1991

Pasture and fodder shrub species for deep sandy soils.

Tim Wiley

TITLE:	Pasture and Fodder Shrub Species for Deep Sandy Soils
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TRIAL NUMBERS:	90MO64, 90MO65, 90MO66, 89BA40, 87MO73
DATE:	1991

TRIAL TITLE: The evaluation of alternative pasture species on deep sandy soils

TRIAL NUMBER: 90MO64

LOCATION: Moora (T. Cawood)

SOIL TYPE: Deep siliceous sand, moisture at depth
pH 5.9 - 6.1 in $CaCl_2$

MED TEST: 3.06 (average): severely non-wetting

SPECIES + SEEDING RATES: See Table 1

SOWING DATES: Block 3 01.06.90; Blocks 1+2 07.06.90

FERTILIZER: 150kg/ha superphosphate + Cu, Zn, Mo at seeding
60kg/ha potash for legumes on 17.09.90
75kg/ha urea for grasses on 21.08.90

RESULTS: Grass establishment

Species	Plant Counts (sqm) 21.08.90	Plant Counts (sqm) 21.11.90
11. Lasiochloa echinata	0	11
13. Lolium multiflorum cv. Corvette	52	0
14. Lolium multiflorum cv. Concord	12	0
16. Phalaris aquatica cv. Sirolan	9	0

RESULTS: Legume and herbaceous plant establishment
(see Table 2)

TRIAL TITLE: The evaluation of alternative pasture species on deep sandy soils

TRIAL NUMBER: 90MO65

LOCATION: West Gillingarra (R. Millar)

SOIL TYPE: Deep siliceous sand, moisture at depth
pH 5.9 - 6.0 in $CaCl_2$

MED TEST: 4.43 (average): severely non-wetting

SPECIES + SEEDING RATE: See Table 1

SOWING DATE: 08.06.90

FERTILIZER: 150kg/ha superphosphate + Cu, Zn, Mo at seeding
60kg/ha potash for legumes on 17.09.90
75kg/ha urea for grasses on 27.08.90

RESULTS: No grasses established at this site
Legume and herbaceous plant establishment
(see Table 2)

TRIAL TITLE: The evaluation of alternative pasture species on deep sandy soils

TRIAL NUMBER: 90MO66

LOCATION: West Koojan (B. Branson)

SOIL TYPE: Deep siliceous sand
pH 5.8 - 5.9 in $CaCl_2$

MED TEST: 3.47 (average): severely non-wetting

SPECIES + SEEDING RATE: See Table 1

SOWING DATE: 18.06.90

FERTILIZER: 150kg/ha superphosphate + Cu, Zn, Mo at seeding
60kg/ha potash for legumes on 17.09.90
75kg/ha urea for grasses on 28.08.90

RESULTS: Grass establishment

Species	Plant Counts (sqm) 27.08.90	Plant Counts (sqm) 21.11.90
1. Agropyron elongatum	15.5	0
4. Dactylis glomerata cv. Porto	11	9
5. Dactylis glomerata cv. Wana	4	7
6. Ehrharta calycina cv. Mission	0	3
8. Festalolium	20.7	1
9. Festuca arundinacea cv. Demeter	12	1
11. Lasiochloa echinata	0	1
12. Lolium perenne cv. Brumby	57.5	6
13. Lolium multiflorum cv. Corvette	78.5	7
14. Lolium multiflorum cv. Concord	49.1	15
16. Phalaris aquatica cv. Sirolan	7.7	5
17. Phalaris aquatica cv. Australian	6.8	8
18. Puccinellia ciliata	29.6	0
19. Puccinellia distans	6.6	0

RESULTS: Legume and herbaceous plant establishment (see Table 2)
Early summer survivial (see Table 3)

LIST OF SPECIES FOR EVALUATION TRIALS 90MO64, 90MO65 AND 90MO66

		Sowing Rate kg/ha
GRASSES		
1.	*Agropyron elongatum*	3
2.	*Bromus inermis*	2
3.	*Chloris gayana* cv. Pioneer	1
4.	*Dactylis glomerata* cv. Porto	1
5.	*Dactylis glomerata* cv. Wana	1
6.	*Ehrharta calycina* cv. Mission	1
7.	*Erogrostis curvula* cv. Consol	1
8.	*Festalolium* (Fescue/Rye Grass cross)	3
9.	*Festuca arundinacea* cv. Demeter	2.5
10.	*Festuca pratensis* cv. Melik	2.5
11.	*Lasiochloa echinata*	1
12.	*Lolium perenne* cv. Brumby	2.5
13.	*Lolium multiflorum* cv. Corvette	5
14.	*Lolium multiflorum* cv. Concord	2.5
15.	*Pennisetum clandestinum* cv. Whittet	1.5
16.	*Phalaris aquatica* cv. Sirolan	1
17.	*Phalaris aquatica* cv. Australian	1
18.	*Puccinellia ciliata*	1
19.	*Puccinellia distans*	1
LEGUMES		
20.	*Medicago murex* cv. Zodiac	8
21.	*Medicago polymorpha* cv. Santiago	10
22.	*Medicago sativa* cv. Hunterfield	2
23.	*Ornithopus compressus* cv. Eneabba	5
24.	*Ornithopus compressus* cv. Madeira	5
25.	*Ornithopus compressus* cv. Paros	5
26.	*Ornithopus compressus* cv. Tauro	5
27.	*Ornithopus compressus* cv. Uniserra	5
28.	*Trifolium balansae* cv. Paradana	5
29.	*Trifolium balansae* 45856MIC	5
30.	*Trifolium balansae* WA382MIC	5
31.	*Trifolium cherleri* cv. Beenong	5
32.	*Trifolium cherleri* cv. Yamina	5
33.	*Trifolium cherleri* cv. Lisare	5
34.	*Trifolium fragiferum*	5
35.	*Trifolium hirtum* cv. Hykon	5
36.	*Trifolium hirtum* cv. Sirint	5
37.	*Trifolium isthmocarpum*	5
38.	*Trifolium nigrescens*	5
39.	*Trifolium resupinatum* WA349RES	5
40.	*Trifolium resupinatum* WA413RES	5
41.	*Trifolium resupinatum* WA276RES	5
42.	*Trifolium subterraneum* cv. Dalkeith	10
43.	*Trifolium vesiculosum*	5
HERBACEOUS PLANTS		
44.	*Chichorium intybus*	2
45.	*Hedysarium coronarium* SA9748	5
46.	*Hedysarium coronarium* SA10672	5
47.	*Hedysarium coronarium* SA10746	5
48.	*Hedysarium coronarium* SA18569	5
50.	*Sanguisorba minor*	3
FODDER SHRUBS		
	Medicago arborea	
	Lupinus arboreus	

TABLE 2. Legume and Herbaceous Plant Establishment Plant Counts (plants/sqm)

Species	21.08.90 90MO64	27.08.90 90MO65	27.08.90 90MO66
20. Medicago murex cv. Zodiac	24	18.6	31.6
21. Medicago polymorpha cv. Santiago	61	49.1	87.3
22. Medicago sativa cv. Hunterfield	6	0	4.5
23. Ornithopus compressus cv. Eneabba	0.7	1.5	2
24. Ornithopus compressus cv. Madeira	30	11.3	26.3
25. Ornithopus compressus cv. Paros	33	8.7	54
26. Ornithopus compressus cv. Tauro	22	26.1	51.8
27. Ornithopus compressus cv. Uniserra	22	19.5	43.9
28. Trifolium balansae cv. Paradana	54	28.6	69.3
29. Trifolium balansae 45856MIC	11	29.8	110.5
30. Trifolium balansae WA382MIC	7	4.2	28.5
31. Trifolium cherleri cv. Beenong	58	11.1	44.3
32. Trifolium cherleri cv. Yamina	35	12.8	41.7
33. Trifolium cherleri cv. Lisare	37	12.5	31.2
34. Trifolium fragiferum	20	14.7	49.1
35. Trifolium hirtum cv. Hykon	43	11.5	54.8
36. Trifolium hirtum cv. Sirint	44	9.2	64.9
37. Trifolium isthmocarpum	10	13.5	66.2
38. Trifolium nigrescens	2	29.7	86.4
39. Trifolium resupinatum WA349RES	22	29.9	87.7
40. Trifolium resupinatum WA413RES	9	35.7	83.8
41. Trifolium resupinatum WA276RES	8	11.3	47.4
42. Trifolium subterraneum cv. Dalkeith	53	19.7	35.8
43. Trifolium vesiculosum	20	7.7	45.6
44. Chichorium intybus	0	11.2	17.9
45. Hedysarium coronarium SA9748	7	7.4	20.2
46. Hedysarium coronarium SA10672	15	9.2	27
47. Hedysarium coronarium SA10746	14	8.8	29.7
48. Hedysarium coronarium SA18569	8	5.7	20

TABLE 3. Summer Survival of Legumes and Herbaceous Plants - 90MO66

Species	Plant Counts (sqm) 21.11.90
22. Medicago sativa cv. Hunterfield	3
44. Chichorium intybus	7
45. Hedysarium coronorium SA9748	1
46. Hedysarium coronorium SA10672	2
47. Hedysarium coronorium SA10746	4
48. Hedysarium coronorium SA18569	2

End of January 1991: lucerne and puna chickory still alive (1-5 plants per plot)

GENERAL COMMENTS: 90MO64, 90MO65, 90MO66

Unseasonal frosts during winter 1990 made the establishment of grasses difficult. Consequently most of the grasses will be resown in the 1991 growing year and re-evaluated.

Non-wetting soils also contributed to the difficulty of establishment. Soils were tested for this using the molarity ethanol drop (MED) test. All three sites were found to have severely non-wetting soils. Wetting agent will be used in the 1991 trials to overcome this problem.

Establishment was poor. Establishment counts were made, but high plant numbers did not necessarily indicate herbage bulk. The most vigorous and easily established species were:

Festalolium
Lolium multiflorum cv. Corvette and Concord
Lolium perenne cv. Brumby
Ornithopus compressus cv. Paros and Madeira
Trifolium cherleri cv. Yamina and Beenong
Trifolium hirtum cv. Hykon and Sirint
Lupinus arboreus

TRIAL TITLE: Tagasaste Establishment Trial

TRIAL NUMBER: 89BA40

LOCATION: Badgingarra Research Station

SOIL TYPE: Poor quality grey sand over yellow sand at variable depth

TREATMENTS:
1. SRF (scalping, ripping, fertilizer)
2. SR (scalping, ripping)
3. SF (scalping, fertilizer)
4. S (scalping)
5. DD RF (direct drill, ripping, fertilizer)
6. DD R (direct drill, ripping)
7. DD F (direct drill, fertilizer)
8. DD (direct drill)

SOWING DATE: July 1989

SEEDING RATE: 13-15 seeds/m single row

RESULTS: Plant Numbers/m of row

Treatment	Oct 1989	Apr 1990	Apr 1991
1. SRF	4.6	3.5	4.0
2. SR	5.8	4.2	3.9
3. SF	2.9	2.2	2.3
4. S	3.3	2.6	2.2
5. DD RF	2.7	2.0	1.7
6. DD R	4.6	2.7	2.5
7. DD F	2.6	0.9	1.0
8. DD	2.4	1.2	1.0

Treatment 2 (scalping and ripping) gave the highest plant number/m row establishment. This treatment was not significantly different to Treatment 1 (scalping, ripping and feritilizer) in all three counts. As well Treatment 2 was not significantly different to Treatment 6 (direct drill and ripping) in October 1989 and April 1989 but Treatment 2 was significantly different to Treatment 6 in the April 1990 counts. Treatment 2 was significantly different to all other treatments (i.e. Treatments 3, 4, 5, 7 and 8) for all three counts. From these results it would seem that for plant number establishment, ripping (to 30cm) is the most important factor.

RESULTS: Plant Height (cm)

Treatment	Oct 1989	Apr 1991
1. SRF	25.9	169
2. SR	17.7	145
3. SF	23.4	154
4. S	15.7	138
5. DD RF	17.9	151
6. DD R	16.6	157
7. DD F	15.1	156
8. DD	14.0	168

Treatment 1 (scalping, ripping and fertilizer) gave the tallest trees in the first year of establishment and also when the trees were almost two years old.

In the year of establishment (1989) plant height measurement showed that Treatment 1 was significantly different to all other treatments except Treatment 3 (scalping and fertilizer). These results suggest that scalping and fertilizer are the two most important factors for plant height in the initial year of establishment.

However, two years after seeding many of the treatments have caught up in height to Treatment 1. In April 1991 Treatment 1 was not significantly different to Treatments 6, 7 and 8.

TRIAL TITLE: The evaluation of tagasaste under rotational grazing

TRIAL NUMBER: 87MO73

LOCATION: Lancelin (B. Wilson)

SOIL TYPE: Very deep poor sand

TREATMENTS: Tagasaste sown in double rows 2m apart with variable interrow spacings of 2, 2.5, 3, 4, 5 and 6m.

Rotational grazing by sheep, four paddock/replicate (2 replicates).

Each paddock grazed for 1 month, then sheep moved to next paddock.

SOWING DATE: May 1988

SEEDING RATE: 5 seeds/m row

FERTILIZER: 150kg/ha superphosphate/Potash 3:1 in 1989

RESULTS: Pasture Interrow Yield (kg DM/ha, mean of 4 samples)

Interrow spacing (m)	Paddock 1+2 14.08.90	Paddock 3+4 20.09.90	Paddock 5+6 22.11.90	Paddock 7+8 19.12.90
2	573	611	505	198
2.5	737	668	861	380
3	1026	753	992	562
4	1149	747	1239	775
5	1336	999	1255	746
6	1373	1152	1327	1012
Significance	***	**	***	***

* P < 0.05
** P < 0.01
*** P < 0.001

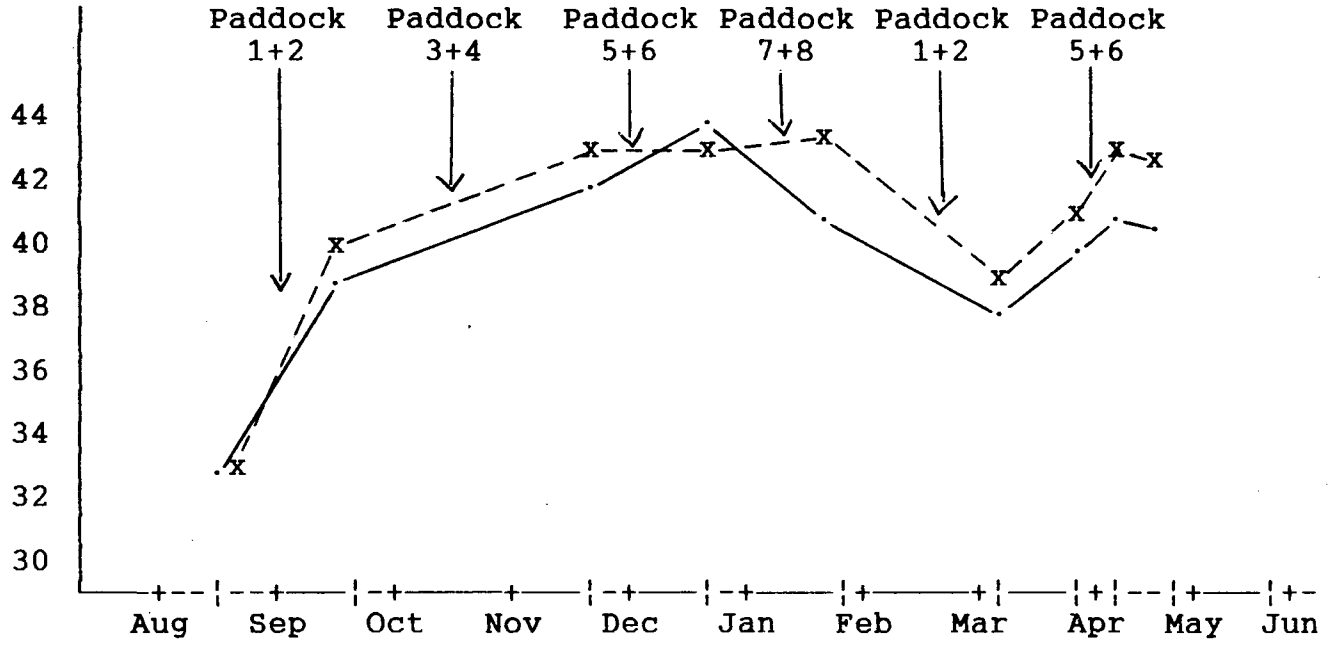
The amount of pasture produced on a per unit basis decreases as interrow spacing decreases. This is probably due to competition with tagasaste trees for water, nutrients and particularly light.

RESULTS: Edible Tagasaste Yield (kg DM/ha, mean of 4 samples)

Interrow spacing (m)	Paddock 1+2 14.08.90	Paddock 3+4 20.09.90	Paddock 5+6 22.11.90	Paddock 7+8 19.12.90
2	3538	3327	4376	3366
2.5	2513	3621	4172	3247
3	3205	3074	3683	3157
4	2040	2784	3567	3110
5	1894	1974	2851	2600
6	1307	1695	2010	2049

It was not possible to determine whether there is a significant difference in the edible tagasaste yield between the low row spacings (2 and 2.5m) and the other row spacings. Unfortunately the tagasaste cutter available at the time was unable to get into the close row spacings. Consequently when the whole plot was cut mid April 1900 prior to the start of the experiment, interrow treatments 2m and 2.5m were not cut.

RESULTS: Sheep Liveweights (kg)



._____. Rep 2 sheep (n = 16)

x____x Rep 1 sheep (n = 18)

Stocking density was 20 sheep/ha until 23.11.90 when the stocking density was increased to 25 sheep/ha. Liveweight (kg) comparisons have only been made of those sheep that are of the original group. Some of these sheep died or were removed because of flystrike, hence for Rep 2 (n = 16) and Rep 1 (n = 18).

The sheep were shorn on 30.04.91 and dyebands removed. These will be analysed this year for strength, length and fibre diameter.

COMMENTS: Basically 1990 was a running-in period for this trial and it will continue on in 1991 and 1992.