Pasture cropping Lupins over subtropical perennial grasses

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Purpose:	To evaluate the impact of crop seeding rate and perennial row spacing on grain yield of lupin crops To evaluate the feasibility of using tine seeders fitted with precision guidance technology to sow annual crops into subtropical perennial pastures (offset to perennial rows) without damaging the perennial base.
Location:	Peter Negus property. West side of Dandaragan Rd (~ 2km North of Rowes Rd)
Soil Type:	Deep sand. Texture is consistent to 1.5m
Soil Test Results:	(0-10cm): OC - 1.06%, P - 26 mg/kg, K - 19 mg/kg, S - 5.9 mg/kg, N - 5.33 mg/kg, conductivity - 0.04 dS/m pH(CaCl2) - 5.4 (0-10cm) 4.5 (10-40 cm) 4.8 (40-80 cm) 5.0 (80-120cm)

BACKGROUND SUMMARY

Pasture cropping for grain (i.e. seeding an annual crop over a live perennial pasture) has proved to be viable at a focus site south west of Moora over the past 4 years (Ward et al. 2012); and herbicide options that control crop weeds without jeopardizing the persistence of the perennial base have been identified (Borger and Ferris 2013). However, information on other management issues, such as crop seeding rate, and options for growers without disc seeders are being sought by innovative growers to help refine pasture cropping systems.

TRIAL DESIGN

Plot size: 15 x 7 m (24 Total)

Machinery use: DAFWA cone seeder (1.5 m wide), 220 mm row spacing, tines with trailing press wheels, offset to perennials rows (DGPS with +/- 2cm accuracy and auto steer)

Repetitions: 3 (8 Treatments)

Crop type and varieties used: Gunyidi* lupins.

Seeding rates and dates: Sown on 24 May 2013 at 100 or 150 kg/ha

Fertilizer rates and dates:

May 24: 160 kg/ha Super Potash 3:1

Herbicide rates and dates:

Management inputs have been consistent across all treatments (except seeding rate)

24 May	Knockdown	Sprayseed (1 L/ha), Treflan (1.5 L/ha), Simazine (1.5 L/ha)
24 May	Insecticide	Dominex (100 mL/ha), Talstar (200 mL/ha)
24 May	Fertilizer at seeding	Super Potash 3:1 (160 kg/ha)
2 July	Grass selective	Select (500 mL/ha)

TRIAL LAYOUT			
Plots			Treatments
1	12	23	Panic rows 88 cm apart (permanent pasture)
2	14	19	150 kg/ha Lupin sown over Panic rows 44 cm apart
3	16	21	150 kg/ha Lupin (annual control)
4	15	17	100 kg/ha Lupin sown over Panic rows 88 cm apart
5	10	24	100 kg/ha Lupin (annual control)
6	13	18	Panic rows 44 cm apart (permanent pasture)
7	9	20	150 kg/ha Lupin sown over Panic rows 88 cm apart
8	11	22	100 kg/ha Lupin sown over Panic rows 44 cm apart

Plot 1 is located at the south-east corner of the trial area (adjacent to Dandaragan Road)

RESULTS/STATISTICS

Perennial pasture base

- Gatton panic establishment was about 6 plants per meter of row (April 2013) and perennial biomass (20 May 2013) just prior to the seeding the lupin crop averaging 720 to 1000 kg/ha.
- Very few perennial plants were damaged (i.e. pulled up by tines) when pasture crops were sown with a DAFWA cone seeder fitted with narrow points, DGPS (+/- 2 cm accuracy) and auto steer.

Lupin density and yield

- Lupin density in the control treatments (i.e. no perennial base) was 43 plants/m^2 for the 100 kg/ha seeding rate and 60 plants/m^2 for the 150 kg/ha seeding rate (Figure 1). By comparison, crop establishment was 8-30% lower for pasture cropped treatments. Notwithstanding, the impact of the perennial base on lupin establishment appeared to be moderated by wide (88 cm) perennial rows.

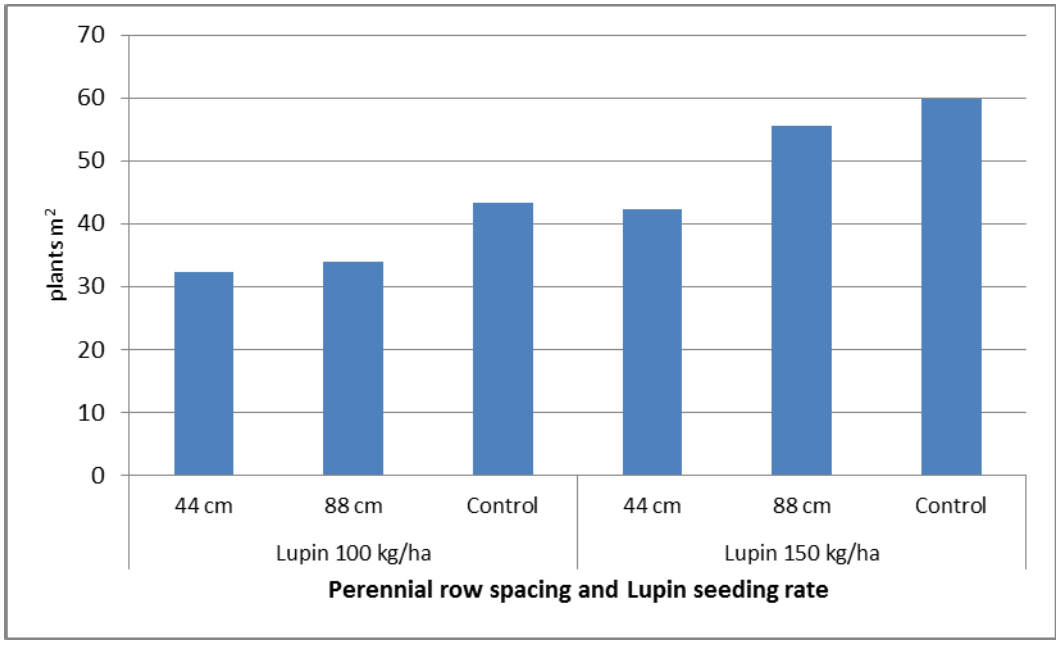

Figure 1. Lupin plant density for annual control and pasture crop treatments Lsd (5%) = 10.3

- Increasing seeding rate from 100 to 150 kg/ha increased grain yield across all treatments (Figure 2).
- Grain yield for the control (no perennial base) seeded at 100 kg/ha was 2.3 t/ha. Grain yield for pasture crops seeded at the same rate were 26% and 17% less for crops sown over narrow (44 cm) and wide (88 cm) panic rows respectively. There was also a yield penalty for pasture crops sown at 150 kg/ha (19-22%)

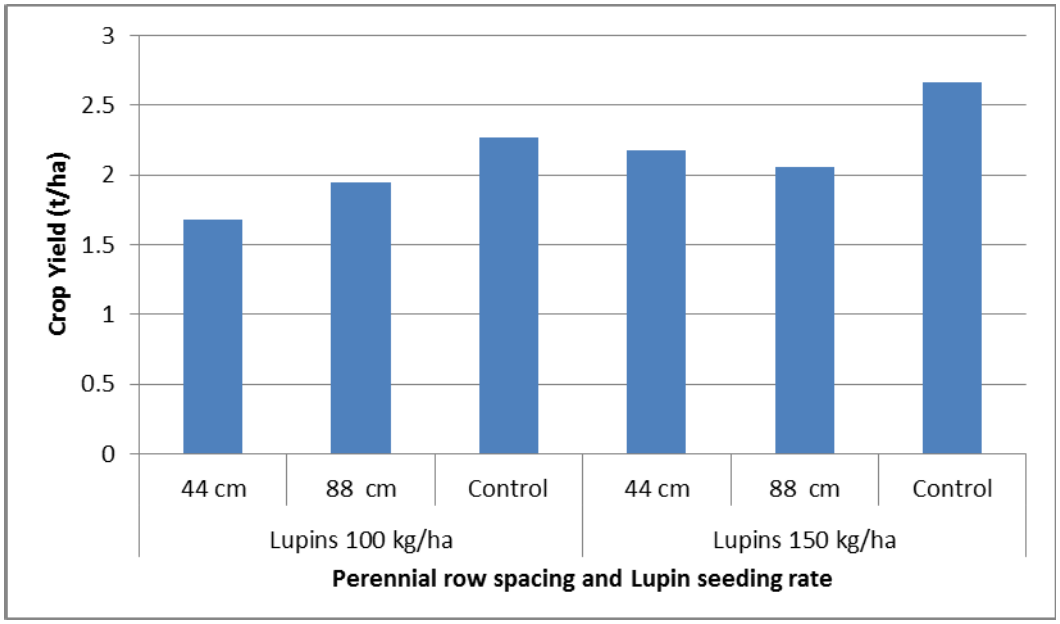

Figure 2. Lupin grain yield for annual control and pasture crop treatments. Lsd

(5%) = 0.53 OBSERVATION/ DISCUSSION/ MEASUREMENTS

- Crop seeding rate and perennial row spacing both influence grain yield of pasture crops.
- Lifting seeding rate of pasture crops might compensate for poorer establishment and, in turn, help to reduce any grain yield penalty. For this experiment and assuming lupin seed is
  $300/t, lifting seeding rate by 50 kg/ha ($15) helped to avert a 26% yield penalty and proved to be $165/ha more profitable overall.
- Where growers do not own a disc machine but have invested in precision guidance technology, with forward planning, it is feasible to use a tined machine to sow crops into perennial pastures without damaging the perennial base.

PEER REVIEW/REVIEW
Geoff Anderson (DAFWA)

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** PBA Gunyidi is protected by Plant Breeders Rights Act 1994 (PBR)*