

Ameliorating Hardsetting Sandy Soils for Cereal Production

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Background

High soil strength affects >20 million ha of Australian cropping regions, and is particularly significant in sandy soils.

In these soils, root exploration down the profile may be **physically constrained** by combinations of compaction, hardsetting and cementation processes. Reduced access to soil water held deeper in the profile restricts **yield** potential and increases **crop vulnerability** to water stress in dry conditions.

The yield response to deep ripping these soils has been inconsistent between locations and seasons. In some soils the benefits are only short term, making it an uneconomical option for farmers.

Project Aims



1. Understanding root constraints in high strength sandy soils:

By investigating the dynamics behind how root systems are constricted, this research aims to shed light on the mechanisms at play in these challenging soils.

2. Exploring transformations through soil amelioration:

This study seeks to unveil changes to the soil structure that result from soil management practices, including deep ripping and the incorporation of soil amendments.

Research Approach

Field monitoring at sites in the SA Murray Mallee indicate that constrained root growth may stem from hardsetting mechanisms. As the soil dries, its strength significantly amplifies.



A series of glasshouse experiments use soil from key sites to explore the interplay between soil moisture, strength, and root growth within this hardsetting soil type, and to investigate potential amelioration strategies.

Next Steps

Field studies will extend our research beyond the glasshouse, focusing on how changes to soil strength and soil moisture affect plant growth throughout the season.



The use of X-ray computed tomography will provide a way to analyse differences in the 3-dimensional structure and porosity of both field and glasshouse soils.