Summer sowing of serradella into established sub-tropical perennial grasses

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Key messages

Summer sowing (February) proved to be a successful technique for introducing hard-seeded annual legumes into established perennial grass pastures; however, the choice of herbicides and impact of perennial grass suppression requires further investigation.

When establishing serradella in subtropical grass pastures, there was generally no disadvantage from summer sowing of pod segments compared to the conventional winter sowing of scarified seed; and wide spacing of perennial rows did not affect overall biomass production of the perennial base or companion legume.

A boost in early *legume* feed was not realized when serradella was summer sown into subtropical perennial grasses; rather, there was a biomass and seed yield penalty for serradella compared to sowing as an annual pasture alone. This, in part, was compensated for by ~1 t/ha perennial grass biomass at the break of season.

Aims

To evaluate the feasibility of introducing French and yellow serradella into subtropical perennial pastures by sowing unscarified pod segments in summer (i.e. summer-sowing technology).

To compare the performance of serradella pastures sown in February (summer-sowing pod) with serradella pastures sown after the break of season (as scarified seed).

To evaluate the impact of perennial row spacing and annual legume seeding rate on establishment, winter growth and seed production of serradella.

Method

A deep sandy soil was selected 20 km south of Dandaragan that had a history of poor pasture and crop production. Even though the soil was non-wetting with low water holding capacity and poor nutrition it was well suited to establishing subtropical perennial grasses. In August 2012 a cone seeder fitted with DGPS (+/- 2 cm accuracy), auto steer and modified scalping points was used to sow subtropical grass treatments at two row spacing's: 44 cm and 88 cm. The subtropical grass (a mix of Gatton panic, Rhodes grass and signal grass) established well over the next six months before summer sowing (February 2013) serradella treatments.

Serradella treatments included Margurita(þ French serradella and an unreleased yellow serradella line (87GEH72.1a) sown either alone or into perennial grasses. Serradella pod was sown at several seeding rates: Margurita(þ pod at 20 and 40 kg/ha and 87GEH72.1a pod at 30 kg/ha. A conventional winter (May) sowing of Margurita(þ seed (scarified) at 10 kg/ha was sown after the break of season for comparison. All serradella treatments were sown with 10 kg/ha of ALOSCA Group S inoculant and GPS guidance was used to accurately place the serradella between the perennial rows. The trial was sprayed with insecticide (Dominex 100 mL/ha and Talstar 200 mL/ha) on 24 May and a grass selective herbicide (Select 500 mL/ha) on 2 July to control ryegrass.

Serradella and perennial grass density were assessed by counting the number of seedlings along 1 m long rows at ten random positions per plot. Biomass production was assessed every 4-6 weeks and seed yield assessed in November by cutting herbage (0.5 x 0.88 m) or collecting pods (0.2 x 1.0 m) from three random quadrats per plot. Seed yields were estimated using the seed to pod ratio of 35% for 87GEH72.1a and 65% for Margurita♭. The treatments were replicated in a randomised complete block design.

Results

Perennial establishment

The perennial pastures sown in August 2012 achieved a density of around 6 plants per meter of row: or 14 plants/m^2 for the 44 cm and 6.4 plants/m^2 for the 88 cm row spacing. Perennial grass biomass on 20 May (just prior to winter sowing) was about 880 kg/ha (44 cm spacing) to 990 kg/ha (88 cm spacing).

Serradella establishment

Establishment of winter sown serradella in perennial pasture plots was excellent with a germination density of over 100 plants/m^2. A summer seeding rate of 40 kg/ha (pod) was necessary to achieve a similar density (Figure 1). As expected seedling density was less but still acceptable for the 20 kg/ha Margurita♭ (pod) and 30 kg/ha yellow serradella (87GEH72.1a) treatments. 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 similar.

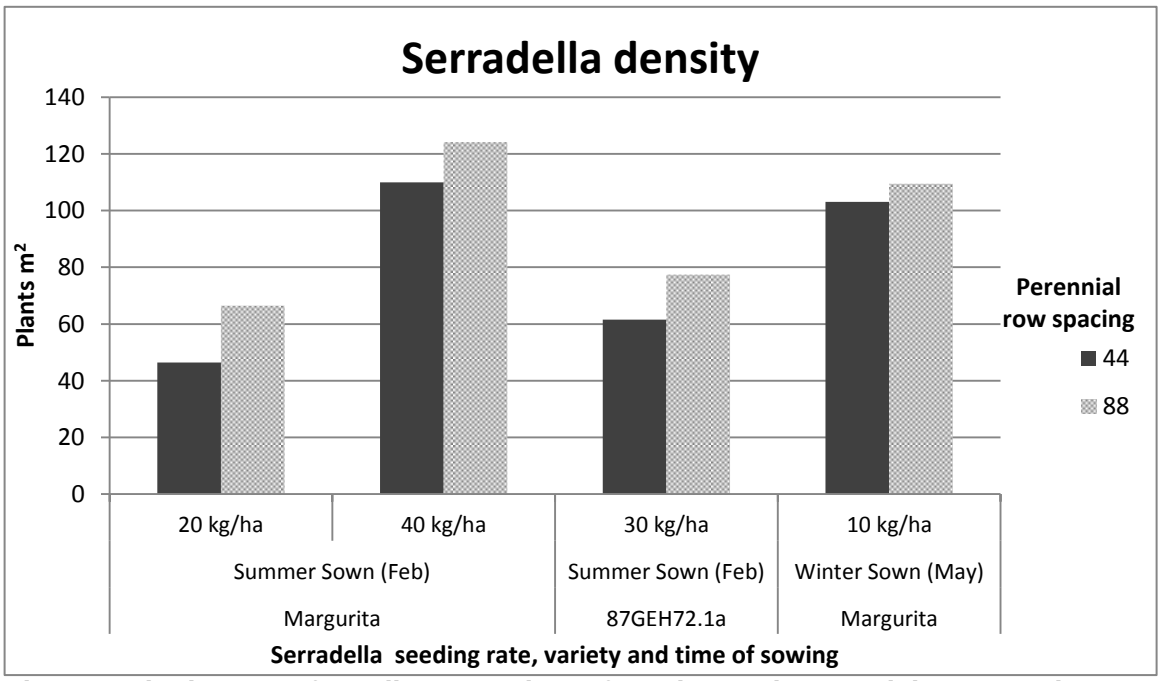

Figure 1 The impact of seeding rate, time of sowing and perennial row spacing on serradella establishment when sown into subtropical perennial grasses; measured June 7. Lsd (5%) = 30.8

Summer sowing (pod segments) versus conventional winter sowing (scarified seed)

Results suggest that summer sowing can be used to introduce serradella into established perennial pastures. In this trial there was little difference in biomass and

seed production of serradella when sown as pod segments in February or as scarified seed in May. However, for summer sown treatments, serradella emergence in perennial grass treatments was delayed relative to annual-only plots. Thus the early feed benefit that is usually associated with summer sowing was not evident when sowing into perennials (Figure 2). Nevertheless, there may still be a logistical advantage in sowing serradella in summer to overcome the usual labour constraints around the break of season.

The impact of perennial grass on serradella production

There was less serradella biomass production when Margurita(þ was summer sown into perennial pastures than in legume-only treatments. By October 16, serradella in the summer sown, nil perennial plots had produced 4.5 t/ha of biomass while the Margurita(þ sown at the same time but into perennial grass plots averaged 3.5 t/ha for the summer sown pod treatments and 3.2 t/ha for the winter sown treatment (Figure 2). The unreleased yellow serradella line (87GEH72.1a) was not as erect and 'showy' as Margurita(þ so initially did not look as productive. However, towards the end of the season it bulked up rapidly and produced 600 kg/ha more biomass than Margurita(þ 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 or biomass production. However, this may be confounded by the suppression of perennial grass growth by the grass selective herbicide (Select 500 mL/ha) applied in July.

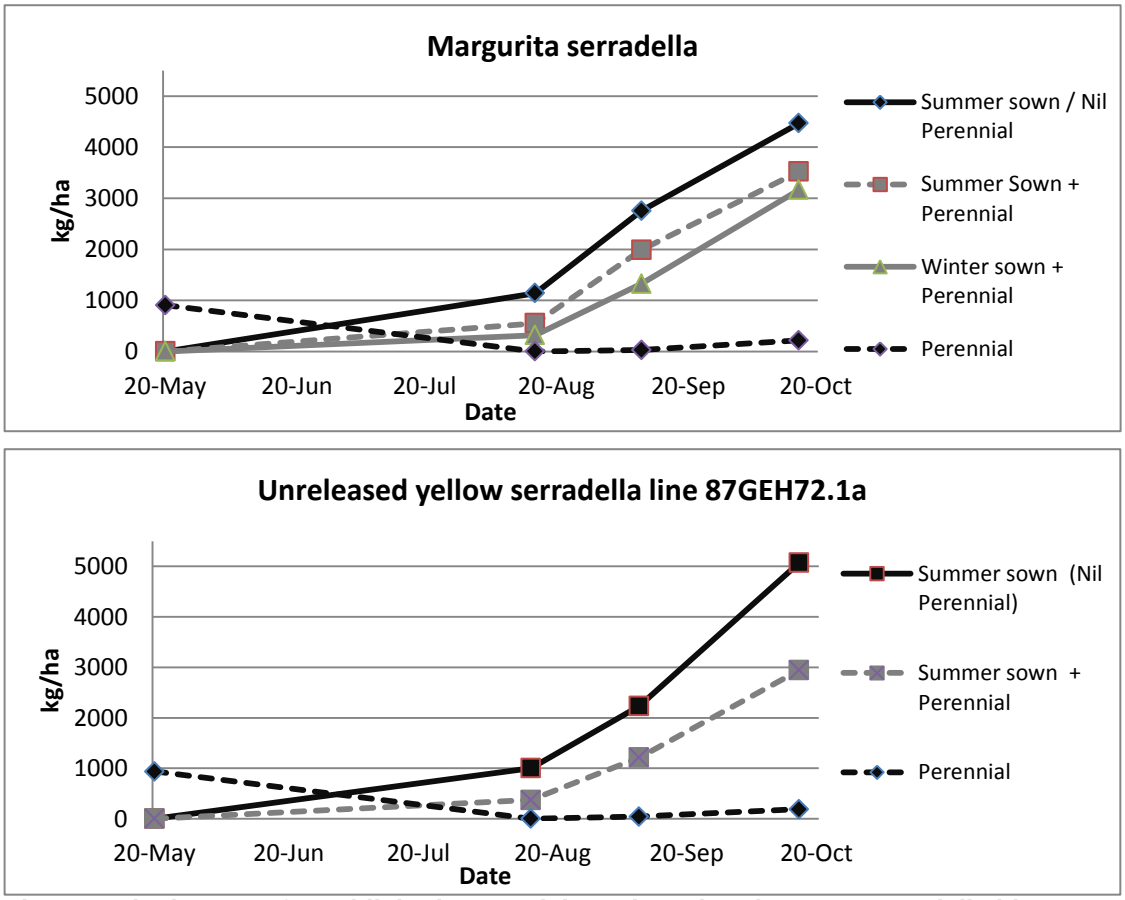

Figure 2 The impact of established perennials and sowing times on serradella biomass production: Margurita(þ (top) 87GEH72.1a (bottom). Graphs present average biomass

production for 20 and 40 kg/ha seeding rate treatments combined, as they were not significantly different.

Should legume seeding rate be increased when sowing into perennials?

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; by mid spring the biomass for the high and low seeding rates were both about 3.5 t/ha.

Biomass correlated closely with seed yield. Sowing into a perennial grass reduced Margurita℗ seed yield by approximately 24% and 87GEH72.1a yield by 43% (Figure 4). However, time of sowing, perennial row spacing and the seeding rates evaluated made little difference to seed yield.

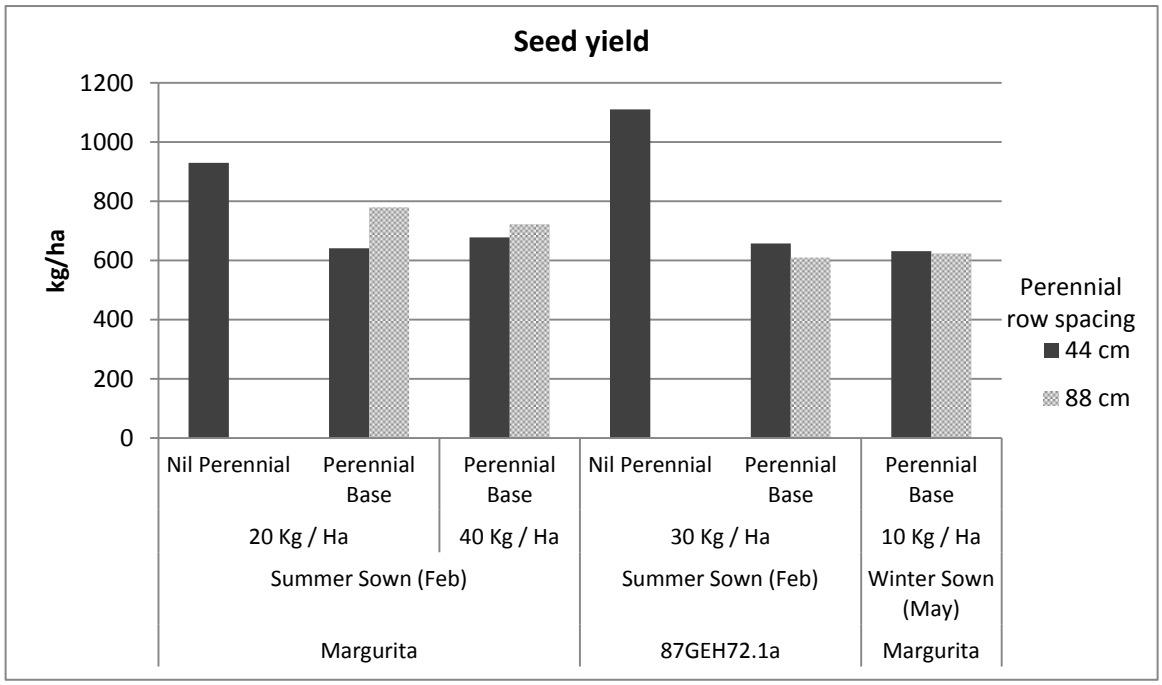

Figure 3 The impact of a perennial base, sowing time and seeding rate on seed yield of Margurita℗ and 87GEH72.1a yellow serradella. Lsd (5%) = 226.1

Spraying ryegrass will suppress perennials over winter

The ryegrass seed bank and density at this site is high. Although ryegrass could be a useful component of a permanent pasture, the decision was made to apply a selective herbicide to (a) minimize the impact of competition (from annual grass weeds) on serradella seed set, and (b) to retain the flexibility of cropping over the subtropical grass plots in the future. Select® (500 mL/ha) had a negative impact on the perennial grasses, especially Rhodes grass. While this might also minimize competition between the first year serradella pasture and perennial base this treatment is not recommended as it is likely to have an impact on the persistence of the perennial grass.

Conclusion

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(þ French serradella and has a hard seed breakdown pattern more suitable for summer sowing than current yellow serradella varieties (Yelbini(þ, Charanno(þ and Santorini(þ). 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.

Acknowledgments

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