Faba Bean, Acid tolerant inoculants, LRZ North Central Region (Pyramid Hill), Victoria

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Aim
To compare the effect of rhizobia strains and application rate on the nodulation, biomass, grain yield and grain quality of faba beans grown in suboptimal (acidic and high salinity) soil conditions.

Treatments
Inoculant strategies: Nil; rhizobia strain WSM-1455 (commercially available peat slurry); rhizobia strain WSM-1455 (double rate); rhizobia strain SRDI-969; and rhizobia strain SRDI-970

Table 1. Other Site Details

	Pyramid Hill
Sowing Date	April 12, May 14, June 5
Plant Density (plant/m^2)	25
Stubble height (cm)	10
Row Spacing (cm)	30
Fertiliser (kg/ha)[1]	60

[1] Granulock Z (N 11, P 21.8, S 4, Zn 1)

Results and Interpretation

- Key Messages: Inoculating faba beans prior to sowing improved nodulation on acid soil. New acid tolerant rhizobia (strain SRDI-969) increased nodulation but not grain yield, which was limited by low rainfall. The SRDI-969 is a promising strain, which is under evaluation as a future replacement for the current commercially available strain (WSM-1455).
- Nodulation measured at flowering showed significant benefits of applying rhizobia compared to the nil treatment (Table 1). Rhizobia strain SRDI-969 produced the highest number of nodules than any other strain: An average of 42 nodules per plant. Nodules were located around the crown area of the root confirming the nodulation was prompt and likely occurred as a result of the inoculants applied. SRDI-969 was the only inoculant that produced adequate nodulation.
- Doubling the rate of commercially available inoculant (WSM-1455) did not increase nodulation compared to the standard rate in this trial. However, it has been shown to be a beneficial strategy elsewhere.
- Improvements in nodulation did not translate in to increase in biomass as growth was likely limited by low rainfall during the growing season (158 mm).

Table 1. Nodule number and biomass at flowering

Treatment	Nodule number (per plant)	Crop biomass (t/ha)
SRDI-969	42.3^{a}	2.4
WSM-1455 x 2	19.2^{b}	2.4
WSM-1455	17.6^{b}	1.9
SRDI-970	11.2^{bc}	2.2
Nil	6.7^{c}	1.9
	LSD (P<0.001) = 10.9 CV% = 36.5	LSD (P=0.17) = NS CV% = 17.4

- Grain yield, grain weight and protein content were not influenced by the inoculant treatments (Table 2). Lack significance in the yield data was likely the result of low rainfall over the growing season and spatial variation across the trial site associated with the acidic soil (pH_{CaCl2} 5.1 in 0 – 10 cm) as well as moderately high salinity levels (ECE of 4.6 in 0 – 10 cm and 6.5 in 10 – 40 cm).

Table 2. Yield and grain quality

Treatment	Grain yield (t/ha)	Grain protein (%)	Grain weight (g/100 seeds)
SRDI-969	1.18	13.5	55.4
WSM-1455 x 2	1.31	13.7	56.3
WSM-1455	1.25	13.5	55.6
SRDI-970	1.20	13.3	53.4
Nil	1.05	13.1	56.0
	LSD(P=0.20) = NS CV% = 12.3	LSD(P=0.35) = NS CV% = 3.5	LSD(P=0.82) = NS CV% = 3.5

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