Mt Hill Pulse Trials

Lower Eyre Peninsula 2022

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Mount Hill trial site

This site was selected as a sandy soil, slightly acidic, that has traditionally only grown lupins and canola as break crops. Higher value pulse crops such as lentil and faba beans have the potential to add diversity to the rotation, providing alternative control options for ryegrass and potentially adding profitability across the rotation.

Rainfall
Av. Annual: 396 mm
Av. GSR: 315 mm
2022 Total: 553 mm
2022 GSR: 364 mm

Table 1: Pre-season soil test results at Mt Hill in 2022.

Depth (cm)	pH 1:5 (H_20)	pH ($CaCl_2$)	Organic Carbon (%)	MIR - Aus Soil Texture	Nitrate N (mg/kg)	Ammonium N (mg/kg)	Colwell P (mg/kg)	PBI + Col P
0-10	7.09	6.61	1.06	Sand	7.7	<1	24	17
10-30	8.13	7.28		Sand	4.3	<1		
30-60	9.14	8.28		Sandy clay	3.1	<1		
60-100	9.62	8.51		Clay loam	6	<1		

Trial 1 Pulse legacy

This trial compared differing broadleaf 'break crops' on a sandy soil on Lower EP.

Table 2: Grain and biomass yields (t/ha).

Crop type	Grain yield (t/ha)	Total biomass (inc grain) at maturity (t/ha)
Canola	2.68	11.38
Faba beans	4.44	13.12
Lentils	2.26	10.09
Lupins	2.94	10.01
Vetch	2.11	11.21
Vetch BM*	0	6.59
LSD (P= 0.05)	*0.47*	*1.47*

*BM = Brown manured (sprayed off early Oct.)

Table 3: Gross margin and following season mineral nitrogen of break crops trialled at Mt Hill 2022.

Crop type	Grain yield(t/ha)	Total biomass (inc grain) at maturity (t/ha)	Gross Margin ($/ha)	Mineral N - March 2023 (kg/ha)
Canola	2.68 cd	11.38 b	913	55.9
Faba beans	4.44 a	13.12 a	1,894	44.6
Lentils	2.26 cd	10.09 b	1,000	30.4
Lupins	2.94 b	10.01 b	783	39.6
Vetch	2.11 d	11.21 b	886	45.0
Vetch BM*	0 e	6.59 c	-381	71.1
LSD (P= 0.05)	*0.47*	*1.47*		

*variable costs – 2022 Farm Gross Margin and Enterprise Planning Guide.

*BM = Brown manured (sprayed off early Oct.)

This trial was able to demonstrate that each of the crops trialled were able to be successfully grown (achieve a profitable gross margin) on this soil type, except for the brown manured vetch crop. The high yielding faba beans realised the highest gross margin. The brown manured vetch treatment resulted in higher levels of mineral N (to 60cm) at the start of the 2023 growing season.

Trial 2 Lentil variety trial

To determine varietal differences in lentils grown in sandy soils.

Table 4: Grain yield (t/ha) of lentil varieties at Mt Hill 2022.

Variety	Yield (t/ha)
Highland	2.97 b
Hurricane	3.54 a
Lightning	3.58 a
Thunder	3.62 a
LSD (P= 0.05)	*0.35*

The variety Highland yielded lower than the other varieties trialled at this site in 2022.

Trials 3 & 4 Nutrition, including trace elements on pulse crops grown on sandy soils

Following consultation with the AIR EP Medium Rainfall RD&E Committee, questions were asked regarding pulses grown on sandy soils and if they would require additional nutrition to achieve maximum potential.

Table 5: Tissue test results, collected prior to application of nutrition in 2022.

Sample Name	Nitrate N (mg/kg)	Nitrogen (%)	Phosphorus (%)	Potassium (%)	Calcium (%)	Magnesium (%)
Mt. Hill lentils	194	5.78	0.53	2.87	0.837	0.3
Mt. Hill beans	<30	5.41	0.42	2.42	0.637	0.26

Sample Name	Sodium (%)	Sulfur (%)	Boron (mg/kg)	Copper (mg/kg)	Zinc (mg/kg)	Manganese (mg/kg)
Mt. Hill lentils	0.094	0.28	24	5.2	56	83
Mt. Hill beans	0.54	0.29	18	4.6	36	49

Sample Name	Iron (mg/kg)	Aluminium (mg/kg)	Molybdenum (mg/kg)	Chloride (mg/kg)
Mt. Hill lentils	190	170	0.22	0.62
Mt. Hill beans	130	79	0.12	0.93

Nutrition treatments applied:

Treatment 1 (applied foliar): Zn - 120gm/ha, Mn - 150 gm/ha, Cu - 45 gm/ha, B - 200gm/ha, Mo - 2.6 gm/ha, Ca - 50gm/ha.

Treatment 2 (applied foliar): B - 200gm/ha, Mo - 2.6 gm/ha, Ca - 50gm/ha.

Treatment 3 (applied foliar): Zn - 120gm/ha, Mn - 150 gm/ha, Cu - 45 gm/ha, Ca - 50gm/ha.

Treatment 4 (applied foliar): Zn - 120gm/ha, Mn - 150 gm/ha, Cu - 45 gm/ha, B - 200gm/ha, Mo - 2.6 gm/ha.

Treatment 5 (broadcast post-em): 13kg/ha N, 10 kg/ha K, 7kg/ha S, 3 kg/ha Ca, 2.5 kg/ha Si, 1.3kg/ha Fe, 0.8 kg/ha Mg, 366 gm/ha Mn, 68 gm/ha Zn, 35gm/ha Cu, 14 gm/ha B, 0.5 g/ha Mo.

Seed nutrition (applied to seed): N 250g/t, P 350g/t, K 500g/t, Zn 30g/t, S 2gm/t, Mg 0.5g/t, Fe 4gm/t, Mn 0.5g/t, Cu - 0.3g/t, Mo 0.02g/t, B 0.2g/t, Co 0.01g/t.

K (applied IBS): 25kg/ha Potassium.

Table 6: Grain yield (t/ha) of Hurricane lentils treated with various nutrition applications.

Treatment	Yield (t/ha)
Hurricane	3.21
Hurricane+seednutrition	3.02
Hurricane+K	3.31
Hurricane_1	3.20
Hurricane_2	3.06
Hurricane_3	3.20
Hurricane_4	3.09
Hurricane_5	3.20
LSD (P= 0.05)	*ns*

Table 8: Grain yield (t/ha) of faba bean treated with various nutrition applications.

Treatment	Yield (t/ha)
Samira	5.01
Samira_1	5.09
Samira+2	4.71
Samira+3	4.86
Samira+4	4.75
Samira+5	4.96
Samira+K	5.01
LSD (P= 0.05)	*ns*

Conclusion

No significant yield improvement was achieved through the application of any of the additional nutrient treatments applied.

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