

Faba bean time of sowing – Wagga Wagga 2015

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Key findings

- » The optimum time to sow faba beans at Wagga Wagga in 2015 was mid–late April.
- » PBA Nasma, PBA Samira, PBA Zahra, Farah and Fiesta VF were the highest yielding commercial varieties.
- » Time of sowing had a far greater effect on growth, development and grain yield of faba bean than variety in this experiment.
- » PBA Nasma produced a small grain size of 53 g/100 seeds, which could have negative marketing implications. Further testing is required to determine if this was a seasonal effect.

Introduction

This experiment aimed to compare growth, development and yield of current commercial faba bean varieties and advanced breeding lines at three times of sowing (TOS) at Wagga Wagga. This information will be used to confirm and update current agronomic recommendations for faba bean in this region.

Site details

Site	Paddock 18, Wagga Wagga Agricultural Institute
Soil type	Red-brown earth, pH _{Ca} 5.8 (0–10 cm) (Table 1)
Experiment design	Randomised complete block design with sowing date as the main blocks and varieties as the sub-plots; three replications
Sowing	Direct-drilled using a six-row cone seeder with 300 mm row spacings, press wheels and GPS auto-steer
Inoculation	Group F peat inoculant was mixed directly into an on-board 100 L water tank then pumped through micro-tubes into each sowing furrow
Stubble management	Burnt to remove wheat stubble (light burn only, still some stubble standing)
Fertiliser	80 kg/ha Grain legume super (N:P:K:S; 0:13.8:0:6.1) placed 50 mm below the seed
Plant population	Target 30 plants/m ²

Weed management

Commercial practices used with the aim of weed-free experiments to eliminate weed competition and weed seed set.

Fallow weed control:

glyphosate (450 g/L) 2.0 L/ha and 2,4-D LV ester (680 g/L) 1 L/ha

Incorporated by sowing:

glyphosate (450 g/L) 2.0 L/ha, Stomp® (440 g/L pendimethalin) 2.0 L/ha, Avadex® (400 g/L tri-allate) 1.6 L/ha and Terbyne® (750 g/kg terbuthylazine) 900 g/ha

Post sowing:

Terbyne® (750 g/kg terbuthylazine) 300 g/ha, Select® (240 g/L clethodim) 500 mL/ha, Verdict® (520 g/L haloxyfop) 100 mL/ha and Uptake® spraying oil 500 mL/100 L

Insect and disease management

Targeting *Helicoverpa* sp, lucerne flea and chocolate spot

Lemat® 100 mL/ha (12 June 2015)

Penncozeb® 750 1 kg/ha (9 July 2015)

Penncozeb® 750 1 kg/ha (7 August 2015)

Howzat® (500 g/L carbendazim) 500 mL/ha (2 September 2015)

Howzat® (500 g/L carbendazim) 500 mL/ha (21 September 2015)

Trojan® (150 g/L gamma-cyhalothrin) 30 mL/ha (24 October 2015)

Table 1. Site soil chemical characteristics for 0–10 cm and 10–30 cm depths at Wagga Wagga in 2015.

Characteristic	Depth	
	0–10 cm	10–30 cm
pH (1:5 CaCl ₂)	5.8	5.0
Aluminium Exc. (meq/100 g)	<0.1	<0.1
Total N (%)	0.026	0.041
Sulfur (mg/kg)	5.1	6.4
Phosphorus (Colwell) (mg/kg)	21	47
CEC (cmol(+)/kg)	7.4	5.5
Organic carbon (OC) (%)	0.51	0.37

The 2015 growing season at Wagga Wagga was almost ideal for pulse production except for a dry and hot September–October period. Growing season rainfall (April–October) was close to the long-term average (333 mm) with 56 mm of this falling in early April enabling timely sowing. Rainfall in June, July and August was 50% above the long-term average and contributed to valuable sub-soil moisture.

However, the flowering and grain filling period of September–October experienced eight continuous weeks of no effective rainfall and wide temperature fluctuations (5 September to 31 October). Three consecutive days in late September (23–25 September) received below zero temperatures and damaging frosts only to be followed by an exceptionally hot, dry October. Average daily maximum temperatures for the month exceeded the long-term average by 8.3 °C and the first week experienced unseasonal temperatures in the mid-30s.

Treatments

Varieties (10)	PBA Zahra [Ⓛ] PBA Samira [Ⓛ] PBA Rana [Ⓛ] PBA Nasma [Ⓛ] Nura [Ⓛ]	Farah [Ⓛ] Fiesta VF AF08207 AF10089 Determinant type
Time of sowing (TOS)	TOS 1: 14 April TOS 2: 1 May TOS 3: 18 May	

Results

Establishment

Faba bean establishment was slightly above the target of 30 plants/m². TOS 1 had an average plant establishment of 36.7 plants/m² and TOS 2 had an average of 34.5 plants/m². TOS 3 was significantly lower ($P < 0.001$) at 28 plants/m².

Grain yield, dry matter production and harvest index

Time of sowing (TOS) was a critical factor for maximising faba bean yield in this experiment. Whilst there was no significant difference

between TOS 1 and TOS 2 (at $P < 0.001$), a delay in sowing until 18 May resulted in a yield decline of 26% across all 10 varieties (Figure 1).

There was also a significant variety and TOS interaction ($P < 0.001$) in this experiment. The 2015-released variety PBA Nasma yielded significantly higher than all other varieties in TOS 1. PBA Nasma is a northern NSW variety susceptible to *Ascochyta* blight and its seed size in this trial was smaller than either PBA Zahra or PBA Samira, which could have marketing implications. Across all sowing dates, PBA Nasma, PBA Samira, PBA Zahra, Farah and Fiesta VF were the highest yielding varieties. The large-seeded PBA Rana was significantly lower yielding than the other commercially available varieties for all three TOS treatments (Figure 2).

The last significant rainfall of the growing season was on 4 September and the trial suffered severe heat and moisture stress in the first week of October. This caused all TOS treatments to abort flowers and mature prematurely. Due to the more advanced stage of development, TOS 1 and TOS 2 were less severely affected. However, these results are consistent with maximum faba bean yields resulting from mid-April to early-May sowing in this region. Growers still need to consider the consequences of:

- » sowing too early (before 20 April) – excessive height, lodging and disease
- » sowing too late (after 10 May) – short plants and restricted dry matter and grain yield.

Growers also need to be aware that in cool, moist extended springs, even late April sowings can be subject to greater disease pressure and require careful monitoring and foliar fungicide sprays. Whilst this site experienced a wet winter and early spring, a preventative fungicide program, combined with dry spring conditions, reduced disease levels to an insignificant level.

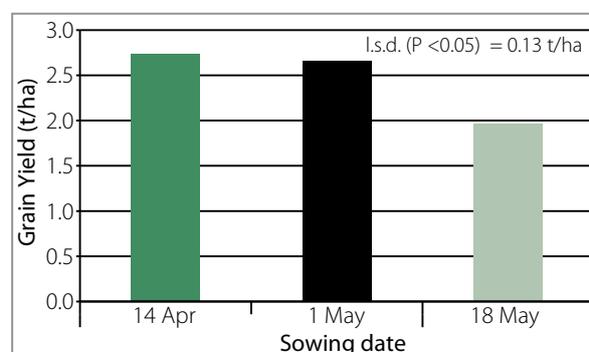


Figure 1. Mean faba bean grain yield from three sowing dates at Wagga Wagga in 2015.

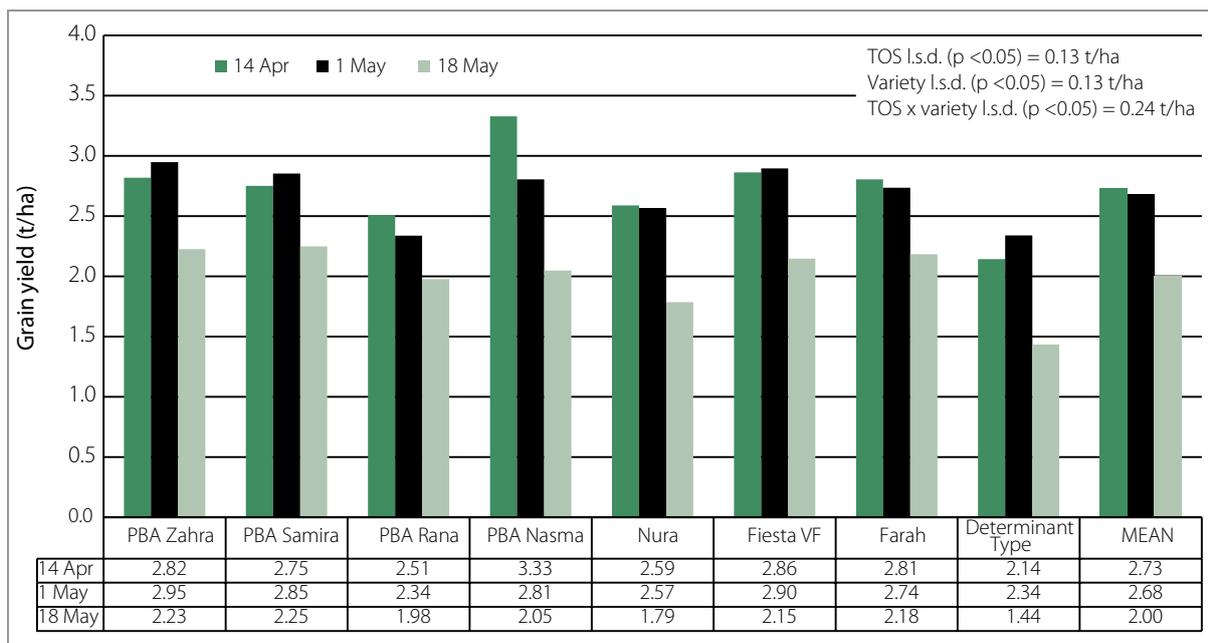


Figure 2. Grain yield of 10 faba bean varieties sown at three dates at Wagga Wagga in 2015.

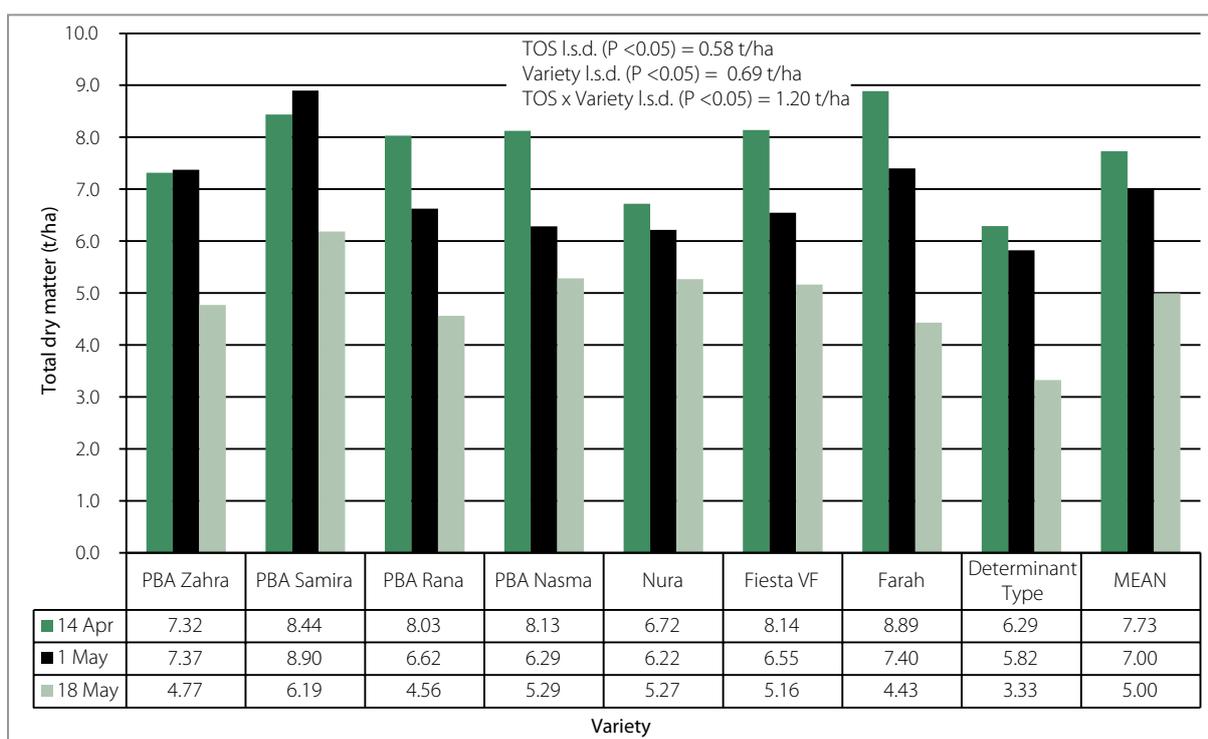


Figure 3. Total dry matter production of 10 faba bean varieties sown at three dates at Wagga Wagga in 2015.

Dry matter (DM) production was similar at the first two times of sowing (7.7–7.0 t/ha) but decreased significantly (by 29%) when sowing was delayed to 18 May (average 5.0 t/ha). The more vigorous growth of PBA Samira, Farah, PBA Zahra, PB Nasma and PBA Rana was reflected in higher DM at the first TOS.

There was a significant TOS and variety interaction for harvest index (HI). The harvest index increased significantly from TOS 1 (35.6%) to TOS 2 and TOS 3 with 40.1% and 40.5% respectively. Whilst TOS 2 and TOS 3 had significantly different grain yield and

DM totals, they were similar in their efficiency of converting DM to grain. The implication here for a higher HI is more nitrogen (N) is exported in the grain, and less residual N remains with lower biomass plants.

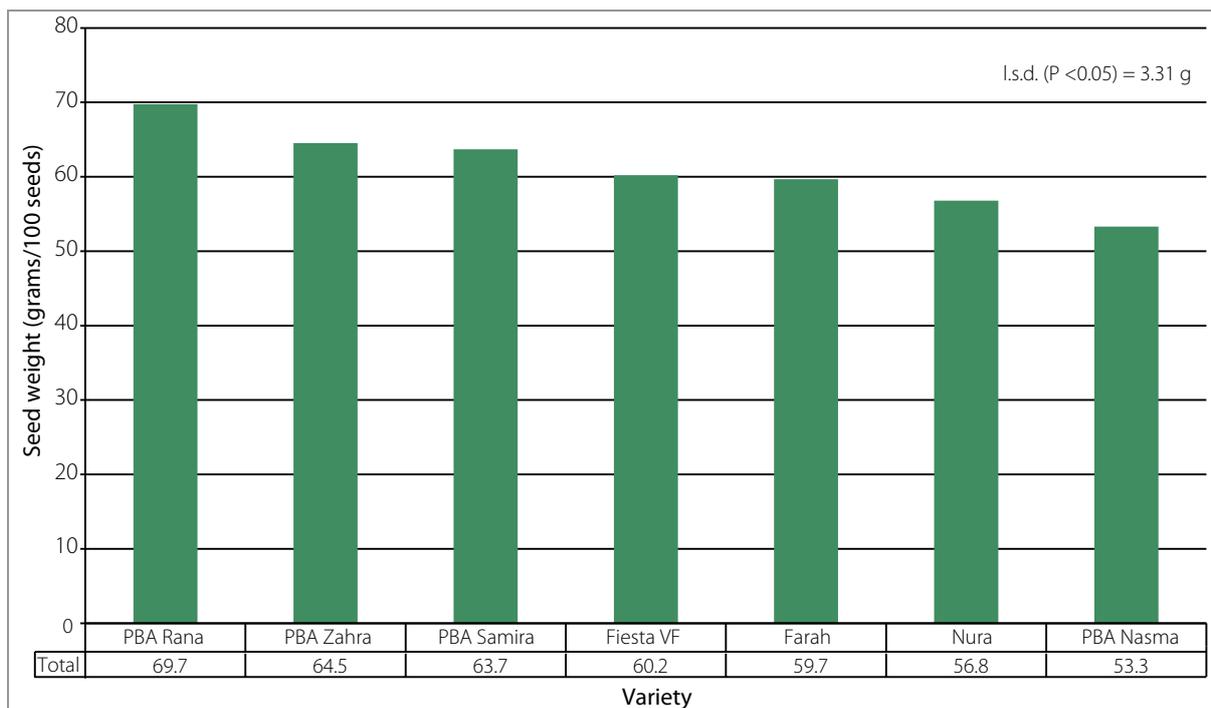


Figure 4. Grain weight of 10 faba bean varieties at Wagga Wagga in 2015.

Seed size

There was no significant variety and time of sowing interaction in this experiment. Variety had a significant effect on seed size ($P < 0.001$) given the normal seed size variation between faba bean varieties. Whilst PBA Rana was significantly lower yielding than the other commercial varieties, it did have a significantly larger seed size at $P < 0.001$ (Figure 4). In this experiment, PBA Nasma was significantly smaller seeded than all other varieties tested, at 53.3 g/100 seeds (Figure 4). This could be a consequence of a number of factors including its very early maturity, the early hot and dry finish and the fact that it out-yielded all other treatments.

Acknowledgements

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