

Only about 3,000 acres of wheat are grown in isolated areas in the province. Eight fields of spring wheat were surveyed in the western part (Carleton, Victoria county) as well as the eastern part (Northumberland county) of the province.

A. Yellow Dwarf (Barley yellow dwarf virus)

Based on symptomatology, this disease seemed to be present in the Fredericton nurseries although no attempts at recovery were made. Similarly, some plants developing symptoms indicative of yellow dwarf were observed in other localities. In wheat, yellow dwarf was less common than in oats or barley.

B. Downy Mildew (Sclerophthora macrospora)

A 1%incidence of this disease occurred in a field in Victoria county. The distribution of downy mildew in the field was associated with areas with high moisture content. It is belived that *S. macrospora* requires abundant free moisture for zoospore distribution and infection (2). Apparently downy mildew has not been previously found in Canada on cereals. **(4).**

C. Molds (Cladosporium herbarum, Alternaria tenuis)

Black molds were present on several varieties in plots at Fredericton. A trace of infected heads developed "deaf ears". Both fungi, however, are considered to be saprophytic **(4).**

D. Glume Blotch (Septoria nodorum)

The disease was recorded from two fields in Victoria county, but was more prevalent along the eastern shoreline. Lesions appeared on both leaves and glumes. Trace to 1%infections had developed in these localities by July 27.

E. Rusts (Puccinia recondita, P. graminis f. sp. tritici)

Moderate leaf rust infection **(40%)** occurred in nurseries at Fredericton. Spring wheat was less heavily attacked than was winter wheat. In other parts of the province little leaf rust was noticed. Stem rust infection was light (1%) in some experimental plots. The aecidial stage was present on barberry.

IV. RYE DISEASES

Rye is rarely grown in New Brunswick. Surveys were confined to plots at Fredericton containing several winter rye varieties and to **4** fields in the eastern part (Westmorland county) of the province.

A. Patchy Germination

All rye fields inspected showed a high degree (30 to 80%) of uneven standing,

which should have necessitated replanting. Failure of the crop is often attributed to winter killing and rye is considered promising only under exceptional circumstances (1). This year's plots at Fredericton did well, however, and it is possible that factors other than lack of winter hardiness were responsible for uneven stand.

B. Scald (Rhynchosporium secalis)

One field showed a trace infection of scald, The fungus was more common on certain grasses.

C. Powdery Mildew (Erysiphe graminis)

A light (trace to 20%) infection of powdery mildew developed in nurseries. In 2 fields mildew was widespread but infection of individual plants was rather light and only a few mycelial pads were observed.

D. Ergot (Claviceps purpurea)

Ergot was found in the province in all surveyed fields but not in nurseries at Fredericton. Infection did not exceed the trace range. Ergot was more common on a variety of grasses than on rye (3).

E. Rusts (Puccinia recondita, P. graminis f. sp. secalis)

Leaf rust was found in all localities where rye was grown. The highest incidence (50%) was found in some plots at Fredericton. P. recondita was also present in some farmers' fields but only a few pustules were scattered over the infected leaves and no great damage was caused by the disease. A trace of stem rust was noticed in the nurseries.

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DEPARTMENT OF BIOLOGY,
THE UNIVERSITY OF NEW BRUNSWICK,
FREDERICTON, N.B.
and
RESEARCH STATION,
CANADA DEPARTMENT OF AGRICULTURE,
FREDERICTON, N.B.