Rhizoctonia inoculum levels and rotations

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RESEARCH

Searching for answers

Location: Streaky Bay
K & D Williams
Streaky Bay Ag Bureau

Rainfall
Av. Annual: 298 mm
Av. GSR: 243 mm

Soil
High calcareous grey loamy sand

Plot Size
60 m x 1.48 m

Disease
Rhizoctonia

Livestock
Trial was not grazed since 2004

Key messages

- **Canola and medic will reduce Rhizoctonia inoculum but only one year of cereal will result in high levels of Rhizoctonia inoculum again.**
- **Disease suppression has not developed in this environment despite it happening within the same time frame in other environments.**

Why do the trial?

A long term trial was established at Streaky Bay in 2004 to determine if disease suppression against rhizoctonia is achievable in an upper EP environment on a grey highly calcareous soil. It also assessed whether soil microbial populations can be influenced by rotation and fertiliser inputs in this environment.

How was it done?

This trial was established in 2004 (see previous EPFS Summaries for treatments and rotations). The DNA based testing service PreDicta® B was used to monitor disease inoculum levels in autumn (March-May) annually.

What happened?

Rhizoctonia inoculum level was strongly influenced by crop type (Figure 1) with both canola and medic (both grass free) having reduced Rhizoctonia inoculum levels but inoculum levels increased again following one wheat crop. Barley did not increase Rhizoctonia inoculum levels as much as wheat. However, Rhizoctonia infection on barley roots 6 to 8 weeks after seeding was similar or greater than wheat with the same inoculum level (Figure 2).

Fertiliser management did not affect inoculum levels or root infection (Figures 1 and 2). However, fluid fertiliser applications showed greater early dry matter (data in previous EPFS Summary articles) and increased grain yield, especially in higher rainfall seasons.

In 2009, surface soils were assessed for potential disease suppression to Rhizoctonia using a pot bioassay and disease suppression was similar in all rotations (EPFS Summary 2009, p 79). In spring of 2011, all cereals were severely affected by Take-all disease (EPFS Summary 2011, p 76). If biological disease suppression had developed, it should have controlled both Rhizoctonia and Take-all. This indicates that disease suppression had not been achieved in this soil type even after eight years of management styles which have created suppression in other environments (Avon) within this timeframe.

What does this mean?

After eight years of several rotations and fertiliser management combinations, it has been shown that canola and grass-free medic have the ability to lower Rhizoctonia inoculum levels for one season compared to a wheat crop, but the inoculum will increase again following one wheat crop.

In good seasons, the district practice treatment has shown that the yield is limited by nutrition, mainly phosphorus. Changing rotation and nutrition have changed the microbial population and diversity after eight years but disease suppression has not developed in this soil type and environment.

Acknowledgements

We would like to sincerely thank the Williams family for supporting MAC and research by having the trial on their property, and the Streaky Bay Ag Bureau for taking a very active interest in this research.

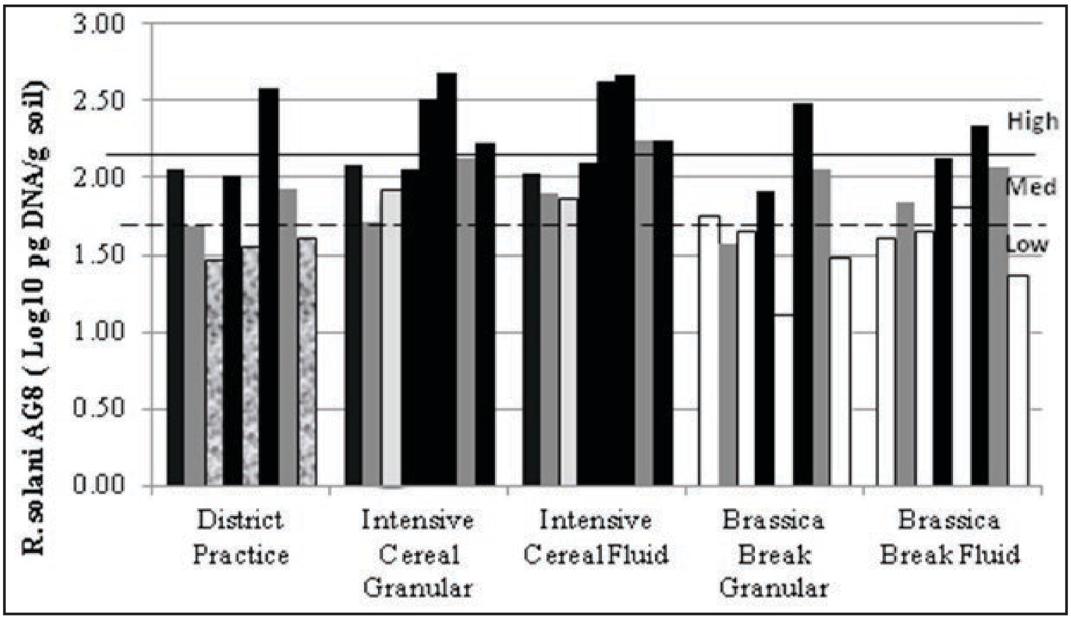

Figure 1 Rhizoctonia inoculum in the top 10 cm of soil at the beginning of each season (2005-2012) for each treatment of the field trial at Streaky Bay

Black bars – following wheat, dark grey - following barley, light grey - following triticale, grey pattern - following medic, white – following canola.

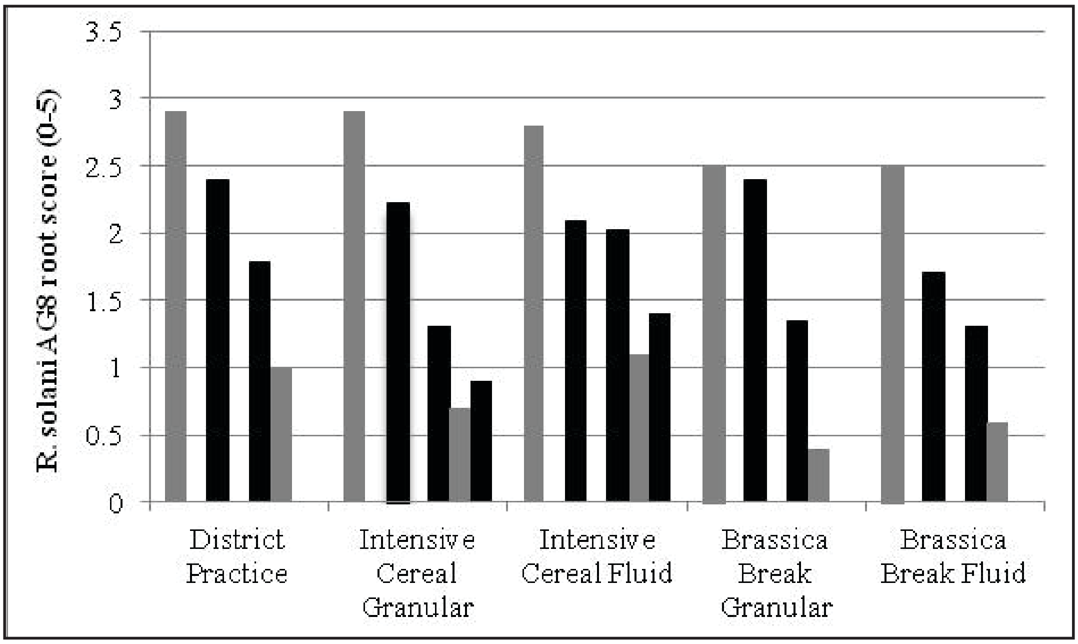

Figure 2 Rhizoctonia root score of cereal plants at 6-8 weeks post seeding (rating 0-5 where 0=no damage, 5=severe root damage) from 2005-2010 at Streaky Bay

Black bars - wheat, dark grey – barley.