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Serradella trial programme.

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DEPARTMENT OF AGRICULTURE

WESTERN AUSTRALIA

SUMMARY OF EXPERIMENTAL RESULTS 1985

Serradella Trial Programme

L. Cransberg
Plant Research Division
Albany

Serradella Trial Programme 1985

85 A1 55

Serradella Line Evaluation - Stage 2

D. Egan - South Stirlings

K. Hyde - Manypeaks

G. Ravenhill - Bow Bridge

85 A1 56

Serradella Line Evaluation - Stage 3

D. Johnson - South Stirlings

K. Hyde - Manypeaks

S. Chandler - Denmark

85 A1 57

Serradella Establishment - Time of Seeding x Seeding Rate

D. Egan - South Stirlings

K. Hyde - Manypeaks

S. Chandler - Denmark

85 A1 58

Serradella Establishment - Pod Undersowing (Variety x Rate)

B. Lyall - North Kamballup

85 A1 59

Serradella Establishment - Pod Undersowing (Inoculation)

B. Lyall - North Kamballup

D. Johnson - South Stirlings

D. Bailey - East Woogenellup

SERRADELLA LINE EVALUATION - STAGE 2 85 A1 55 / 4985 EX

Aim:

To evaluate 23 promising serradella lines in terms of herbage and seed production, and regenerative ability.

i) Trial Site: D. Egan, South Stirlings

Trial Specifics:

Design - randomised block with three replicates.

Soil type - grey-white coarse sand >30 cm deep over a lateritic base.

pH (CaCl₂) 0 - 5 cm - 4.70
5 - 10 cm - 4.23

Site preparation - Applied 2 L/ha Sprayseed on 10/5. Cultivated with farmer combine and worked back on 13/5.

Seeding - Sown 14/5 at 5 kg/ha of inoculated and lime pelleted seed. Plot size 20 m x 1.4 m (N.B. Small seeded varieties sown at 2.5 kg/ha).

Fertiliser - At seeding 200 kg/ha Super No. 1
50 kg/ha KCl
3/9 100 kg/ha 3:2 Super potash

Insects - Sprayed on 31/5 with 80 ml/ha Rogor to control red legged earth mite.

Results:

Line	Days from sowing to flowering	Plant Establishment Counts/m ² 26/6	Visual Rating at 5/8 Ranking	Dry Matter Production 21/10 (kg/ha) Ranking
O. Compressus DP6	107	33	21 (17)	1892 bcde (8)
" MC1	102	23	29 (5)	2399 abc (5)
" MC2	107	27	36 (3)	2861 a (1)
" M115	116	12	19 (20)	1188 efg (18)
" Uniserra	113	19	16 (22)	1207 efg (17)
" M167	116	21	19 (19)	1758 cdef (11)
" GM 065.2	113	19	25 (14)	2237 abcd (7)
" GT 046	104	29	27 (8)	1766 cdef (10)
" CPI 47250	122	25	49 (1)	2467 abc (4)
" GM 016	120	17	26 (9)	1280 efg (15)
" GM 107	120	13	30 (4)	1813 cdef (9)
O. Pinnatus GM 134.1	124	47	22 (16)	1264 efg (16)
O. Perpusillus GM 034	125	11	16 (23)	416 h (23)
O. Compressus GM 065.1	133	23	28 (7)	1366 efg (13)
" GT 047.1	133	24	26 (11)	1005 gh (21)
" Pitman	138	25	21 (18)	1004 gh (22)
" CPI 47251	138	20	26 (10)	1287 efg (14)
" CPI 50774	135	33	24 (15)	2523 ab (3)
" CPI 50484	135	16	18 (21)	1678 defg (12)
" GS 046.1	138	21	28 (6)	1096 fg (20)
" GP 019	140	29	41 (2)	2587 ab (2)
" CP 52.1	141	29	25 (13)	2304 abcd (6)
O. Pinnatus 47261	141	27	25 (12)	1138 fg (19)

Data mean of three replicates

LSD (95%) 622.6

Statistical differences between varieties in terms of dry matter production indicated through Duncan's multiple range test.

* Visual ratings are based on growth and density estimates, which are multiplied to yield final ratings.

ii) Trial Site:

Trial Specifics:

Design - randomised block with three replicates.

Soil type - coarse grey sand containing a 'woody' fraction.
Depth greater than 50 cm and pH (CaCl₂) again acidic.

pH 0 - 5 cm - 4.78
5 - 10 cm - 4.16

Site preparation - Applied 2 L/ha Sprayseed on 13/5. Cultivated on 14/5 and 15/5 with scarifier (wide points) leaving a slightly cloddy seedbed.

Seeding - Sown 15/5/ at 5 kg/ha of inoculated and lime pelleted seed. Plot size 20 m x 1.4 m (N.B. Small seeded varieties sown at 2.5 kg/ha).

Fertiliser - At seeding 200 kg/ha No. 1
50 kg/ha KCl
3/9 100 kg/ha 3:2 Super potash

Insects - Sprayed 80 ml/ha Rogor on 31/5 for red legged earth mite control.

Results:

Line	Days from sowing to flowering	Plant Establishment Counts/m ² 26/6	Visual Rating at 5/8 Ranking	Dry Matter Production 21/10 (kg/ha) Ranking
O. Compressus DP6	108	25	21 (10)	1851 bcd (4)
" MC1	111	21	24 (9)	1273 efghi (14)
" MC2	111	33	31 (1)	1557 bcdegfh (8)
" M115	116	16	12 (22)	1739 bcde (5)
" Uniserra	113	19	14 (19)	1393 defgh (11)
" M167	116	20	17 (17)	1037 hij (19)
" GM 065.2	116	19	29 (*3)	1090 ghij (18)
" GT 046	108	8	18 (15)	895 ij (20)
" CPI 47250	125	31	29 (*3)	2352 a (1)
" GM 016	125	20	28 (6)	884 ij (21)
" GM 107	116	16	29 (2)	1441 cdefgh (10)
O. Pinnatus GM 134.1	125	32	28 (**7)	1686 bcde (6)
O. Perpusillus GM034	116	11	8 (23)	349 k (23)
O. Compressus GM065.1	129	8	21 (11)	1194 fghi (15)
" GT047.1	129	24	13 (20)	1875 bc (3)
" Pitman	142	11	12 (21)	1314 efghi (13)
" CPI 47251	145	45	28 (5)	1579 bcdef (7)
" CPI 50774	142	23	16 (18)	1132 fghi (16)
" CPI 50484	142	16	17 (16)	1480 cdefgh (9)
" GS 046.1	145	20	19 (13)	1091 ghij (17)
" GP 019	145	41	28 (**7)	1380 defgh (12)
" CP 52.1	145	9	20 (12)	2001 ab (2)
O. Pinnatus 47261	145	25	19 (14)	721 jk (22)

LSD (95%) 406.4

*** Only two replicates

Statistical differences between varieties in terms of dry matter production indicated through Duncan's multiple range test.

iii) Trial Site: G. Ravenhill, Bow Bridge

Trial Specifics:

Design - randomised block with three replicates.

Soil type - Deep, acidic, grey 'problem' sand.

pH (CaCl₂) 0 - 5 cm - 4.39
5 - 10 cm - 3.98

Site preparation - Worked twice on 17/5 with disc plough.
Sprayed transplants on 21/5 with 1.5 L/ha Roundup.

Seeding - Sown 27/5 with 5 kg/ha inoculated and lime pelleted seed. Plot size 20 m x 1.4 m (N.B. Small seeded varieties sown at 2.5 kg/ha).

Fertiliser - At seeding 200 kg/ha No. 1
50 kg/ha KCl
50 kg/ha FeSO₄
4/9 100 kg/ha 3:2 Super potash

Insects - On 13/6 sprayed 80 ml/ha Rogor for control of red legged earth mite.

Results:

Complete data was not compiled for this site due to the extremely poor establishment and little subsequent growth. Plant growth even by late October was minimal and serradella dry matter production at that stage was considered less than 250 kg/ha, hence no cuts were taken. Visual ratings were completed in August, which revealed the top five ranking varieties in order CPI 47250, MC2, CPI 50484, GP 019 and GT 047.1.

The extended season resulted in some plant growth and seed production through December, and seed yields will be measured.

First Year Assessment:

At this stage conclusions may only be drawn on the basis of establishment, winter vigour, dry matter production and maturity parameters, as seed yields and regenerative capacities have yet to be determined. However there are several significant points to emerge at this stage.

- i) Pitman and Uniserra are consistently outperformed by many of the introduced varieties, enhancing the prospects of serradella as a suitable pasture legume for the deep sandplain soils of the south coast.
- ii) Two varieties are showing outstanding potential over the range of trial sites, CPI 47250 and MC 2. Other highly promising lines include GP 019, MC 1, CPI 50774 and GM 107.
- iii) The five lines released on a limited basis to farmers in 1985 were included in these trials and would be expected to rank highly. Apart from CPI 47250, DP 6 and GM 134.1 performed reasonably in the first year, whereas M 167 and GM 034 were very disappointing.

SERRADELLA LINE EVALUATION - STAGE 3 85 A1 56 / 4985 EX

Aim:

To evaluate five promising lines selected from variety trials, on a large plot scale, in terms of herbage and seed production, and regenerative ability.

i) Trial Site: D. Johnson, South Stirling

Trial Specifics:

Design - Randomized block with four replicates.

Soil type - Deep grey-white sand.

pH (CaCl₂) 0 - 5 cm - 4.75
5 - 10 cm - 4.29

Site Preparation - 2 L/ha Sprayseed on 10/5. Cultivated twice on 16/5 with wick point scarifier.

Seeding - Sown 16/5 at 5 kg/ha inoculated and lime pelleted seed (N.B. Small seeded varieties sown at 2.5 kg/ha). Plot size 2.8 x 40 m.

Fertiliser - 200 kg/ha Super at seeding.
100 kg/ha 3:2 Super potash 3/9.

Results:

Line	Days from sowing to flowering	Plant Establishment Counts/m ² 26/6	Visual Rating at 5/8 Ranking	Dry Matter Production 18/10 (kg/ha) Ranking
DP6	112	22	22 (4)	701 b (3)
Uniserra	112	28	26 (2)	611 bc (5)
M 167	114	32	22 (3)	484 bcd (6)
CPI 47250	119	38	27 (1)	1099 a (1)
GM 134.1	119	38	15 (7)	324 cd (7)
GM 034	129	32	15 (8)	220 d (8)
Pitman	135	28	21 (5)	634 bc (4)
Mixture		40	18 (6)	770 b (2)

LSD (95%) 309.39

Statistical differences between varieties in terms of dry matter production indicated through Duncan's multiple range test.
N.B. Only trial grazed - heavily grazed 25/7 - 28/8.

ii) Trial Site: K. Hyde, Manypeaks

Trial Specifics:

Design - Randomized block with four replicates.

Soil Type - Deep (>50 cm) coarse grey sand containing some 'woody' material.

pH (CaCl₂) 0 - 5 cm - 4.88
5 - 10 cm - 4.28

Site Preparation - 2 L/ha Sprayseed on 13/5. Cultivated 14/5 and 15/5 with wide point scarifier.

Seeding - Sown 15/5 at 5 kg/ha inoculated and lime pelleted seed (small seeded varieties sown at 2.5 kg/ha). Plot size 2.8 x 40 m.

Fertiliser - Seeding 200 kg/ha No. 1 Super
50 kg/ha KCl
3/9 100 kg/ha 3:2 Super potash

Insects - Sprayed 31/5 with 80 ml/ha Rogor for red legged earth mite control.

Results:

Line	Days from sowing to flowering	Plant Establishment Counts/m ² 26/6	Visual Rating at 5/8 Ranking	Dry Matter Production 22/10 (kg/ha) Ranking
DP6				1386 b (5)
Uniserra	Owing to site contamination with serradella only dry matter production data were recorded. However, only limited value can be attributed to these figures.			1744 b (7)
M 167				2136 b (3)
CPI 47250				3182 b (1)
GM 134.1				1809 b (6)
GM 034				1696 b (8)
Pitman				1878 b (4)
Mixture				2372 ab (2)

Data mean of four replicates.

LSD (95%) 841.09

Statistical differences between varieties in terms of dry matter production indicated through Duncan's multiple range test.

N.B. Only trial grazed - heavily grazed 25/7 - 28/8.

iii) Trial Site: S. Chandler, Denmark

Trial Specifics:

Design - Randomized block with four replicates.

Soil type - Dark grey sand >45 cm in depth.

pH (CaCl₂) 0 - 3 cm - 3.96
 3 - 10 cm - 3.66

Site Preparation - Sprayed 1.5 L/ha Roundup on 21/5. Disc ploughed and heavy harrowed on 23/5.

Seeding - Sown 28/5 at 5 kg/ha inoculated and lime pelleted seed (small seeded varieties sown at 2.5 kg/ha). Plot size 2.8 m x 40 m.

Fertiliser - At seeding 200 kg/ha Super No. 1
 50 kg/ha KCl
 50 kg/ha FeSO₄
 4/9 100 kg/ha 3:2 Super potash

Insects - Sprayed 13/6 with 80 ml/ha Rogor for red legged earth mite control.

Results:

Line	Days from sowing to flowering	Plant Establishment Counts/m ² 26/6	Visual Rating at 5/8 Ranking	Dry Matter Production 18/10 (kg/ha) Ranking
DP6	N/A	37	22 (3)	1800 ab (3)
Uniserra	"	28	22 (2)	1428 b (5)
M167	"	36	21 (5)	1973 ab (2)
CPI 47250	"	72	56 (1)	2690 a (1)
GM 134.1	"	13	7 (7)	1027 b (6)
Pitman	"	34	17 (6)	930 b (7)
Mixture	"	21	23 (2)	1586 b (4)

Data mean of four replicates.

LSD (95%) 944

Statistical differences between varieties in terms of dry matter production indicated through Duncan's multiple range test. N.B. GM 034 not sown due to insufficient supplies.

Comment:

- 1) CPI 47250 is consistently outstanding in these varietal evaluation trials, over a range of soil types and rainfall zones.
- 2) DP 6 and M 167 performed reasonably in comparison to Pitman and Uniserra.
- 3) The small seeded varieties, under the current establishment systems used, demonstrated limited potential for first year production.
- 4) Seed yields and regenerative ability, which are not yet available, may alter the potential of several varieties.

SERRADELLA ESTABLISHMENT - TIME OF SOWING x SEEDING RATE
 85 A1 57 / 4984 EX

Aim:

To determine the optimal seeding time and seeding rate for the successful establishment of serradella.

Trial Sites:

D. Egan, South Stirlings
 K. Hyde, Manypeaks
 S. Chandler, Denmark

Trial Specifics:

As for respective line evaluation trials on these sites apart from:

Seeding - Plots (2 m x 5 m) were hardseeded and lightly raked. Seed, (Pitman) was inoculated and lime pelleted.

Results:

i) D. Egan, South Stirlings

Serradella dry matter production (kg/ha)

Seeding Rate (kg/ha)	Sowing Time		
	14/5	4/6	20/6
1	153.66 (3)	9.00 (3)	64.33 (3) : 75.66 (9)
2	187.33 (3)	116.00 (3)	189.00 (3) : 164.11 (9)
4	576.33 (3)	384.66 (3)	298.00 (3) : 419.66 (9)
8	975.66 (3)	934.66 (3)	451.33 (3) : 787.22 (9)
16	1451.33 (3)	1504.66 (3)	612.66 (3) : 1189.55 (9)
Total	668.86 (15) LSD (95%) 421.37	589.80 (15)	323.06 (15)

Significance:

	df	F	Prob.
Seeding rates	4	30.07	0.000
Time of seeding	2	7.17	0.001
Interaction	8	2.33	0.044
Residual	30		
Total	44		

Comment:

1) Apart from the obvious significance of seeding rate, there were significant time of seeding and interaction effects. Later seeding (20/6) depressed dry matter production, especially at the high seeding rates.

- 2) The three week delay in seeding from 14/5 resulted in no production differences at the higher seeding rates, but reduced production at lower seeding rates.

N.B. There were no significant differences between replications, when analysed in conjunction with seeding rates and time of sowing.

ii) Results: K. Hyde, Manypeaks

Serradella dry matter production (kg/ha)

Seeding Rate (kg/ha)	Sowing Time		
	15/5	6/6	20/6
1	401.00 (3)	293.66 (3)	67.66 (3) : 254.11 (9)
2	443.66 (3)	453.66 (3)	483.66 (3) : 460.33 (9)
4	1413.66 (3)	1870.33 (3)	864.33 (3) : 1382.77 (9)
8	1697.66 (3)	1631.33 (3)	1297.66 (3) : 1542.22 (9)
16	988.00 (3)	2788.00 (3)	1724.33 (3) : 1833.44 (9)
Total	988.80 (15)	1407.40 (15)	887.53 (15)
	LSD (95%) 871.01		

Significance:

	df	F	Prob.
Seeding rates	4	15.98	0.000
Time of seeding	2	4.17	0.025
Interaction	8	2.11	0.066
Residual	30		
Total	44		

Comment:

- 1) The early June sowing produced highest yields in this situation, though essentially through a very low production figure from 16 kg/ha sown on 15/5.
- 2) Later sowing generally reduced yields, with maximum depressions evident at higher seeding rates.
- 3) Largest response in dry matter production to increased seeding rates occurred between 2 and 4 kg/ha.

N.B. There were no significant differences between replications, when analysed in conjunction with seeding rates and time of seeding.

iii) Results: S. Chandler, Denmark

Serradella dry matter production (kg/ha)

Seeding Rate (kg/ha)	Sowing Time		
	18/5	10/6	26/6
1	648.00 (3)	680.00 (3)	1049.33 (3) : 792.44 (9)
2	812.00 (3)	1525.00 (3)	1388.00 (3) : 1241.77 (9)
4	2086.00 (3)	762.33 (3)	1144.33 (3) : 1330.88 (9)
8	1875.33 (3)	1243.33 (3)	1093.33 (3) : 1404.00 (9)
16	1839.33 (3)	2435.66 (3)	2521.66 (3) : 2265.55 (9)
Total	1452.20 (15)	1329 (15)	1439.33 (15)

Significance:

	df	F	Prob.
Seeding rates	4	9.239	0.000
Time of sowing	2	0.244	0.784
Interaction	8	2.533	0.030
Residual	30		
Total	44		

Comment:

- 1) No time of sowing effect evident.
- 2) Trial partly grazed immediately prior to harvesting, resulting in variable production data.

SERRADELLA ESTABLISHMENT - POD UNDERSOWING (VARIETY x RATE)
85 A1 58 / 4984 EX

Aim:

To determine the effectiveness of pod undersowing as an establishment technique for serradella, and evaluating the role of pod hardseededness and pod seeding rate in this establishment.

Trial Site: B. Lyall, North Kamballup

Trial Specifics:

Design - Split plot with three replicates.

Soil type - Very light, grey sand to depth.

pH (CaCl₂) 0 - 5 cm - 5.00
5 - 10 cm - 4.54

Site Preparation - Chisel ploughed 2/5. Spray 1.5 L/ha roundup on 21/5 cultivated with combine 3/6.

Seeding - Cover crops sown on 5/6 and covered with tailing harrows.
Lupins - Illyarrie 80 kg/ha
Barley - Stirling 55 kg/ha
Triticale - Satu 55 kg/ha

Pods were inoculated and lime pelleted and hardseeded on 13/6.

Fertiliser - Lupins: 200 kg/ha Super Mn
100 kg/ha KCl
Cereals: 200 kg/ha Agras No. 1

Results:

The crops under which the pods were spread failed to establish, due to the very fine non wetting sand, and a severe rabbit menace. The ensuing ryegrass dominant site was left as such, owing to its highly erosive nature, and the important regeneration measurements will be recorded in 1986.

SERRADELLA ESTABLISHMENT - POD UNDERSOWING (INOCULATION)
85 A1 59 / 4984 EX

Aim:

To investigate the necessity of pod inoculation, while determining the role of pod undersowing as an establishment technique for serradella.

Trial Sites:

D. Johnson, South Stirlings.
D. Bailey, East Woogenellup.
B. Lyall, North Kamballup.

Trial Details:

Design - Split plot with four replicates.

Site Selection - Sites selection based on prior serradella and lupin history. The three sites selected

- i) Never having had lupins or serradella - new land. D. Bailey.
- ii) Having had lupins and serradella less than five years ago. D. Johnson.
- iii) Having had lupins or serradella greater than five years ago. B. Lyall.

Seeding - Seeding depth 2 - 3 cm for cereals and lupins but approximately 1 cm for the triticale and serradella seed treatment.

Seeding Rates - Lupins 80 kg/ha
Barley 55 kg/ha
Triticale 55 kg/ha
- Pitman pods hand sown at 10 kg/ha

Fertiliser -

- i) New land 500 kg/ha Super No. 1
100 kg/ha KCl
Cereals 150 kg/ha Agras three weeks after seeding.
- ii) iii) Lupins 200 kg/ha Super Mn
100 kg/ha KCl
Cereals 200 kg/ha Agras No. 1

Results:

i) D. Bailey

Crop	<u>Pods</u>	Serradella plant counts per plot 13/9	% Pod Germination	Cereal Yields 30/12 (t/ha)
Lupins - Inoculated		295	4.20	-
- Uninoculated		261	3.70	-
Barley - Inoculated		151.5	2.16	0.99
- Uninoculated		138	1.97	
Triticale - Inoculated		133.5	1.91	1.18
- Uninoculated		133	1.90	
	+ <u>Serradella seed</u>			
Triticale - Inoculated		131	1.87	1.16
- Uninoculated		171	2.45	

Comment:

- 1) Lupin plots decimated by rabbits and kangaroos. Resulting lack of canopy eliminates competition for light and moisture, and serradella survival and counts were approximately double those under cereal canopy.
- 2) Inoculation of pods not significant.
- 3) Triticale slightly higher yielding than barley on new land.

ii) D. Johnson

Crop	<u>Pods</u>	Serradella plant counts per plot 10/9	% Pod Germination	Cereal Yields 21/12 (t/ha)
Lupins - Inoculated		151	2.16	
- Uninoculated		166	2.37	1.02
Barley - Inoculated		106	1.51	
- Uninoculated		109	1.56	1.95
Triticale - Inoculated		151	2.16	
- Uninoculated		160	2.28	1.35
	+ <u>Serradella seed</u>			
Triticale - Inoculated		19	0.27	
- Uninoculated		21	0.29	1.31

Comment:

- 1) The comparatively open canopies of lupins and triticale result in better seedling survival than under a dense barley canopy.
- 2) The triticale and serradella seed plot was sown too deep for the serradella seed to emerge.
- 3) Barley easily outyielded triticale, and lupins, which were affected by root rots.

iii) B. Lyall

The cover crops failed to establish (see 85 A1 58), but regeneration from the ensuing ryegrass dominant site will be measured in 1986.