Initial infection of barley crops by *Rhynchosporium secalis* and effects of scald disease on grain yield

by

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SUMMARY

The importance of *Rhynchosporium secalis* in plant debris, as a source of scald disease in barley crops was investigated. The fungus survived between growing seasons in dead leaves of hosts on the soil surface in the field in a range of barley-growing environments. Survival of inoculum was longer in tissue above the soil surface, and if infected tissue was buried, survival of inoculum was apparently insufficient to enable infection of barley sown at the start of the following growing season.

In a field experiment it was found that the commonly used practices of burning or grazing barley stubble reduced the amount of scald disease at early but not at later crop growth stages. However, different amounts of *R. secalis* inoculum applied to barley plots at seedling emergence in a field experiment produced different levels of scald disease at both early and late growth stages. Possible interactions between the effects of management practices on development of scald disease are discussed.

Absence of hosts for 18 months eliminated detectable levels of *R. secalis* from treated areas in another experiment.

The fungus did not appear to multiply in irrigated volunteer barley growing during late summer. Possible detrimental effects of high temperatures on the development of scald disease were investigated. Post-inoculation temperatures of 40°C, but not 35°C, inhibited lesion production and sporulation of *R. secalis* in barley leaves.

To evaluate effects on grain yield of disease severity at specific plant growth stages, grain yields of diseased and healthy barley were compared under controlled environmental and field
conditions. In the controlled environment experiment greatest losses occurred when plants were inoculated after stem elongation growth stage. These were associated with reductions in root weight, leaf area, water use and in a delay in anthesis. No significant effects of scald disease on the amount of non-reducing sugars in roots or leaves of diseased plants were measured. But analyses of scald disease severities and components of grain yield of barley in a field experiment indicated that the disease at early crop growth stages reduced grain yield more than at later growth stages. These analyses also suggested that reductions in grain yield in the field may be a result of interactions of effects of scald disease with other factors affecting grain yield.

Relationships between scald disease severities and grain yields of individual barley tillers were compared with those obtained from plots. In this instance, the plot assessment was the better method for evaluating disease/yield loss relationships.