

FABA BEAN VARIETIES AND MANAGEMENT

Mick Lines, SARDI Clare, Ph: 8842 6264, email: michael.lines@sa.gov.au
Larn McMurray, SARDI Clare, Ph: 8842 6265, email: larn.mcmurray@sa.gov.au
Jeff Paull, University of Adelaide, Ph: 8313 6564, email: jeffrey.paull@adelaide.edu.au
Charlton Jeisman, SARDI Struan, Ph: 8762 9132, email: charlton.jeisman@sa.gov.au

Key Points:

- Grain yields of beans were lower in 2012 in than previous seasons, averaging 3.6t/ha at Bool Lagoon.
- All varieties showed higher yields sown early.
- Later maturing varieties PBA Rana and PBA Kareema performed similarly to other varieties in this trial in 2012, despite the low season rainfall.
- The three earlier maturing varieties (Farah, Fiord and Nura) showed increased yield from increasing plant density, while no yield response was seen in later maturing and larger seeded varieties (PBA Rana and PBA Kareema).
- Fiord showed the most response from varying plant density across the three seasons of trials.
- Crop-topping trials showed a 9% yield loss across all varieties from crop-topping at the milky dough stage of ryegrass in 2012 and caution is required with this practice in later maturing regions. No yield loss was generated from later treatments.

Trial Objectives: To determine appropriate sowing dates and densities of new faba bean varieties in the South East of SA, and quantify effect of various crop-top timings on yield of commercial cultivars.

Trial Duration: 2012

Location: Bool lagoon

Farmer Cooperator: Bruce McLean

Soil Type: Clay over limestone

Monthly Rainfall:

Rain	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Total
Struan, 2012	4	3	29	19	35	78	50	86	33	25	14	14	388

Trial Details

Table 1: Treatment characteristics of Bool Lagoon bean trials in 2012.

Trial	Sowing Date x Variety x Density	Crop-top timing x Variety
Sowing Date/s	Early: May 21	May-23
	Late: Jun 27	
Varieties	Farah (<i>fb</i>)*	Fiesta (<i>fb</i>)*
	Fiord (<i>fb</i>)	Nura (<i>fb</i>)
	Nura (<i>fb</i>)	PBA Rana (<i>fb</i>)
	PBA Rana (<i>fb</i>)	
	PBA Kareema (<i>bb</i>)	
Agronomic treatment	Plant Density (plants/m²)	Crop-top Timing
	Low (16 <i>fb</i> , 8 <i>bb</i>)	Nil - no desiccant applied
	Recommended (24 <i>fb</i> , 12 <i>bb</i>)	Early (24/10) - applied 21 days prior to RMDS**
	High (32 <i>fb</i> , 16 <i>bb</i>)	Mid (14/11) – applied at RMDS
		Late (30/11) – applied 16 days after RMDS
		Desiccant: 700ml/ha Paraquat

* *fb* = faba bean, *bb* = broad bean

** RMDS = Ryegrass Milky Dough Stage

Trial Results

Bean yields averaged 3.6t/ha across all varieties, sowing dates and plant densities in 2012. This was lower than previous seasons where bean yields averaged 4.9t/ha and 4.3t/ha in 2010 and 2011, respectively, but still high considering the low growing season rainfall.

TOS x Variety x Plant Density

A significant sowing date by variety interaction occurred for grain yield (Figure 1). All varieties showed a yield penalty from delayed sowing. Nura showed the greatest yield penalty from delayed sowing (53%) and Farah showed the least (29%). Nura, Fiord and PBA Rana were the highest yielding varieties sown early and Farah the lowest. At the late sowing date Nura was the lowest yielding variety but similar to PBA Kareema and Farah.

A two-way interaction between sowing date and plant density showed that yield of Farah, Fiord and Nura increased from the lowest density (16 plants/m²) to the highest density (32 plants/m²) (Figure 2). There was no advantage of increasing plant density over the recommended rates for each bean type however Fiord did incur a yield loss in the lower than recommended rate which was not seen in any other variety. PBA Rana and the broad bean variety PBA Kareema showed no effect of plant density on yield. Within each plant density all varieties performed similarly except that PBA Rana yielded higher than Farah at the Low and Recommended plant densities. Fiord was the most responsive variety to plant density, showing a 29% increase in yield when plant density was increased from 16 to 32 plants/m².

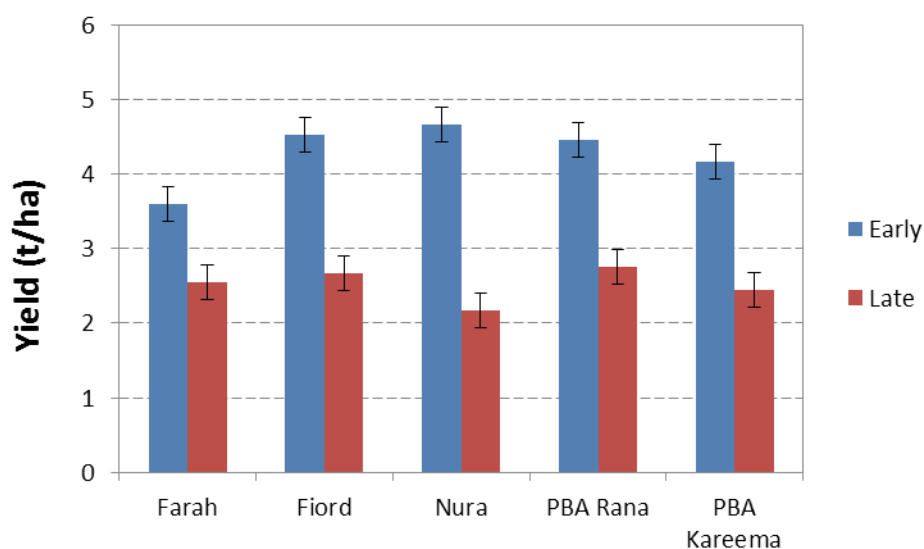


Figure 1: Yield of five bean varieties at two sowing dates, Bool Lagoon sowing date trial, 2012.

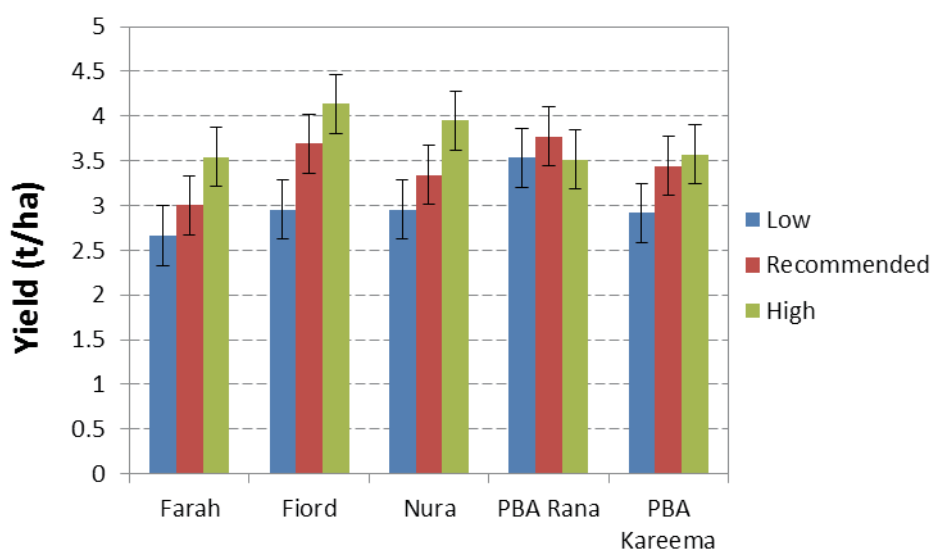


Figure 2: Yield of five bean varieties at three plant densities, Bool Lagoon sowing date trial, 2012.

Crop-topping x Variety

Crop-topping trials at Bool Lagoon in 2012 showed no interaction between variety and crop-top timing. This means that all three varieties showed the same grain yield response at each application timing and that no variety was better suited to crop-topping. The trial did however show significant grain yield responses for variety and crop-top timing individually. Fiesta was the highest yielding of the three varieties, while Nura and PBA Rana performed similarly (Table 2). Crop-top treatments showed a yield penalty from crop-topping at or before milky dough stage of ryegrass in 2012, with the largest penalty (72%) at the earliest timing (Table 3). Crop topping at the milky dough stage of ryegrass (labelled Mid) produced an average 9% yield loss across all varieties, while there was no yield penalty from crop-topping two weeks later.

Table 2: Grain yield of three faba bean varieties, Bool Lagoon crop-topping trial, 2012.

Variety	Fiesta	Nura	PBA Rana	LSD (P<0.05)
Yield (t/ha)	4.0 ^b	3.7 ^a	3.7 ^a	0.2

Table 3: Grain yield of faba beans at three crop-top timings, Bool Lagoon crop-topping trial, 2012.

Timing	Early 24/10	Mid 14/11	Late 30/11	Nil	LSD (P<0.05)
Yield (t/ha)	1.3 ^a	4.3 ^b	4.9 ^c	4.7 ^c	0.3

Comments

Despite relatively low growing season rainfall in 2012, bean yields were still reasonably high at Bool Lagoon in 2012. It is likely that yields were buoyed by high December 2011 rainfall, lack of disease, and the relatively mild (although dry) finish to the 2012 season.

Sowing date summary

In the recent run of seasons with favourable finishes (2009 to 2011) time of sowing has not been important to grain yield of beans in this region. However due to the low growing season rainfall and lack of disease in 2012 beans benefited significantly from early sowing in this trial. This complements previous findings that early sowing offers higher yield potential providing disease, weed issues and other agronomic practices eg spraying, harvesting can be managed. Sowing date by plant density trials at Bool Lagoon and Tarlee in the states mid north, have shown that the later maturing and larger biomass types generally show the highest yield losses from delayed sowing. These later maturing plant types are also more reliant on long favourable seasons for yield stability, and are best suited to higher rainfall, longer growing season areas.

Nura showed the greatest benefit from early sowing at Bool Lagoon in 2012. Sowing date trials at Bool Lagoon and Tarlee have shown Nura to be well suited to early sowing due to its combination of shorter plant type, mid flowering and improved chocolate spot and rust resistance compared to other varieties. These characteristics favour this variety in shorter seasons with a dry finish, and where late season humidity-driven diseases (eg chocolate spot and rust) are common.

Plant density summary

Bean sowing density trials over the last three seasons have showed that yield gains are possible from increasing plant density. Recommended sowing rate of faba beans is 24 plants/m², while broad beans are recommended to be sown at 12 plants/m². However this target may vary significantly in practice where growers base seeding rate on a kg/ha output and may not allow for variations in grain weight and germination percentages across seasons and varieties. Over the last three seasons there has been a general yield response to increasing sowing density from 16 to 32 plants/m². This was more prominent where sowing was delayed, such that increasing plant density was able to

recapture some of the yield loss caused by delayed sowing. However, previous research has shown a link to increased disease pressure at higher seeding rates, which may negate any potential yield advantage from this high seeding rate in situations with high disease pressure.

Fiord was the most responsive variety to plant density in 2012, while in 2011 it showed the most response from increasing plant density when sown early but was the only variety not to respond to plant density when sown late. Preliminary results from bean experiments where plant and pod traits were measured have shown that Fiord produces more branches per plant than other varieties tested. Further to this, sowing at higher densities reduced total branch production per plant more in Fiord than in other varieties. This shows that Fiord may be more responsive to exploiting soil moisture by producing extra branches than other varieties, however increasing plant density may provide a more effective method of converting biomass into grain yield. This is likely to be of greater importance in seasons with a rapid finish where late branches do not get the opportunity to produce and set many pods.

PBA Rana (faba bean) and PBA Kareema (broad bean) showed no grain yield response to plant density in 2012. This may be related to their later maturity timing than the other varieties evaluated. These varieties had grain yields similar to earlier maturing varieties in 2012 despite their later maturity and the relatively low growing season rainfall. This is surprising given the season, and highlights the suitability of these varieties to this area, where the longer growing season can favour their later maturity.

Crop-topping beans

All varieties responded similarly at each crop-top timing in 2012. This means that none of the three common commercial varieties tested were more or less suited to crop-topping in 2012. Results from previous seasons trials on Eyre Peninsula, and from other trials conducted on Eyre Peninsula and Yorke Peninsula in 2012, have likewise shown little difference between varieties.

Yield penalties from crop-topping were much higher in this trial at Bool Lagoon than in other trials. A 72% reduction in grain yield was generated from Early crop-topping in this trial, compared with 39% at the same timing in previous experiments. A 9% yield penalty was generated from crop-topping at the RMDS in this trial in 2012, while there has generally been no yield penalty from crop-topping at this timing in previous experiments in other regions. The reason for the higher losses at this site in 2012 compared with previous years is thought to be due to the longer growing season at Bool Lagoon compared to other trial sites. Growers should be mindful of the risk of high yield losses from incorrect timing of this practice, particularly in longer season areas.

Crop-topping has also been associated with reduced grain weight in previous seasons (not yet tested in 2012). An average 17% reduction in grain weight was generated from Early crop-topping and 9% loss at the RMDS in previous trials. Grain weight is particularly important in broad bean production, where large seed size and consistency of seed size is desired. Growers should be mindful of effects of crop-topping on grain quality, including the potential for development of field mould on seed that has been crop-topped early, as has been found in chickpea and field pea in related work carried out by this project.

Conclusion and into the paddock

Yield potential of beans is maximised by early sowing, however disease, weeds and crop height management issues associated with early sowing must be considered. Increasing plant density may increase yield in some instances, but may also contribute to increased disease severity in seasons with high disease pressure.

Common commercial varieties showed little variation in suitability to crop-topping. Growers should be aware of the risks to grain yield and grain quality from incorrect timing of this practice.

Acknowledgements

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