

Managing N fixation in pulses

Barellan 2021

Key findings

- The site chosen was a red sandy loam soil with inherent low fertility and an acidic topsoil, pH (CaCl₂) 4.5. Field peas were last grown in 2017.
- Nodulation was greatest in both lentils and field peas where seeds were inoculated (standard or acid tolerant rhizobia) and no N was applied.
- Standard peat and acid tolerant rhizobia strain (regardless of N treatment) had greater nodulation over the Nil in both the lentil and field pea trial.
- In lentils the acid tolerant rhizobia strain resulted in the highest peak biomass (8.01 t/ha), 1.24 t/ha more than standard peat.
- In lentils yield was higher in both the standard and acid tolerant rhizobia than uninoculated. Nitrogen application increased yield by an average of 0.29 t/ha (averaged across inoculation treatments).
- In field peas, there was no difference in grain yield between inoculation treatments or nitrogen treatments.

Trial Details

Table 1: Trial management and treatments applied at Barellan in 2021.

Management	
Pre-sow herbicides	13 May: 2 L/ha Crucial® (600 g/L glyphosate) + 20 g/ha Terrad'or® (700 g/kg tiafenacil) + 800g/ha Terbyne® (750 g/kg terbuthylazine) + 1.2 L/ha Treflan (480 g/L trifluralin) + Hasten (0.5 L/100 L)
Sowing date	13 May
Starter fertiliser	80 kg/ha Superfect® (phosphorus 8.8%, sulphate sulphur 11.0%, calcium 19%)
Sowing rate	Calculated to target 100 lentil plants/m ² and 40 field pea plants/m ²
Fungicide	2 September – 1 L/ha Miravis® Star
Harvest date	9 December
Treatments	
Species, variety	Lentils, PBA Hallmark XT [Ⓛ] Field Peas, Sturt [Ⓛ]
Rhizobia inoculant	Nil Standard strain peat Acid tolerant strain peat
N rate (as urea)	0 kg N/ha 40 kg N/ha

Results

Lentils

Table 2: Nodulation scores*, peak biomass and grain yield of lentils at Barellan in 2021.

Treatment	Nodule Score*	Biomass (t/ha)	Grain yield (t/ha)
Inoculation			
Nil	1.47	6.55	2.60
Standard	3.62	6.77	3.00
Acid tolerant	3.62	8.01	3.20
l.s.d. ($P < 0.05$)	2.07	1.14	0.28
Nitrogen			
0 N	3.14	6.93	2.82
40 N	2.67	7.29	3.11
l.s.d. ($P < 0.05$)	n.s.	n.s.	0.17

* Nodulation scores 0 to 8, where 0 = no nodules and 8 = extremely abundant. A score of 4 is considered adequate. Source: Dr Ron Yates, Department of Agriculture and Food WA.



Figure 1: Poor growth of uninoculated field peas with no applied nitrogen (left) compared with field peas inoculated with the standard strain of rhizobia plus 40 kg N/ha applied (right).

Field Peas

Table 3: Nodulation scores* and grain yield of field peas at Barellan in 2021.

Treatment	Nodule Score*	Grain Yield (t/ha)
Inoculation		
Nil	2.81	5.15
Standard	3.81	5.43
Acid tolerant	4.10	5.39
l.s.d. ($P < 0.05$)	0.92	n.s.
Nitrogen		
0N	4.02	5.38
40N	3.13	5.27
l.s.d. ($P < 0.05$)	0.30	n.s.

* Nodulation scores 0 to 8, where 0 = no nodules and 8 = extremely abundant. A score of 4 is considered adequate. Source: Dr Ron Yates, Department of Agriculture and Food WA.

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