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

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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):

race 2 (4); race 11 (1); race 15B-1 (255); race 15B-2 (16); race 34 (1); race 48 (2); race 56 (25); race 139 (1). The two strains of race 15B, designated 15B-1 and 15B-2, were differentiated by means of the reaction of the durum wheat variety Golden Ball, which is distinctly more susceptible to the latter strain.

Race 15B appeared to have a wider distribution in 1952 than in the preceding year. It occurred in collections from all provinces except P. E. I. Its greatest concentration was in Man. and Sask., where it occurred almost to the exclusion of other races. The extent of the predominance, in this region, of race 15B may be judged from the isolations from wild barley (Hordeum jubatum) which, owing to its susceptibility to many races, might be expected to yield other races as well as race 15B. Thirty-four collections from this host yielded no race other than 15B. From such results, it seems justifiable to conclude that stem-rust infection in Man. and eastern Sask. was caused almost entirely by this one race.

In Alta., race 56 was the prevailing race, as it was in 1951, while race 15B was second in order of frequency. Two other races, 34 and 139, were collected in that province. Collections from B. C. were limited to the vicinity of Creston in the southeastern corner of the province. Race 15B was isolated from this area for the first time but race 56 appeared to be the race of most common occurrence. Races 2 and 48, which occurred in that area in 1951, were again collected there in 1952.

The significance of the two strains of 15B, distinguished from each other by the reaction of Golden Ball, is not clear beyond the certainty that the one designated 15B-2 is more virulent to Golden Ball and certain hybrid lines derived from crosses with it. Such tests as have been made do not indicate that this strain is more virulent to varieties of common wheat than other cultures of race 15B.

Puccinia graminis var. secalis on Barley

Stem rust of rye was less common in the Prairie Provinces in 1952 than in the preceding year, being isolated only once from barley, as against 29 times in 1951. In Eastern Canada, this rust occurred more frequently on barley, 2 isolates being obtained from New Brunswick, 2 from Quebec, and 6 from Ontario. Of these 10 isolates, 7 came from the supposedly stem-rust resistant varieties, Vantage, Peatland, U. M. 1020, and H. 106 (Wisc.).

Puccinia triticina

The physiologic races of leaf rust of wheat are recorded according to the "Unified Numeration" (U. N.) of the key agreed on, in 1948, by American and Canadian investigators of this rust, in which the races are grouped into the classes that they would fall if the differential hosts consisted of only Malakof, Webster, Loros, Mediterranean, and Democrat. Race identification was carried out by means of these hosts with the addition of the variety Brevit, and the further addition of the variety Renown which separates certain biotypes otherwise not readily distinguishable. In the enumeration below, the races

are classified not only under their U.N. numbers, but also under their old race numbers. The biotypes are also listed separately.

All rust collections, after initial multiplication on the susceptible wheat Little Club, were inoculated to a "screening set" composed of the resistant varieties, Exchange, Gabo, Lee and Frontana. Any large pustules produced on the screening varieties were used to initiate cultures that were later used for the determination of the races involved.

The 278 isolates studied were identified as follows (number of isolates in brackets) UN 1 = races 1 (2) and 1a (13); UN 2 = races 15 (9) and 15a (72); UN 3 = races 3 (3), 58 (65), and 141 (1); UN 5 = races 5 (3) and 5a (60); UN 6 = races 126 (21) and 126a (13); UN 9 = race 9 (3); UN 10 = races 11 (9) and 38 (1); UN 11 = race 93 (1); and UN 14 = race 128a (2). Races bearing the suffix "a" as 1a, 15a, are virulent to seedlings of Renown and many other derivatives of H 44 and Hope.

The survey shows that race distribution in 1952 was very much the same as in the three preceding years. In Man. and Sask., the prevailing races were 15a, 5a, and 126 or 126a, in descending order of frequency. In Eastern Canada, race 58 was the predominant race. In B.C., (most of the collections came from the Creston area) race 1a was the predominant race, but races 11 and 128a were collected there as in the preceding year.

Most of the isolates from the Prairie Provinces as noted above, were virulent to Hope and H 44 derivatives whereas most of the isolates from Eastern Canada showed only moderate or slight ability to attack such varieties.

Puccinia graminis var. avenae

The following races were identified in a study of 171 isolates of oat stem rust (number of isolates of each race in brackets): race 1 (9); race 2 (28); race 5 (3); race 6 (9); race 7 (57); race 7A (2); race 8 (30); race 10 (15); race 11 (15); race 12 (1) and race 13 (2).

Owing to the scarcity of stem rust on cultivated oats in Man. and Sask. until late in the summer, a large proportion of the collections was made on wild oats. As wild oats are susceptible to all races of oat stem rust, the survey is considered to give a rather accurate picture of race distribution in this area. The most noticeable feature of the survey is the very common occurrence of race 7 which was collected more frequently than in any previous year and was, in fact, the predominant race in this part of the country.

The 38 isolates from Eastern Canada came from cultivated oats. As 19 of these isolates belong to the race group 8, 10, 11, it seems that these races are the ones most generally distributed. It is worth noting that races 6 and 13, which can attack all generally cultivated oat varieties, accounted for 10 of the 38 isolates studied. As these races were found in 3 provinces (Ont., N.B., and N.S.), they appear to be widely distributed and, as suggested in last year's report, are apparently on the increase.

The discovery of a biotype of race 7, designated race 7A, is of some interest. It was found in an increase field of the new variety R.L. 2123 near Winnipeg. It cannot be distinguished from ordinary race 7 on the regular differential hosts but attacks R.L. 2123 and Canuck, which are highly resistant to race 7. The fact that the variety Garry is highly resistant to it, shows

that Garry possesses a resistance factor (or factors) not present in Canuck or R. L. 2123. Previously, it had been assumed that these three varieties possessed identical stem-rust resistance derived from a common origin. As the biotype was found near the beginning of the survey, it was possible to test for its presence in nearly all stem rust collections by the inclusion of R. L. 2123 among the differential hosts. It is apparently quite rare as there was no evidence for its presence except in the one locality mentioned above.

Puccinia coronata var. avenae

In 1951, the following workers, H. C. Murphy, Marr D. Simons, H. A. Rodenhiser, T. R. Stanton, and H. R. Rosen in the United States and B. Peturson in Canada agreed to adopt a new revised set of ten differential oat varieties for identification of physiologic races of crown rust in Canada and the United States. It was further agreed that all races identified with the new revised set of differential hosts should be numbered, starting at no. 201. The numbers from 1 to 200 were left for those who wish to continue using the old set of differential hosts. In the new set, are included eight oat varieties currently used by plant breeders in the breeding for resistance to crown rust; Bond, Bondvic, Landhafer, Santa Fe, Saia, Trispernia, Ukraine, and Victoria.

The races here reported were all identified by means of the new revised set of ten differential hosts. They were assigned numbers after consultation with Dr. H. C. Murphy, and Dr. Marr D. Simons, who are in charge of the crown rust survey in the U. S. A.

From 115 cultures of crown rust established from uredinial collections obtained on wild and cultivated oats in Eastern Canada and the Prairie Provinces, 15 distinct physiologic races were identified. All the 15 races had been isolated previously in Canada. The designation of the 15 races identified, followed by the former designations of each race, is as follows: 201=34; 202=45 and 57; 203=45a; 209=1948-1; 210=1947-1; 211=34a; 228=2a; 229=2b; 231=3a; 232=3b; 234=2c; 235=3c; 237=1 and 6; 239=2 and 38; and 240=3.

The number of isolates of each race identified is indicated in brackets after the number of the race: 201 (24), 202 (15), 203 (5), 209 (1), 210 (1), 211 (6), 228 (7), 229 (2), 231 (7), 232 (3), 234 (1), 235 (3), 237 (7), 239 (13), 240 (20).

Of the races identified, six (201, 202, 203, 209, 210 and 211) are capable of attacking Bond and its derivatives. These six races comprised 28.1% of all isolates originating from collectionsobtained in Eastern Canada and 62.1% of those originating in the Prairie Provinces. Races 239 and 240 declined somewhat in prevalence in Eastern Canada. They are, however, still the most prevalent races there and comprised 36.8% of all isolates from that area.

The varieties Santa Fe, Landhafer, Victoria, Vicland and Trispernia proved highly resistant to all the isolates studied.