Sowing serradella into sub-tropical grasses

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Transforming the Northern Sandplain and EverCrop projects

Purpose:	To evaluate the performance of annual crop and pasture species sown into subtropical grasses To compare summer and winter sowing options to introduce serradella into subtropical perennial pastures.
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

Subtropical grasses can transform deep sandy soils that are marginal for continuous crop production and prone to wind erosion. Over the last decade, innovative growers have been improving the productivity of deep sandy soils by sowing Gatton panic and Rhodes grass mixtures across infertile sands in particular. Benefits have included year-round groundcover, green feed over summer and increased animal production.

Currently there are concerns about the ongoing productivity of perennial grass based systems due to inadequate nitrogen inputs. A companion annual legume could provide the nitrogen to drive productivity and improve feed quality of perennial grass pastures. However, sowing annual pastures in winter often conflicts with demands of a large annual cropping program. Consequently many annual legume pastures are sown late under conditions too cold to promote rapid growth and good establishment.

This trial evaluates the value of summer sowing as a method of introducing hard-seeded annual legumes into established perennial pastures. Summer sowing is a technique where hard, pasture-legume seeds (normally pod segments) are sown in early summer. These seeds soften in the soil over the summer (3-4 months) and lie ready to germinate at the break of season.

TRIAL DESIGN

Plot size: 15 x 7 m (30 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 (10 Treatments)

Crop type and varieties used: Margurita* French Serradella, 87GEH72.1a Yellow Serradella (unreleased).

Seeding rates and dates:

Feb 27 (Summer Sowing): Margurita pod 20kg/ha

Margurita pod 40 kg/ha 87GEH72.1a pod 30 kg/ha

May 24 (Winter sowing): Margurita seed 10 kg/ha

Fertilizer rates and dates:

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

Herbicide rates and dates:

May 24 (Knockdown): Sprayseed 1 L/ha prior to winter sowing treatments only.

July 2 (Grass Selective): Select 500 mL/ha

Treatments

10 kg/ha Margarita (seed) Winter sown over Perennial rows 44 cm apart

10 kg/ha Margarita (seed) Winter sown over Perennial rows 88 cm apart

20 kg/ha Margarita (pod) Summer sown (control)

20 kg/ha Margarita (pod) Summer sown over Perennial rows 44 cm apart

20 kg/ha Margarita (pod) Summer sown over Perennial rows 88 cm apart

40 kg/ha Margarita (pod) Summer sown over Perennial rows 44 cm apart

40 kg/ha Margarita (pod) Summer sown over Perennial rows 88 cm apart

30 kg/ha 72.1A (pod) Summer sown (control)

30 kg/ha 72.1A (pod) Summer sown over Perennial rows 44 cm apart

RESULTS/STATISTICS

Perennial establishment

- The perennial pastures sown in August 2012 established well and produced approximately 1 t/ha of dry matter over summer (Jan-April).

Serradella establishment

- Establishment of winter sown French serradella was excellent with a germination density over 100 plants/m^2 in perennial pasture plots (Figure 1). A summer seeding rate of 40 kg/ha (pod) was necessary to achieve a similar density.
- Although seedling density of the 20 kg/ha treatment was half that of the 40 kg/ha treatment by mid-August the biomass of these plots and winter sown treatment were comparable.
- There was little difference in biomass and seed production of serradella sown as pod segments in February and scarified seed in May. However, summer seeded serradella emergence when sown into perennial pasture was delayed and relative to an annual-only pasture.

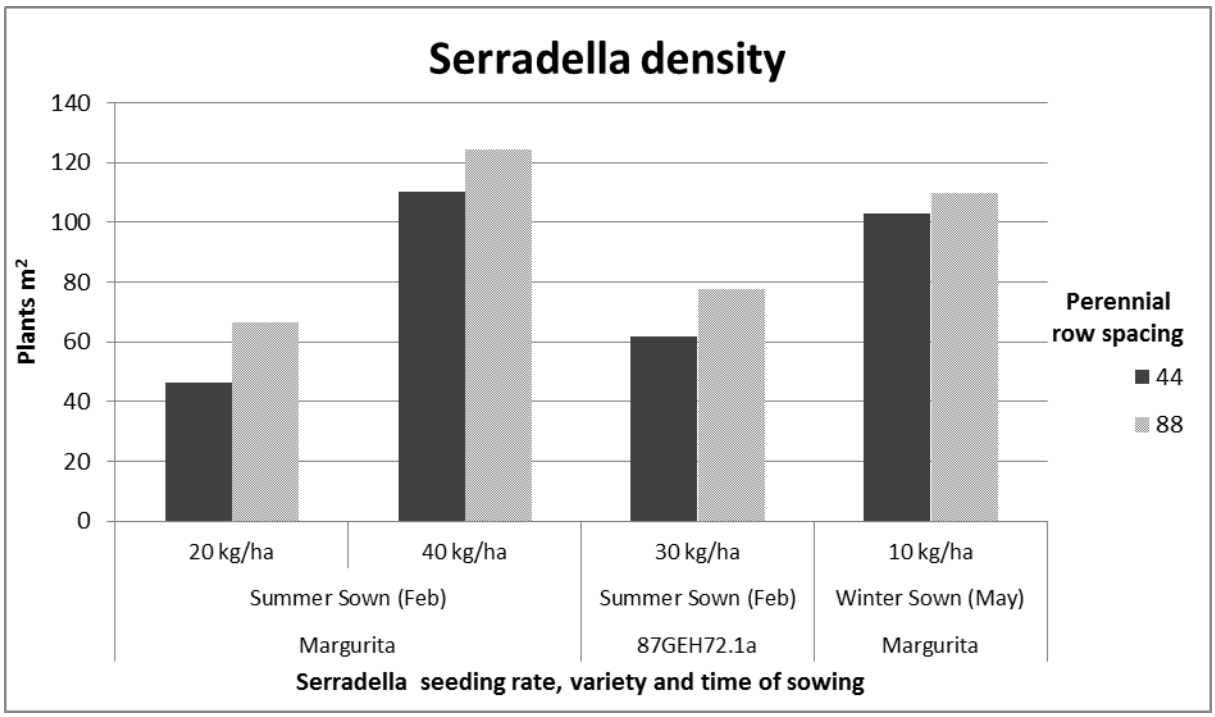

Figure 1. The impact of seeding rate, time of sowing and perennial row spacing on serradella establishment when sown into subtropical perennial grasses. Lsd (5%) = 30.8.

The impact of perennials on serradella production

- There was lower biomass production when Margurita was summer sown into perennial pastures (Figure 2). The unreleased yellow serradella line (87GEH72.1a) produced 600 kg/ha more biomass than Margurita in monoculture (i.e. no perennial base) but 600 kg/ha less when sown into perennial grasses.
- Perennial row spacing did not appear to have a significant effect on either serradella establishment, biomass or seed production (Figure 1& 2).

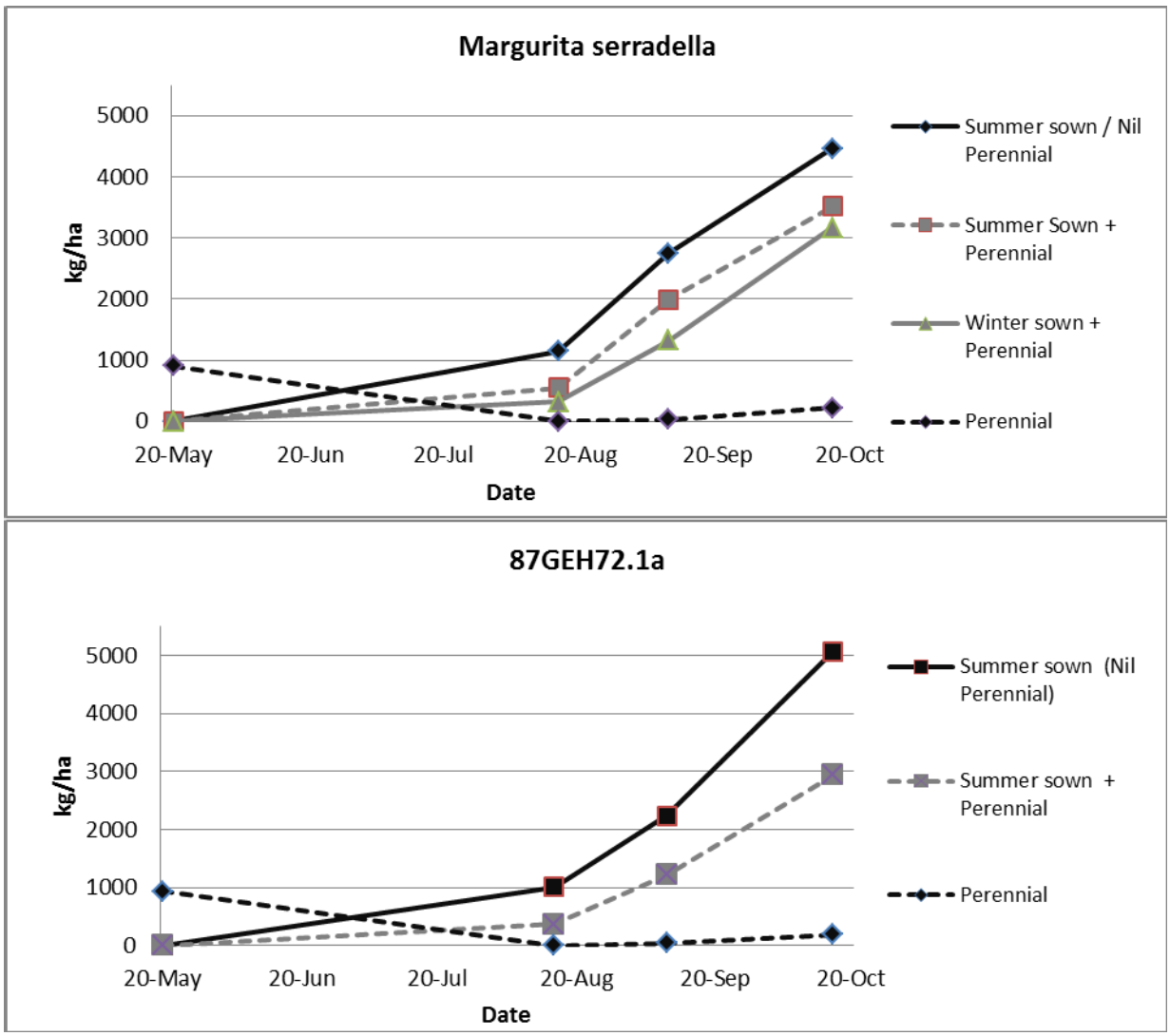

Figure 2. The impact of established perennials and sowing times on serradella biomass production: Margurita (top) 87GEH72.1a (bottom).

Should seeding rate be increased when sowing into perennials?

- Germination was very good (over 100 plants/m^2) for the winter sown Margurita and plant numbers were comparable to the high (40 kg/ha pod) summer seeding rate (Figure 1). But this did not flow through to greater biomass relative to the low (20 kg/ha pod) seeding rate.
- There was little or no advantage from a high seeding rate (40 kg/ha) of Margurita pod when compared to 20 kg/ha pod or 10 kg/ha of clean seed. Although, the high seeding rate helped to achieve greater plant density and early biomass; but by mid spring the biomass for the high and low seeding rates were both about 3.5 t/ha and seed yield was similar (Figure 4).

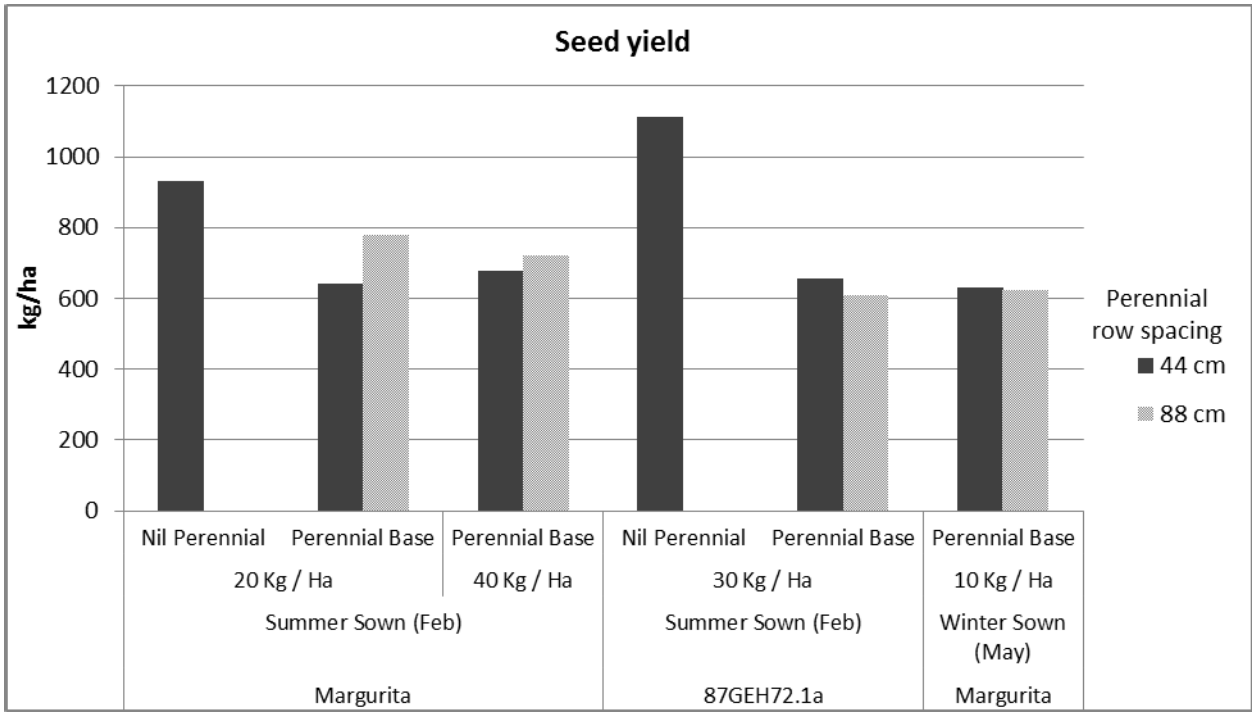

Figure 4. The impact of a perennial base, sowing time and seeding rate on seed yield of Margurita and 87GEH72.1a yellow serradella. Lsd (5%) = 226.1

OBSERVATION/ DISCUSSION/ MEASUREMENTS

In this trial both summer sowing and conventional seeding after the break of the season resulted in the successful establishment of serradella into perennial grass pastures. All treatments resulted in serradella seed yields greater than 600 kg/ha, which has set them up for good legume regeneration in subsequent years. The yellow serradella experimental line (87GEH72.1a) shows considerable promise as a companion legume for perennial grasses in this environment. It flowers earlier than Margurita French serradella and has a hard seed breakdown pattern more suitable for summer sowing than current yellow serradella varieties (Yelbini*, Charano* and Santorini*). Both summer sowing and conventional sowing of annual legumes into perennial grasses after the break require good weed control. Herbicide options and the impact of perennial grass suppression require further investigation. Weed seed set control in the year prior to establishment is recommended.

PEER REVIEW/REVIEW

Brad Nutt (DAFWA)

ACKNOWLEDGEMENTS/ THANKS

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** Margurita, Yelbini, Charano and Santorini serradella are protected by Plant Breeders Rights Act 1994 (PBR)*