

Climate-Smart Nitrogen Use Efficiency – Hub Trials

Smith Family, South Stirling

Lizzie von Perger, CEO, SCF

BACKGROUND

Western Australian baseline carbon emissions output data from broadacre properties shows the higher rainfall zones in the Albany region (400-600mm annual rainfall) are approximately 30% less efficient than the medium rainfall zone and almost 50% less efficient than the low rainfall zone. This is largely driven by much higher and possibly inefficient fertiliser use (due to high rainfall, soil types, higher production potential). With the potential for either market premiums or market access issues (regarding carbon emissions) on the horizon, it is important that local farmers have a good understanding of nitrogen use efficiency (NUE) specific to local soil types, as well as understanding what levers (in terms of rotation & nitrogen strategies) can be pulled to improve NUE without impacting on profitability.

METHODOLOGY/TREATMENTS

Four trials sites will be implemented across the high rainfall zone of the lower Great Southern Region in partnership with neighbouring grower groups and will run for three years. Tight canola and cereal rotations will be compared to rotations that include a legume and within these rotations nitrogen strategies will also be compared (nil, moderate and high-end nitrogen applications).

The economics and emissions profile will be overlain over each rotation by nitrogen strategy treatment to better understand the link between profitability and emissions intensity from grains production. The trial treatments will be co-designed with host farmers so that at least one trial treatment is very close to standard farmer practice (control treatment).

The small plot trials will be triple replicated, randomised and fully phased to ensure one 'bad' year does not skew rotational treatment results. The following measurements

will be recorded for each treatment for each year of the trial:

- Baseline trial site soil characterisation at commencement of trial 2025 (April 2025)
- Soil sampling & analysis 0-10cm & 10-30cm, prior to seeding each year (April 2025, 2026, 2027).
- Deep soil sampling for nitrogen analysis prior to seeding each year and immediately post-harvest (April & December 2025, 2026, 2027).
- Plant establishment counts (plants/m²) each year, approximately four weeks after seeding (early June 2025, 2026, 2027)
- NDVI with multispectral drone or handheld greenseeker, at peak nitrogen accumulation (August 2025, 2026, 2027).
- Plant tissue sampling for analysis, at time of peak nitrogen accumulation (August 2025, 2026, 2027).
- Nodulation assessment, legume plots only, time of peak nitrogen accumulation (August 2025, 2026, 2027).
- Machine harvest (Kalyx) & grain quality analysis (Dec 2025, 2026, 2027).

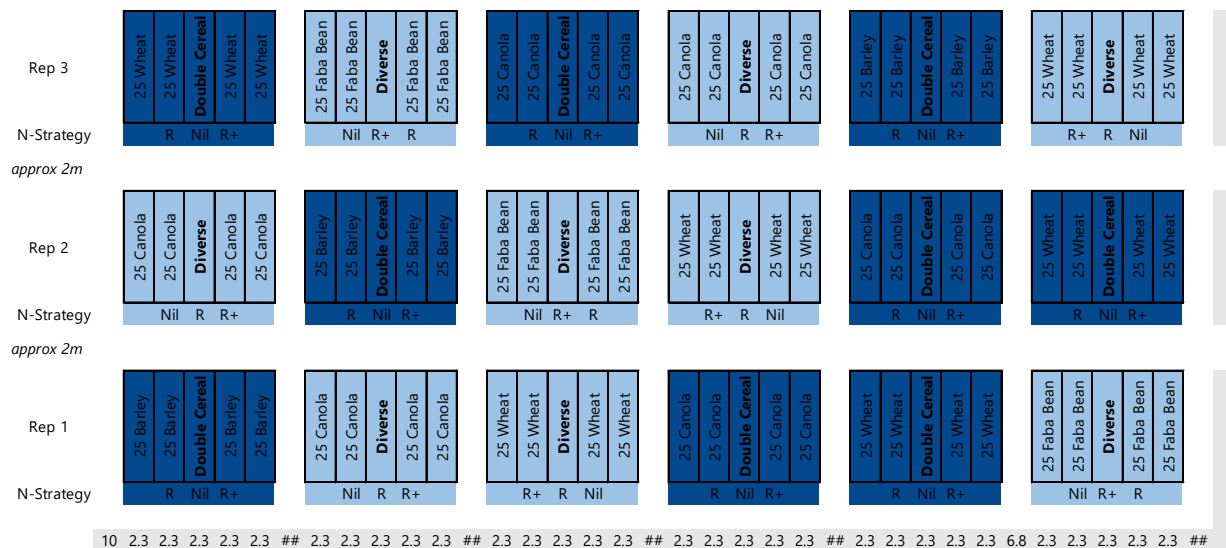


Figure 1: An example trial plot design for the Climate Smart Nitrogen Use Efficiency trials.

SUMMARY

The four ‘hub’ small plot trial sites, which will run for three years and will be fully phased, are modelled on the larger ‘GRDC Riskwise’ trial site located in Kendenup. The Riskwise site is going into its third year in of rotation (of four years) and these hub trials will broaden an already valuable data set by exploring different soil types and environmental differences in the region.

At the completion of the Riskwise and Climate Smart projects it is hoped that SCF, in collaboration with Farm Optimisation group (Agricultural Economist), will be able to develop a simple calculator whereby farmers can input soil type, rotation strategy and nitrogen strategy and have emissions intensity and nitrogen use efficiency estimated for them.

ACKNOWLEDGMENTS

Stirlings to Coast Farmers would like to acknowledge the Federal Government for funding the project through the Climate Smart Agriculture Program. We’d also like to acknowledge our project partners North Stirlings Pallinup Natural Resources, Fitzgerald Biosphere Group, Southern Dirt, Farm Optimisation Group and Southern Aboriginal Corporation.



Australian Government
Department of Agriculture,
Fisheries and Forestry

