

Dryland legume pasture systems

Fiona Tomney, Jessica Crettenden and Naomi Scholz

SARDI, Minnipa Agricultural Centre

RESEARCH



Why do the trial?

A new five-year Rural Research and Development for Profit funded project supported by GRDC, MLA and AWI, and involving Murdoch University, CSIRO, SARDI, Department of Primary Industries and Regional Development, Charles Sturt University and grower groups will begin in 2018 across the low-medium mixed rainfall farming systems region. The project is titled *"Boosting profit and reducing risk of mixed farms in low and medium rainfall areas with newly discovered legume pastures enabled by innovative management methods"*, or Dryland Legume Pasture Systems (DLPS) for short.

Legume pastures have been pivotal to sustainable agricultural development in southern Australia. They provide highly nutritious feed for livestock, act as a disease break for many cereal root pathogens, and improve fertility through nitrogen (N) fixation. Despite these benefits pasture renovation rates remain very low and the quality of the pasture base is very poor on many low to medium rainfall mixed farms. Over the past three decades there has also been a shift towards continuous cropping in dry areas. Continuous cropping is prone to herbicide resistant weeds,

requires large N fertiliser inputs and is prone to major financial shocks due to frost, drought or low grain prices. The reason for farmers not improving pastures include a lack of suitable pasture options for some environments, the high opportunity costs of pasture renovation, changing labour resources and difficulty in quantifying the benefits provided by new cultivars, particularly where pastures are grazed.

This new project will develop recently discovered pasture legumes together with innovative management techniques that benefit animal and crop production and farm logistics, and promote their adoption on mixed farms in over one million hectares in the low and medium rainfall areas of WA, SA, Vic and southern NSW by 2026. As a result, average farm profit will be boosted by 10% and economic risk will be halved over a range of seasons, compared to intensively cropped farms.

Proposed research outcomes

Output 1: Two novel pasture legumes options identified and promoted, that are adapted to soils in dry areas. Novel legumes will require hard seed profiles suited to low cost establishment methods and/or persistence in contemporary farming systems.

Output 2: Quantify the key benefits (eg nitrogen, soil water, weeds, pests and diseases) of the novel pastures to following crops, generate data to inform economic models, and promote outcomes to growers in paddock scale trials.

Output 3: A large-scale integrated grazing and cropping experiment to assess the impacts of novel self-regenerating pasture legumes on animal production.

Output 4: Use simulation modelling to estimate the economic and biological value of two pasture types on crop, pasture and animal productivity across seasons and soil types.

Output 5: Develop an extension and evaluation plan to provide the effective dissemination of project results in collaboration with grower groups and to monitor the adoption and benefit of the new pasture technologies on mixed farms in dry areas.

MAC's involvement

The Minnipa Agricultural Centre (MAC) will have a key role in Outputs 1, 3 and 5.

From 2018-2020 there will be small plot germplasm evaluation and trials at MAC to assess which novel legumes are adapted to the southern region. Chosen legumes will include pre-releases, legumes with new traits and pasture genebank selections based on their likely adaptation to rainfall and soil type. Based on the trial results, three legumes will be prioritised for establishment studies and demonstration trials. Hard seed studies will be conducted from February 2018 to determine which legumes have suitable hard seed levels.

In 2018-2019 there will be a field experiment aiming to improve N fixation by 20%. In 2020 there will be trials at Minnipa to assess whether next generation legume genotypes provide further benefit.

From 2018 a large-scale multi-year grazing/cropping experiment will be established at MAC, with treatments imposed on 2 ha plots to assess what novel pasture options can beat current autumn sown vetch or medic options. The pasture phase of two years (2018 and 2019) will be grazed and then

allowed to regenerate after being sown to wheat in 2020. Soil N, soil water, weeds, pests and diseases will be measured before pasture establishment, and pasture legume performance quantified. Primary livestock data will also be measured, including liveweights, meat quality, wool quality/quantity, reproduction, pasture palatability and animal health. Ewe ovulation may also be measured.

MAC's extension work will include presentations at the EP Farmer Meetings and the annual

MAC Field Days. Demonstration sites for different species and establishment techniques will also be set up across Eyre Peninsula and the Upper North in conjunction with EPARF, LEADA and UNFS grower groups, to give farmers an opportunity to see how the innovations may fit in their local farming systems.

The project is planned to conclude in 2022.



Australian Government
Department of Agriculture
and Water Resources

