

Lentil, Nutrition, LRZ Southern Mallee (Curyo), Victoria
Lentil, Nutrition, LRZ Central Mallee (Ouyen), Victoria

Authors

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Aim

To investigate the response of lentil to application of microbial inoculants and micro and macro nutrients across a sandhill and swale soil at Ouyen and a sandy loam at Curyo.

Treatments

Variety: PBA Jumbo2

Treatments: See Table 1 below

The **All_Nut** treatment had kg/ha of nutrients N 4.4, P 14, K 22, S 5, Zn 2.5, Cu 2, Mn 3 and Mo 0.06.

Arbuscular mycorrhiza fungi (AMF)-seed treated @ 1kg of product per tonne of seed.

Polymicrobial inoculant (1×10^8 cfu/ml *Bacillus licheniformis*, 2×10^8 cfu/ml *Bacillus methylophilus*, 2×10^8 cfu/ml *Bacillus subtilis*) @ 1.2 L/ha).

Other Site Details

	Curyo (Sandy loam)	Ouyen (Sandhill and Swale)
Sowing date	06 May	16 May
Stubble height (cm)	Standing (15)	Standing (10)
Row Spacing (cm)	36	28
Plant density (plants/m²)	120	120

Results and Interpretation

- Key Message: Only treatments with phosphorus removed from fertilizer resulted in grain yield losses consistent with previous seasons. Some visual responses were observed for other nutrients, but nothing resulted in a yield gain or loss.
- Establishment and Plant Growth: At Curyo, establishment and growth of lentil were excellent in 2019 due to adequate soil moisture at sowing and suitable growing conditions during most of the season. Dry conditions in spring limited yield potential. No visual differences between nutrient treatments were noted except stunting of growth and slight yellowing in the 'P' and No fertilizer.

At Ouyen, timing of establishment in both soil types was variable, occurring over a period of about 4 weeks due to marginal soil moisture at sowing. Total number of plants established (measured in the swale soil only) was generally close to optimal of 120 pl/m². There was no significant impact of nutrient treatment, although there was a trend towards lower establishment in the AMF treatment (Table 1). Plant growth during the rest of the season was slow and impacted by the extremely dry seasonal conditions, which may have restricted microbial growth, movement and uptake of the applied nutrient by the crop. Similar to Curyo, stunting of growth and slight yellowing in the 'P' and 'no fertilizer' treatments were observed. Several significant frosts during the reproductive phase of growth combined with dry spring conditions resulted in flower and pod abortion and early senescence of leaves.

- Grain Yield: There was significant grain yield difference between the microbial inoculation and soil nutrition treatments at Curyo. Grain yield ranged between 2.21 and 2.91 t/ha (Table 2). The no fertiliser and 'P' treatments had significantly lower grain yield than the all nutrient treatment (Table 2). There was no significant yield gain from application of N, K, S, Zn, Cu, Mn and Mo, indicating the availability of adequate level of these nutrients in the soil. Similarly, application of neither the polymicrobial inoculant nor arbuscular mycorrhiza fungi (AMF) improved yield of lentil. However, these results should be verified as they are based on a single field experiment.

At Ouyen, the difference in grain yield between the treatments was not significant. Adverse growing conditions rapidly progressed maturity and resulted in low grain yields ranging between 0.32 and 0.57 t/ha (Table 3). Hence, results should be treated with caution.

Table 1. Effect of microbial inoculation and application of soil nutrients on establishment (plants/m²) of lentil at Ouyen in 2019.

Treatment	Establishment (pl/m ²)
Nut_All - Zn	132
Nut_All - S	122
Nut_All - Cu	125
Nut_All - N	117
Nut_All - Mo	118
Nut_All	128
Nut_All + Polymicrobial inoculant (Liquid)	124
Nut_All - Mn	125
Arbuscular mycorrhiza fungi (Seed treatment)	104
Nut_All -K	123
Nut_All - P	112
No fertilizer	136
LSD (P<0.05)	ns

Table 2. Grain yield (t/ha) response of lentil to microbial inoculation and application of soil nutrients at Curyo and Ouyen, Victoria in 2019.

Treatments	Grain Yield (t/ha)	
	Curyo	Ouyen
Nut_All - Zn	2.91	0.52
Nut_All - S	2.88	0.41
Nut_All - Cu	2.82	0.57
Nut_All - N	2.72	0.36
Nut_All - Mo	2.70	0.40
Nut_All	2.69	0.43
Nut_All + Polymicrobial inoculant (Liquid)	2.59	0.51
Nut_All - Mn	2.58	0.45
Arbuscular mycorrhiza fungi (Seed treatment)	2.38	0.40
Nut_All -K	2.34	0.38
Nut_All - P	2.22	0.35
No fertilizer	2.21	0.32
LSD (P<0.05)	0.43	ns