Better Prediction and Management of Rhizoctonia Disease in Cereals

RESEARCH

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Searching for answers

Location: Streaky Bay
B Goosay
Streaky Bay Ag Bureau

Rainfall
Av. Annual: 340 mm
Av. GSR: 274 mm
2009 Total: 311 mm
2009 GSR: 275 mm

Yield
Potential: (W) 3.5 t/ha
Actual: up to 2.3 t/ha

Paddock history
2007: Barley
2006: Wheat
2005: Pasture

Soil
Highly calcareous grey loamy sand

Plot size
60 m x 1.48 m

Other factors
Early moisture stress, strong winds, polyphrades.

Key messages

- **Rhizoctonia solani AG8 inoculum levels were reduced over summer and this may be associated with summer rainfall events.**
- **Crop rotation does affect Rhizoctonia inoculum levels i.e. levels were lowest immediately after canola compared to that after wheat.**
- **The incidence and severity of Rhizoctonia bare patch disease in cereals depend on the amount of pathogen inoculum, soil microbial community activity and crop/root vigour.**
- **Seed treatments did not reduce rhizoctonia levels in 2009 trials undertaken on EP and the Mallee.**
- **To reduce risk of yield loss caused by Rhizoctonia:**
  1. **Control summer weeds to stop build-up of inoculum,**
  2. **Encourage early seedling vigour, sow early,**
  3. **Cultivate deep sow shallow (avoid disc seeders).**
- **Canola can help reduce inoculum for the following wheat crop.**
- **Barley and wheat are the most intolerant crops.**
- **Minimise N deficiency at seeding, particularly for cereal on cereal rotations where summer rainfall has been low, by deep banding N and minimising stubble incorporation at seeding.**

Why do the trial?

Rhizoctonia continues to be an important but unpredictable disease in the southern agricultural region, especially in the Eyre Peninsula soils. This is the second year of a national project funded by GRDC to improve the long term control of Rhizoctonia by increasing the understanding of the interactions between disease inoculum and natural soil suppressive activity and to improve the prediction and management of disease. As part of the project a three year trial was established at Streaky Bay in 2008. Disease inoculum levels were also monitored over the 2008/09 summer in four EP paddocks.

How was it done?

Rhizoctonia disease control and inoculum levels are being compared with three different tillage systems; conventional cultivation (1 April - wide sweeps; 30 April - narrow points), strategic cultivation (12 May - narrow points), no-till and several rotations. The trial was sown on 22 May into reasonable moisture but strong winds followed.

Correll wheat was sown at 70 kg/ha with DAP @ 60 kg/ha and Urea @ 35 kg/ha. Cobbler canola was sown @ 5 kg/ha with MAP @ 150kg/ha and Urea @ 70 kg/ha (resown at 7 kg/ha with no fertiliser). Herald medic was sown @ 2.5 kg/ha ha with MAP at 35 kg/ha. Both the canola and medic had poor establishment for the second season due to strong winds and the plots were resown on June 25. The trial area received 1.5 L/ha of Sprayseed and 1.5 L/ha of Treflan pre seeding, 1.5 L/ha of Lorsban post sowing and 500 ml/ha of Astound and 400 g/ha of Achieve later in the season. The canola plots also received 1.5 L/ha of Atrazine and 200 ml of Lontrel.

Sampling included soil characterisation, soil moisture, pathogen DNA levels, root disease infection, dry matter, soil microbial populations and grain yield.

Paddock monitoring was also undertaken at different times over the 2008/09 summer in four EP paddocks, on a heavy red soil, a red sandy soil and two grey calcareous soils.

Similar data was also collected at other southern Australian sites to determine changes in Rhizoctonia inoculum levels during non-cropping period.

What happened?

The 2009 trial results show that the previous rotation does affect Rhizoctonia inoculum levels (Figure 1). Levels were lowest immediately after canola, medic pasture and fallow, and the highest following wheat. These differences in Rhizoctonia inoculum were correlated with amount of disease in the following wheat crop (Figure 2) although soil nutrition differences contributed to differences in grain yield.

The reduced inoculum levels following canola, medic pasture and fallow were associated with increased yield (Figure 3). Cultivation prior to sowing reduced inoculum levels, but the level in the trials was still high. Inoculum levels are reduced by summer rainfall in weed free plots, but increases as the soil dries out. The results from the farmer paddocks which were monitored in the 08/09 summer also reflected similar results as a reduction in inoculum over summer after rainfall events was also observed.

Seedling assessments revealed minor rhizoctonia damage to the seminal roots, however the crown roots were often severely affected (Figure 2). This is probably due to the seminal roots escaping the disease by rapidly growing through warm soil while the crown roots emerged into cold soil with re-establishment of the rhizoctonia hyphal network following soil disturbance at seeding.

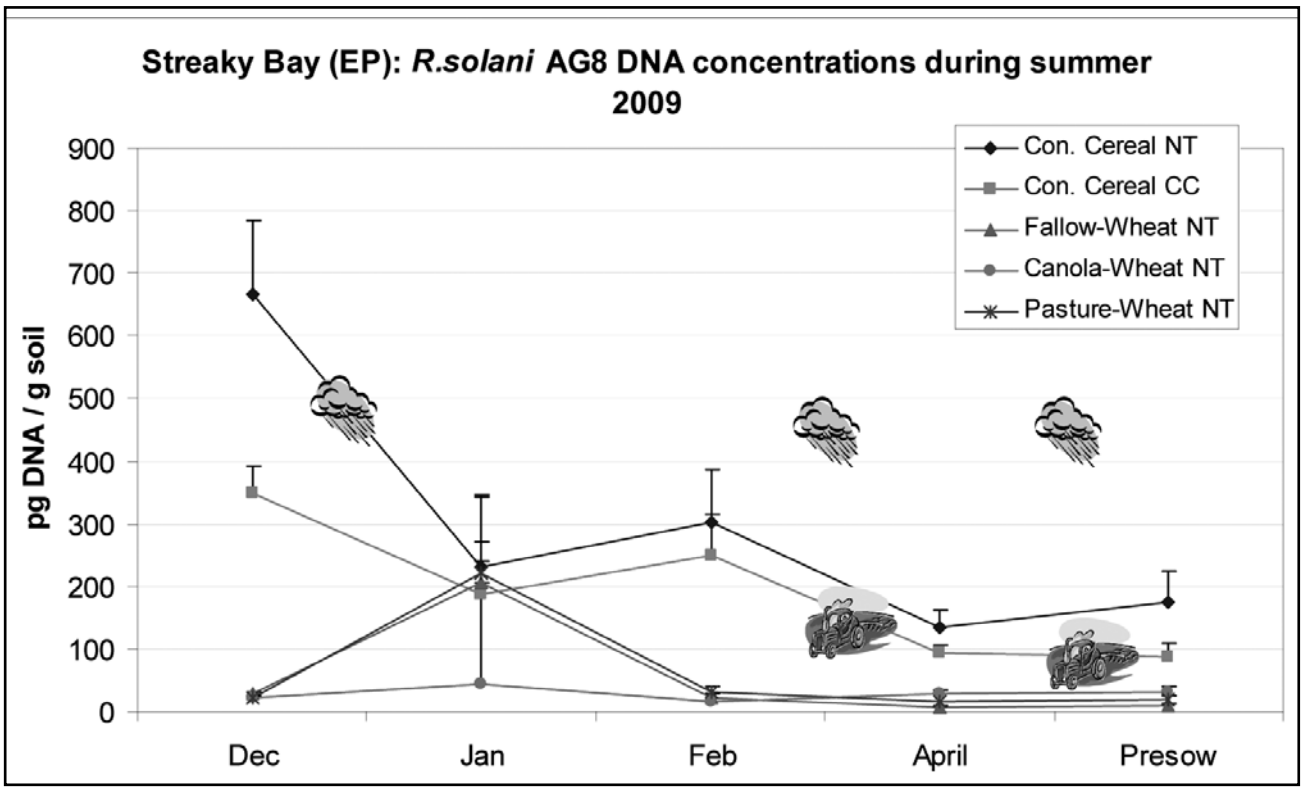

Figure 1 Changes in the amount of Rhizoctonia solani AG8 DNA in the surface soil under different rotation and tillage treatments during summer of 2009 at Streaky Bay

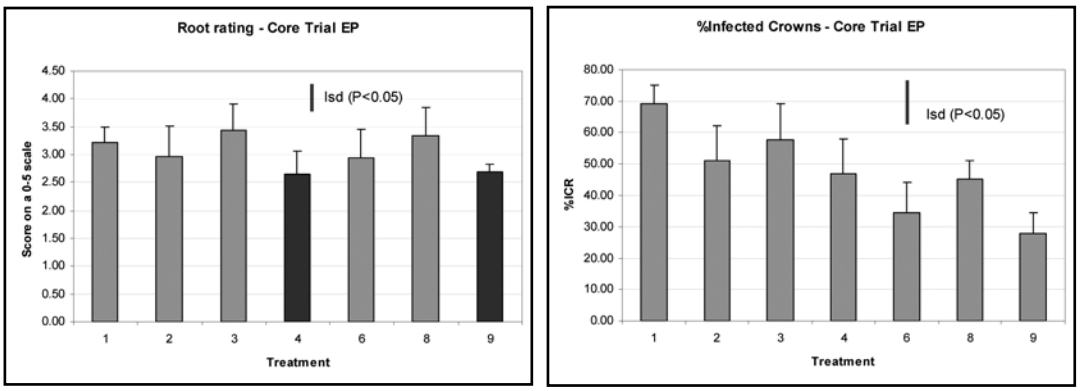

Figure 2 Rhizoctonia disease rating on wheat roots during 2009 (Selected treatments are; 1 - Cereal NT, 2 - Cereal Cult, 3 - Cereal Strategic Cult, 4 - Fallow/Wheat, 6 - Canola/Wheat, 8 - Pasture/Wheat NT, 9 - Pasture/Wheat Cult). Root rating was done on a 0-5 scale; 0 = no infection and 5 = high infection. % infected crowns represent % of crown roots infected with Rhizoctonia.

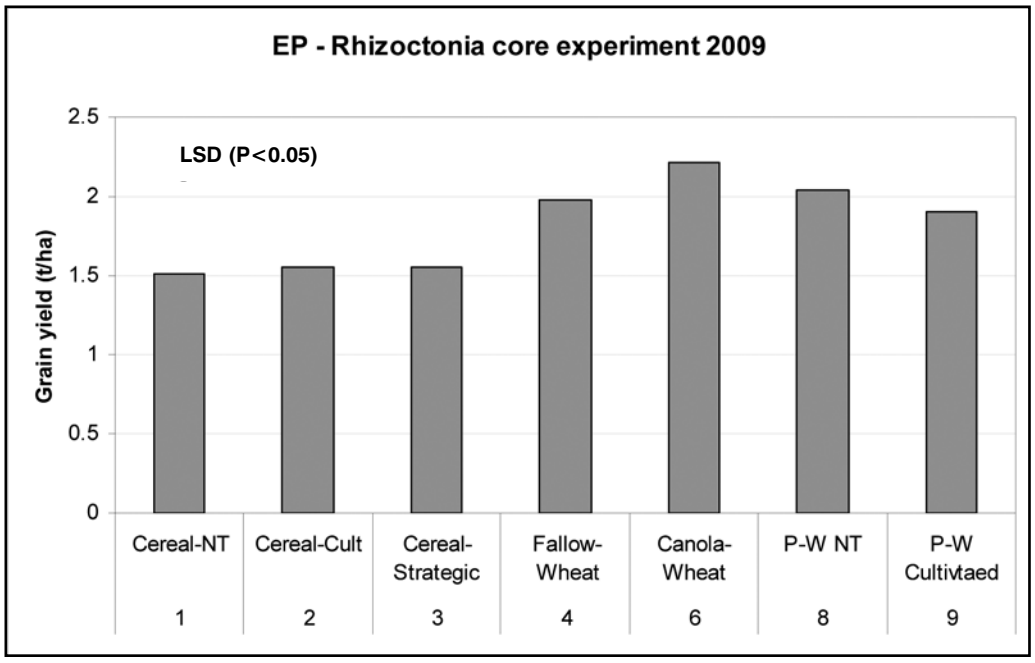

Figure 3 Wheat grain yields in 2009 as influenced by rotation and tillage treatments

Seed treatments

In trials to evaluate seed treatments on Eyre Peninsula and in the Murray Mallee, we were not able to show either a significant reduction in Rhizoctonia damage or an increase in yield of wheat or barley.

What does this mean?

The risk of yield loss caused by Rhizoctonia can be reduced by controlling summer weeds to stop build-up of inoculum, encouraging early seedling vigour by sowing early and using quality seed with good nutrition.

In paddocks with high risk of Rhizocontia cultivate deep and sow shallow (avoid disc seeders), canola can help reduce inoculum for the following wheat crop so may be used in problem paddocks. Barley and wheat are the most intolerant crops to Rhizoctonia. Minimise nitrogen deficiency at seeding, particularly for cereal on cereal rotations where summer rainfall has been low, by deep banding N and minimising stubble incorporation at seeding, as it will tie up available nitrogen. No seed treatments reduced Rhizoctonia levels in trials in 2009.

Acknowledgements

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