Maximising grain legume production and closing the yield gap

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Key message

- **The GRDC funded SA Grain Legume Project will provide development and extension strategies to close the economic yield gap and maximise farming systems benefits from grain legume production in South Australia.**

Why do the trial?

The GRDC funded Southern Pulse Agronomy project (DAV00150) funded a large portion of pulse research on the Eyre Peninsula over the past 8 years and concluded in early 2021 (Bruce *et al*. 2020, Day *et al*. 2021, Gutsche *et al*. 2021, Roberts *et al*. 2021). An increase in pulse production over the past decade and a shift to novel pulse species and management strategies has demonstrated the pulse investment to be well received on the Eyre Peninsula, providing support and drive for the GRDC to invest further in pulses. In 2021, the GRDC funded SA Grain Legume Project commenced. This project will run for four years in South Australia, with Eyre Peninsula components managed by SARDI Port Lincoln, EPAG Research and AIR EP. Contributors in other regions include SARDI Clare, Trengove Consulting, FAR Australia, Frontier Farming Systems and Ag Communicators, as well as local grower groups.

The project will follow a model of hub and spoke sites to deliver grower-driven grain legume validation and demonstration trials across South Australian sub-regions to address economic yield gaps. Hub sites will deliver a focus on a combination of sub-regional development and extension priorities and extension of new research learnings. Spoke sites will be focused on-farm with one to two simple trials at each site. More specifically, trials undertaken will address economic impacts of grain legumes on farm profitability, disease management and integrated weed management strategies.

What happened?

In 2021, SARDI managed a spoke site at Kimba and a hub site at Tooligie. The Tooligie hub encompassed four trials investigating pod shatter and pod loss in lentil; economic disease management in lentil (Figure 1); integrated management of annual ryegrass in lentil (Aggarwal et al. 2022); and ground cover and legacies of pulses in rotation, including some intercropping treatments (Figure 2). At the Kimba spoke site, pulse end uses in vetch and lentil were evaluated, looking specifically at the success of varieties and plant densities for either grazing, hay or grain production, (Day *et al*. 2022). Individual trial results will be published on Online Farm Trials following each season, while key trials and results will be published in EPFS Summaries each year.

Although not directly funded by the GRDC SA Grain Legume project, a lentil variety trial was co-located at the Kimba spoke site to compare variety performance in the low rainfall environment of the Eyre Peninsula. The lentil variety trial was requested by local advisors and growers as a result of the developing interest and uptake of lentil production in marginal areas of the Upper Eyre Peninsula. Lentil varieties evaluated included PBA Hallmark XT, PBA Highland XT, PBA Hurricane XT, GIA Leader, PBA Jumbo2 and PBA Bolt. No significant differences were recorded between lentil varieties and the site average recorded 1.4 t/ha ($P>0.05$).

Communication and extension events attracted approximately 90 participants (growers, reps, advisors & breeders) to the Kimba spoke site in 2021 over three separate crop walk events held by AgSave Kimba and Buckleboo Farm Improvement Group (BFIG). SARDI and AIR EP held a major pulse field day at the Tooligie hub site which had approximately 50 participants attend (Figure 3). Across the state, the project engaged over 500 participants through numerous crop walks and field days hosted at hub and spoke sites. We will continue to communicate research findings and present at crop walks and field days at the spoke and hub sites over the duration of the project. Growers are strongly encouraged to engage in extension activities to learn best practice in legume agronomy and contribute to future trials, project ideas and investments.

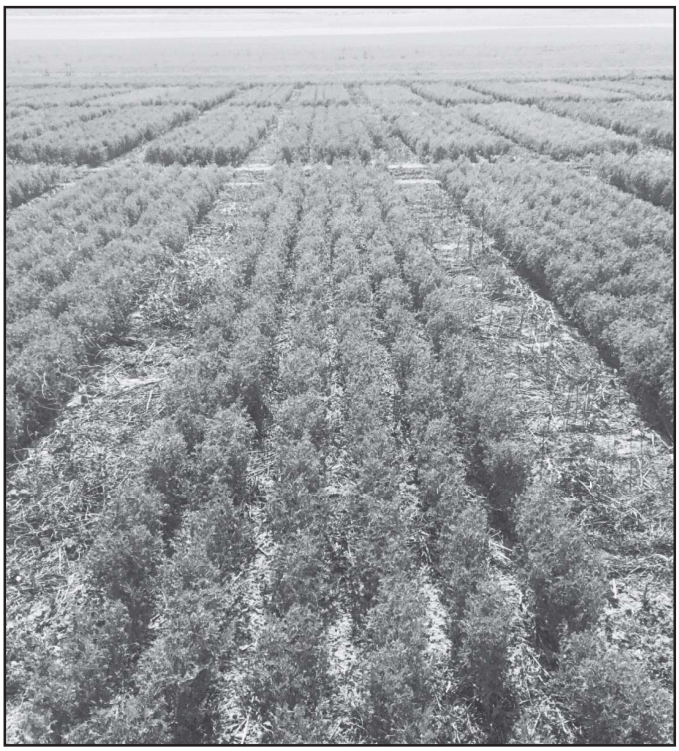

Figure 1. Lentil Disease Management at Tooligie, Eyre Peninsula, 12th October 2021. Canopy closure in lentil did not occur.

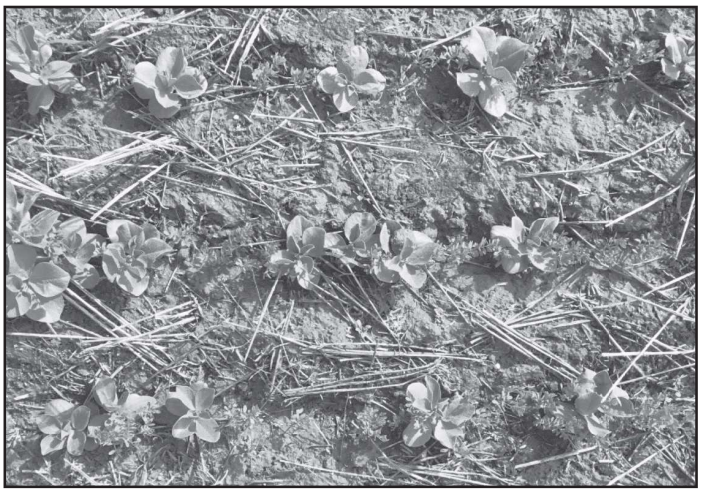

Figure 2. Faba Bean mixed with lentil as an intercropping treatment in Ground Cover and Legacies of Pulses trial at Tooligie, Eyre Peninsula 2021.

Figure 3. SARDI Senior Research Agronomist in weed ecology, Navneet Aggarwal, presenting at the Tooligie Pulse Field Day in October 2021.

What does this mean?

At the conclusion of the four year project, the investment will have minimised the current yield gap in grain legumes through supporting increased technical efficiency of growers with extension of best practice grain legume agronomy. System profitability and sustainable expansion of grain legumes will be maximised by supporting grain growers and advisors to incorporate grain legumes into paddock rotations and farming systems. The project aims to target 45% of growers to adopt or have the intention to adopt new practices emerging from achievable research findings.

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References

Bruce, D., P. Roberts, A. Gutsche and S. Day (2020). Group B herbicide tolerance in lentil and faba bean on the Eyre Peninsula. Eyre Peninsula Farming Systems Summary 2019. Minnipa, South Australia.

Day, S., P. Roberts and A. Gutsche (2021). Lentil and vetch management and alternative end use in the low rainfall zone. Eyre Peninsula Farming Systems Summary 2020. SARDI. Minnipa, South Australia.

Gutsche, A., P. Roberts and D. Bruce (2021). Exploiting the indeterminate nature of pulses. Eyre Peninsula Farming Systems Summary 2020. A. Cook, N. Wilhelm, F. Tomney *et al*. Port Lincoln: 122-125.

Roberts, P. and S. Day (2021). Mixed species cropping and intercropping: where, how and why? Eyre Peninsula Farming Systems Summary 2020. A. Cook, N. Wilhelm, F. Tomney *et al*. Port Lincoln: 131-134.

Aggarwal N., Keeley A., Roberts P., (2022). Management of grass weeds in lentil. Eyre Peninsula Farming Systems Summary 2021. Minnipa, South Australia: p. 123.

Day S, Keeley A. (2022) Improving lentil and vetch management and mitigating risk in the low rainfall zone. Eyre Peninsula Farming Systems Summary 2021. Minnipa, South Australia: p. 113.

Amy Keeley, SARDI Port Lincoln speaking at NVT pea trial at Minnipa Agricultural Field Day, September 2021.