Figure 1. Rhizoctonia patches in a barley paddock. Image: DPIRD

Protecting WA Crops

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Contents

Tackling Rhizoctonia: Promising treatments and soil strategies for the low and medium rainfall zones

At a glance:

- A national collaborative project investigating innovative management options for Rhizoctonia root rot in low and medium rainfall zones of southern and Western Australia (WA) has just been completed.
- A new seed treatment consistently reduced disease incidence and increased yields in several paddocks.
- The impact of soil amelioration on rhizoctonia varied across soil types.
- In one trial, a significant interaction for yield loss was observed between soil amelioration treatments and inoculum levels, suggesting that disease pressure influenced the effectiveness of amelioration strategies. Overall, deep ripping produced greater yield improvements than mouldboard ploughing, likely due to enhanced root penetration and improved soil structure.
- Heat and water stress at grain fill in barley crops exacerbates disease impacts.

Rhizoctonia root rot continues to quietly erode yields across WA's low and medium rainfall zones, sometimes by more than 20%, but new research offers growers practical ways to fight back.

The disease, caused by *Rhizoctonia solani* AG8 (*R. solani*), remains a significant constraint on crop yields in the low and medium rainfall zones (LRZ and MRZ) of southern and WA.

This soilborne disease can affect a wide range of crops, but cereals (particularly barley) are the most severely impacted. It damages the root systems of broadacre crops, restricting water and nutrient uptake and leading to stunted growth.

Figure 2. Barley roots showing the distinctive spear tipping caused by Rhizoctonia disease.

Yield losses are often underestimated because symptoms can be subtle and variable. Infected seedlings typically form sharply defined circular patches of poor growth, ranging from less than a metre to several metres in diameter. These patches may merge, return in the same spots over multiple seasons or occasionally shift or disappear altogether.

A three-year, nationally coordinated project led by Department of Primary Industries and Regional Development (DPIRD) WA, with partners from the South Australian Research

and Development Institute, University of Adelaide, and CSIRO, and co-investment from the Grains Research and Development Corporation (GRDC) has just been completed.

This research aimed to develop innovative strategies for managing Rhizoctonia, identify seasonal and environmental factors influencing disease expression, and gain a clearer understanding of the associated yield and economic impacts. To achieve these goals, the project conducted 19 field trials, established 10 demonstration sites, and carried out complementary laboratory and glasshouse studies across southern and western Australia.

Management strategies

Fungicides and biological control

Managing Rhizoctonia remains challenging due to the disease's uneven distribution in paddocks, variable expression across seasons, and limited effective control options. To address this, seven field trials were conducted across various locations in southern and WA to evaluate new fungicides and biological treatments.

One seed treatment consistently reduced disease and improved grain yield at four of the seven trial sites. Two other treatments also suppressed the disease, but yield improvements were observed in fewer trials.

In-furrow fungicides were also assessed for their effectiveness in controlling the disease and boosting yield. The in-furrow products proved effective in seasons with moderate rainfall, but their performance declined significantly under drought conditions. A new in-furrow treatment showed promise in reducing disease symptoms but was also associated with reduced tillering and lower yields in some trials, indicating a need for further formulation refinement.

Biological control agents, including *Bacillus*, *Streptomyces*, and another species, were tested for their ability to reduce disease. However, these treatments delivered inconsistent results and rarely led to yield improvements, particularly in dry soil conditions. While not currently suitable as standalone control measures, these biological options may contribute to future integrated disease management strategies.

Soil amelioration

In 2021, a field trial was established at Muresk Institute in WA, to assess the impact of soil inversion and deep ripping on *Rhizoctonia solani* AG8 densities in barley and canola crops, compared to untreated control plots. Building on this work, 2 additional field trials were conducted in 2023 at DPIRD research stations in Merredin and Wongan Hills. These trials aimed to evaluate the effects of soil amelioration techniques and organic amendments on the incidence, severity, and yield loss caused by *R. solani* AG8 in barley (*cv.* Maximus CL).

The trials also examined how soil amelioration influenced the distribution of *R. solani* AG8 in the soil profile and its relationship with disease expression. Results across all sites indicated that the pathogen responded differently to soil amelioration treatments across various soil types. It was also found that deep ripping resulted in higher yields compared to mouldboard ploughing in the year of the amelioration treatment. Further work on the Wongan Hills trial will assess the disease impact in the year following amelioration.

Economic and disease impact

Field trials conducted during the 2024-2025 seasons examined how environmental factors (particularly heat and water stress) affect disease at different crop growth stages. The results showed that in barley, infection by Rhizoctonia led to significant yield losses when heat and water stress occurred during the grain filling stage. In contrast, a similar trial in wheat showed a lower impact from the disease under the same conditions.

This insight is particularly valuable for growers in the LRZ and MRZ, where heat and moisture stress during grain fill are common, as these stresses can exacerbate Rhizoctonia impacts. By understanding this relationship, growers can better assess Rhizoctonia risk and more accurately estimate potential economic losses.

A macro-economic analysis was carried out across Australia's major grain-producing regions from 2018 to 2023. It used a method that combined DNA-based pathogen detection with crop production data, to assess disease impact in different regions. The study covered nine agro-ecological zones and included 5,136 soil samples tested to measure pathogen levels present before sowing.

The results estimate that Rhizoctonia can lead to substantial economic impacts with conservative assumptions showing annual losses of $96.9 million, moderate $203 million and severe $331.8 million annually.

For more information refer to GRDC Tips and Tactics - Rhizoctonia Southern region and Western region or podcast Managing rhizoctonia in low and medium rainfall.

Meet Crop protection team member – Kithsiri Jayasena

Dr. Kithsiri Jayasena (or just Kith, as most people know him) is a Plant Pathologist with DPIRD based in Albany, WA.

Originally from Sri Lanka, Kith graduated from the University of Ceylon, Peradeniya, with a Bachelor of Science in Agriculture (Honours) before heading to Australia to complete his PhD at the University of Adelaide.

These days, he's focused on helping farmers manage crop diseases more sustainably, especially in broadacre systems across the Albany port zone. He's also a key part of the High-Rainfall Economic Sustainability (HiRES) project. His work covers everything from monitoring fungal spores and diagnosing diseases to improving biosecurity and developing practical tools that growers can use.

Kith is passionate about clear, useful science communication. You'll often find him out in the paddock at field days and crop walks or sharing cereal disease updates with growers and consultants on social media.