Infection Studies with Aecia on Berberis and Rhamnus in 1947

Isolations from Aecia on Berberis

The distribution of the varieties of Puccinia graminis in the 21 aecial collections derived from barberry is much the same as in previous years. Although the collections this year were mostly from Ont. (8 collections) and N.B. (9), the few made in Que. (1) and N.S. (2) fit well into the general picture. One collection was made at Winnipeg, Man. The two predominating varieties, Secalis (from 13 collections) and Avenae (12) followed closely by the variety Agrostidis (10) are widely distributed from Ont., eastward. The variety Tritici occurred only at Dorchester and Shediac, N.B., and Winnipeg, Man., and the variety Poae was found only at three points in Ont.

The physiologic races of oat stem rust and wheat stem rust in the varieties Avenae and Tritici were identified. These races, with numbers of isolates of each in brackets, were: oat stem rust - race 2 (8), race 7 (2), race 8 (2), race 10 (1) and race 11 (1); wheat stem rust - race 15 (2) and an undescribed race (1) differing from race 21 only by its "x" reaction on Vernal. The occurrence of race 7 of oat stem rust and race 15 of wheat stem rust is worth mentioning. Oat stem rust race 7 has been very rare in past years in field collections made on oats, but it occurred twice in 14 isolates from aecial collections of the rust in 1947 and once in 6 isolates in 1946. Similarly, race 15 of wheat stem rust has been of rare occurrence on wheat but made up two of the three collections derived from aecia this year. Both of these collections correspond to the original race 15, not race 15B.

The fact that barberry collections frequently contain races of wheat stem rust or oat stem rust that are not commonly found on wheat or oats suggests that most of the rust occurring each year on these hosts comes from sources other than barberry. On the other hand the presence of uncommon races on barberry shows that it is a fertile breeding ground for such races and may at any time give rise to dangerous strains of rust.

Editor's note: The finding of wheat stem rust in aecial collections from barberry at Shediac and Dorchester, N.B., recall observations made during my cereal disease surveys in 1937 and 1938. Wheat was frequently encountered along the coast of the Northumberland Strait from Antigonish, N.S., to Newcastle, N.B. Although the varieties were susceptible and often carried relatively heavy infections of stem rust, it appeared that one reason for most of the wheat being grown near the coast was its greater freedom from rust. In the interior wheat fields were few and almost invariably heavily rusted.

If, therefore, wheat stem rust is to be found in aecial collections from the barberry it is most likely to occur from bushes located in the wheat belt along the coast. Even here there was little direct evidence of spread of stem rust to wheat. During these surveys, barberries were located at Shediac and Dorchester, N.B., and at River John, N.S. Only at River John was there evidence of some spread of rust to barley and wheat, but even here the fields were too far away to be moderately infected. Both at Shediac and River John oat fields were very close and severely rusted.

The authors' contention that most of the stem rust occurring each year on wheat comes from sources other than the barberry seems fully justified. It is not quite so clear when stem rust on oats is considered. Damaging amounts of rust were seen on several occasions, but as far as they were investigated the initial inoculum was found to be aecial infection on the barberry. Elsewhere stem rust of oats rarely exceeded a trace. In Ont., and Que., moderate infections may occasionally be found where a barberry source is unknown, but every "rust area" so far investigated has proved to be one where barberries occur, often as escapes.

Whatever role the barberry may play in breeding new races, it is effective in multiplying scarce virulent races once they appear in trace amounts on otherwise resistant oat varieties (I.L.C.).

Isolations from Aecia on Rhamnus cathartica and R. Frangula

Fifteen aecial collections of Puccinia coronata Corda were obtained in Eastern Canada in 1947. Twelve of these occurred on Rhamnus cathartica and three on R. Frangula. Aeciospores from each collection were transferred to oats and to several grass hosts in an attempt to determine the varieties of crown rust present on these two Rhamnus species.

None of the three lots of aeciospores collected on R. Frangula was capable of infecting cultivated oats. They, however, caused normal rust infection on the following grasses: Agrostis stolonifera, A. hyemalis, A. lacnantha, and A. tenuis.

All three collections from R. Frangula had similar infection capabilities and apparently belong to the same crown rust variety. This variety appears to be identical with P. coronata var. Agrostis Erikss., a variety that occurs quite commonly in Europe. Although the variety has been collected on R. Frangula at Fredericton, N.B., each year since 1939, it has not, so far as known, been collected elsewhere in America on R. Frangula.

Two varieties of crown rust, P. coronata var. Avenae Erikss. and P. coronata var. Bromi (Muehleth.) were isolated from the aecial material collected on R. cathartica. Seven collections yielded both these varieties of P. coronata, 2 yielded the variety Bromi only, one yielded the variety Avenae only, and two were transferred to oats only and yielded the variety Avenae. The rust variety here designated as Bromi, although apparently not identical with the European variety Bromi, is probably a race of that variety. This variety has not been collected before in America. It evidently is not similar to the race of crown rust isolated by Fraser and Ledingham on Bromus ciliatus in Western Canada and designated as var. Bromi by these authors in 1933. Their variety Bromi has aecia on Shepherdia canadensis and not on R. cathartica and also differs from the European variety Bromi with respect to its grass host range.

The variety Bromi here reported caused normal infection on B. secalinus and a rather weak infection on B. sterilis, but was incapable of infecting cultivated oats.

Although the variety Bromi was not isolated from the aecial collections on R. cathartica obtained in 1945 and 1946, it may well have been present as no hosts susceptible to this rust variety were included in the hosts used in those two years.

Eight isolates of race 3, one each of races 2 and 6 were obtained from the cultures of variety Avenae. Race 3, as well as being the most prevalent race on the buckthorn, was also the most prevalent race on cultivated oats in Eastern Canada in 1947.

Editors' Note: The authors are strictly correct in observing that the Aecidium on Rhamnus Frangula is known only from Fredericton, N.B. However it is worth noting that there are 3 collections of P. coronata on Agrostis stolonifera in the Division Herbarium; one from Kentville, N.S., and two from points some distance apart to the south and west of Chelsea, Que. Moreover, Rhamnus Frangula is known to occur at or near these places. Further search must reveal additional centres for the Aecidium on Rhamus Frangula or some unsuspected race. (I.L.C.).