Distribution of Physiologic Races of the Cereal Rusts

Attacks of the cereal rusts were, generally, not severe except in Man., where weather conditions in June, July, and August favoured their development. Heavy attacks of stem rust of wheat and oats and crown rust of oats occurred in middle and late summer on susceptible varieties in Man. and at certain points in eastern Ont. Leaf rust infection was heavy in wheat in late summer in Man. and was also moderate or heavy in some parts of Ont. and Que., and at certain points in southern B.C. Leaf rust of barley was found only in trace quantities in a few places in Eastern Canada and B.C.

The survey of physiological races of stem rust of wheat showed that race 56 predominated in all parts of the country; it represented 62% of the isolates. Races 17 and 29, which have been common since 1940 and which, for practical purposes, may be regarded as the same race, accounted for only about 11% of the isolates in 1944 as against 24% in 1943, 19% in 1942 and 42% in 1941. Other races collected were, in order of prevalence, races 19, 38, 125, 39 and 9. A total of 127 collections of this rust were studied.

In leaf rust of wheat, a study was made of 170 isolations from 93 collections. In most cases two single-pustule isolates were made from each collection. The three rather similar races 2, 15, and 34, comprising nearly 30% of the isolates, predominated as they have done for some years past. Race 76, which has been common in previous years, particularly in Eastern Canada, was present in only 1.8% of the isolates. Race 128, which has not been found in Canada previously but which bears some resemblance to race 29, was common in Man. and Sask. Other races isolated were, in order of prevalence, races 3, 9, 29, 31, 5, 1, 126, 58, 28, 52, 101, 11, 53, and 65. Apart from the scarcity of race 76 and the relative abundance of race 128, there was little change from previous years in the distribution of leaf rust races in Canada.

In oat stem rust, races 2 and 5 predominated as they have done since surveys were first undertaken. Races 8, 10 and 11, which were rather common in 1943, were decidedly less prevalent in 1944. Owing to the fact that many of the collections of these 3 races came from oat varieties resistant to almost all other races found in 1944, they were not as prevalent as the figures indicate. In Man., for instance, races 8, 10, and 11 make up 17, or 28.8% of the 59 isolated from Man. When,however, only those isolates are considered that came from oat varieties equally susceptible to all races, it is found that these races account for only 11.6% of the isolates for Man. In 1943, a similar calculation indicated that about 18% of the rust in that province was made up of the 3 races. In all 157 collections of oat stem rust were studied.

In a study of 126 collections of crown rust, it was found that races 2 and 3 comprised by far the largest proportion of the rust collected in the East. Both these races increased in prevalence in Western Canada, with race 3 showing much the greater increase. These two races have been on the increase for the past three years and comprised about one half of the collections made in this area in 1944. Races 1 and 4, which formerly were the commonest in the West, have decreased very greatly in prevalence. Race 6, which has been on the increase in both Eastern and Western Canada during the past few years, decreased slightly in prevalence, but is still quite common in both areas.

Three physiologic races of barley leaf rust were isolated from 5 cultures of the rust. Two races were similar to two previously identified by A.M. Brown. The third race, collected at Agassiz, B.C. differed from any race previously collected in Canada.

Infection Studies with Aecia on Berberis and Rhamnus

In the spring of 1944, arrangements were made with several individuals to collect aecia on Berberis vulgaris and other species and on Rhamnus cathartica and to forward the collections by air mail to the Laboratory at Winnipeg. The writers are indebted to these persons for their collaboration.

On arrival at Winnipeg, the aecia were placed in moist Petri dishes to induce spore discharge and the aeciospores so produced were used for the inoculations. Spores from aecia on barberry were used to inoculate seedlings of wheat, oats, rye, Agrostis alba, and Poa pratensis. Spores from aecia on buckthorn were used for the inoculation of oat seedlings. The aecia were collected between May 31 and July 19. The distribution of viable collections by provinces was as follows: aecia on barberry - Man. 2, Ont. 10, Que. 10, N.B. 12, N.S. 1, total 35; aecia on buckthorn - Ont. 1, Que. 4, N.B. 5, total 10.

The following varieties of Puccinia graminis were isolated from aecia on barberry: Secalis only from 21 collections; Poae only from 1; Secalis and Agrostidis from 6; Secalis and Avenae from 3; Agrostidis and Tritici, Agrostidis and Poae, Secalis, Avenae and Agrostidis, and Secalis, Avenae and Tritici, from 1 each. In most instances the first mentioned variety predominated in the collection. Similarly the following races were isolated from aecia on buckthorn: race 3 from 8 collections; race 2, and races 3 and 24 from one each.

The work with the aecia on barberry leads to the conclusion that grasses play a predominant part in spreading rust to barberry. In most localities in the East, P. graminis Secalis was the predominant rust in the aecia. Most of the infection came from telia on Agropyron repens. The second most common variety of stem rust was P. graminis Agrostidis spread to barberry presumably by telia on Agrostis alba and probably other Agrostis spp. that may be common in the East. P. graminis Avenae, which occurred in five different collections of aecia, was probably spread to barberry by cultivated oats, although orchard grass (Dactylis glomerata) could also be responsible. P. graminis Poae is probably not very common as it occurred in only two collections. P. graminis Tritici appeared in only two collections, one from Dorchester, N.B. and the other from Glenholme, N.S. As only a single uredinium appeared in the latter collection, this may have arisen through a contamination from wheat stem rust present in the greenhouse.1/

With regard to buckthorn, the races of crown rust appearing from the aecial collections are the same ones common in field collections made on oats. Race 3, which predominated, is also as far as our knowledge goes, the one most common in the field. Similarly, the races of oat stem rust from barberry also the ones common in the field with exception of the single culture of race 10 occurring in the collection from Glenholme, N.S.