Summer sowing serradella pod into perennial grass pastures

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Purpose:	1. To evaluate the effectiveness of establishing annual legumes into established perennial grass-based pastures by 'summer' sowing of hard-seeded serradella pod.
	2. To test the effectiveness of drilling pod versus broadcasting of pod..
Location:	Tom & Sue Alston, Badgingarra
Soil Type:	Sandy gravel (rep. 1) to moderately deep pale sand (rep. 2, 3)
Rotation:	Medium-term perennial sub-tropical grass based pasture
GSR:	365 mm

BACKGROUND

'Summer sowing' is an innovative method of establishing hard-seeded annual legumes which is currently being evaluated in cropping systems to allow the annual legumes to be sown dry. Two 'summer sowing trials' in established perennial grasses were undertaken in 2010 at Badgingarra (T. Alston) and at Dongara.

The concept is that pod of hard-seeded annual legumes (serradella) are sown in late summer (February – March) and hard-seed breakdown occurs in response to large diurnal changes in soil temperature over the summer – early autumn period (e.g. high soil temperatures 40-60°C during the day followed by mild temperatures at night). Some soil coverage is desirable to achieve seed softening.

Hard-seeded French serradella (cvs. Margurita, Erica) has a hard-seed breakdown pattern suitable for summer sowing as about 50-60% of the seed softens each year. Commercial varieties of yellow serradella have a high proportion of hard seed which will persist for more than one year in the soil (~70%), with only about 20-30% of the seed softening in any one year and as a result are unsuited to summer sowing. An experimental line of yellow serradella 72.1A has a similar softening pattern to hard-seeded French serradella. With subterranean clover almost all the hard-seed breakdown for the year has occurred by mid-March and the seed is then ready to germinate, so it is highly susceptible to false breaks from mid-March onwards.

TRIAL DESIGN

Perennial paddock with a sub-tropical grass pasture (good density) - mainly Rhodes grass with some panic grass. The trial had 6 treatments with 3 replicates (plots 60 m long by 22 m wide) and was established on the 12th March.

Serradella pod was sown with a modified Massey 511, width 14' (4.2 m) with single plough discs followed by press wheels on a 14" (35 cm) spacing. To achieve the required rates the seeder made one pass (20 kg/ha), two passes (40 kg/ha) and four passes (80 kg/ha) as the seeder was set-up for sowing low rates of small-seeded perennial grasses. With the drilled treatments the discs were only in the ground for the final pass to avoid damaging the perennial grasses. With the broadcast treatments the pod was trampled by a mob of cattle about one month after sowing.

Annual legume treatments:

1) Margurita French serradella pod drilled @ 20 kg/ha

2) Margurita French serradella pod drilled @ 40 kg/ha

3) Margurita French serradella pod broadcast @ 80kg/ha

4) Margurita French serradella pod broacast @ 40 kg/ha then animals used to trample into soil

5) Margurita French serradella pod broadcast @ 20 kg/ha then animals used to trample into soil

6) Yellow serradella experimental line 72.1A pod drilled @ 40 kg/ha

All treatments were sown with 10 kg/ha of Alsoca dry granular inoculum. The trial was not fertilized and no herbicides were applied, however it was sprayed for native budworm on 20th September. The trial was not grazed until after the samples for pod yield had been collected in November.

The seedlings were counted in early May and again in June after the break of the season. The seed (pod) yields were measured in November with 12 random samples per plot which were then bulked. Biomass was not measured because of the abrupt end to the growing season, with minimal rainfall after the first few days in September.

RESULTS

Some serradella seedlings germinated after the rain on March 21-22 and by early September these were large plants which were flowering. The seedlings which germinated on the March rain were the soft-seeded pods as there was not the required time between sowing and the rainfall for the seed to soften in the field. Most of the seedlings germinated after the break to the annual growing season in mid-May. There was a good correlation between seeding rates and seedling numbers, however overall the strike rate was comparatively low. At each sowing rate the drilled plots of Margurita French serradella had higher seedling numbers than broadcasting the seed and trampling it into the topsoil with stock (Figure 1).

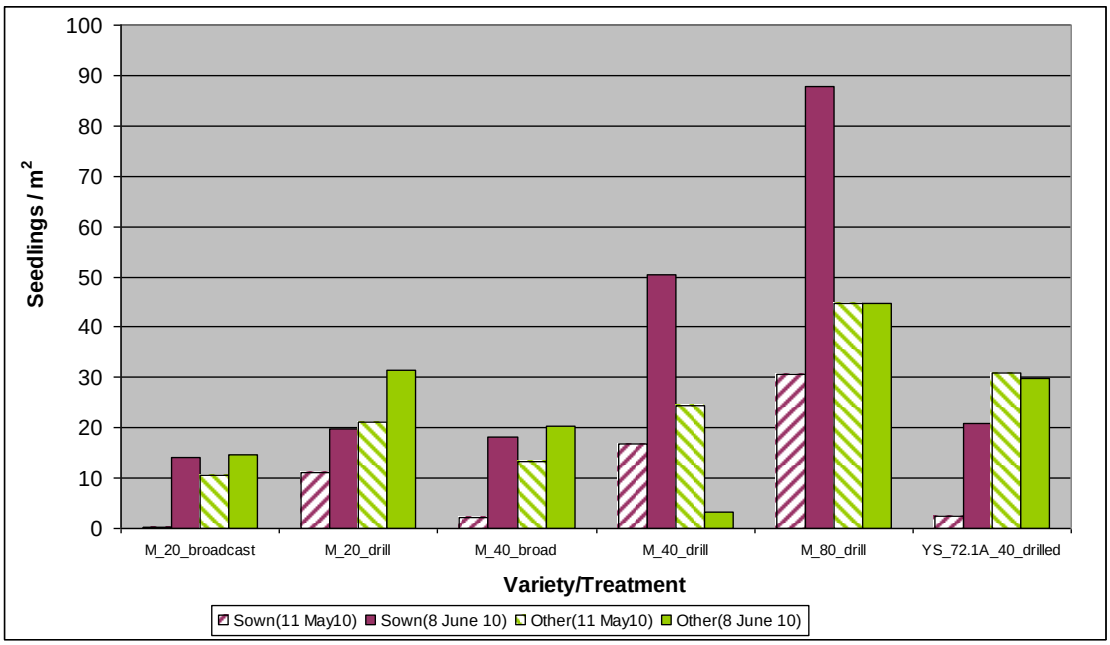

Figure 1. *Seedling counts (sown, other legume) in early May and after the break of the season in June for the 'summer sowing' trial at Badgingarra*

The serradella pod yield (or seedbank) in November ranged from 130 kg/ha to 540 kg/ha for the Margurita French serradella, while the yellow serradella was 98 kg/ha (Table 1). All of the treatments where the pod was drilled resulted in seedbanks >300 kg/ha. The Margurita French serradella drilled at 20 kg/ha had the highest ratio of pod yield to pod sown of 17. Drilling the seed resulted in much higher seedbanks than broadcasting at the same sowing rate.

Table 1. *Average serradella pod yields (kg/ha)*

Treatment / Variety	**Av. clean pod weight (kg/ha)**
Margurita French serradella at 20 kg/ha broadcast + animals	130
Margurita at 20 kg/ha drilled	342
Margurita_40_broadcast + animals	234
Margurita at 40 kg/ha drilled	414
Margurita at 80 kg/ha drilled	541
Yellow serradella 72.1A at 40 kg/ha drilled	98

DISCUSSION

The results for summer sowing into an established perennial grass pasture were encouraging in a season with minimal spring rainfall. The results were negatively impacted by the low rainfall in spring.

Drilling pod was more successful than broadcasting pod and then using animals to trample it into the soil. This was the first summer sowing trial into perennial grasses in WA so it is too early to develop recommendations, but it appears that you need to use 20 to 40 kg pod/ha to achieve a good seedbank. The mid-March sowing time is at the end of the 'sowing window' for summer sowing. Sowing in early February is desirable to maximize the time for hardseed breakdown.

With summer sowing using pod rather than seed there is no need for de-hulling, so there is a cost saving per kilogram, but higher sowing rates are required as the seedlings need to compete with annual grasses, broadleaf weeds as well as the perennial grasses. The summer sowing method requires relatively high sowing rates and the concept relies to a large extent on farmers producing hard-seeded serradella pod on-farm at a low cost.

After these promising results in 2010, similar trials will be undertaken in 2011 with local producers.

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