PARTIAL STERILITY (2,4-D injury suspected). In a crop of fall rye in the plots at Saskatoon, Sask., the lower, centre, or upper third of the heads bore sterile florets; the rest of the head was normal. (T. C. Vanterpool).

RUST NURSERIES IN CANADA IN 1952

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

In this report (issued November 1952) are presented the results of the examination of varieties of wheat, oats, barley, rye, and flax, grown in 34 places in Canada, for the presence of rusts and some other fungous diseases. (Detailed observations on the incidence of some of the diseases were given in eight tables but only the summary presented in the nineth table is reproduced here in Table 4).

Twelve varieties of wheat, seven of oats, five of barley, one of rye and three of flax were grown in the nurseries. The varieties were: wheat - McMurachy, Lee, Carleton, Little Club, Marquis, Mindum, Thatcher, Yaroslav Emmer, Norka, Redman, Exchange, and Frontana; oats - Bond, Trispernia, Ajax, Vanguard, Garry, Clinton, and Landhafer; barley - Montcalm, Wisconsin H. 106, Vantage, Peatland, and Univ. Manitoba 43-1020; rye - Prolific; and flax - Dakota, Bison, and Rocket.

Cereal Rusts in the Prairie Provinces in 1952

Wheat stem rust (Puccinia graminis var. tritici) began its northward spread, this spring, from very small beginnings owing to scanty overwintering in the southern United States and Mexico. Its spread was thereafter limited for some time by dry weather and low temperatures with the result that by mid-May there was less stem rust than usual in northern Texas. Later stem rust found rather favorable conditions for increase in northern Oklahoma and Kansas, and from this area a northward spread into the spring wheat region took place in June. Dry weather, in June, in the Dakotas and Minnesota was undoubtedly a factor militating against any rapid increase of stem rust in that area. In consequence, the drift of spores northward was relatively light until early in July.

Wheat stem rust was first collected near Winnipeg on 30 June and could be found, a week later, in most wheat fields in the Red River Valley. Further spread was rather slow but by 24 July it was present on wheat and barley throughout southern Manitoba and in southeastern Saskatchewan. At harvest appreciable stem rust infection had spread westwards and northwards to a boundary definable by a line drawn from Swift Current, Sask., northeast to Saskatoon and east from there to Kelvington, Sask., and Swan River, Man. In the western and northern part of this area (west of Regina and north of Yorkton) infection was too light to cause appreciable damage. On common wheat and barley, heavy stem-rust infection was largely limited to the Red River Valley and adjacent interlake district. In this region, late-maturing crops were subject to considerable loss although the bulk of the crop escaped with slight damage. Damage to durum wheat extended over a considerably greater area owing to its later maturity and the fact that most of the stem rust consisted of race 15B to which durum wheat is highly susceptible.

This crop was severely damaged in Man., and southeastern Sask., especially the later fields..

Beyond the area outlined above, i. e., west of the Regina-Saskatoon line, stem rust infection was of little significance although the rust became generally distributed throughout the eastern part of southern Alta., by mid-August. There (according to information supplied by Dr. M. W. Cormack) it was most prevalent in irrigated fields and caused severe damage in a few late-sown stands of Lemhi soft wheat. Farther north, a few light infections were found in the vicinity of Edmonton and at Clandonald some 130 miles farther east.

Leaf rust of wheat (P. triticina) was first found in Alta., about the middle of June and in Man., on 20 June. Its northward and westward movement took place somewhat in advance of stem rust and extended farther west and north. The area of heavy infection included all the agricultural part of Man., and eastern Sask., as far north as Yorkton. In Alta., leaf rust developed rapidly after mid-June and was found in most stands examined in the southern part of the province. A severe infection occurred in late September on early sown stands of winter wheat.

Infection by stem rust of oats (P. graminis var. avenae) and crown rust of oats (P. coronata var. avenae) did not occur until late in the season and, for this reason, these rusts did very little damage.

Leaf rust of rye (P. secalina) was widely distributed in the southern parts of the Prairie Provinces. In Alta., it occurred commonly in maturing stands of rye and was also very prevalent in young stands in late September.

Stripe rust (P. glumarum) was prevalent on Hordeum jubatum and other grasses in southern Alta., and also developed to an unusual degree on late-sown stands of wheat and barley. In the third week of August it was found to occur commonly on H. jubatum in the vicinity of Findlater and Kenaston, Sask.

Cereal Rusts in the Rust Nurseries

Wheat stem rust was more conspicuous in the rust nurseries than for several years past. Infection was heaviest at Brandon and Winnipeg, Man., but stem rust was found in all of the 14 nurseries in Ont., and Que., and moderately heavy infection occurred on some varieties in 9 of them. Little infection was found in nurseries in the Maritime Provinces and, except for Creston, B. C., in those located in Alta., and B. C. The amount of stem rust infection on varieties such as Lee, Carleton, Thatcher, Yaroslav Emmer, and Redman, and race isolation studies from the rust present on them, show that race 15B gained a wide distribution in Ont. and Que.

Leaf rust of wheat was found in all nurseries examined for its presence except those at Saanichton, B. C., and Beaverlodge, Alta., and from a study of rust behaviour of the various wheat varieties it is evident that certain varieties showed a different response to leaf rust in different localities. For example, Redman, highly susceptible in the Prairie Provinces, showed high resistance at Agassiz, B. C., and at several places in Eastern Canada. Conversely, Carleton and Mindum showed very little leaf rust infection in the Prairie region but carried a much higher percentage of infection at Creston, B. C., and at several points in Eastern Canada. Studies on race

determination indicate that these results are due to differences in regional distribution of races rather than to environmental differences. The varieties Lee, Exchange, and Frontana were highly resistant in all the rust nurseries.

Stem rust of oats was scarce in Western Canada but considerable infection by this rust occurred in several of the nurseries in Eastern Canada. The rather heavy infection on the variety Clinton which was resistant prior to 1950, reflects the presence in considerable amounts of race 7 which appears now to be widely distributed except perhaps in the Maritime Provinces and B. C.

Crown rust of oats, not found in any nursery west of Man., produced heavy infection in several of the nurseries in Eastern Canada. The varieties Bond and Clinton were rusted rather severely at Mindemoya, Ont., but they appeared to be rather highly resistant in most of the nurseries, a fact indicating that the races pathogenic to them are by no means uniformly distributed. Trispernia was subject to considerable infection at Ottawa, and Williamstown, Ont., but the reaction was moderately resistant and the infection was evidently caused by races not highly pathogenic to it. The variety Landhafer showed high resistance at all points.

Infection by stem rust on barley was heavy in only two localities, Fredericton, N. B., and Merrickville, Ont. In the former place, it may be presumed that infection was caused entirely by rye stem rust (P. graminis var. secalis) as no wheat stem rust was present on the wheat varieties grown in the nursery. In the latter place, both rusts were present but the infection appeared to be caused chiefly by rye stem rust. The relatively greater susceptibility of the varieties H. 106, Vantage, Peatland and U. M. 43-1020 to rye stem rust than to race 15B of wheat stem rust is demonstrated by a comparison of the percentage infections at Brandon, Man., with those at Fredericton, N. B. At Brandon an intense epidemic of race 15B caused infection of 5, 5, 8, and 15% respectively. At Fredericton rye stem rust caused infection of 60, 50, 40, and 60% respectively.

Infection by leaf rust of barley (P. hordei) was observed in the western nurseries only at Winnipeg and Brandon. In Eastern Canada the rust was present in six of the nurseries examined, but infection was very light except at Charlottetown, P. E. I.

Stem rust of rye occurred in most of the nurseries in Eastern Canada but was found, in slight amounts, in only two of the ten nurseries in the Prairie Provinces. Leaf rust of rye was present in all the nurseries except two in Alta., and one in B. C.

Table 4. The incidence of certain pathogenic fungi on wheat, oats, barley and rye grown at 34 localities in Canada in 1952.

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	Erysiphe graminis
Saanichton, B.C.	0	0	-	0	0	0	0	0	-	0	0	0	0	-
Agassiz, B.C.	1	4	0	2	0	-	0	0	4	0	0	2	4	0
Creston, B.C.	3	4	0	1	0	0	2	0	0	-	-	2	2	0
Beaverlodge, Alta.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edmonton, Alta.	1	2	-	0	0	0	1	0	-	0	4	0	4	-
Lethbridge, Alta.	1	3	3	0	0	0	0	0	0	0	0	0	0	0
Lacombe, Alta.	1	4	1	0	0	0	0	0	0	4	3	0	2	1
Scott, Sask.	1	4	0	0	0	0	1	0	0	0	4	0	3	0
Melfort, Sask.	0	2	0	0	0	0	0	0	0	3	4	0	2	0
Indian Head, Sask.	2	4	0	0	0	0	1	0	0	2	0	0	3	0
Brandon, Man.	4	4	0	2	2	0	3	1	0	1	1	1	4	0
Dauphin, Man.	2	4	-	0	0	0	1	0	-	1	-	0	3	-
Morden, Man.	4	4	0	3	1	0	2	-	0	-	-	-	-	0
Winnipeg, Man.	4	4	0	4	2	0	2	2	0	1	0	2	4	0
Ft. William, Ont.	3	4	0	2	2	3	2	1	0	2	0	0	2	0
Kapuskasing, Ont.	3	4	0	2	1	3	1	-	0	4	0	1	2	0
Mindemoya, Ont.	2	4	2	4	3	3	1	-	3	0	0	0	4	0
Guelph, Ont.	3	3	4	3	0	3	2	1	1	0	-	2	3	0
St. Catharines, Ont.	1	2	4	0	0	-	0	0	4	-	-	0	3	-
Appleton, Ont.	3	4	3	3	1	-	2	-	1	-	-	3	-	0
Ottawa, Ont.	2	4	0	2	2	-	1	-	0	-	-	2	3	0
Merrickville, Ont.	3	4	-	4	3	-	3	2	-	-	-	3	3	-
Kemptville, Ont.	2	4	4	2	4	-	1	1	3	-	-	2	2	-
Williamstown, Ont.	-	2	-	-	4	-	-	-	-	-	-	-	-	-
Macdonald Coll., Que.	2	4	-	0	1	-	1	1	-	-	-	1	2	-
L'Assomption, Que.	3	4	0	2	3	2	2	-	0	0	0	2	3	0
Lennoxville, Que.	3	4	1	3	1	2	1	0	0	-	-	2	3	0
Normandin, Que.	3	4	0	3	1	3	2	0	0	4	0	1	3	0
Ste. Anne de la Poc., Que.	4	4	1	3	4	4	2	0	0	1	2	3	2	0
Fredericton, N.B.	0	4	0	1	4	3	4	-	0	0	0	4	-	0
Kentville, N.S.	0	4	1	2	2	-	2	0	0	0	0	2	3	0
Nappan, N.S.	0	3	3	1	2	-	0	-	0	0	0	0	3	0
Pictou, N.S.	2	3	0	2	3	4	0	-	0	0	0	1	2	0
Charlottetown, P.E.I.	1	3	-	2	1	2	1	3	-	0	0	0	2	-

Note: 1 = trace; 2 = light; 3 = moderate; 4 = heavy; - signifies that no observation was made

Other Diseases

Powdery mildew (Erysiphe graminis) was observed on wheat in 11 of the rust nurseries but heavy infection was noted at only St. Catharines, Guelph, and Kemptville, Ont. On barley, mildew was found only at Agassiz, B. C., and in five nurseries in Ont. No mildew was found on oats in any of the nurseries, but trace infection was seen on Prolific rye at Lacombe, Alta.

Infection by several species of Septoria was noted. Glume blotch (Septoria nodorum) was rather severe on wheat at Fredericton, N. B. Elsewhere, it was noted only as very light infection at Charlottetown, P. E. I. S. tritici caused heavy infection of speckled leaf blotch of wheat at Lacombe, Alta., and lighter infection at Lethbridge. S. avenae f. sp. triticea occurred on wheat in most of the nurseries in the Prairie Provinces, Ont., and Que., and was particularly conspicuous on the variety Lee.

Speckled leaf blotch of oats (S. avenae) was not found in any nursery in Western Canada but occurred in all the nurseries in Eastern Canada that were examined for its presence. Speckled leaf blotch of barley (S. passerinii) occurred in 10 of the 24 nurseries that were examined for its presence. Scald (Rhynchosporium secalis) was heavy on barley at Edmonton, Alta., Scott, and Melfort, Sask., and moderately heavy at Lacombe, Alta. Elsewhere, it was found only in trace amounts at Brandon, Man., and as a light infection at Ste. Anne de la Pocatiere, Que.

Flax varieties were included in the rust nurseries for the first time this year. Rust (Melampsora lini) infection was rather severe at Brandon, Morden, and Dauphin, Man., and moderate at Winnipeg, Man., and Fort William, Guelph, and Mindemoya, Ont. Traces only developed at Edmonton, Alta., and Indian Head, Sask. No rust was observed on the rust-resistant variety, Rocket.

PHYSIOLOGIC RACES OF CEREAL RUSTS IN CANADA IN 1952

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

The original report (issued January 1953) gives a brief account of the development of the cereal rusts in Canada in 1952, which will not be included here as the subject has been covered in the report on the Rust Nurseries (q. v.). However, the report records the distribution of the physiologic races of 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). This information will be summarized, but the tables will be omitted. The authors also include a record of the isolations from collections of aecia from barberry and buckthorn in Eastern Canada.

Distribution of Physiologic Races

Puccinia graminis var. tritici

In 1952, the stem-rust survey comprised 307 isolates. The following races were isolated (with the number of isolates of each race in brackets):