PHYSIOLOGIC RACES OF CEREAL RUSTS IN CANADA IN 1946

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In 1946, surveys were made of the distribution, in Canada, of physiologic races of the following cereal rusts: Puccinia graminis var. Tritici, P. triticina, P. graminis var. Avenae, P. coronata var. Avenae, and P. Hordei (P. anomala). There are also included infection studies carried out with aecia on barberry and buckthorn collected in Eastern Canada.

Distribution of Physiologic Races of the Cereal Rusts

Nine physiologic races of Puccinia graminis var. Tritici were identified in 145 isolations. These races were in order of prevalence: 56, 38, 29, 17, 19, 36, 15, 49, and 48. The distribution of the races differed very little from that of 1945. The chief differences consist in a slightly diminished prevalence of race 56 (49.7% of all races in 1946 compared with 60% in 1945), an increased prevalence of race 38 in Eastern Canada (17.2%), and the occurrence of races 15 and 36, which had not been collected on cereals in Canada since 1942.

The most notable feature of the leaf rust survey is the now widespread prevalence, in commonly occurring races of P. triticina, of biotypes capable of heavily attacking Renown, Regent, Redman, and other derivatives of Hope or H-44. Twenty races, including biotypes, were identified in 272 isolates. These races, with biotypes designated by the letter "a" after the number, were in order of prevalence: 15; 128; 15a; 76; 5a; 9; 3; 58, 113a (equal); 5, 113 (equal); 29; 1, 1a, 126 (equal); and 2, 11, 65a, 72, 46-1 (equal). The biotypes were identified by adding to the regular differential hosts the varieties Renown and Hope, the latter being a particularly useful differential host. Strains of leaf rust to which Hope is susceptible in the seedling stage have invariably been found to attack Hope and the other above-mentioned wheats heavily in the adult stage. The biotypes virulent towards these varieties are particularly common in races 5 (8.8% of all strains), 15 (11.4%) and 113 (6.3%). The cultures identified as race 128 (12.5%) differ so little from race 29 that they might, perhaps, equally well be regarded as representing a biotype of that race.

Geographically, these virulent biotypes occur most frequently in the area in which the newer, stem-rust resistant wheats are most commonly grown, that is Man. and Sask. Calculations based on the occurrence of the virulent biotypes (including race 128) on wheats that do not select them out (wheat varieties equally susceptible to all races) indicate that in Man. and Sask. the virulent strains make up about 50% of the leaf rust present in that area. For the other provinces the corresponding figures were: Ont. 15%, Que. 25%, Alta. 5%. The rather meagre survey data for B.C. and the Maritime Provinces indicated that in these regions the virulent strains are present only in trace quantities.

One collection was made of a race that could not be identified with any of the hitherto known races. This race is provisionally designated as 1946-1. The infection types are: Malakof 0, Carina 4, Brevit 4, Webster 4, Loros 4, Mediterranean 4, Hussar 2-, Democrat 4, and Hope X.

Eight races of P. graminis var. Avenae were identified in 171 isolates. These races were, in order of prevalence: 10, 8, 2, 5, 11, 1, 6 and 7. The year 1946 saw a further increase in the prevalence of races 8, 10, and 11, which are capable of attacking Vanguard, Ajax, and other oats of similar origin. Calculations based on their occurrence on oat varieties equally susceptible to all races show that races 8, 10, and 11 now constitute about 30% of the oat stem rust present in Man. and Ont., 20% in Que., and 15% or less in the Maritime Provinces. Scanty survey data for Alta. and B.C. indicate that these races are not common in these two provinces. The occurrence of race 6 in Ont. and its significance will be discussed in the next section.

From 127 collections of crown rust obtained from localities in Eastern Canada and the Prairie Provinces, 9 races of P. coronata var. Avenae were isolated as follows, in order of prevalence: 3, 1, 6, 2, 4, 5, 1946-1, 45, and 38. One race, tentatively designated as race 1946-1, had not previously been collected in Canada. This new race heavily attacks all the crown rust differential hosts except Red Rustproof, Ruakura, Sunrise, Steresil, Belar and Glabrota. It resembles races 34 and 45 in that it heavily attacks Bond. Race 1946-1 was collected in one locality in Ont. and in one in N.S. At Pictou its intensity averaged upwards of 20% on Bond and Clinton in the rust nursery. Races 2 and 3 predominated in Eastern Canada where they comprised 57% of all races isolated, and races 1 and 4 were the most common races in Western Canada comprising 80% of all isolates of the area. Race 5, although present in both Eastern and Western Canada, was much less prevalent than in 1945 - 5.5% of all races in 1946 compared with 22.1% in 1945. There was no marked change in the relative prevalence of the other races.

Infection Studies with Aecia on Berberis and Rhamnus in 1946

This is the third year in which infection studies have been made with aecia from barberry and buckthorn collected in Eastern Canada. We are indebted to the following for collecting and forwarding infected leaves: R.R. Hurst, Charlottetown, P.E.I., J.D.E. Sterling, Nappan, N.S., J.A. Boyle and K. Cox, Kentville, N.S., J.L. Howatt and S.F. Clarkson, Fredericton, N.B., J.E. Jacques, Montreal, Que., R.A. Ludwig, Macdonald College, Que., I.L. Conners, Ottawa, Ont., J.W. McRae, Kemptville, Ont., F.A. Lashley, Alliston, Ont., and W.M. Cockburn, Newmarket, Ont.

In the isolations from barberry, the Secalis variety of P. graminis predominated as it did in the two previous years. It occurred in 19 of the 25 collections studied. Next in frequency of isolation were varieties Avenae and Agrostidis, each of which were present in 5 collections. The Avenae variety was composed of 3 isolates of race 2 and one each of races 5, 7, and 8. The occurrence of race 7 is noteworthy because in past years it has been very rare in rust collections made on oats and grasses. The