OBSERVATIONS ON THE OCCURRENCE OF GRASS AND FORAGE DISEASES IN NEW BRUNSWICK[1]

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Abstract

Many of the organisms that attack the grass family in other parts of North America also occur in New Brunswick. Limited surveys of wild and cultivated grasses in 1960 showed that leaf diseases were the more conspicuous and prevalent ones. Among grass diseases commonly found in the province were: Drechslera leaf blight and scald on quackgrass, tar spot on quackgrass and bent grasses, Ovularia leaf spot on bent grasses, Drechslera leaf spot and scald on smooth brome grass, eye spot and scald on orchard grass, leaf streak and eye spot on timothy, and different rusts and powdery mildews on various hosts, Although the effect of any single disease upon a grassland community is relatively mild, the combined attack of various diseases can be serious. It is estimated that grass diseases were responsible for a 5-10% reduction in the yield and quality of the hay crop. Forage legumes, such as the clovers and alfalfa, harbored a variety of diseases which were often widespread and troublesome. Diseases of prime importance were: common leaf spot, anthracnose, powdery mildew and rust on red clover; black stem and common leaf spot on alfalfa. Losses caused by these diseases might have been in the neighbourhood of 10%.

Introduction

Observations on some grass diseases were made in connection with a cereal disease survey (2), as well as by inspecting local grassland in the Fredericton area. The scope of the survey made it necessary to limit the areas covered, the intensity of search, and the variety of grasses inspected. Consequently, only the more common grasses found in pastures, meadows, forage fields or in other plant communities were examined for disease in some fifteen localities within the province. In New Brunswick many grasses must be considered of economic importance, making up as they do, the herbage of the natural or cultivated grasslands used for forage. In contrast, cultivated clovers and alfalfa do not occupy a large acreage and are therefore of little agricultural importance in the province. A brief appraisal of the diseases found on forage legumes was included in the survey.

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A. GRASS DISEASES

1. Diseases on Agropyron

a. Bacterial blight (Xanthomonas translucens f. sp. cerealis)

An incidence of bacterial blight was seen on June 4, in the Fredericton area. Only two infected plants were found and blight was not encountered in other localities or later in the season.

b. Head mold (Fusarium avenaceum)

This fungus prefers marine or moist climates (3) and has been previously reported to occur on cereal crops in New Brunswick. In 1960 it was not observed on any small grains (2) but a trace ipfection was present on quackgrass in the Fredericton area.

c. Leaf blight (Drechslera tritici-repentis)[1]

This widely distributed'disease was seen in the province in several localities, especially in the northern and eastern regions. Rate of infection was was quite variable in different areas but was generally light (10%). All collections were made during early July and no perithecia of Pyrenophora tritici-repentis were found,

d. Scald (Rhynchosporium secalis)

Scald caused considerable leaf spotting on quackgrass near Fredericton and in localized areas in the eastern part of the province. However, the fungus was more prevalent on smooth brome grass, which apparently is attacked by a different physiological race of R. secalis (3).

e. Speckled leaf blotch (Septoria elymi)

Early in the season, a few plants of A. repens were found to be lightly affected by speckled leaf blotch, As pointed—out by Sprague (3), the short and narrow conidia of this fungus are readily separable from other Septoria spp. occurring on the same hosts.

f. Ergot (Claviceps pupurea)

Quackgrass was one of several grasses attacked by this omniparasitic fungus, Infections were widely scattered and within the track range.

g. Powdery mildew (Erysiphe graminis)

Several grasses were affected by powdery mildew but the disease was most prevalent and destructive on quackgrass. Rate of infection was quite variable and seemed to be connected with the ecological conditions of the growing site. A 50-80% infection was common in several localities.

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[1] The nomenclature proposed by Shoemaker (Can. J. Botany 37:879:87) is followed throughout this article,

h. Tar spot (Phyllachora graminis)

The black, sunken spots produced by this fungus were sometimes found on A. repens. In most localities a trace infection had developed by July 28, but in two grassland fields at Fredericton infection reached a level of 20%.

i. Stripe smut (Ustilago striiformis)

On July 5, stripe smut was found on quackgrass near Fredericton. However, the rate of infection was low and infected plants were rare in other localities later in the season.

j. Rusts (Puccinia recondita, P. graminis)

Of the rust fungi attacking quackgrass, leaf rust appeared first and a trace infection was common in most places. Stem rust was more severe later in the season.

2. Diseases on Agrostis

a. Eye spot (Mastigosporium rubricosum)

Up to 20% of Agrostis stolonifera was found infected in a meadow near Hartland. Ratings for diseased plants averaged 10% and damage was negligible. The disease was certainly more prevalent on orchard grass,

b. Leaf spot (Ramularia pusilla)

Early in July this disease was widespread on Agrostis tenuis, A. stolonifera and A. perennans, but only a few spots had developed. A few weeks later a heavy infection was found in one locality near Fredericton. Severely infected leaves withered progressively from the tip but only a few spores were produced.

c. Twist (Dilophospora alopecuri)

On June 30, a trace infection was found on Agrostis tenuis in grassland near Fredericton. Twisted, malformed shoots and heads were the striking symptoms of the disease. Sprague (3) did not list Agrostis as a host plant of this fungus.

d. Tar spot (Phyllachora graminis)

Red top and brown-top were subject to tar spot and a trace infection was found in several localities near Fredericton and Woodstock. As pointed out by Sprague (3), the disease was more prevalent along the edges of woods where suitable microclimatic conditions prevailed.

e. Rusts (Puccinia recondita, Puccinia graminis)

Agrostis perennans developed a trace infection of leaf rust. Later on more damage was inflicted by P. graminis on A. stolonifera growing in the western part of the province.

3. Diseases on Anthoxanthum

a. Brown stripe (Passalora graminis)

This disease, which occurred on a variety of grasses, was also noticed on Anthoxanthum odoratum. On this host, however, brown stripe was quite rare.

b. Ergot (Claviceps purpurea)

A few infected plants were seen in central New Brunswick. Sweet vernal grass is not listed in Sprague's host plant list for the fungus (3).

c. Stem rust (Puccinia graminis)

On this host stem rust was rarely encountered and only a few infected plants were found in a waste lot near Fredericton.

4. Diseases on Bromus

a. Purple brown spot (Stagonospora bromi)

The fungus was isolated from Bromus ciliatus growing along roadsides in Victoria County. The disease was quite common in these localities and produced a 20% infection, Pycnospores of S. bromi were not unlike those of Septoria nodorum obtained from wheat (2).

b. Leaf blotch (Drechslera bromi)

Leaf blotch appeared early in June and was the most prevalent disease of the season. It was found in most localities on Bromus inermis and was also common on different varieties of smooth brome grass grown in nurseries at the Research Station at Fredericton.

c. Scald (Rhynchosporium secalis)

Scald was another common disease of B. inermis. Generally, it caused light damage but leaf spotting was severe in some localities near Fredericton and in eastern New Brunswick. Like Drechslera leaf spot, scald was most prevalent in spring and early fall.

d. Ergot (Claviceps purpurea)

Some ergot was encountered on a few plants of B. inermis in most areas.

e. Head smut (Ustilago bullata)

Occurrence of this smut was restricted to western New Brunswick. Five per cent of B. ciliatus in two localities was infected and developed the conspicuous sori in the spikelets.

5. Diseases on Calamagrostis

a. Head mold (Fusarium avenaceum)

In early August F. avenaceum was locally abundant and had caused leaf blight on blue joint growing in thick stands along the St. John River valley. Although this fungus attacks more generally the heads of Gramineae, it has been found to incite stem canker; a shoot blight has been reported from Quebec (3). Re-examination of the stands a few weeks later did not show any advance of the disease. Further spread and development was probably checked by a drought during August.

b. Eye [illegible] ([illegible]g[illegible]porium [illegible]ubri[illegible]
S[illegible]pt of [illegible]e[illegible]t were fr[illegible]q[illegible] observed on [illegible]a[illegible]amagrostis [illegible]aden[illegible] and the rate of [illegible]tion in mars[illegible] [illegible] the St. [illegible] averaged 10%. Eye [illegible] was more p[illegible]le and [illegible] on [illegible]

c. Ergot (Claviceps purpurea)
Blue joint was also attacked by this fungus. As with most other grasses, infection was widely scattered and within the trace range.

d. Crown rust (Puccinia coronata f. sp. calamagrostidis)
About 10% of blue joint around Fredericton was slightly infected (10-20%) by late August. Earlier in the season the aecial stage of the fungus developed on Rhamnus alnifolia. Only a few pustules were seen on this host.

6. Diseases on Dactylis glomerata

a. Eye spot (Mastigosporium rubricosum]
This disease was evident on leaves of orchard grass in early June. The rate of infection was quite variable throughout the province; in some localities up to 90% of the plants developed moderate leaf symptoms, while the disease was absent in other regions. Little was seen of the disease during the summer months.

b. Scald (Rhynchosporium orthosporum)
Scald was one of the more prevalent diseases found in the province. Like eye spot, scald appeared early in the season but was also common throughout the summer and early fall, It was a rare event not to find the disease on its host. Rate of infection averaged 30-40% for most localities.

c. Brown stripe (Passalora graminis)
Brown stripe was sometimes found on orchard grass but the disease was of little consequence on this host.

7. Diseases on Glyceria

a. Leaf spot (Septoria avenae)
A leaf spot caused by S. avenae was found on Glyceria striata and G. canadensis in the Fredericton area. Spores from this host material compared closely with those of S. avenae obtained from oats. A related fungus, S. glycericola also attacks various species of manna grass, but possesses somewhat narrower spores with pointed ends (3).

b. Brown Stripe (Passalora graminis)
Brown stripe was often seen on Glyceria grandis in areas of the St. John River valley, and rate of infection averaged 20% in two localities, There was a high percentage of 3-septate spores averaging 50u x 10u, whereas spores from' other hosts are mostly 1-septate and are somewhat smaller.

c. Brown smut (Ustilago longissima)
Several plants of G. grandis were parasitized by this fungus near Fredericton. Numerous brown sori had developed on the leaves.

8. Diseases on Festuca

a. Twist (Dilophospora alopecuri)

The fungus was collected from Festuca elatior in late June at different sites near Fredericton and in the western parts of the province. The disease was widely scattered and of no importance, Because of the striking symtomatology, twist disease could be easily located in most of the grasslands inspected.

b. Net blotch (Drechslera dictyoides)

This fungus causes a net blotch, which closely resembles that produced by Drechslera teres on barley. It has been reported that the disease is so common in the eastern United States that it may serve to identify its host plant in the vegetative stage (3). Trace infections were found in two meadows near Fredericton and Woodstock,

c. Leaf spot (Ramularia pusilla)

Spots indicative of the common Ramularia leaf spot were found in trace amounts in meadows in the western part of the province. Spores of the obscure fungus were seen on some of the collected material.

d. Brown stripe (Passalora graminis)

This common parasite of grasses was also found on F. rubra. However, the disease was not very common on this host and only a few infected plants were present in two localities at Fredericton.

e. Blast (Spermospora subulata)

A light infection of 20% occurred on 30% of the red fescue growing in a waste place near Fredericton. Symptoms of the disease were quite distinct and scald-like lesions diffused over the lower parts of the leaves and the sheaths.

f. Saprophytic fungi

The scattered pycnidia of two fungi were found on necrotic tissue of F. rubra. One fungus had brown, elongated spores and was probably close to Phaeoseptoria festucae; the other, probably Wendersonia culmicola, had bacillar pycnospores.

g. Ergot (Claviceps purpurea)

The first case of ergot in 1960 was recorded on red fescue late in July, There were only a few infected plants and on these the sclerotia were sparsely scattered.

9. Diseases on Lolium perenne

a. Ergot (Claviceps purpurea)

The highest incidence of ergot was seen at Fredericton in a small experimental plot of perennial ryegrass where 60% of the plants were infected. About 25% of the head was replaced by the sclerotia.

10. Diseases on Phleum pratense

a. Eye spot (Heterosporium phlei)

Eye spot was a rather common and sometimes destructive disease affecting an estimated one-third of the timothy. It was found as early as May 4 and was present throughout the growing period. Heavily infected leaves became yellow and died prematurely. Rate of infection was about 25% in the spring but less during summer.

b. Brown stripe (Passalora graminis)

This disease was without doubt the most common one occurring on Gramineae. It was observed early and by June 6 was found on virtually all the timothy examined. Since timothy is extensively grown in the province and is equally abundant in natural grass associations, brown stripe must have been responsible for light (1-5%) reduction in quality of the hay.

c. Stripe smut (Ustilago striiformis)

Stripe smut was without consequence as only a few infected plants were collected in Sunbury County.

d. Stem rust (Puccinia graminis)

Although stem rust on timothy was restricted in its range, it caused severe damage in local areas. The first few pustules were seen on July 1 near Fredericton; four weeks later a 50% infection had developed in the same locality,

11. Diseases on Poa

a. Purple spot (Drechslera vagans)

Purple spot was more prevalent during late spring, apparently favored by the cool and rainy weather. At that time of the season an estimated one-tenth of Kentucky bluegrass was lightly (10%) infected.

b. Brown stripe (Passalora graminis)

The disease was regularily encountered on Poa palustris in all parts of the province. On this host, however, brown stripe was rather mild, producing only a few scattered lesions on the leaves.

c. Powdery mildew (Erysiphe graminis)

Powdery mildew as a common disease of Kentucky bluegrass. Infections ranging from trace to 70% were seen in grasslands at Fredericton, Woodstock, and Chatham.

d. Stripe smut (Ustilago striiformis)

A trace infection of stripe smut was recorded on turf in one locality at Fredericton.

e. Leaf rust (Puccinia poae-nemoralis)

Both P. pratensis and P. palustris were subject to leaf rust. The disease was found in the central and eastern part of the province. At the Fredericton Research Station a 20% infection developed in nurseries on Kentucky bluegrass.

f. Leaf mold (Epicoccum nigrum)

Sporodochia and spores of this fungus had developed on a few leaves of P. pratensis. Epicoccum is considered as saprophytic on dead plant parts (3).

B. FORAGE LEGUME DISEASES

1. Diseases of Alfalfa

a. Spring black stem (Ascochyta imperfecta)

All six alfalfa fields examined at Fredericton and in eastern New Brunswick were found to be lightly (10-20%) infected by early June. Some damage occurred as a result of defoliation. Black stem was no problem later in the season on second cut alfalfa.

b. Leaf spot (Stagonospora meliloti

The fungus was isolated in its Stagonospora stage from alfalfa leaves. In two fields at the Fredericton Research Station 30% of the crop was lightly (10%) infected. No root rot symptoms were encountered.

c. Leaf spot (Stemphylium botryosum)

One third of the plants in an alfalfa field at Fredericton were lightly (20%) affected on July 6, but no appreciable damage could be attributed to this leaf spot. A few infected plants were found in the same locality in early September.

d. Common leaf spot (Pseudopeaiza trifolii f. sp. medicaginis-sativae)

This disease of worldwide distribution was also the most common disease on alfalfa in New Brunswick. It was found on June 11, in the Fredericton area, and three weeks later in all other localities where alfalfa was grown. Disease incidence averaged 30% except in one field in which plants were more severely affected.

e. Yellow leaf blotch (Leptotrochila medicaginis)

Yellow leaf spot was scarce and found only in one alfalfa stand in Northumberland County. Rate of infection averaged 20% on one third of the crop and some defoliation was noticed on more heavily attacked plants.

2. Diseases of Clover

a. Viruses

Symptoms indicative of virus diseases were seen, at least in trace amounts, in all localities. No identifications have been made because of the complex nature of such studies.

b. Sooty Blotch (Cymadothea trifolii)

The slightly elevated blotches of this disease appeared early in June on Trifolium repens and were seen thereafter throughout the growing period. Sooty blotch was also found on red clover but appeared less prevalent on this host. Infection was usually widely scattered and of low density except in forage nurseries at the Research Station where an incidence of 30% infection occurred on white clover.

c. Northern anthracnose (Kabatiella caulivora)

Anthracnose was a major disease in local areas though not of general distribution. In two badly infected fields in western New Brunswick, losses caused by the disease were estimated as high as 25%. In three other fields in the northern part of the province the disease was also present but less severe.

d. Common leaf spot (Pseudopeziza trifolii)

This leaf spot was also common on red clover and alsike clover, and was often more prevalent than on alfalfa. This disease was found in every field inspected. Rate of infection averaged **30%.**

e. Powdery mildew (Erysiphe polygoni)

This powdery mildew was one of the most common diseases in the province. Epiphytotics developed on red clover during late summer and early fall. Rapid development and spread of the disease in 1960 may have been accelerated by the dry summer weather. It is believed that mildew epidemics are favoured by relatively dry weather during the summer months(1).

f. Rust (Uromyces trifolii)

Rust was common and of considerable importance on red clover in late summer. Rust and powdery mildew reduced both the yield and quality of red clover. A 50% infection was found in several localities.

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