

Response of faba bean to in-season application of nitrogen - Gibson

Mark Seymour (Senior Research Scientist), Department of Primary Industries and Regional Development

Key Messages

- Applying 100 kg N/ha 8 weeks after sowing increased yield, but did not lead to increased gross margins
- Trial site was flooded in August – treat results with caution

Background

Pulses have high demand for nitrogen during the reproductive stage when their growth rate increases and pods are set and filled. We wish to determine if applying nitrogen in-season will increase nitrogen supply, pod set and yield.

Aim

To determine if faba bean responds to applied nitrogen.

Trial Details

Property	Esperance Downs, Gibson, GPS - 33.609°S 121.795°E
Plot size & replication	2 m centres x 10 m sown x 3 reps
Soil type	Fleming sand
Soil pH (CaCl₂)	0-10 cm: 6.0 10-20 cm: 6.1
EC (dS/m)	0-10 cm: 0.121 10-20 cm: 0.051
Sowing date	1/4/2020
Sowing rate	PBA Amberley 150 kg/ha, treated with Alosca and TagTeam Group EF rhizobia
Fertiliser	100 kg/ha Superphosphate at seeding plus N treatments applied as urea on 26 th June (8WAS) and 24 th of July (12WAS) – additional unplanned treatment applied 17WAS.
Herbicides, insecticides & fungicides	30 th April Sprayseed 2 L/ha, 1 st May Terbyne Xtreme 0.86 kg/ha + Terrain 180 g/ha + Ultro 900WDG 1.1 kg/ha, 1 st May IAS Pyrinex Super1 L/ha, 24 th June Raptor45g/ha 9 th July 3.18 kg/ha MgSO ₃ + 1.07 kg/ha ZnSO ₄ , 26 th August Aviator Xpro 600 mL/ha
Harvested	4 th December – machine harvest
Growing season rainfall	402 mm

Treatments

6 nitrogen rates x 2 timing (8WAS and 12WAS)

1. Nil
2. N25 - 25 kg N/ha applied as urea
3. N50
4. N100
5. N200

Plus an additional unplanned treatment was applied where 70 kg N/ha applied as 17WAS as UAN

Results

Table 1 Seed yield (kg/ha) and gross margin (\$/ha) of Faba bean with applied N at Gibson in 2020 – raw data was transformed (LOG10) prior to analysis and then back transformed for presentation

N	Time	GY	GM
0	NA	1,115	185
25	8WAS	963	46
50	"	1,542	340
75	"	1,495	246
100	"	1,786	373
200	"	1,480	150
25	12WAS	1,331	300
50	"	841	15
75	"	1,020	51
100	"	889	21
200	"	506	-307
70	17WAS	1,564	281
P		0.027	0.077

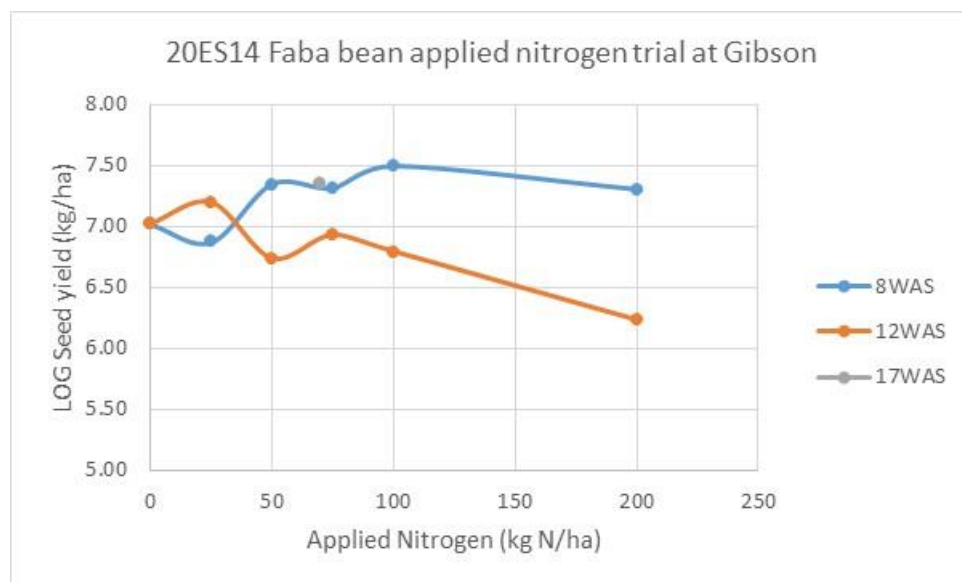


Figure 1 Seed yield of faba bean (log kg/ha) with applied N at three timings at Gibson in 2020. Raw data was transformed (LOG10) prior to REML spatial. LSD or N100 8WAS compared to N0 was significant at 0.414 log kg/ha. Other treatments not significantly greater than N0.

Comments

August rainfall was very high in 2020 which led to waterlogging and flooding. The faba bean site was flooded for around four weeks leading to widespread defoliation and in the worst areas plant death. Therefore, the results from this experiment should be treated with caution.

The 8 and 12 weeks after sowing N treatments were applied before the flooding occurred. It was not obvious to the eye that nitrogen application improved the growth of the faba beans. Indeed, if anything, the 200N treatments looked worse than the Nils (0N).

As we were concerned that roots might be rotting away during the flooding period, on the 26th August we sampled plants from the Nil treatments (0N), and 200N 8WAS and 12WAS treatments. Roots were washed and then nodulation was visually assessed. Nodulation was rated on average a 7 on a 0-10 scale, described as “crown nodulation incomplete or >30 nodules”. We found no difference between treatments ($P>0.05$). The adequate nodulation in all treatments assessed may have been due to higher than normal sandplain pH of 6 in the topsoil and the fact we used both Alosca and TagTeam rhizobial inoculum on the seed.

Seed yield responded to 100 kg N/ha applied 8 weeks after sowing (REML spatial), with lower rates producing similar yields to the Nil treatment. Nitrogen applied at 12 weeks after sowing, close to when the trial became flooded produced lower yields – but it is not clear why this occurred.

An extra nitrogen treatment of 70 kg N/ha was applied once the flooding and waterlogging had dissipated. Visually the plots improved – looking greener in the subsequent two weeks. However, seed yields were no different to the Nil treatment.

Statistical analysis of the gross margins per hectare produced for each plot indicated that with faba beans worth ~\$450/t (5 year average) no treatment produced higher gross margins than the Nil treatment – albeit there was a trend for 75 and 100 kg N/ha applied at 8 weeks to produce greater returns than 0, 25 and 50 kg N/ha applied at a similar time.

Acknowledgements

This experiment is one of a series supported by the DPIRD/GRDC co-investment “High Value Pulses - Raising awareness, optimising yield and expanding the area of faba bean, chickpea and faba bean in Western Australia” (DAW1903-004RTX).

Thanks to the Esperance TSU for trial management, SEPWA and PASE for their continued support. Pam Burgess provided technical assistance to ensure all measurements occurred in a timely and accurate fashion.

Links

For other reports related to this trial visit GRDC’s on-farm trial web site at <https://www.farmtrials.com.au>

For more information, contact

Mark Seymour
Senior Research Scientist
Department of Primary Industries and Regional Development
mark.seymour@dpiird.wa.gov.au