



Evaluating mechanisms and field performance of rhizosphere re-engineering technologies

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BACKGROUND

The diversity of species, particularly legume species, in many Australian cropping systems has declined during the past decade. Yet species diversity in farming systems, particularly from the inclusion of legume species, is recognised as having multiple benefits which can lead to improved environmental sustainability.

Riverine Plains Inc has established a trial site at Burramine as part of a national Soil CRC project which aims to identify rotations that enable a diverse range of species to be integrated into farming systems to improve soil performance and increase farm profitability. This project is supported by the Goulburn Broken Catchment Management Authority's 'From the Ground Up' program through funding from the Australian Government's National Landcare Program.

The trial site at Burramine is part of a series of long-term Soil CRC field trials designed to assess the viability of integrating diverse species into the farming system, as either winter rotation crops, green/brown manures, or as summer cover crops.

Further, the Burramine trial also evaluates how green manure crops, cover crops (grown primarily for the benefit of the soil, rather than for yield) and companion crops (two or more species of crop grown at the same time) can affect soil performance.

This field site will run for four years, with ongoing funding likely to enable long-term comparisons to be made.

AIM

Given the profitability of a cereal–brassica rotation, there is little incentive for growers in southern cropping systems to increase plant diversity by growing alternative winter crops. This project aims to investigate other options to increase plant diversity, such as summer cover-cropping, intercropping or companion-cropping, and to examine their impacts on soil function and winter crop yields.

TREATMENTS

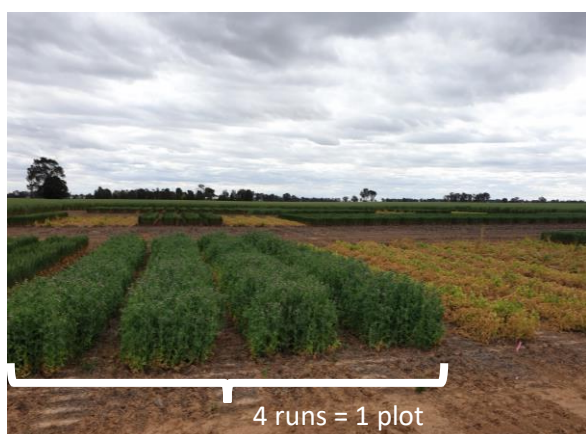
A randomised block design is used, with three replicates of each treatment. The control treatment was wheat in 2019 and is currently canola (2020), before likely setting a wheat/barley/canola rotation, with other treatments changing different facets of the rotation.

Treatment no.	Treatments	2019 Winter crop	2020 Summer Crop	2020 Winter crop
1	Control Wheat/ Canola /Wheat/Barley	wheat	-	canola
2	Wheat/Pulse/ Canola /Wheat	Field peas	-	canola
3	Wheat/manured Pulse/ Canola /Wheat	Field peas	-	canola
4	Wheat/manure mix/ Canola /Wheat	Peas + tillage radish	-	canola
5	Wheat/[Peas+canola]/Wheat/ Barley	wheat		Canola + peas*
6	[Wheat+subclover]/ Canola / [Wheat+subclover]/Barley	Wheat + subclover#		canola
7	Covercrop mix 1 (low biomass) Wheat/ Canola /Wheat/Barley	wheat	Medic + buckwheat	canola
8	Covercrop mix 2 (high biomass) Wheat/ Canola /Wheat/Barley	wheat	Sorghum, millet, forage rape, tillage radish	canola
9	Max Diversity Multiple species sown in both summer & autumn	wheat	Sorghum, millet, forage rape, tillage radish	Canola + peas

Cultivars used: Canola - ATR Bonito; Field Peas - Morgan sown 6 May 2020.

* Desiccant used so canola and peas harvested together

Subclover sprayed out in Spring



This trial is part of the Plant-based solutions to improve soil performance through rhizosphere modification project, supported by the Cooperative Research Centre for High Performance Soils (Soil CRC) and led by Southern Cross University. This project is supported by the Goulburn Broken Catchment Management Authority's 'From the Ground Up' program through funding from the Australian Government's National Landcare Program.