Crown rust (Puccinia coronata) of oats was light in Man., but it was heavy in many localities in Eastern Canada. Leaf rust (Puccinia Hordei) of barley was present in only trace quantities in Man. and eastern Sask., but it occurred sporadically throughout Eastern Canada.

In attempts made by one of us (Johnson) to determine the distribution of the various Septoria diseases of cereals, plant material sent from the rust nurseries and from other sources was examined. Outside of Man. the localities from which specimens were received were too few to permit anything in the nature of a satisfactory survey of the prevalence or destructiveness of these diseases. As far as available data permit, their distribution is indicated below.

Septoria Avenae f. sp. triticea Johnson (Can. Jour. Res. C, 25: 259-270. 1947), which resembles S. Avenae morphologically but attacks wheat and sometimes barley, appeared to be generally distributed through the Prairie Provinces, Ont. and Que., but was probably not sufficiently severe anywhere to cause much damage.

Septoria nodorum was found only in trace quantities at a few points west of the Great Lakes and, though not generally distributed throughout Eastern Canada, was abundant at several points in Ont., Que., and N.B.

Septoria Avenae was found only in trace or light quantities at a few points in Western Canada but was rather generally present in Ont. and particularly in Que. Only two collections were obtained from the Maritime Provinces, both from N.B.

Septoria Passerinii was of common occurrence in Man. and eastern Sask. from which area a number of heavily attacked barley specimens were obtained. In Eastern Canada it was obtained only from three points, Kapuskasing and St. Catharines, Ont., and Normandin, Que.

Of the other diseases recorded in Table 3 one deserves comment. Helminthosporium victoriae, recorded in the rust nurseries, for the first time this year, was found in seven nurseries in Eastern Canada but it did not appear to be present in those from Western Canada, except at Winnipeg. In each instance, only the variety Garry was infected.

PHYSIOLOGICAL RACES OF CEREAL RUSTS IN CANADA IN 1947

T. Johnson and B. Peturson

The following report records the distribution, in Canada in 1947, of physiologic races of the following cereal rusts: Puccinia graminis var. Tritici, P. triticina, P. graminis var. Avenae and P. coronata var. Avenae. Included also is a record of infection studies carried out with aecial collections from barberry and buckthorn in Eastern Canada.

Table 3. Incidence of certain pathogenic fungi on wheat, oats, and barley grown at 33 localities in Canada in 1947.

Location 1/	Wheat							Oats							Barley							
	P. gr. Tritici	P. triticina	E. graminis	S. nodorum	S. Avenae f. sp. triticea	Fusarium sp. (scab)	Head discoloration *	P. gr. Avenae	P. coronata Avenae	Erysiphe graminis	Septoria Avenae	H. Avenae	H. victoriae	C. graminicola	P. graminis	P. hordei	Erysiphe graminis	Septoria Passerinii	H. teres	H. sativum	Physiological spotting	Rhynchosporium secalis
1	1	3	4	0	0	0	0	1	0	0	0	1	0	0	0	0	4	-	-	-	-	-
2	0	4	0	0	2	0	4	2	0	0	1	1	0	0	0	0	4	0	0	1	1	0
3	3	4	1	-	-	0	-	1	0	0	0	1	0	0	4	0	0	0	2	0	3	0
4	0	0	1	1	0	0	1	0	0	0	0	1	0	2	0	0	0	0	1	0	0	2
5	1	1	4	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	1	1	1	3
6	1	4	1	0	3	0	0	1	0	0	0	1	0	0	0	0	0	0	2	0	2	2
7	0	2	4	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
9	1	1	0	-	-	0	-	0	0	0	-	-	-	-	0	0	0	1	0	0	1	0
10	4	4	0	0	0	0	0	2	0	0	0	1	0	0	4	1	0	0	1	0	1	0
11	3	4	0	1	3	0	0	3	1	0	0	1	0	0	2	0	0	4	1	1	2	0
12	3	4	-	0	3	1	2	-	-	-	2	1	2	-	-	-	-	2	2	-	-	-
13	4	4	0	0	3	2	2	4	2	0	1	2	?	0	2	0	0	3	1	2	3	0
14	3	4	0	1	2	2	3	3	0	0	2	1	0	0	4	1	0	0	1	2	2	0
15	1	4	0	0	2	0	1	2	0	0	2	0	0	0	1	0	0	3	0	0	1	2
16	2	4	0	0	1	0	-	3	2	0	3	-	-	-	2	2	0	0	0	1	1	0
17	3	4	3	3	3	1	2	2	1	0	0	3	4	0	1	4	2	0	0	2	1	0
18	0	4	2	1	1	1	1	0	0	0	1	1	0	0	0	0	1	1	1	0	1	0
19	1	4	0	0	2	1	2	1	2	0	0	1	0	0	1	0	0	0	0	1	2	0
20	2	4	0	1	3	0	3	1	3	0	1	1	0	0	2	1	1	0	0	0	2	0
21	2	4	0	0	2	1	2	1	4	0	1	1	?	0	1	1	0	0	0	1	2	0
22	0	4	0	0	3	1	3	1	4	0	3	1	3	0	0	1	0	0	0	4	3	0
23	0	4	0	1	1	0	2	0	4	0	0	1	0	0	2	0	0	0	1	1	2	0
24	2	4	0	0	2	3	3	3	4	0	0	3	4	0	1	2	0	0	0	4	3	0
25	2	4	2	1	2	1	4	2	4	0	2	3	0	0	0	2	3	0	0	3	3	0
26	0	4	2	0	1	0	2	2	4	0	1	1	0	0	1	0	1	0	0	2	2	0
27	1	4	0	1	1	1	3	3	4	0	2	1	4	0	1	2	0	0	0	4	3	0
28	3	4	0	3	0	1	1	2	1	0	3	1	0	0	0	0	0	4	0	1	1	0
29	2	4	1	0	0	0	1	2	-	0	2	1	0	0	1	0	0	-	-	-	-	-
30	0	4	0	4	0	0	0	4	4	0	0	2	2	2	3	0	0	0	0	4	3	0
31	0	4	0	0	0	1	0	2	4	0	0	1	0	0	2	1	0	0	0	2	1	0
32	1	4	0	0	0	0	-	2	4	0	0	1	1	-	0	4	0	0	0	2	2	0
33	2	4	0	-	-	0	-	3	-	0	0	1	4	0	0	3	0	0	0	1	1	0

*The head discoloration here recorded occurred only on the Hope and H-44 derivatives, Apex, Regent, and Redman.

Note: 1 = trace; 2 = light; 3 = moderate; 4 = heavy.

Distribution of Physiologic Races of the Cereal Rusts

In 1947, eleven races of Puccinia graminis var. Tritici were identified in 123 isolates. The races, with the number of isolates of each in brackets, were in order of decreasing prevalence: race 56 (98), race 38 (8), race 15 (4), races 29 and 32 (3), race 17 (2), and races 10, 23, 39, 74 and 87 (1). The most noteworthy feature of the 1947 survey was the extraordinarily high percentage of isolates (80%) identified as race 56. Races, such as 17, 29, and 38, which were fairly common in past years, were relatively rare last summer. The four isolates of race 15 lack the general virulence of 15B and are not to be classed with that race. The lone isolate of race 87 obtained this year, however, seems, from preliminary tests, to have much the same infection characteristics as race 15B.

In this year's survey, 17 races of P. triticina were recognized in 201 isolates. The races were in order of decreasing prevalence: race 5a (34), race 15a (33), race 126a (28), race 58 (24), race 15 (17), race 3 (14), races 9 and 128a (12), race 76 (9), race 1a (6), race 11 (4), race 126 (3), races 1, 28, 31, 44, and 83 (1). To distinguish races or biotypes that attack Hope and H-44 derivatives heavily from those that do not, the usual differential hosts were supplemented by the Hope variety. All races or biotypes that attacked Hope heavily in seedling tests have been designated by the letter "a" to differentiate them from those that produced an "x" infection or one of a still lower grade. Numerous infection tests with adult plants of Hope and Redman showed a close relationship between the seedling reaction of Hope and the adult plant reaction (that of the uppermost leaves) of these two varieties.

The chief difference between the distribution of the races of P. triticina in 1947 and the preceding year lies in the decrease in the prevalence of race 128a (designated as race 128 in the 1946 survey) and the marked increase in that of races 126a (designated as race 113 the previous year), 5a, and 15a. As all these isolates bear an "a" designation, the major difference between the distribution in the two years were changes in the prevalence of races that attack Hope and H-44 derivatives.

1/. Location of nurseries were:-

1. Saanichton, B.C.
2. Agassiz, B.C.
3. Creston, B.C.
4. Beaverlodge, Alta.
5. Edmonton, Alta.
6. Lacombe, Alta.
7. Lethbridge, Alta.
8. Scott, Sask.
9. Melfort, Sask.
10. Indian Head, Sask.
11. Brandon, Man.
12. Winnipeg, Man.
13. Morden, Man.
14. Fort William, Ont.
15. Kapuskasing, Ont.
16. Mindemoya, Ont.
17. Guelph, Ont.
18. St. Catharines, Ont.
19. Appleton, Ont.
20. Ottawa, Ont.
21. Manotick, Ont.
22. Merrickville, Ont.
23. Kemptville, Ont.
24. Alexandria, Ont.
25. Macdonald College, Que.
26. L'Assomption, Que.
27. Lennoxville, Que.
28. Normandin, Que.
29. Ste. Anne de la Pocatière, Que.
30. Fredericton, N.B.
31. Kentville, N.S.
32. Pictou, N.S.
33. Charlottetown, P.E.I.

A study of isolates derived from wheat varieties susceptible to all races indicates a marked concentration in the central part of Canada (Ont., Man., and Sask.) of races and biotypes virulent towards Hope and H-44 derivatives. In Que., and the Maritime Provinces only one of 17 isolates from susceptible wheats was virulent in this sense; whereas in Man. 16 of 27 such isolates belonged to one or other of the virulent races. In Alta. and B.C. the concentration of the virulent races differred little from the eastern side of the continent as only two of the 15 isolates derived from known susceptible wheats were of the virulent type.

The way in which Regent, Renown and Redman select out races of the virulent type is well illustrated by a study of the 39 isolates derived from these varieties. All of these isolates attacked Hope heavily in the seedling stage. The races identified, with the number of isolates of each in brackets, were: race 1a (2), race 5a (11), race 15a (8), race 126a (11), and race 128a (7). Seventy-six isolates from Little Club, Thatcher, and other fully susceptible wheats contained the same five races but there were present, in addition, races 1, 3, 9, 11, 15, 58, 76, and 83.

The 1947 survey revealed 6 races of P. graminis var. Avenae in 115 isolates. The races, with the numbers of isolates of each in brackets were: race 1 (8), race 2 (33), race 5 (17), race 8 (28), race 10 (15) and race 11 (14). The distribution of the races differs little from that reported for 1946. In the present survey, the 115 isolates were divided almost equally between race-group 1, 2, 5, (the common races of earlier years) and the race-group 8, 10, 11, which has come into prominence in the last few years. It should not be assumed, however, that this fact indicates an equal distribution of the two groups of races in Canada at the present time. Many of the collections studied were made on oat varieties that, being resistant to the first race-group and susceptible to the second, had a strong tendency to select out races 8, 10, and 11. Calculations based on isolates from varieties susceptible to all races indicate that races 1, 2, and 5 constitute about 70% of the oat stem rust in the country.

From collections made on wild and cultivated oats in Canada in 1947, 139 isolates of P. coronata were obtained. The 11 races, with the numbers of isolates of each in brackets were: race 1 (15), race 2 (30), race 3 (39), race 4 (18), race 5 (11), race 6 (17), race 24 (4), race 34 (3), race 45 (1), and race 1947-1 (1). In this material races 1, 2, 3, 4, 5, and 6 predominated and comprised 93% of the isolates studied. As in former years, races 2 and 3 were the most prevalent races in Eastern Canada whereas races 1 and 4 were the most prevalent ones in Western Canada. However all these races were present in both the Eastern and Western areas from which collections were obtained. One new race, tentatively designated as race 1947-1, was isolated. This race resembles races 34 and 45 in that it can heavily attack the variety Bond. It cannot, however, infect the variety Victoria, from which our new crown rust resistant varieties derive their resistance or the varieties Landhafer and Santa Fe, which are now coming into use as sources of crown rust resistance.