LEAF RUST (Puccinia secaline). Infection was sev. in one field near Creston, B.C., and was tr. in 3 others in s. Alta. (J.S.H.).

SCALD (Rhynchosporium secalis). Infection was 2-tr. 4-sl. 1-mod. /8 fields examined in s. Alta. (H.S.Horricks).

SPECKLED LEAF BLOTCH (Septoria secalis). Infection was 4-tr. 22-sl. 7-mod. 1-sev./64 fields examined in Alta., occurring chiefly in central and n. Alta. (W.P.C., J.S.H.).

STEM SMUT (Urocystis occulta). Infection was a tr. in one field in s. Alta. (J.S. Horricks) and 2% of the stems at Ladywood, Man. (W. Popp).

BACTERIAL BLIGHT (Xanthomonas translucens). A tr. infection observed in one field in s. Alta. (J.S.H.). Sl. infections were found at Douglas and Broomhill, Man. (W.A.F. Hagborg).

RUST NURSERIES IN CANADA IN 1953

B. Peturson, G.J. Green, T. Johnson and A.M. Brown

In Report 5 issued by the Plant Pathology Laboratory, Winnipeg, Man., in November 1953, are recorded the observations on the occurrence of rusts and several other fungus diseases on varieties of wheat, oats, barley, and rye grown at 33 localities in Canada in 1953. The incidence of the various diseases on the different varieties in the nurseries is given in eight tables with a summary of the data in the ninth, which alone is here reproduced (Table 2).

Twelve varieties of wheat, eight of oats, five of barley were grown in the nurseries. The varieties were: Wheat - McMurachie, Lee, Carleton, Little Club, Marquis, Mindum, Thatcher, CT-186 (since named Selkirk), Norka, Redman, Exchange and Fontana; oats - Bond, Trispernia, Ajax, Vanguard, Garry, Clinton, Landhafer, and Canuck; barley - Montcalm, Wisconsin H. 106, Vantage, Peatland, and Univ. Manitoba 43-1020; and rye - Prolific.

Cereal Rusts in the Prairie Provinces in 1953

Wheat stem rust (Puccinia graminis var. tritici) was abundant in northern Mexico during the late winter and early spring of 1953. In the southern part of the Great Central Plains area, Texas and adjoining states, rust development was scanty owing to drouth conditions. However, in the northern part of the winter wheat belt and in the spring wheat region of the United States conditions were favourable for rust development and a heavy stem-rust infection was general on wheat throughout much of this region by mid-June. The northward spread of rust spores into Western Canada began early. A few spores were caught on the slides 25-28 May at Winnipeg, Morden, and Brandon in Man., and at Regina in Sask. Stem-rust spores began to appear in appreciable numbers on slides exposed in Western Canada about 18 June and from then until the end of the crop season rust inoculum wa abundant in the air over Man. and eastern Sask. Not since 1935 has there been so much rust inoculum in the air over this area. On a number of occasions several thousand spores per square inch were caught on slides during 72-hour exposures.

Table 2. The incidence of certain pathogenic fungi on wheat, oats, barley, and rye grown at 33 localities in Canada in 1953.

Locality	Wheat			Oats			Barley					Rye	
	P. graminis tritici	*P. triticina*	*Erysiphe graminis*	*P. graminis avenae*	*P. coronata avenae*	*Septoria avenae*	*P. graminis*	*P. hordei*	*Erysiphe graminis*	*Septoria passerinii*	*Rhynchosporium secalis*	*P. graminis secalis*	*P. secalina*
Saanichton, B.C.	0	0	3	0	0	0	0	2	3	0	0	0	0
Agassiz, B.C.	1	4	3	1	0	3	0	1	3	0	0	1	3
Creston, B.C.	3	4	0	3	0	0	3	0	1	0	0	1	4
Beaverlodge, Alta.	0	0	2	0	0	0	0	0	0	0	4	0	0
Edmonton, Alta.	1	3	0	0	0	0	0	0	0	4	2	0	2
Lacombe, Alta.	1	2	0	0	0	0	0	0	0	0	4	0	1
Lethbridge, Alta.	1	1	-	0	0	0	1	0	0	0	0	0	0
Scott, Sask.	1	0	0	0	0	0	1	0	0	0	1	0	1
Melfort, Sask.	2	2	0	1	0	0	1	0	0	0	4	0	0
Indian Head, Sask.	4	4	0	0	1	0	3	0	0	0	0	1	0
Brandon, Man.	4	4	0	4	3	-	3	0	0	-	0	1	3
Morden, Man.	4	4	0	4	4	0	2	0	0	4	0	1	0
Winnipeg, Man.	4	4	0	3	4	-	3	2	0	2	0	1	3
Ft. William, Ont.	4	2	0	4	2	1	2	0	0	2	0	1	2
Kapuskasing, Ont.	2	4	0	1	0	0	0	0	1	2	0	0	2
Mindemoya, Ont.	3	4	0	3	4	0	1	1	3	0	0	1	4
Guelph, Ont.	3	4	0	2	4	0	1	1	4	0	-	1	3
St. Catharines, Ont.	2	4	1	1	0	0	2	1	3	-	-	0	3
Appleton, Ont.	4	4	0	4	-	2	3	2	0	0	0	1	3
Ottawa, Ont.	3	3	2	2	3	1	1	2	0	0	0	2	3
Merrickville, Ont.	3	3	0	1	4	1	1	0	0	0	0	2	2
Kemptville, Ont.	3	2	0	2	3	0	2	0	3	0	0	2	2
Williamstown, Ont.	1	3	0	1	1	1	1	0	0	0	-	1	1
Macdonald College, Que.	3	2	3	2	2	1	1	2	4	0	0	2	2
L'Assomption, Que.	3	4	2	2	2	0	2	0	3	0	0	1	4
Lennoxville, Que.	3	4	0	3	4	1	1	1	0	0	0	3	4
Normandin, Que.	3	4	0	1	0	4	1	0	0	3	0	0	0
Ste. Anne de la Poc., Que.	3	4	0	4	3	3	3	2	0	0	2	2	1
Fredericton, N.B.	1	1	0	2	1	1	3	0	0	0	0	4	4
Kentville, N.S.	4	3	2	3	0	2	1	0	0	0	0	2	1
Nappan, N.S.	1	3	4	1	1	-	0	0	0	0	0	0	0
Pictou, N.S.	1	1	0	2	4	-	0	0	0	0	0	1	0
Charlottetown, P.E.I.	2	4	0	2	2	3	1	0	0	0	0	0	1

- indicates no observation made; 1 = trace; 2 = light; 3 = moderate; 4 = heavy

Wheat stem rust made its earliest appearance in Western Canada since continuous records were first kept in 1925. A few pustules of this rust were found on Regent wheat at Morden, Man. on 16 June, two weeks earlier than in 1952. A heavy infection developed on wheat in Man. and eastern Sask., and a trace to a light infection in western Sask. and Alta. The northerly and westerly limits of the heavy rust area were roughly definable by a line running northwesterly from a point on the International Boundary directly south of Weyburn to Belle Plaine (east of Moose Jaw) and thence north-easterly to Sturgis and then from there east across eastern Sask. and Man. Within the area just mentioned the average severity of stem rust on Thatcher, Redman, and Lee ranged from 5 to 30% in early-sown fields and from 40 to upwards of 60% in late-sown fields. About 70% of the wheat acreage in Man. and eastern Sask. was sown early (April and early May). The remaining 30% was sown late (late May and early June), owing to heavy rainfall during the last three weeks in May. The amount of rust present was rather closely correlated with the date of seeding. To the west of the above mentioned line, rust diminished rather rapidly in western Sask., and the infection ranged from trace to light. Stem rust was present in trace amounts throughout much of Alberta. So far as could be observed there were about equal amounts of stem rust in comparable stands of Thatcher, Redman and Lee. All appeared to be about equally susceptible. Regent wheat in experimental plots throughout Man. carried appreciably less stem rust than the three previously named varieties. In most localities in the heavy rust area trace amounts of stem rust occurred on CT-186 (Selkirk).

The durum wheats, Carleton, Stewart, and Mindum, carried higher rust infections (up to 80%) particularly in late fields, than the bread wheat varieties. However, in Man. some early sown durum fields were only lightly rusted (10-30%).

Stem rust was much less prevalent on barley varieties than on wheat. In the heavy rust area a trace to 10% infection occurred on early sown barley and 25-40% infection in late sown fields. It was present in negligible amounts on barley in western Sask. and Alta.

The distribution of leaf rust of wheat (Puccinia triticina) was coextensive with that of stem rust. It appeared later than usual and was light (5-25%) in the early-sown crop. It, however, became quite severe in the later stands of Thatcher and Redman in the heavy-rust area where infection averaged upwards of 75%. Leaf rust infection was light on Lee, Selkirk, and on the durums.

Yield losses from rust infection were greater in Man. and eastern Sask. than in any year since 1935. The wheat acreage in the heavy-rust area amounted to about 5,000,000 acres (2,000,000 in Man. and 3,000,000 in Sask.). It is estimated that the yield of late-sown Thatcher, Redman, and Lee (sown in late May and early June) was reduced by about 50% on about 1,500,000 acres and that bushel weight was reduced by about 6 pounds. The early-sown acreage, amounting to about 3,500,000 acres, was much less affected. About half of it suffered no appreciable rust losses but the remainder, perhaps 1,700,000 acres, suffered about a 12% reduction in yield. West and north of the limits of heavy rust infection the damage amounted to only a small fraction of the losses in the heavy-rust area. Generally, durum wheat was damaged more severely than bread wheat.

Stem rust of oats (P. graminis var. avenae) was first observed in Man. at Dominion City on 13 July. Heavy infection developed on wild oats and on late stands of oat varieties susceptible to race 7. Oat varieties resistant to race 7,

such as Vanguard, Ajax, Exeter, and Fortune, remained almost free of infection in early-sown fields and carried only a light infection (about 20%) in late-sown fields. In western Sask. and in Alta., the rust occurred chiefly in trace amounts.

With regard to the other cereal rusts, crown rust of oats (P. coronata var. avenae) was prevalent throughout Man. and extended a third of the way across Sask. in appreciable amounts. It was present in trace amounts in western Sask. but did not extend into Alta. Leaf rust of rye (P. secalina) was present in all three prairie provinces, but infection was generally light. Trace amounts of leaf rust of barley (P. hordei) were observed in a few fields in southern Man. Stripe rust (P. glumarum) was found on winter wheat in the Lacombe area, Alta.

Cereal Rusts in the Rust Nurseries

The incidence of wheat stem rust in the rust nurseries is shown in Table 2. The level of infection on varieties such as Lee and Carleton is a fairly good index of the amount of infection by race 15B. At Creston, B.C., and in some nurseries in Que. and the Maritime Provinces, infection was predominantly by races other than 15B. In the nurseries in Man. and Sask. and in many of those located in Ont., 15B was the prevailing rust race. Despite the intensity of infection by this race in many of the rust nurseries there was little stem rust on McMurachy or the new variety CT-186 (Selkirk). The maximum infection recorded on the latter was 5% (at Indian Head, Sask.).

Infection by leaf rust of wheat was rather severe in most of the nurseries from eastern Sask. to eastern Ont. (Table 2). Of the varieties tested, Frontana displayed the highest degree of resistance. Other bread wheats with a high degree of resistance include Exchange, its derivative CT-186 (Selkirk), and Lee. Redman, as in former years, was rather susceptible in Man. and Sask., but displayed good resistance at many points in Eastern Canada.

When the reaction of oat varieties to oat stem rust is considered (Table 2), the susceptibility of the variety Clinton at most places where the rust was prevalent was evidently due to the presence of race 7, and the resistance of Ajax and Vanguard in many of these places was due to their resistance to this race. Heavy infection of Ajax and Vanguard in some localities was probably the result of the presence there of races 8, 10, or 11. The varieties Garry and Canuck showed a high degree of resistance except at Winnipeg, Man., and Appleton, Ont., where about 5 or 10% infection developed.

Crown rust of oats (Table 2) was not found west of Indian Head, Sask. It was sporadic in its occurrence in the Maritime Provinces but produced heavy infection in the nurseries in Man. and eastern Ont. The heavy infection of Bond and Clinton reflected the presence of race 45 and related races at most of the points where crown rust was prevalent. The varieties Trispernia and Landhafer had only traces of infection in most places.

The occurrence of stem rust on barley is shown in Table 2. There is some evidence that the rust infection on Wis. H.106, Vantage, Peatland, and U.M. 43-1020 at Ste. Anne de la Pocatiere, Que., and Fredericton, N.B. was caused mainly by rye stem rust.

Other Diseases

In addition to the cereal rusts, a summary of the incidence in the rust nurseries of several other diseases is given in Table 2. Powdery mildew (Erysiphe graminis) of wheat and barley was confined largely to the nurseries in B.C., and a few of those in Eastern Canada. Speckled leaf blotch of oats (Septoria avenae) was not found west of Fort William, Ont., except at Agassiz, B.C., where a moderately heavy infection occurred. It was present in various amounts in most of the nurseries in Eastern Canada. Speckled leaf blotch of barley (S. passerinii) occurred in the nurseries in Man. and at Edmonton, Alta., but was rare in the Eastern nurseries. Disease ratings on the varieties in the test revealed that Wis. H.106 was generally more lightly infected than the others. Scald of barley (Rhynchosporium secalis) was found in the nurseries located in the northern areas of Alta. and Sask., but was observed at only one other point (Ste. Anne de la Pocatiere, Que.). Some other diseases on which no systematic notes were taken were widespread such as net blotch (Helminthosporium teres) and spot blotch (H. sativum) of barley and Septoria leaf blotch of wheat caused by Septoria avenae f. sp. triticea. Septoria nodorum, the cause of glume blotch of wheat was less common but was found in slight amounts at Edmonton, Alta., Scott, Sask., Normandin, Que., and Fredericton, N.B. Septoria tritici was found only at Lethbridge and Edmonton, Alta.

PHYSIOLOGIC RACES OF CEREAL RUSTS IN CANADA IN 1953

T. Johnson, B. Peturson, G. J. Green and A. M. Brown

In Report 6 issued by the Plant Pathology Laboratory, Winnipeg, Man., in January 1954, an account is given of cereal rust development in Western Canada in 1953 and the distribution in Canada is recorded of the physiologic races of the rusts: wheat stem rust (Puccinia graminis var. tritici), wheat leaf rust (P. triticina), oat stem rust (P. graminis var. avenae), and oat crown rust (P. coronata var. avenae). Isolations from a few collections of aecia from barberry and buckthorn in Eastern Canada are also recorded.

Cereal rust development in Western Canada has been reported elsewhere (see Rust Nurseries). Accordingly the distribution of the physiologic races of cereal rusts and the results from aecial collections of barberry and buckthorn are summarized below.

Distribution of Physiologic Races

Puccinia graminis var. *tritici*

In 1953, the stem-rust survey comprised 307 isolates. The following races were isolated (the number of isolates of each race in brackets): race 2(3); race 10(1); race 11(1); race 15B-1(246); race 15B-2(6); race 15B-3(1); race 19(1); race 29(7); race 38(2); race 48(1); race 49(1); race 56(28); race 59(1); race 59B(2); race 98(1); race 113(1); and race 139(4). It may be noted that race 15B-1 produces a 2+ or 3- type of infection on Golden Ball and flecks or 1 type on Selkirk, 15B-2 produces a 4 type on Golden Ball and flecks or 1 type on Selkirk, and 15B-3 produces a 2+ or 3- type on Golden Ball and a 4 type on Selkirk. Again, 59 produces a 2 type of infection on Marquis, 0 on Reliance and flecks on Kota, and 59B produces a 2+ type on Marquis, and a 2 type on Reliance