



# RESEARCH SUMMARY

## SAR2223

### FAST FACTS

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#### PROBLEM

Vetch provides clear benefits in farming systems, but agronomic recommendations are inconsistent and there is a lack of evidence to guide profitability and reliability

#### PROJECT

The project consolidated Australian vetch research, tested key agronomic claims, and applied new breeding methods to accelerate variety development

#### PARTICIPANTS

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#### DATES

**Start:** 1 Jul 2023

**Finish:** 30 Jun 2025

# PROFITABLE VETCH – AGRONOMY, BREEDING AND MARKET DEVELOPMENT

This project reviewed and consolidated Australian vetch agronomy research and introduced Rapid Generation Cycling (RGC) into vetch breeding. The review confirmed that vetch delivers benefits in farming systems, but highlighted major gaps in evidence-based agronomy, particularly for hay production. The review also highlighted the considerable research into use of gibberellic acids (GA) in vetch that indicates GA does not provide any consistent or economic yield benefits. RGC successfully reduced the breeding cycle to allow multiple generations per year, accelerating progress toward improved varieties. While the project did not deliver full agronomy packages, it indicated that there are significant opportunities to improve agronomic recommendations and laid a strong foundation for future research and breeding investment.

### BACKGROUND

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Vetch is widely recognised for its value in mixed farming systems, including nitrogen fixation, ground cover and flexibility of end-use such as grazing, grain and hay. Despite this, growers have limited access to robust, locally relevant agronomic guidelines, particularly for hay production and low rainfall systems. Much of the available information is based on small studies, anecdotal experience or on work conducted decades ago. This has made it difficult for growers to assess production risks, optimise management, or confidently invest in vetch as part of their rotation.

### RESEARCH AIMS

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The core objectives of the project were to:

- Consolidate existing Australian vetch agronomy research and identify key knowledge gaps that limit grower confidence and profitability
- Translate consolidated findings into practical extension material for growers, with emphasis on low rainfall systems
- Assess the agronomic and economic value of gibberellic acid use in vetch
- Develop and integrate Rapid Generation Cycling technology to accelerate delivery of breeding targets and improved vetch varieties.

### IN THE FIELD

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A comprehensive literature review was undertaken, covering Australian vetch research from 1988 to 2024. This review assessed agronomy, farming system benefits, hay production, and the suitability of the existing research data to be used for modelling approaches such as Agricultural Production Systems sIMulator (APSIM).

Data from multiple trials investigating GA use in vetch was collated and analysed to determine consistency of response to GA and economic value.

Rapid Generation Cycling (RGC) was developed and validated in a controlled glasshouse environment using extended photoperiods with LED lighting enriched in far-red wavelengths. A large vetch population was progressed from early to advanced generations within a single year.

## RESULTS

The literature review confirmed vetch delivers valuable farming system benefits, but the evidence base for agronomic best practice is limited and fragmented. Vetch management strategies, particularly for hay production, lack sufficient replicated data to support confident recommendations. As a result, the review could not underpin the development of complete agronomy packages or the development of a reliable APSIM model for vetch from this data.

However, the review clearly defined priority areas for future research investment including the development of a best-practice guide for vetch production that includes agronomic inputs and gross margin analysis. More research is needed into fertiliser responses in vetch, particularly P and the performance of vetch under constrained conditions such as acidic or low-fertility soils. Other gaps including improving knowledge of vetch hay agronomy (focus on fodder yield and quality and implications on soil N and C) and the effect of legume end-use on rotations, including economics of decisions (focus on reducing synthetic N fertilisers).

A review of GA use in vetch showed no consistent improvements in biomass production or yield, and no changes in crop development. Responses varied between trials and seasons, and any occasional increases were not reliable or large enough to justify the cost of application. From an economic and risk perspective, GA use in vetch is not recommended. A fact sheet was produced and disseminated widely to growers, advisers and industry stakeholders and published on the SAGIT website and by multiple farming systems and research groups.

RGC was successfully applied to common vetch for the first time in Australia. By extending daylength to 18 hours and optimising plant density and nutrition, the breeding program achieved a seed-to-seed cycle of around 12 weeks. This allowed multiple generations per year, compared with a single generation previously. A large population was advanced to a stage suitable for developing genetic markers for traits such as flowering time, biomass production and rust resistance. This represents a major step change in breeding efficiency and delivers modern breeding tools to the program for the first time. It is hoped this work can be fully utilised in future breeding projects.

## VALUE FOR GROWERS

This project provides growers with clearer guidance on what is currently known, and not known, about vetch management and agronomy. The identification of key agronomic knowledge gaps helps guide future research toward issues that matter most on-farm, particularly hay production and low rainfall performance. The project demonstrated that GA is unlikely to deliver any reliable yield changes or return on investment and is therefore an unnecessary input cost.

Faster breeding progress through RGC could mean improved vetch varieties are available sooner, supporting more profitable and reliable use of vetch in South Australian farming systems.

### MORE INFORMATION:

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SARDI Subprogram Leader, Vetch Stuart Nagel led research to develop and integrate Rapid Generation Cycling technology to accelerate delivery of vetch breeding targets and improve varieties.

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