Despite the potential environmental and economic benefits, the adoption of winter and summer pulse crops has been slow. For example in the Queensland grains region it is around eight and four per cent of total cropping area respectively – much less than what is required to keep grain-cropping systems profitable in the long term.

To increase the share of pulses in the total Australian cropping area, strategies are required to enable growers to more consistently realise the potential productivity and profitability of pulse cultivars in their farming systems.

The situation in the north

Winter pulses (chickpea and faba bean) currently comprise about eight per cent of total cropped area in the Queensland grains region although the adoption varies from 5 to 12 per cent depending on the growing region. Chickpea (Cicer arietinum) is the most adapted winter pulse crop in Queensland with the area expanding to historically high levels in 2010.

Seasonal yields of chickpea range from 0.5 to 2.0 tonnes per hectare depending on the timing and severity of biotic and abiotic stresses during the growing season. Although yields as high as 4.0 tonnes per hectare have been achieved in variety trials and in favourable environments with good management, the average yield during the 2008–11 period was about 1.2 tonnes per hectare. So there is a significant gap between seasonal potential and harvested yields.

Faba bean (Vicia faba) is gaining popularity in the northern grains region thanks to higher prices in recent seasons and improved varieties. Although southern regions dominate the production for Australia, northern NSW and southern Qld are looking more favourably upon faba bean as part of their rotation as a break crop for disease and for its nitrogen fixing ability.

Yield of faba beans ranges from two to four tonnes per hectare but the pulse agronomy trials have shown a potential of up to six tonnes per hectare.

Even a modest 10 per cent increase in yield would result in a $20 to $25 increase in gross margin per hectare. Over a winter pulse area of 125,000 hectares in the north, the increase in-crop production would be valued at $2.5 to $3 million per annum.

Although the area sown to winter pulses in the northern region has increased over the past three years, there have been many challenges for growers with erratic seasonal conditions and a range of disease pressures on yield and quality. Growers’ attitude to pulse crops is also influenced by forecast prices relative to other cropping options and experiences from the previous season.

The area of winter pulses in the region needs to be stabilised and the reliability of achieving seasonal yield potential improved.

The GRDC Pulse Agronomy project has consulted widely within the pulse industry to determine the priorities to be investigated throughout the term of the project and to assist in developing trials – and subsequently answers – to new questions that arise.

This article presents highlights of faba bean agronomy trials conducted by the Queensland Department of Agriculture and Fisheries (DAF) and the Queensland Alliance of Agriculture and Food Innovation (QAAFI). The trials were aimed at investigating row spacing and plant population effects on yield performance of commercially relevant varieties. The next issue of Australian Grain will present the results of our chickpea agronomy trials.
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plants per m². The trial was planted on a grey vertosol which had been on a long fallow prior to planting. The crop received 96 mm of in-crop rain.

**Results**

Overall, above average yields were obtained at the Garah site and there were significant effects according to agronomic treatments. The highest yielding treatment was 60 per cent greater than the lowest yielding treatment. There was no significant difference overall between the cultivars PBA Warda and Cairo but the breeding line X220-D performed significantly better than the other two varieties (Table 1). The narrow row spacing of 0.25 m has significantly out yielded other spacings at 5.51 tonnes per hectare (Table 2). X220-D was significantly higher yielding than the other two cultivars at 0.25 m and at 0.5 m while there was no significant difference between the cultivars at 1.0 m.

Similar to the Warra (southern Qld) site, the same trend can be found when comparing the effect of row spacing and cultivar on yield – narrower rows are gaining the highest yields (Figure 1). The pre-release variety, X220-D yielded 20 per cent greater in the 0.25 m and 0.5 m treatments than both PBA Warda and Cairo.

**Warra (southern Qld)**

The trial design consisted of two varieties PBA Warda and X220D (a pre-release line) grown in three row spacings (0.25, 0.5 and 1.00 metre) at a density of 30 plants per m². The soil type is a grey cracking clay vertosol and the trial was planted on an available water content of 140 mm in 0–120 cm profile. The crop received 113 mm rainfall during the season.

**What we found**

Overall, there was no significant difference between the two cultivars (Table 3) but the breeding line X220-D achieved marginally better yields than PBA Warda. But significant effects of the agronomic treatments were observed with both varieties responding positively to decreasing row spacing.

**TABLE 2: Effect of row spacing on yield, Garah**

<table>
<thead>
<tr>
<th>Row spacing</th>
<th>Mean yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>5.51</td>
</tr>
<tr>
<td>0.50</td>
<td>4.95</td>
</tr>
<tr>
<td>1.00</td>
<td>3.25</td>
</tr>
</tbody>
</table>

(LSD = 0.513, P=0.05)

**TABLE 3: Effect of cultivar on yield, Warra, winter 2014**

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Grain yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBA Warda</td>
<td>3.08</td>
</tr>
<tr>
<td>X220-D</td>
<td>3.25</td>
</tr>
</tbody>
</table>

(LSD = 0.491, P=0.05)

When comparing the row spacing there is a trend indicating that narrower rows are producing higher yields. There is significant difference in yield between the 0.25 and 0.5 m spacing as well as between the narrow rows and 1.0 m (Figure 2) But the yield response of the pre-release line X220-D to decreasing row spacing was consistent whereas the yield increment between 0.50 and 0.25 m was marginal for PBA Warda.

**Effect of time of sowing on yield of faba bean**

This preliminary trial was planted and managed by Glenn Milne near Dalby. The variety PBA Warda was planted into standing corn stubble on a well-structured, uniform deep to very deep, fine, selfmulching, cracking clay, with a targeted plant population of 25 plants per m² on 32 cm row spacing. There were three times of sowing in 2014:

- April 23;
- May 19; and,
- June 9.

There was a linear reduction in yields as the planting time...
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delayed beyond April 23 (Figure 3). But there was no significant difference in yield between the first and second dates nor the second and third dates. There is significant difference between the first and third dates. The first planting date (April 23) had the highest yield at 1.82 tonnes per hectare, followed by the second date at 1.43 tonnes and then the latest at only 0.99 tonne per hectare. This trend indicates that there is a need to investigate earlier dates of sowing with more varieties for the southern Darling Downs region for achieving higher yields.

To sum up

Narrower rows (0.25 m and in some cases 0.5 m) gave significantly higher yields for faba bean crops at all sites. Narrow rows did not result in yield reduction even under lower yielding conditions.

The pre-release faba bean variety, X220-D yielded 20 per cent greater in the 0.25 and 0.5 m treatments than both PBA Warda(1) and Cairo(1).

Earlier time of sowing dates showed to be achieving higher yields in faba bean but more investigation on earlier planting dates is required.

The 2014 winter crop season was the second year these trials were conducted – the 2014 results were consistent with the results from 2013.

Across the sites where (WUE) was measured, narrower rows consistently produced higher WUE.

Trials are continuing in 2015 to confirm the trends seen in 2014, and to firm up recommendations in relation to current varieties and management strategies.

1DAF, Goondiwindi.
2DAF, Toowoomba.
3QAAFI UQ, Kingaroy.

Acknowledgements: Many thanks to supporters of the trials from technical staff Stephen Krosch, Katrina Conway, trial co-operators Glenn Milne, Wade Bidstrup, The Moloney Family and the Woods Family.

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC.

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NEXT ISSUE: Results of the chickpea trials.

variety for 2015

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