ARC Research Hub for
Smart Fertilisers

www.smartfertiliserhub.org.au

THEME 3 - MICROBIOME INTERACTIONS

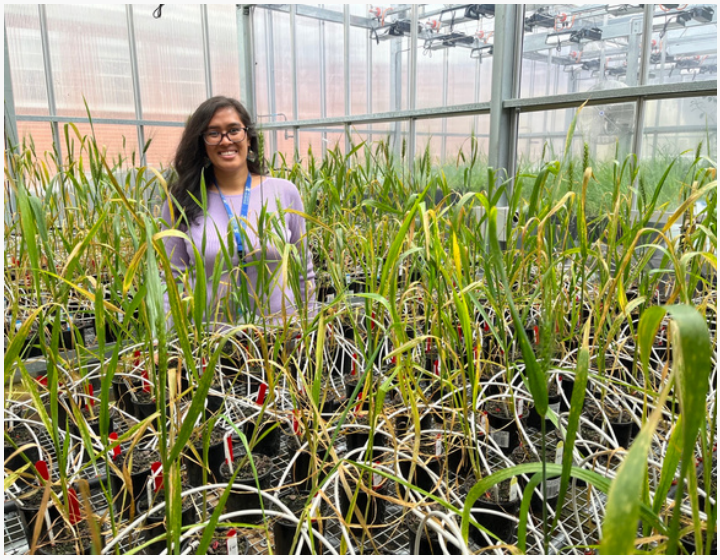
Soils are complex. New fertilisers and inhibitors may vary in efficacy between soil conditions. Before new products are brought to market, their usefulness, efficacy, and effect on soil processes need to be evaluated. Additionally, insights into plant-soil microbiome interactions will help inform the development of new fertiliser products.

THE OPPORTUNITY

- Evaluate the nitrogen-use efficiency of new fertilisers and inhibitors in a range of environmental conditions.
- Evaluate the interactions of new fertiliser products with plant roots and soil microbiomes.
- Further understanding of how new fertilisers impact the plant and microbe signalling molecules used in nitrogen acquisition.
- Based on new insights, develop a guideline to optimise design of new fertilisers.
- Isolate and identify microbes with potential to be used in biofertiliser development

GOALS

- Evaluate the efficacy of new fertiliser and inhibitor products.
- Generate knowledge of plant-soil-microbe interactions to optimise the design of new fertilisers.



INDUSTRY OUTPUT

- Evaluation of the efficacy of new fertiliser products and their effects on soil health.
- Develop insights into root signalling molecules to inform and opimise coating and inhibitor design in Themes 1 and 2.

OUR PARTNERS

THE UNIVERSITY OF MELBOURNE

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LA TROBE UNIVERSITY

Australian Government
Australian Research Council

The ARC Research Hub for Smart Fertilisers is funded by the Australian Government through the Australian Research Council Industrial Transformation Research Program

RESEARCH ACTIVITIES

Soil management innovations must be created and implemented with recognition of the complex ecosystems in which they are being applied. Theme 3 will carry out a range of research activities to evaluate the performance and reaction of plants and their associated microbiomes to new smart fertilisers. Novel insights realised in Theme 3 will also inform the development of fertilisers by Themes 1 and 2.

Research Activities	
Nitrogen Use Efficiency of New Fertilisers	• Test the growth, nitrogen acquisition, and nitrogen use efficiency of new fertilisers in a range of major soil types and environments and for key crop species.
Microbial Mechanisms and the Nitrogen Cycle	• Identify microbial mechanisms that transform nitrogen and assist in crop nitrogen acquisition. • Identify the response of microbial mechanisms to new fertilisers.
Plant Signalling Molecules and Nitrogen Acquisition	• Define the biochemical signals key crop species use to acquire nitrogen. • Investigate opportunities to inform fertiliser design using new knowledge of plant signals.
Identification and Characterisation of Plant-Beneficial Microbes	• Collect, isolate and characterise microbes to identify individuals with plant-growth-promoting traits. • Combine promising isolates in synthetic communities. • Test synthetic communities for plant growth promotion by adding beneficial cultivated microbes to fertilisers in greenhouse experiments.

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