

Closing the Economic Yield Gap for Grain Legumes in Western Australia

SCF Component – Demonstration of impact of sowing time and row spacing on faba bean disease and productivity.

Host: Preston Family (West Cranbrook).

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KEY MESSAGES:

- In a wet year, sowing legumes earlier is likely to be more profitable.
- Higher legume yields may be achieved with narrow row (25mm) spacing, compared to a wide row spacing (50mm).
- PBA Bendoc faba beans can significantly outyield PBA Amberley faba beans.
- The improved disease rating in PBA Amberley may not decrease disease loading in a high-pressure environment or translate to yield improvement (in comparison with PBA Bendoc).
- PBA Bendoc faba beans yielded higher than lupins when sown in April but lupins outyielded both varieties of faba beans at a later time of sowing (June).
- Faba bean seeding rates as low as 120 kg/ha can still result in more than 20 plants/m² (20-25 recommended) and do not impact on grain yield compared to a higher seeding rate (180 kg/ha).

Background

Faba beans are the preferred pulse crop in the Frankland River/Tenterden region because they have the greatest waterlogging tolerance. Many growers are replacing lupin hectares with faba beans because they are more profitable. Lupins were added to the trial design to allow SCF to compare the productivity and profitability of the two pulse crops in the trial.

Faba beans require more protection from disease than any other common broad-acre crops grown in Western Australia (WA). In 2021, local Frankland farmers recorded up to five different fungicide applications during the season to protect faba beans from chocolate spot, *Botrytis fabae*. Local growers and advisors wanted to know if sowing later lowers the disease pressure and reduces the number of fungicide applications.

The small plot trial looked at the interaction between row spacing, disease levels and sowing times. The wider the row, the lower humidity is, which means the causal agent of Chocolate Spot (*Botrytis fabae*) is less likely to infect

faba bean plants successfully. However, most growers have 25-30cm row spacings in WA to suit other crops (wheat, barley and canola) and need considerable motivation to sow faba beans with wider spacings. A small number of WA growers have separate seeders to plant faba beans at wider spacings, but it is not common practice.

Methodology/Treatments

The small plot trial was located in West Cranbrook. The six treatments were sown at two separate sowing times and included:

- PBA Amberley faba beans sown on 25mm tyne spacing
- PBA Amberley faba beans sown on 50mm tyne spacing
- PBA Bendoc faba beans sown on 25mm tyne spacing
- PBA Bendoc faba beans sown on 50mm tyne spacing
- PBA Jurien lupins sown on 25mm tyne spacing
- PBA Jurien lupins sown on 50mm tyne spacing

Living Farm seeded the first time of sowing (TOS) on April 22nd, 2022, and second TOS on June 9th, 2022. The SCF R&D team completed most of the trial site observations during the growing season which included:

- Plant counts
- Disease ratings
- Nodulation scoring
- Lodging scoring
- Grain harvest

Best practice agronomic management for growing pulse crops was undertaken to ensure other factors did not impact on the experimental variables of sowing time, row spacing and crop type/variety. These agronomic factors included plant nutrition, rhizobium inoculation, herbicide control and fungicide management.

Results & Discussion

Plant counts

The PBA Amberley cultivar resulted in a slightly higher plant establishment compared to the PBA Bendoc across both row spacings. This could have come down to seed size and weight, given the plots were planted to kg/ha rate rather than a targeted seeds/plants per m². Plant numbers at the post germination stage did not have a significant impact on final harvest yield.

Disease Assessments

The crop disease assessments (at flowering) showed the disease burden to be evenly and randomly distributed between plots from the same TOS (Table 1) and there was no advantage between row spacing or the variety. It is interesting that these results contradict the idea that seeding on 500mm alleviates disease pressure somewhat, although this might have been due to the high disease pressure in the trial i.e., row spacing may have had more of an impact where disease was lower. There was a significant disease difference in the faba beans between TOS1 and TOS2. TOS2 had less disease, however, was waterlogged, accumulated less biomass, and was seeded in cold and wet weather that then continued throughout winter. These

conditions were not conducive to disease growth.

Nodulation Scoring

Table 1 - Small plot legume average disease assessment score

Legume	TOS1	TOS2
Faba beans- Amberley	2.84	1.00
Lupins- Jurien	0.915	1.17
Faba beans- Bendoc	2.98	1.47

In the trial, nodulation score assessment averages showed no significant difference between faba bean varieties across both times of sowing (Table 2). There was, however, a significant difference in nodulation between the two times of sowing for both faba beans and lupins. For TOS1, averages were between 4-5 (adequate to abundant scores). And for TOS 2, these were 1.2 and 1.8, much lower – most likely a symptom of the waterlogging and less time available for nodulation.

Table 2 - Small plot trial legume nodulation scores by TOS

Legume	TOS1	TOS2
Lupins - Jurien	4	1.8
Faba Beans - Bendoc	5	1.2
Faba Beans - Amberley	4.6	1.7

Grain Yield

All three crop types generally yielded better on the narrow row spacing, compared to the wide row spacing, and the first time of sowing yielded higher than the second time of sowing (Figures 1 and 2). Most growers in the region sow their legumes on wider row spacings, which does result in messing around with seeding gear at an already busy time, as it is believed this reduces the disease pressure. This was not represented in this trial and warrants further investigation. If further work does confirm that standard (narrow) row spacings yield higher, it may make legumes a more attractive prospect (profitable and practical) for many growers.

Overall, PBA Bendoc significantly out yielded PBA Amberley, which claims to have better disease resistance. As such, it is likely that the yield advantages between the crop types were not primarily driven by disease.

Both faba bean varieties outyielded the lupins in the first time of sowing. This was reversed for the second time of sowing (Figures 1 & 2).

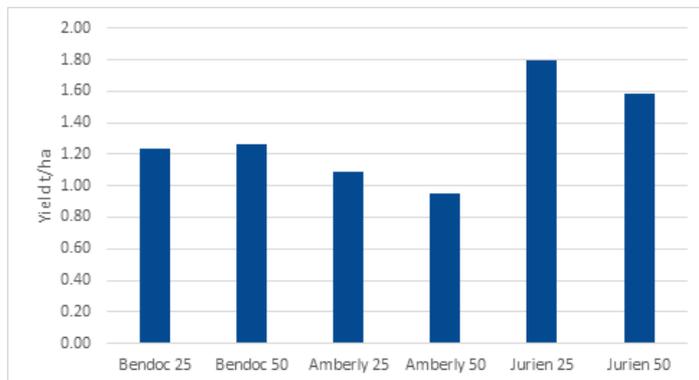
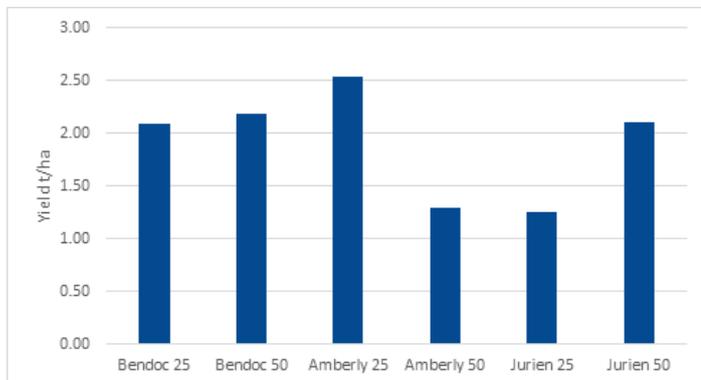


Figure 1: Small plot trial yields by variety and row spacing for TOS1

Figure 2: Small plot trial yields by variety and row spacing for TOS2

Conclusion

At the beginning of 2022 the trial location experienced a wet, slow start to the growing season. This particularly impacted on the TOS2 treatment which struggled to get going and was therefore affected more by waterlogging, yielding much less overall than TOS1. This indicates that an earlier time of sowing for legumes, particularly in a wet year, is likely to be more profitable.

Narrow row spaced treatments yielded better than the wide row spaced treatments and PBA Bendoc yielded better than the PBA Amberley. Both results were somewhat surprising and warrant further investigation.

Acknowledgments

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