Northern NSW pulse agronomy project – faba bean density experiments 2015

Andrew Verrell[1] and Leigh Jenkins[2]

[1] NSW DPI, Tamworth [2] NSW DPI, Trangie

Key findings

Faba beans sown to target 20 plants/m^2 appears to optimise yield in northern regions of NSW.

Faba beans sown to target 30 plants/m^2 appears to optimise yield in central regions of NSW.

Doza$^{\Phi}$ appears more prone to frost damage than either PBA Warda$^{\Phi}$ or PBA Nasma$^{\Phi}$

Introduction

The 2015 season was characterised by severe frost events, episodic cold weather during flowering and terminal drought during grain filling. These seasonal conditions severely affected crop performance, reducing the potential yield of faba beans across most areas of the northern NSW cropping zone.

The Northern Pulse Agronomy Initiative (NPAI; Winter Pulse) project conducted a range of experiments covering a number of different agronomic themes in 2015. This paper reports on the outcomes of a series of faba bean variety × density experiments across northern NSW.

Site details

This experiment was conducted at five experimental locations: Bullarah, Cryon and Tamworth in northern NSW and Coonamble and Trangie in central NSW.

Treatments

Three faba bean varieties were sown; Doza$^{\Phi}$, PBA Warda$^{\Phi}$ and the new line PBA Nasma$^{\Phi}$. Four target plant densities were examined; 10, 20, 30 and 40 plants/m^2. All five trials were grown under dryland cropping conditions (i.e. not irrigated). The difference in seed size for these commercial lines is shown in Figure 1, where PBA Nasma$^{\Phi}$, on average, has seed that is 40% larger than Doza$^{\Phi}$.

Results

For grain yield, there were no significant interactions between variety and plant density, only main effects (Table 1). PBA Warda and PBA Nasma out yielded Doza at two of the five sites (Coonamble and Tamworth); while at Trangie, PBA Nasma out yielded both Doza and PBA Warda (Table 1). Plant density showed significant responses at two sites: yield at Cryon plateaued at 20 plants/m^2, while at Trangie peak yield was obtained at 30 plants/m^2 (Table 1). The remaining sites showed no yield response across different plant densities.

Table 1. *Grain yield (kg/ha) for the main effects of variety and plant density at five locations in 2015*

Treatment	Grain yield (kg/ha)				
	Bullarah	Coonamble	Cryon	Trangie	Tamworth
Variety					
Doza	1602 a	2900 b	1547a	2036 b	2954 b
PBA Warda	1687 a	3280 a	1700 a	2246 b	3296 a
PBA Nasma	1685 a	3452 a	1686 a	2658 a	3359 a
Density (plants/m^2)					
10	1498 a	3376 a	1373 b	1975 c	3177 a
20	1670 a	3411 a	1772 a	2275 b	3329 a
30	1768 a	3246 a	1673 a	2515 a	3210 a
40	1666 a	3270 a	1745 a	2489 a	3096 a
Values with the same letter are not significantly different at P <0.05					

Frosts were prevalent across the northern region in 2015 and the Tamworth site suffered a number of severe frosts. From 28 July to 8 August, six frosts were recorded ranging from −1.3 to −3.5 °C. The resulting frost damage included elongated stems that developed a bent stick (hockey stick) appearance and blackened leaf margins. Treatments were scored for frost damage on a 1–9 scale on 7 August, with one representing no frost damage and

nine equal to plant death. Frost damage symptoms were significantly worse for Doza than either PBA Warda or PBA Nasma (Figure 2).

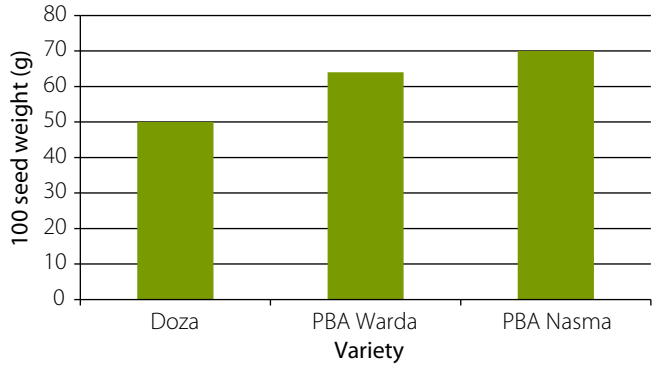

Figure 1. *Average 100 seed weight (g) for selected faba bean varieties*

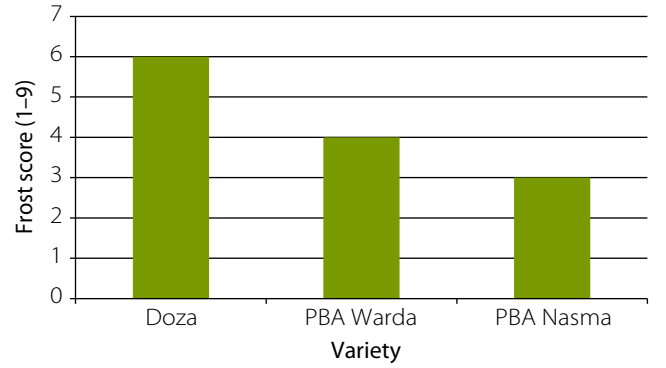

Figure 2. *Frost scores for faba bean varieties (1 = no symptoms, 9 = plant death) at Tamworth in 2015*

Summary

Limited data from the first year of trial results in 2015 suggests that for northern and western sites, 20 plants/m^2 is a preferred target plant density, while in central areas 30 plants/m^2 is a better option to achieve optimum yield with faba bean grown under dryland cropping conditions.

Large seed does not necessarily confer higher yield, with PBA Nasma out yielding PBA Warda at only one location, Trangie, in 2015.

Doza appears more prone to frost damage than either PBA Warda or PBA Nasma. Frost tolerance is a key attribute for the faba bean breeding program in northern NSW, with new releases (particularly PBA Nasma) targeted at having better tolerance than Doza, which was apparent in these trials in 2015.

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