Faba bean fertiliser trial – Spring Ridge 2016

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Key findings

- Adding phosphorus (P) did not significantly increase yield or seed weight in the varieties PBA Warda$^{\Phi}$ and PBA Nasma$^{\Phi}$.
- PBA Nasma$^{\Phi}$ produced greater yield and seed size than PBA Warda$^{\Phi}$.

Introduction

This experiment aimed to study the effect of nitrogen (N) and phosphorus (P) application separately and in combination on the growth and yield of faba bean. A small amount of N at sowing might improve yield through faster establishment and groundcover. There is also little local data available on faba bean response to additional P.

Site details

Location 'Nowley', Spring Ridge

Co-operator The University of Sydney

Soil type and nutrition The experiment was undertaken on a known P-responsive vertosol

Site soil chemical characteristics for 0–15 cm depth at Nowley in 2016.

Characteristic	Depth (0–15 cm)
pH_{Ca}	7.7
Zinc (mg/kg)	1.5
Sulfur (mg/kg)	14
Phosphorus (Colwell) (mg/kg)	14
Organic carbon (OC) (%)	1.3
Cation exchange capacity (CEC) (meq)	48

Trial design A randomised split block design was used with variety as the main blocks, N as subplot and P as the sub-subplots; with three replications. Fertiliser treatments were applied immediately pre-sowing and seed was sown offset from fertiliser rows by 5 cm. Reflectance was measured on 25 July using an N Tech® Industries, Inc. Model 505 GreenSeeker Hand Held™ Optical Sensor Unit and a biomass cut was taken on 10 October at late podding. Grain samples from harvest were used to measure seed weight.

Sowing date 5 May

Plant population Target 20 plants/m^2

Weed management Post-sowing/pre-emergence: Terbyne® 1 kg/ha (terbuthylazine 750 g/kg) applied on 5 May
Post-emergence: clethodim 500 mL/ha (clethodim 240 mL/L) applied 15 July with mancozeb (see Disease management section below).

Disease management Targeting rust (*Uromyces vicia-fabae*), and chocolate spot (*Botrytis fabae* and *B.cinerea*):

- Dithane™ @ 2 kg/ha (mancozeb 750 g/kg) applied on 4 July
- Dithane™ @ 1 kg/ha (mancozeb 750 g/kg) applied on 15 July
- Unite® 720 @ 1.5 L/ha (chlorothalonil 720 g/L) applied on 2 August
- Spin flo® @ 500 mL/ha (carbendazim 500 g/L) applied on 2 September

Insect management	*Heliothis* sp. pressure was low and no insecticides were applied.
Harvest date	21 November

Treatments

Varieties (2)	PBA Warda$^{\phi}$, PBA Nasma$^{\phi}$
Nitrogen	0 and 10 kg N/ha applied as urea
Phosphorus	0, 5, 10 and 20 kg P/ha applied as triple superphosphate

Results

Establishment

Faba bean establishment of 19 plants/m^2 was achieved, close to the target (20 plants/m^2) and there were no significant (P<0.05) differences in establishment due to N, P or variety.

Reflectance and dry matter

No significant differences (P<0.05) in reflectance or biomass due to N, P or variety occurred, indicating that plant growth was not influenced by the treatments applied.

Grain yield and seed weight

Overall, PBA Nasma$^{\phi}$ gave significantly higher (P<0.05) yield and seed size than PBA Warda$^{\phi}$ (Table 1) and N application unexpectedly reduced yield, with zero N plots yielding significantly (P<0.05) more (3.6 t/ha) compared with plus N plots (3.2 t/ha). Overall, adding P made no significant difference to yield (Table 2), although there was a trend to higher yield with the highest (40 kg/ha) P application.

Table 1. Yield and seed size of two faba bean genotypes at Nowley in 2016.

Variety	Yield (t/ha)	Seed size (g/100 seeds)
PBA Nasma$^{\phi}$	3.6^{a*}	80.1^{a*}
PBA Warda$^{\phi}$	3.1^{b}	64.8^{b}

*letters denote significance at P<0.05

Table 2. Phosphorus application and yield across two genotypes of faba bean at Nowley in 2016.

Phosphorus applied (kg/ha)	Yield (t/ha)
0	3.3^{a*}
5	3.4^{a}
10	3.3^{a}
20	3.6^{a}

*letters denote significance at P<0.05

Conclusions

In this experiment, additional P did not increase yield, however, on a lower P site, a positive response to P might occur. The reduction in yield caused by adding N might be due to reduced nodulation in N-treated plots, although nodulation was not measured in this trial. The greater yield and seed size of PBA Nasma$^{\phi}$ compared with PBA Warda$^{\phi}$ supports other experimental data.

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