

20. Managing Bean Crop Canopies to Optimise Yield Potential

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KEY MESSAGES

- Trial work funded by GRDC via the Southern Pulse Agronomy Program.
- Early sowing of beans in 2017 at Bool Lagoon did not increase grain yields.
- Different PGR treatments and application timings did influence grain yield at Conmurra in 2017.
- Trial planning for 2018 is underway.

Trial Background

Advanced modern farming systems incorporating minimal tillage, stubble retention, improved soil moisture storage and varieties with improved agronomic traits offer opportunities for early sowing and increasing yield potential. Canopy management strategies for controlling high biomass production often associated with early sowing in favorable environments may be critical in improving the reliability and performance of this increasingly popular agronomic practice for faba beans. The frequent occurrence of variable rain accompanied by high temperatures during the critical crop growth stages of flowering and pod filling has also exacerbated the need to bring forward the sowing date to reduce the adverse effects of drought and heat during these stages.

Southern Pulse Agronomy (SPA), a bi-state research program (SARDI and Agriculture Victoria) funded by GRDC, has ongoing targeted agronomic research aimed at delivering best management strategies, all of which have influence on canopy development of pulse crops.

Reported below are the results of two field trials being undertaken in the South East of South Australia.

Bool Lagoon Bean Time of Sowing Trial

Three times of sowing (TOS) were evaluated at Bool Lagoon, TOS 1 18 April, TOS 2 9 May and TOS 3 14 June. Sown at each TOS were four commercial faba bean varieties, five experimental faba bean lines and one commercial broad bean variety. Presented in this report are the results from the commercial varieties only.

In 2017, there was no sowing date by variety interaction for grain yield. The main effects for sowing date and variety were found for grain yield.

The highest yields were obtained from TOS 2 (2.52 t/ha), compared with TOS 1 (1.94 t/ha) and TOS 3 (1.52 t/ha) (P Value <0.001, LSD 0.236), which also differed from each other.

Similar to the 2016 trial, TOS 1 had significantly lower grain yields compared to TOS 2. This may be a result of TOS 1 experiencing waterlogging at the critical time of flowering and early pod filling, possibly causing a reduction in yield in the earlier sown crop.

TOS 3 had similar yields to TOS 2 in 2016, whereas in 2017 TOS 3 had significantly lower yields compared to TOS 2. In 2017 the cold seasonal conditions and extended period of inundation resulted in the later sown TOS 3 having decreased biomass production at maturity, 2.93 t/ha compared to 5.38 t/ha and 5.45 t/ha for TOS 1 and TOS 2 respectively (P Value <0.001, LSD 0.655), and subsequently lower grain yields. TOS 3 also had lower 100-grain weight (56.84 grams) on average compared to TOS 1 (68.64 grams) and TOS 2 (68.46 gram) (P value 0.003, LSD 3.875).

Overall grain yields were down on previous years. Farah had on average the highest yield of 2.50 t/ha, which was not significantly different to PBA Samira (2.44 t/ha), PBA Zahra (2.19 t/ha) and Nura (2.04 t/ha), but was significantly greater than the only broad bean sown, PBA Kareema (1.58 t/ha) (P Value 0.005, LSD 0.55) (Figure 1).

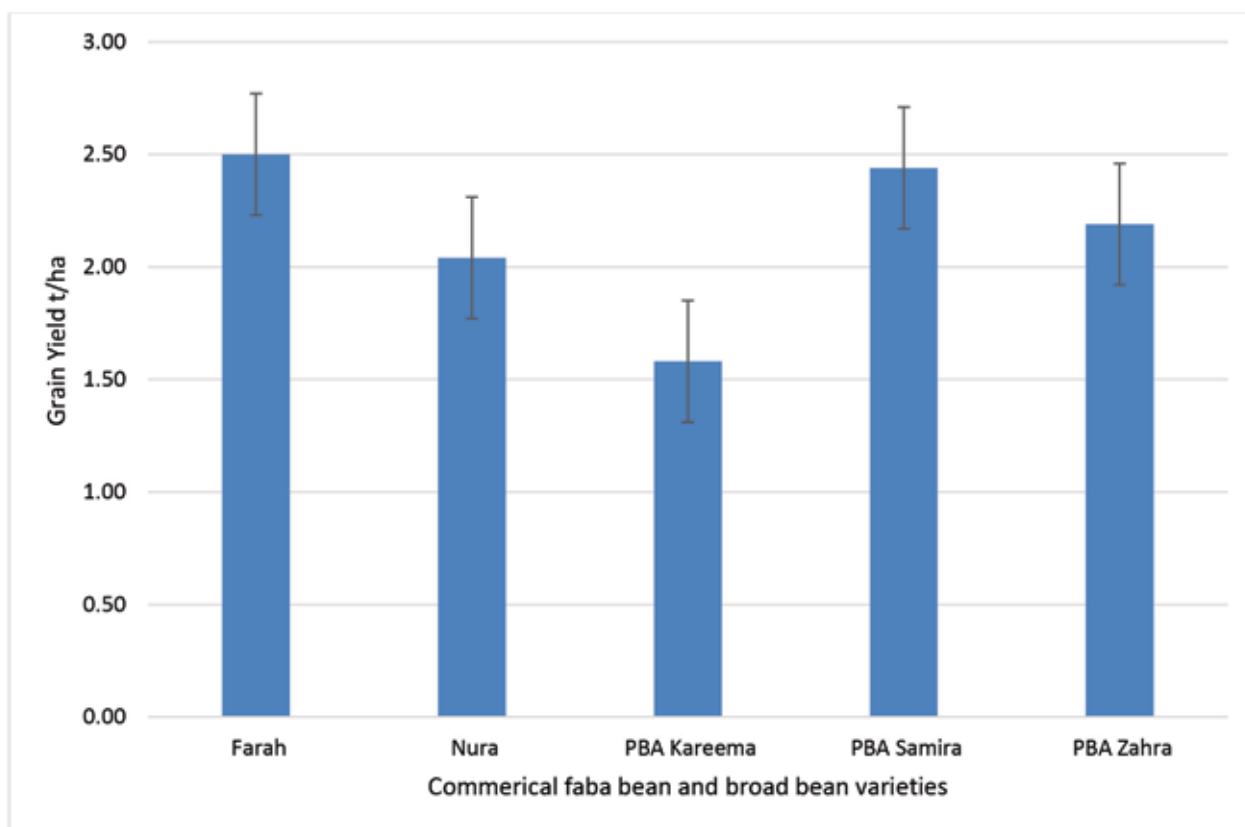


Figure 1. Commercial faba bean and broad bean across all three times of sowing variety grain yield (t/ha) at Bool Lagoon in 2017 (P Value 0.005, LSD 0.55).

Conmurra Plant Growth Regulators (PGRs) in Canopy Management Trial

Plant growth regulators (PGRs) modify plant physiological processes and may have an important role in manipulating canopy growth to suit early sowing and maximise potential yields under different environments. Over the last three years, a range of experimental PGRs, chemicals and agronomic treatments have been evaluated on faba bean and broad bean in Southern Pulse Agronomy trials in South Australia and Victoria, with results showing some treatments reduced plant height without altering grain yield. Results also suggest that application timing of treatments is important.

Building on the previous three years' trials, a broad bean trial was sown at Conmurra on 11 May. The trial continued evaluation of the use of PGRs and application timings to manipulate broad bean plant architecture without decreasing yields.

Three PGR treatments were used to either stimulate lateral branching, reduce growth or reduce vegetative biomass. The treatments were applied at four different timings: 2 node, 4 node, 8 node and bud emergence. The earlier applications aimed to stimulate lateral branching and the later applications to trigger pod set.

There was a significant difference in grain yield between treatments (PGR X application timing (P Value 0.016, LSD 0.304) (Figure 2), but no differences in grain quality (average 100 grain weight of 110 grams).

At the 2 Node application timing and bud emergence application timing, PGR 1 had a greater grain yield compared to the other treatments at the respective application timings.

At the 4 node application timing PGR 1 had a similar grain yield to the Nil treatment, but was greater than the other two PGRs.

At the 8 Node application timing the Nil treatment yield was significantly less than all other treatments.

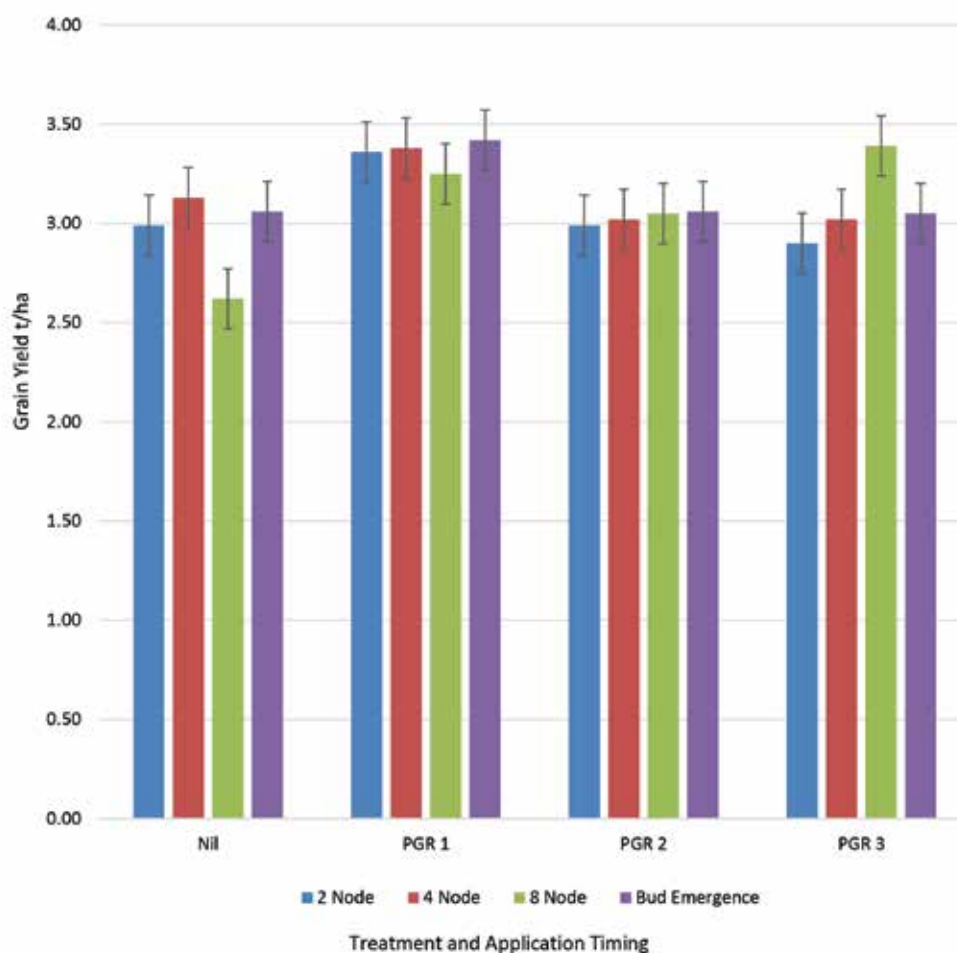


Figure 2. PBA Kareema grain yield (t/ha) with different PGR treatments X application timing at Bool Lagoon in 2017 (P Value 0.016, LSD 0.304).

Conclusion

In 2017, as in 2016, early sowing of beans at Bool Lagoon did not increase grain yields, which contrasted with the 2015 trial results, where dry seasonal conditions resulted in TOS 1 having the highest yields. Long-term analysis (2006-2015) of faba bean sowing date trials in high rainfall environments has generally found a flat or nil grain yield response to sowing date. However, within each individual year, yields can show a positive, negative or no response to sowing timings and this has been a result of variety response due to varying seasonal conditions and yield limiting factors such as disease or lodging.

In contrast to the 2016 results, grain yield differences were measured at Conmurra between PGR treatments and application timings. PGR Treatment 1 at two application timings (2 Node and bud emergence) had greater grain yield than other treatments.

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- Miles Family (Bool Lagoon) and Hocking Family (Conmurra) as co-operating growers

