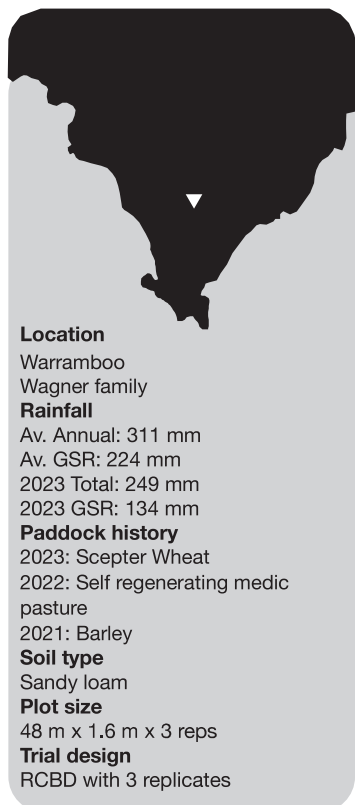


Demonstrating deep ripping and fungicide application on rhizoctonia management

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Key messages

- **Uniform in-furrow fungicide did not reduce rhizoctonia root disease in Calibre wheat in 2023.**
- **Neither ripping nor uniform fungicide altered grain yield of wheat compared to the control in 2023.**
- **Calibre outyielded Scepter by 0.4 t/ha in the control treatment.**

Why do the trial?

Rhizoctonia (*Rhizoctonia solani*) remains a significant constraint to crop production in the low and medium rainfall zones of the Southern and Western regions, especially on the calcareous soils of upper Eyre Peninsula (EP).

The aim of the current GRDC investment 'Epidemiology and management of Rhizoctonia in low and medium rainfall zones' (DAW2206-006RTX) is to examine innovative management strategies for rhizoctonia management in low and medium rainfall zones, by exploring new actives (chemicals and biologicals) that can reduce rhizoctonia infection, applied either pre-sowing or in-crop, and investigating the potential of different practices (e.g. soil amelioration and deeper sowing with long coleoptile varieties, and plant fumigants) to reduce the impact of rhizoctonia. The AIR EP Warramboo grower demonstration was implemented in 2023 to investigate the effects of soil amelioration, fungicide application and a long coleoptile wheat variety on rhizoctonia.

Newer long coleoptile varieties like Calibre may offer opportunities to sow below the highest Rhizoctonia inoculum level in the soil (0-5 cm) and to also allow better crop establishment from depth after deep ripping.

How was it done?

A grower at Warramboo implemented three deep ripping and Nil control blocks pre-sowing in mid-April 2023. The deep ripping treatments (6 m wide per pass) were imposed to 40 cm using a Bednar ripper, then rolled. Three seeding treatments were implemented; either Scepter, Calibre (long coleoptile wheat) or Calibre + Uniform[®] fungicide @ 400 ml/ha applied with a split application on plots 48 m long by 1.6 m wide.

The replicated trial was sown using a small plot seeder with Harrington knife points and press wheels on 31 May into a moist seed bed. A pre-sowing knockdown consisted of 2 L/ha Glyphosate, 80 L/ha Hammer and LI700 at 400ml/100L. Scepter and Calibre were sown @ 72 kg/ha with MAP fertiliser @ 70 kg/ha placed below the seed. The fungicide Uniform[®] (active ingredients, azoxystrobin & mefenoxam) was applied at 400 mL/ha with 80 L/ha of water as a split application (on top of the seed rows and banded under the seed rows). 50 kg/ha of urea was spread post crop emergence on 6 July.

Crop establishment was measured on 6 July 2023. At eight weeks after seeding 15 plants were sampled per treatment and scored for number of tillers, number of crown roots, and rhizoctonia infection of crown roots, seminal roots and overall. Internode root length, plant weight and root weight were also measured. Rhizoctonia infection was assessed using a score (0-10) developed by the project team. The ratings are: 0=no disease, 2-3=<25% roots damaged, 4-5=25-50% roots damaged, 6-7=50-75% roots damaged, 8-9>75% roots damaged, 10=all roots highly diseased and truncated. Crop vigour was estimated by NDVI on 26 August. Grain yield using a Zurn plot harvester was sampled on 10 November and grain quality traits were assessed.

Data from quantitative assessments were analysed using an ANOVA with three replicates sown in a single range using GENSTAT.

What happened?

The 2023 season on upper Eyre Peninsula had below average winter and spring rainfall, but there was some stored soil moisture from November 2022 summer rainfall events. Mid-April rains allowed seeding to occur in adequate to drier moisture, however, follow up

rainfall events greater than 10 mm over two days didn't occur until late June-early July.

The total rainfall for Kyancutta in 2023 (16 km from trial site) was 249 mm, and the 2023 growing season rainfall was 134 mm.

Wheat establishment across all treatments averaged 111

plants/m², however shallower sown Scepter wheat had better establishment (126 plants/m²) than the Calibre Nil treatments (Figure 1). The Scepter wheat had similar to plant establishment to the Calibre unripped with Uniform fungicide applied treatment (Figure 1).

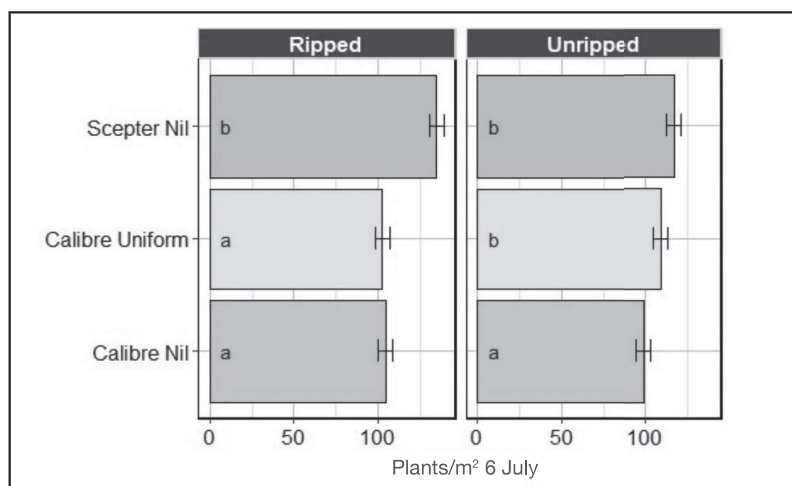


Figure 1. Wheat establishment in the Warramboos rhizoctonia management trial, 2023. The letters within the graph represent the LSD of treatments which are significantly different at LSD ($P=0.05$).

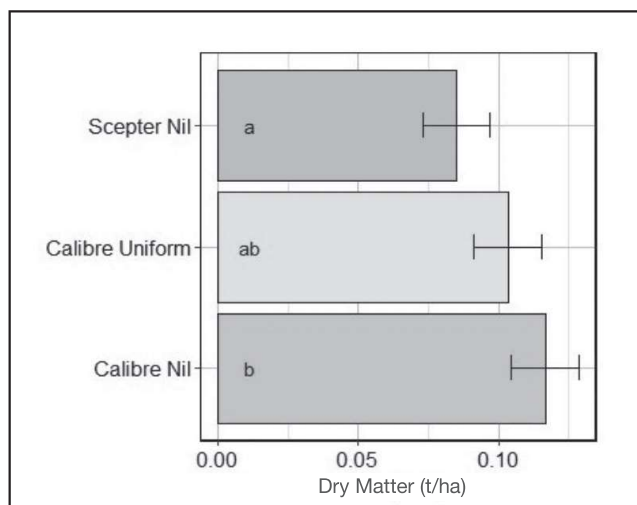


Figure 2. Average wheat dry matter (t/ha), averaged over soil amelioration treatments, eight weeks after seeding in the Warramboos rhizoctonia management trial, 2023. The letters within the graph represent the LSD of treatments which are significantly different at LSD ($P=0.05$).

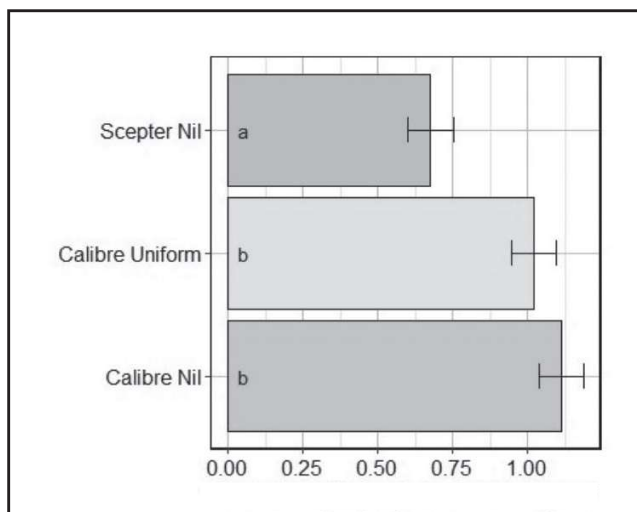


Figure 3. Average Grain yield (t/ha) of wheat in the Warramboos rhizoctonia management trial, 2023.

Table 1. Grain protein (%) of wheat in the Warramboo rhizoctonia management trial, 2023.

Management treatment	Grain protein (%)
Calibre Nil	12.6 a
Calibre Uniform	13.0 a
Scepter Nil	13.8 b
LSD ($F_{prob} = 0.05$)	0.7

Soil amelioration did not impact on plant biomass or NDVI. The Calibre Nil (without fungicide) treatment had greater biomass than Scepter without fungicide (Figure 2).

The management treatments of soil amelioration, variety or fungicide did not change rhizoctonia infection (average rating of 5.6), number of tillers (3), internode root length (3 cm) or number of crown roots (11) or % crown root infection (46%) eight weeks after seeding in 2023.

The only treatment which affected grain yield was variety choice; Calibre yielded 0.39 t/ha than Scepter (Figure 3), with average yield across the trial being 0.94 t/ha.

Scepter had higher protein than Calibre (Table 1). There were no other differences in grain quality.

What does this mean?

Scepter wheat and Calibre Nil in unripped plots had higher plant establishment than Calibre after deep ripping. Calibre had greater plant biomass than Scepter during the season.

Soil amelioration in a deep white sand at Warramboo did not affect plant biomass, rhizoctonia disease levels or root growth, grain yield or quality in a decile 2 season.

Uniform® fungicide applied in a split fluid application did not improve plant root growth or reduce Rhizoctonia disease impacts on seminal or crown roots on in either ripped or unripped soil.

The plant dry matter taken in August was greater with the Calibre unripped treatment compared to the Scepter unripped treatment, and the gains in dry matter followed through to differences in grain yield at harvest. Scepter wheat had higher grain protein levels than Calibre.

The lack of benefit from Uniform® on rhizoctonia has been common in previous upper EP research with earlier and drier finishes to the seasons. Using canola or legume break crops which are grass free in the rotation, and any other strategies to reduce grass weed numbers, are still the “go to” management options to reduce rhizoctonia inoculum levels before the cereal crop. Rhizoctonia

inoculum levels will increase during the season with a cereal crop.

The ‘Epidemiology and management of rhizoctonia in low and medium rainfall zones’ research has one more season to run. In 2024, crop performance and rhizoctonia infection will be monitored again to investigate management strategies for rhizoctonia such as deep ripping and the use of long coleoptile varieties.

Acknowledgements

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