

Pasture Trials Report

MLA Funded project: SCF – Optimal pasture phases for livestock in crop based rotations
John Blake, SCF



Key Messages

- The MLA trials demonstrated that early summer seeding (January) of Serradella pod was a viable option. The summer sowing of Serradella pod has outperformed the twin sowing methods in the two trials conducted by SCF growers
- The current district practice of dry seeding pasture seed in Autumn on sandplain soils has severe limitations compared to summer pod sowing or seeding when soil is moist after full seasonal break. This was confirmed in the 2014 season in the MLA trial where the second time of sowing (into moist soil) outperformed the first time of sowing in total legume biomass production and this advantage has carried right through to seed set in Year 3 (in M1 trial Santorini and Margurita plots).
- The performance of a precision seeder for sowing Serradella in a 2015 trial demonstrated that modifications of conventional seeding systems could improve plant establishment efficiency by more than 35%.
- The hard seeded Serradellas are performing well in specific treatments in the MLA trials even on the lower fertility, acidic and non-wetting sandplain soils. Mixed maturity Serradellas like cv Margurita lose significant pod set with spraytopping ryegrass compared to Cadiz or Santorini.

Trial Results for 3 year project:

Site 1: MLA Trial: Optimal Pasture phases for Crop based rotations:

Trial Site M1: John, Dorothy and Ashton Hood's property



This first trial site involved Pasture trial first year then Canola year 2 and Cereal year 3

2014: The purpose of Trial Site 1 (M1) was to evaluate species and pasture phase systems (including hard seeded annuals) for light sand-plain soils (with low pH and low available soil water) in crop-based rotations. M1 Trial results: Refer to previous reports. High producing Second time of sowing in 2014 carried through to 2016.

2015 the net benefit of the 2014 legume phases (versus non-legume phases) to the Canola crop was monitored and measured with plot sampling of control plots and 2014 2nd TOS Serradella plots. A yield response of 0.23t/Ha was measured in the plots with highest legume biomass.

2016: A Pasture strip within the crop paddock has been used to monitor year 3 regeneration. In 2016 the regeneration of pasture from the 2014 seed set was assessed. Again the best regeneration was following the second Time Of Sowing Serradella with highest pod set in 2014. The unclayed section was used to assess pasture species tolerance to spray treatments and weed control in IWM.

Note: The contrast between 2013, 2015, 2016 and now 2017 (moist soils when April sowing) with 2014 (April dry sowing) has been very significant and demonstrates best methods will be seasonal dependent

	
<p><i>Figure 1: YEAR 3: Spraytopping lowered seed set in Margurita but less in Santorini</i></p>	<p><i>Ashton Hood: co-initiator of MLA project</i></p>

Site 2: MLA Trial: Optimal Pasture phases for Crop based rotations:

2014/ 2015 Trial Site M2: John, Dorothy and Ashton Hood's property

Will twin sowing in the previous crop year or summer sowing of pod in pasture year achieve a better early feed source, while still fitting within the management system?

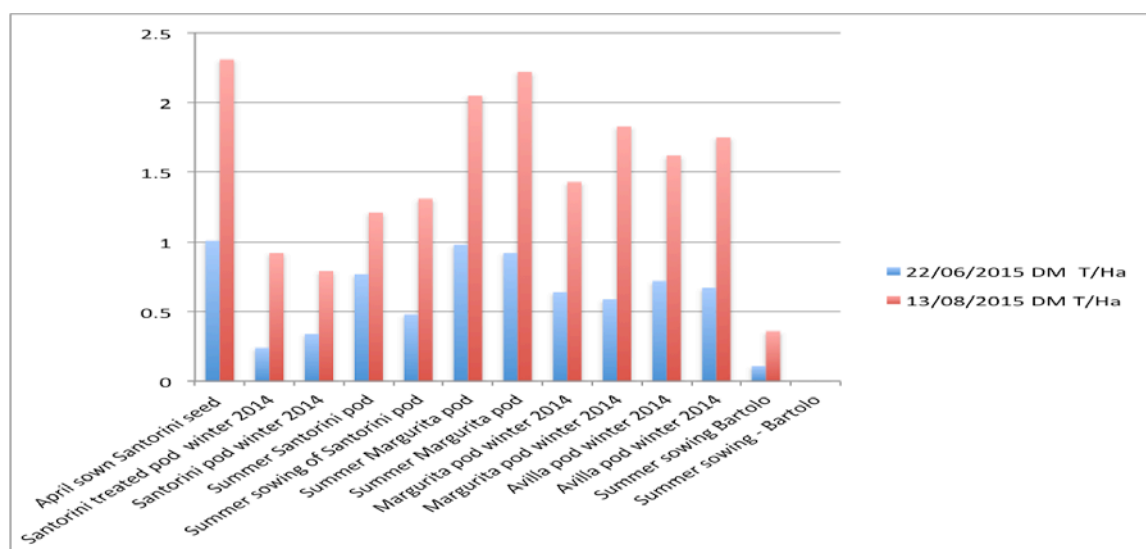


*Figure 2:
John Hood at his M2 trial site 2015*

1. Twin sowing (application by sowing or spreading of seed pod in previous crop) June 2014,
2. Summer application of Serradella pods, January 2015 and
3. Sowing de-hulled seed in April 2015.

It appears there is varying hard-seed levels with Margurita Serradella and in the 2014 and 2015 trials M1, M2, M4 and M3 all having good regeneration of Margurita. *Note: during the exceptionally wet summer.*

Santorini and Avilla have had low levels of regeneration by comparison after the December and January rain events and did not regenerate well even after the March rainfall events.



M2a trial - John and Ashton Hood				
Treatment	Treatment #	Date applied	Plant counts 27 May 2015 (plt/m2)	Plant counts 29 Jan 2016 (plt/m2)
Control	0		0	0
April sowing of Serradella – Santorini seed	7	11 April 2015	76	11
Santorini treated pod broadcast in crop 2014	3	9 July 2014	20	5
Summer sowing of Santorini (treated) in pod	6	17 Jan 2015	38	8
Summer sowing of Margurita serradella pod	5	17 Jan 2015	86	41***
Margurita pod broadcast in crop winter 2014	1	9 July 2014	48	12
Avila pod broadcast in crop winter 2014	2	9 July 2014	51	5
Summer sowing of Bladder clover	4	17 Jan 2015	3	0

M3: SCF/MLA Trial: Optimal pasture phases for crop based rotations: 2015 preliminary test: precision planting of Serradella

Site 3: Peter and John Diprose – owners of precision planter and host for test site.

This preliminary test site has been implemented following SCF interest in the outstanding performance on sowing small seed (in 2014 – Canola) into non wetting soils in an adverse growing season start (2014 with < Decile 1 dry start) using a precision planter. SCF intends to contract a slot seeder and a conventional tyne seeder to sow alongside the precision seeder in a dry April start (not 2015 or 2016 season thankfully). The crop sequence was 2014 Saia Oats, 2015 Sown Serradella pasture, 2016 planned Canola but because of outstanding Serradella performance in year 2 it was retained as a pasture paddock.

Fig 3: Site M3 – Precision sowing of Serradella on non-wetting soils
– sown 19 April 2015 and re-established in 2016 (normally a crop phase)



Figure 4: Site M3 – Precision planting of Serradella at 250mm row spacing (plot 1) on non-wetting soils – 11 August 2015 Peter Diprose & John Blake.



Figure 5: John Blake presenting to Bus 2 group at 2015 SCF Spring Field day 17 September 2015.

Soil Type: Stirlings Sandplain: Medium level water repellence.

Crop: Serradella (cv Margurita and Santorini)

1. Establishment rates of 70% were exceptional.
2. The 250mm row spacing is the maximum spacing of plant rows as at 500mm row spacing, full canopy closure was not achieved until early September.
3. At commencement of podding the pasture dry weights in treatment 1 were 5.3 t/Ha however a very dry spring has caused severe moisture stress in the highest biomass plots in 2015
4. With 2016 wet summer and autumn the Margurita produced cohorts of Serradella plants with each rain event resulting in sufficient plant numbers for 2016 pasture phase.

Pasture trial - precision planting of Serradella cultivars

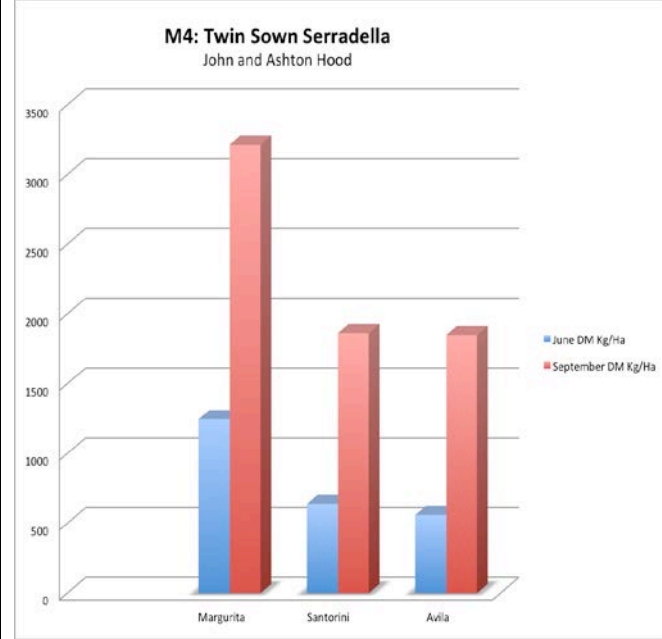
Treatment	Sowing Rate	Target seed density	Average plants no's at 8 WAS	Establishment of germinable seed	DRY Matter by 11 Aug	DM on 8 Sept	DM on 8 Oct	Date of full Canopy Cover	Pod Dry weight 11 Dec 2015
Treatment 1 Margurita Serradella	250 mm row spacing: 6 Kg/Ha	200 seeds per sq. m	142	62.2%	2.22 t/Ha	3.46 t/Ha	5.34 t/Ha	Early August	0.27 t/Ha
Treatment 2 Margurita Serradella	500 mm row spacing: 3 Kg/Ha	100 seeds per sq. m	74	71.6%	1.32 t/Ha	2.43 t/Ha	3.85 t/Ha	Early September	0.39 t/Ha
Treatment 3 Santorini Serradella	500 mm row spacing 3 Kg/Ha	100 seeds per sq. m	73	70.7%	1.41 t/Ha	2.67 t/Ha	4.11 t/Ha	Late August	0.48 t/Ha

Establishment rates were relatively high (a 50% improvement on that recorded in Serradella establishment rates using conventional seeders). The canopy closure with more narrow rows was more than a month earlier assisting weed control. With poor finishing rains the pasture trials still produced good dry matter yields however pod yields were depressed. Budworm spraying with alpha Cypermethrin was less effective on the larger budworm and penetration into the heavy canopy was not optimal requiring respray. Santorini set more pod as earlier in maturity and less affected by high spring temperatures, less affected by budworm escapes and by the very dry finish in 2015. The new Serradella pasture (2015) paddock was to be cropped in 2016 but with summer rains the Margurita serradella had cohorts emerging after each rain and grower decided to stock paddock.

M4: MLA Trial: Evaluating twin sowing of pasture phases for Crop based rotations: 2015 Application of Serradella pod in front of seeding a cereal crop in 2015: Site M4: John and Ashton Hood

	M4 trial - John and Ashton Hood- Pod applied 21 May with barley sown 21 May 2015 - for pasture establishment 2016	<i>10m in from fence</i>		Legume Plant counts 5 April 2016
PLOT #	Treatment	Treatment	Pod rate	
1	Margurita pod applied in cereal crop 2015	1	38 kg/ha	39
2	Control	0	0	
3	Santorini pod applied in cereal crop 2015	2	38 Kg/ha	6
4	Avila pod applied in cereal crop 2015	3	38 Kg/ha	22
5	Margurita pod applied in cereal crop 2015	1	38 kg/ha	48
6	Avila pod applied in cereal crop 2015	3	38 Kg/ha	19
7	Control	0	0	
8	Santorini pod applied in cereal crop 2015	2	38 Kg/ha	9

With the summer rains cohorts began germinating from January onwards with staggered emergence. Margurita has performed the best in the twin sowing method although plant numbers overall have been lower than with summer sowing of pod method in the M5 trial (see below chart and M5 results below). For statistical analysis see website.



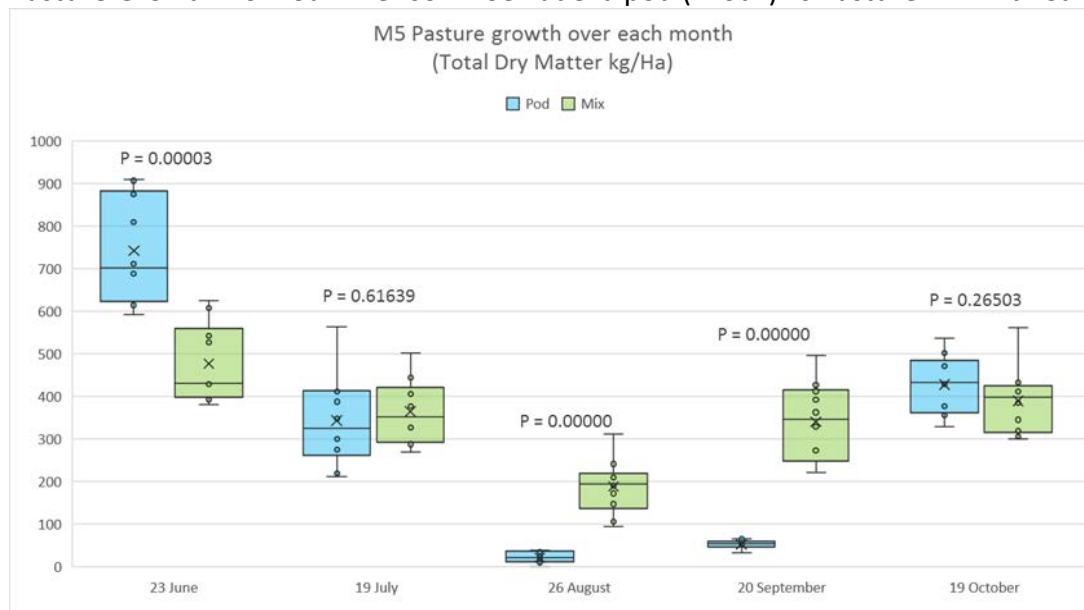
M4:Twin sown 2015 Serradella, 2016 DM production

M4: Grazed and sprayed twin sown Serradella Photo 21 Sept 2016

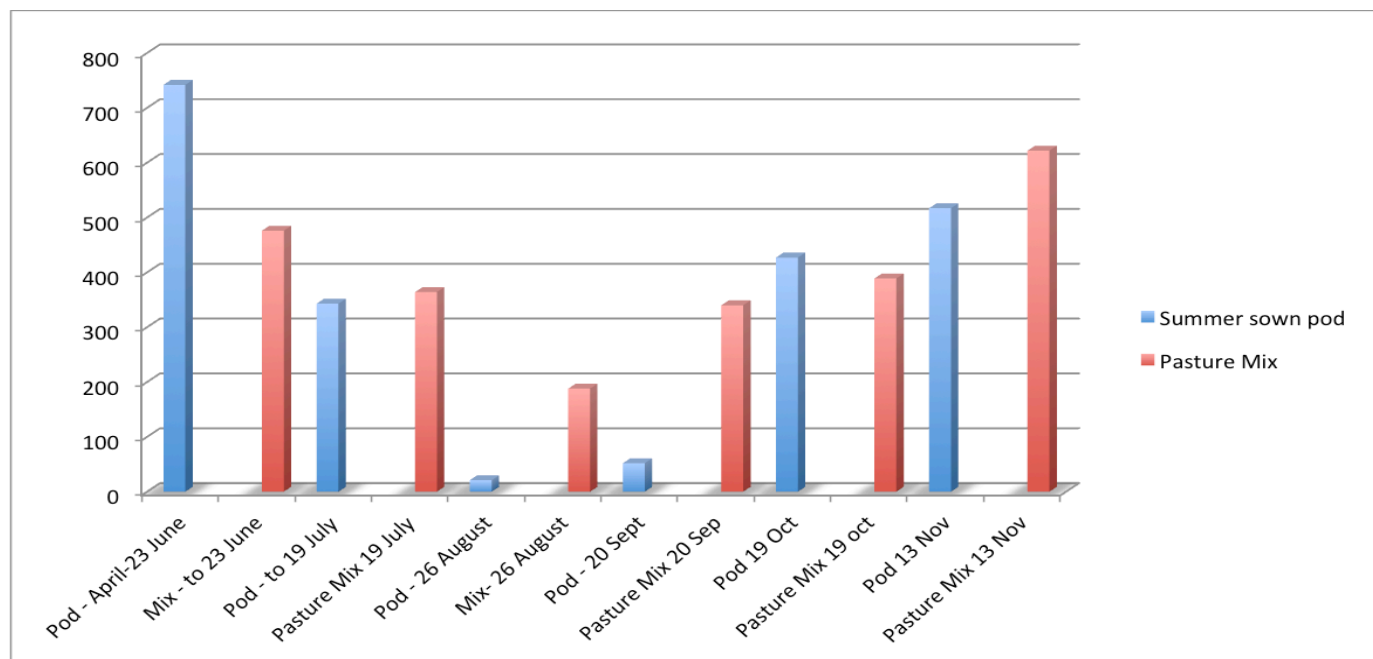


**M5: MLA Trial: Evaluating summer sowing of pasture phases for Crop based rotations:
2015 Sowing of Serradella pod in February 2016 versus direct seeding of bare seed pasture mixes:
Site M5: Mal and Marie Thomson**

Pasture Growth from Summer sown Serradella pod ("Pod") vs Pasture mix with Saia Oats ("Mix").



Excellent Autumn growing conditions	June Waterlogging	July Severe waterlogging	August Severe waterlogging	September Still waterlogging	October improved conditions	November Serradella still growing
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NOTE: With decile 10 rain-fall in total of summer, autumn and winter (5 Dec 2015 to 5 October 2016) the whole paddock including the trial site was affected by more severe waterlogging (perched water-tables) than experienced in last two decades.

Pasture mixes more productive than single species. Pasture mix (Saia Oats, Cadiz Serradella plus Monti Clover) sown 14 April 2016. Mal Thomson's trial had good establishment despite stubble fire but later waterlogging showing advantage of using pasture mixes (Mal's mix was Saia Oats, Cadiz Serradella plus Monti sub clover) with pasture mix plots out producing summer pod sown Serradella, which went into zero growth as plants died due to waterlogging.

Mal's Pasture Mix





Mal's mix is Cadiz Serradella at 5 Kg/Ha, Saia Oats at 15 Kg/Ha and Monti sub Clover 5Kg/Ha.

Paddock stocking rate:

Mal's paddock has carried just over 10 dse/Ha for three months despite waterlogging.

SPRAY cross treatments applied 9 Aug 2016

The Dilemma: Pasture mixes can be more productive across paddocks but weed control (especially grasses if over-sowing with a cereal) more difficult.

	
<p>Figure: M5 Mal Thomson sowing Margurita serradella pod summer Trial: February 2016 (note: sprayed out self sown barley)</p>	<p>Figure: M5 trial site on 5 April 2016 showing emergence from Summer sown (Feb 2016) Margurita pod at 38 Kg of pod/Ha. Partly burnt in April in stubble fire on 10 April. Photo 5 April 2016.</p>
	
<p>M5: Mal Thomson trial: Margurita Pod summer sown plot (RHS plot) vs Pasture mix with Saia oats (LHS plot). First replicate of treatments. Photo: 8 November 2016</p>	<p>M5: Margurita summer pod sown plot with cross treatments of herbicide sprays. Raptor showed best results Photo 19 October 2016</p>

IWM Post emergent herbicide / Foliar fertiliser treatments across M4 trial

1. 500ml/Ha MCPA - Serradella 30-40% biomass reduction less than expected, no activity on toad rush
2. 500g of Simazine – very good activity on toad rush. Knocked Serradella biomass by about 30%
3. 500ml/Ha of Paraquat: Ok on toad-rush, ok on Serradella 20-30% biomass reduction
4. 1L /Ha of Paraquat: Good weed control but severe on Serradella: 80% biomass reduction
5. 50g Raptor: Very soft on Serradella. 40% reduction in toad-rush biomass& good brome-grass control.
6. 35g of Raptor& 700 ml Bromoxynil/Ha: Same weed control as Raptor, 15% Serradella reduction.
7. 1.5 bromoxynil: No activity on toad rush, 20% less biomass than Raptor and Bromoxynil.
8. 80 Litres /Ha Flexi N – no improvement on Serradella – main response from Toad rush and in Saia Oat: pasture mix plots!

M6: MLA Trial: Evaluating sowing of pasture species for waterlogged and marginal salinity: 2016
Pasture species 10 June 2016 (supplier delay) Messina versus Balansa: Site 6: Trial Host: Iain Mackie



M6: Messina (rear plot showing exceptional growth given delayed sowing) vs Balansa (front plot) on waterlogged and marginal salinity. Trial Host: Iain Mackie. Photo: 9 November 2016



M6: A real test for Messina vs Balansa: (seed had to be top-dressed on waterlogged site due to late arrival of seed on 10 June 2016) – this photo 6 weeks after sowing at end of July – ongoing water inundation and marginal salinity – site selection assured that test sowings would get a high challenge.

Dry Matter Yields 10 November 2016 (Note: plots not planted until June 10)

Legume Pasture for waterlogged & marginal salinity areas	Average dry matter yield (somewhat variable across plots) Kg/Ha	Pod yields Kg/Ha
Messina – Melilotus -legume	4285	394
Balansa – Clover - legume	3120	276

Recommendations

- Summer sowing of Serradella pod and twin sowing needed further testing as the SCF region has highly variable summers sometimes largely hot and dry but sometimes wet and mild. This is in contrast to the rest of Southern WA where hot dry summers are the norm.
- Most success in the trials has come from the summer sowing of Serradella pod (Margurita).
- Weed control in the pasture phase remains a significant issue (especially in a season where non-wetting causes staggered germinations for both the pasture species and the weeds. Herbicide resistance testing (HRT) is an essential part of testing new rotational systems. We need to monitor changes in HR status as an overall impact of system changes such as introducing a pasture phase in a cropping rotation. Ongoing HRT is being undertaken. Trials involving IWM were implemented across the broad-scale MLA pasture trials.
- Treatments involving +/- soil wetters or new seed coatings were planned trial treatments but due to the early breaks and high summer rainfall wetters not applied in 2015 or 2016.
- An initial claying treatment done in 2015 and a further trial with claying treatment applied in 2016 for M1.
- A trial hosted by Scott Smith with +/- clay treatments is being monitored for Serradella regeneration. In previous years the site was used by CSBP but no pasture data was gathered during the pasture phase in 2014. The 2018 season will be an opportunity.
- The M2 establishment methods trials and M3 and M4 are being measured for regeneration performance. The apparent flexibility of Margurita to wet or dry summers could be a significant

factor with our variable summers but test results indicate Santorini maturity is best for spraytopping ryegrass.

- M5 (Summer sowing pods vs autumn sowing bare seed systems) and M6 (Messina vs Balansa on marginally saline and waterlogged areas) were recommended at the review and are in progress in 2016/17. Messina only arrived for sowing on 10 June (and was sown on 10 June) but has proved a very viable option for the marginally saline and waterlogged areas.

Acknowledgements

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