Role of Seed-Borne Infection in Rhynchosporium Epidemics in Barley

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Figure 1 Typical Rhynchosporium lesions.

Background

Rhynchosporium is the most damaging disease of barley. *Rhynchosporium secalis* can complete its life cycle within a host without producing any visible symptoms. A greater understanding of the epidemiology of this pathogen, how it spreads during the symptomless phases of its life cycle, the role of seed-borne infection and subsequent proliferation and spread, will assist resistance breeding, improve guidance to farmers for control measures and help optimize fungicide application.

Transformation

Agrobacterium tumefaciens-mediated transformation of *R. secalis* using two pathogenicity-characterised isolates was done by co-cultivating high concentration of *R. secalis* spores with *A. tumefaciens* in the presence of acetosyringone. The transformed colonies were selected on minimal media containing hygromycin.

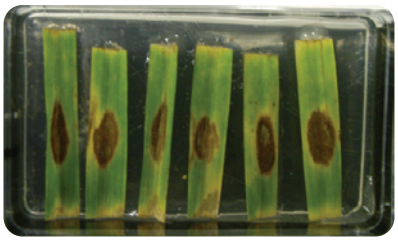

Figure 2a Symptoms produced by transformed *R. secalis* on a susceptible cultivar.

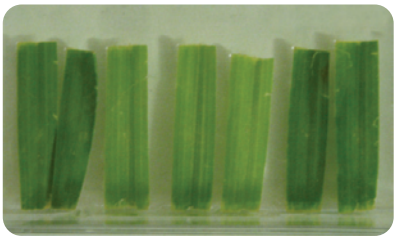

Figure 2b Symptomless infection on a resistant cultivar.

Time Series Experiment

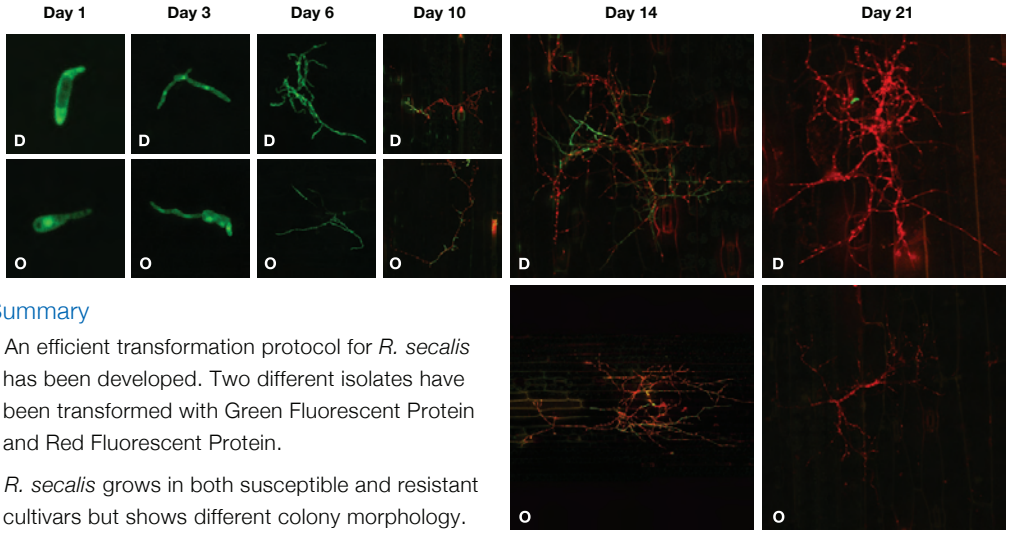

Figure 3
D= Digger (Susceptible)
O= Osiris (Resistant)

Summary

- An efficient transformation protocol for *R. secalis* has been developed. Two different isolates have been transformed with Green Fluorescent Protein and Red Fluorescent Protein.
- *R. secalis* grows in both susceptible and resistant cultivars but shows different colony morphology.
- Use of propidium iodide during imaging helps distinguish living and senescent mycelia in infections.

Future Prospects

- Observations made during the asymptomatic phase will help to identify and understand different Rhynchosporium resistance genes in barley and their potential use in breeding.
- Tools developed in this project will aid in identifying the mechanisms of seed-plant-seed infection.
- This study will be helpful for devising variety-specific crop protection strategies (fungicide application and timing).

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