LEAF SCALD OF BARLEY

by

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SUMMARY

Barley (*Hordeum vulgare*) and barley grass (*Hordeum leporinum*) are the only known hosts of *Rhynchosporium secalis* in South Australia. Thirty-five isolates from the two hosts were separated into 20 races on the basis of pathogenicity to 12 barley cultivars. Each of 8 isolates from barley grass infected most barley cultivars but only 2 of 5 barley isolates attacked barley grass. An isolate of *Rhynchosporium orthosporum* from *Dactylis glomerata* did not infect barley or barley grass.

Cultural characteristics, morphology of leaf-borne conidia and growth rate of germ tubes were not related to pathogenicity but there were some similarities in pathogenicity between isolates from the same geographic area.

In some cases conidia germinated on barley leaves to produce short germ tubes and appressoria, and penetration of the cuticle was initiated from a proportion of these appressoria. However, more than 50% of conidia that effected penetration had not formed superficial germ tubes or appressoria. Penetration was aided by chemical modification of the cuticle.

Hyphae in the subcuticular position penetrated between collapsed epidermal cells to establish both intercellular and intracellular mycelia in the mesophyll which collapsed before being

reached by the hyphae.

Subcuticular stromata formed on inoculated sides of leaves and substomatal stromata formed on the opposite sides in substomatal cavities. Conidia, which were formed on both types of stromata, protruded through the cuticle above subcuticular stromata and were extruded through stomatal pores from substomatal stromata.

Symptoms similar to those shown by infected leaves occurred in leaves of barley seedlings whose cut stems had been immersed in cell-free culture filtrates of R. secalis. Barley leaves sprayed with culture filtrates developed dark brown spots similar to the dark brown margins of R. secalis lesions and the dark brown hypersensitive spots on barley leaves. Culture filtrates also induced some scald disease symptoms in wheat, oats and Dactylis glomerata which are not hosts to the pathogen. The toxicity of culture filtrates was not affected by dialysis or autoclaving.

Leaf-borne conidia smeared on leaves of susceptible Clipper barley adhered to the leaves for longer periods than those smeared on leaves of the more resistant barley cultivars, Atlas 46 and Osiris. Inoculum derived from potato-sucrose-peptone adhered to the leaves of the three cultivars longer than did leaf-borne inoculum. Germ tubes were produced at the same rate on leaves of the three cultivars, but frequency of penetration of the cuticle was

significantly higher on Clipper. Growth of subcuticular hyphae which formed in Atlas 46 and Osiris appeared to be inhibited by some fungitoxic material(s).

In the field, the disease progressed mainly between adjacent plants, but pockets of infection sometimes appeared at isolated positions several metres away from the nearest source of inoculum. Sporulation occurred when free water was available and conidia were caught in a spore trap during rainfall or irrigation. Some conidia were trapped under windy but rainless conditions. Conidia were trapped at any time of the day or night but few were obtained at any one time.