GIBBERELLIC ACID USE IN VETCH

FACT SHEET

September 2024

Photo: Brooke Bennett, BCG

- Limited effectiveness of GA on vetch
- Potential for biomass yield loss
- Negative impact on crop colour
- No significant improvement of crop development, grain yield, or fodder quality
- Economic viability is questionable

Figure 1: GA treated Morava left, untreated right

Background

Gibberellic acids (GA) are natural plant hormones that promote growth by stimulating shoot and cell elongation through increased water accumulation. This leads to larger leaves and a more upright plant structure, primarily enhancing plant growth without increasing leaf numbers. GA can be used as a hormone spray to boost winter growth in grass-based pastures and is known to increase biomass and crop height shortly after application, with effects lasting up to 3-4 weeks. In tree crops and vines, GA influences flowering time and reproductive growth. There is anecdotal evidence that GA may similarly enhance height, biomass, and reproductive growth in vetch.

Trials and methods

Between 2016 and 2023, four research groups studied the effects of GA on vetch for enhancing biomass production and its impact on flowering time. These trials took place across ten locations in South Australia and Victoria (Fig 2), with all trials occurring in a single season. Half of the trials were replicated in multiple locations. One research group had trials in the same location over consecutive years however, the trials had different treatments.

The trials typically focused on one to four vetch varieties, most commonly including Morava and Timok. Biomass was measured in all trials, although the timing of measurement varied. Grain yield was measured in several trials and fodder quality in two trials (Table 1).

Two GA-based products, ProGibb® (400 g/kg) and GALA™ (100 g/L) were used across the trials. The products differ in their concentration and form of GA. A standard rate (8 g/ha of GA) was commonly used across trials with a half rate (4 g/ha of GA) included in some trials. Application times varied from sowing to late August, with application timings targeting biomass production for grazing or hay. Comparisons were either of the two rates of GA with an untreated control or a comparison of multiple application timings with an untreated control.

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Table 1: Frequency of measurements captured in vetch trials assessing the impact of GA (n=8).

	Frequency of Measurement
Height	6
Colour/NDVI	1
Development and Flowering	1
Biomass	8
Fodder Quality	2
Grain Yield	4

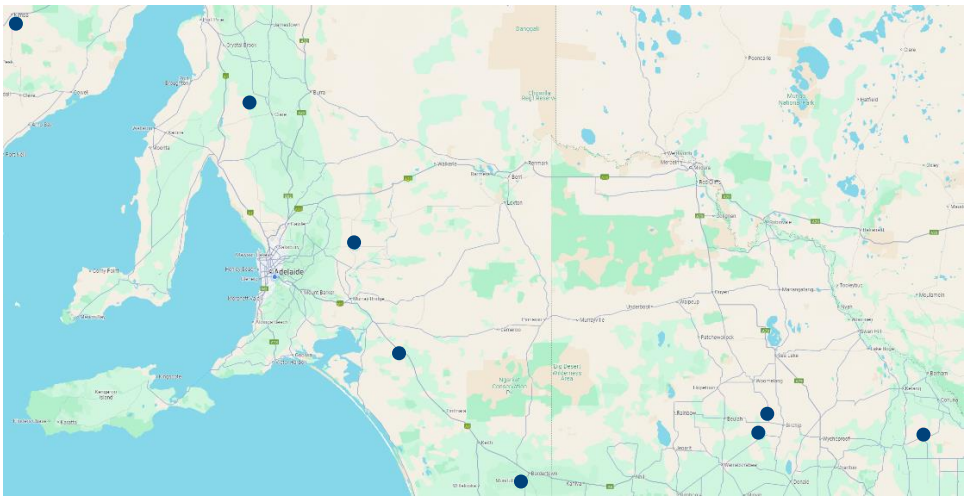

Figure 2: Locations of GA trials between 2016 and 2023 across South Australia and Victoria.

Impacts of GA

Crop height

Vegetative or early plant height was often increased by a GA application but only for a limited period (Fig 3). An increase was measured between two- and four-weeks post application. But by flowering there was no difference to untreated control. Furthermore, in some cases the treated plants were shorter than the untreated plants after six or more weeks post application (Fig 4).

Crop colour

Crop colour was negatively affected by the application of GA. Treated plants are often paler in colour and have a spindlier appearance.

Crop development and flowering

The application of GA was not shown to affect crop development. There was no change in crop development associated with GA application reported in any trial.

Crop biomass

GA applications have not consistently impacted biomass production. Most trials showed no change, with only two demonstrating a slight increase in early biomass (100-200 kg/ha) within three to four weeks post application. One trial showed an increase in biomass after three weeks but not after four weeks. Conversely, two trials reported a negative impact: one trial at Kimba showed a 150 kg/ha decrease in early vegetative biomass but no impact on subsequent hay biomass. This is likely due to dry conditions and the increased moisture requirements associated with a GA application. Another trial at Mundulla recorded a 500 kg/ha penalty to hay biomass associated with an early vegetative GA application, however this trial was part of a larger plus/minus nutrition trial which may have affected results. Overall, trials show minor or inconsistent yield changes from GA applications.

Fodder quality

GA application is unlikely to affect fodder quality. Two trials tested the effects of GA at different rates and timings. An early June application resulted in no change in fodder quality four weeks later. Similarly, a late August application, aimed at increasing hay biomass, showed no change in fodder quality three weeks post application. A late July application to target grazing biomass did decrease crude protein and increase neutral detergent fibre, but the changes were minor (1-2%) and unlikely to significantly impact fodder quality classification.

Grain yield

Four of the trials assessed grain yield after GA applications, recording no impact. Grain size at harvest was also shown to not be affected.

Economic impact

Economic analysis estimated the cost of GA at $8-9 per hectare plus application costs.

While GA effects on vetch are inconsistent and therefore, unlikely to deliver a reliable economic benefit for vetch production.

Figure 3: Effect of GA on early growth and vigour. (Source: Frontier Farming Systems 2019)

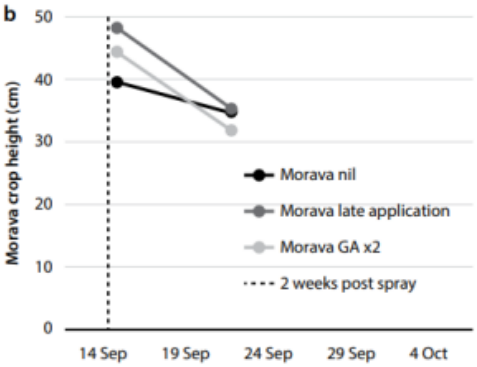

Figure 4: Crop height (cm) of Morava after GA applications. (Source: BCG 2021)

Product label recommendations

The labels for both ProGibb® and GALA™ indicate that GA is primarily intended for use on grass-based perennial pastures that are at least one year old, with the goal of promoting growth through post-grazing application. Since GA is a foliar application, the crop must be sufficiently large to ensure good spray contact, with a recommended biomass of more than 1 t/ha at the time of application. Additionally, to support increased growth and cell elongation, adequate moisture and nutrients must be available. The labels also caution that GA is unlikely to boost the growth of broadleaf crops or weeds. GA applications may also cause the crop and weeds to become paler in colour.

Conclusions

GA applications can increase vetch crop height, but the response is only temporary. GA may negatively impact crop colour and does not affect crop development or improve grain yields or fodder quality. The effect on biomass is inconsistent, making it unlikely to deliver a reliable economic benefit for vetch production.

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ACKNOWLEDGEMENTS

The authors wish to acknowledge the previous work by Birchip Cropping Group, Frontier Farming Systems, Hart Field Site Group, and SARDI that has been utilised for this factsheet and their cooperation.

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SAGIT PROJECT CODE

SAR2223 – Profitable Vetch – Agronomy, Breeding, and Market Development.