1985

Farm systems research involving new pasture species.

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ANNUAL SUMMARIES 1985

FARM SYSTEMS RESEARCH INVOLVING NEW PASTURE SPECIES

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413

INDEX

EVALUATION OF MEDICAGO POLYMORPHA VAR BREVISPINA CV CIRCLE VALLEY IN TERMS OF PRODUCTION AND PERSISTENCE AND VALUE TO THE GRAZING ANIMAL UNDER SET STOCKED CONDITIONS

Aim: To evaluate *Medicago polymorpha* var *brevispina* cv Circle Valley in terms of production, persistence and value to the grazing animal under set stocked conditions and persistence in a 1:1 crop/pasture rotation.

BACKGROUND

In 1981 a pasture research programme funded by the Australian Meat Research Committee was begun. The aim of the project was to determine the suitability of alternative pasture species to annual ryegrass on the hard setting soils of the Great Southern where annual ryegrass toxicity (ARGT) is a major problem.

Up until 1984 some 50 species and 600 lines have been evaluated in small plots for dry matter, seed production and regeneration. The legume species *Medicago polymorpha* var *brevispina* has been identified as a species of outstanding potential in terms of dry matter, seed yield and persistence on the grey clay 'Moort' and red brown clay loam soils of the region.

With the release of two cultivars of this species for the eastern and central wheatbelt; namely Circle Valley and Serena, information on their ability to withstand grazing and their value to the grazing animal is essential in the medium rainfall zone. As the species is an aerial seed producer, grazing during flowering and over summer are considered to be important factors in governing their long term persistence.

TRIAL DETAILS

Treatments : Stocking rate/ha 3, 5, 7, 9
: Replicates 4 with 5 sheep/plot
: Rotation 1:1 (full system trial)

RESULTS

There was no significant effect of stocking rate on sheep liveweight until late December when sheep at 5, 7 and 9/ha were 3.0 kg lighter than those stocked at 3/ha (Figure 1).

By deferring grazing 8 weeks for pasture establishment the effects of stocking rate on pasture production and animal liveweight are not as large as if the sheep were grazing the pasture from the break of the season. Early indications are that burr medic pod is a valuable summer feed as indicated by summer liveweights at the high stocking rate. Observations on the seed content of faeces in January showed that 12-15% of faeces weight was seed, with 11.8% at 3/ha and 14.8% at 9/ha. The number of seeds/faecal pellet was 10.9-13.3 with an average seed weight of 2.9 mg. The passed seed was on average 18% soft seeded which is 15 percentage units more soft seeded than field samples of seed.

There was a significant ($P < 0.05$) effect of stocking rate on burr medic pasture on offer throughout the season (Figure 2). From early August to October pastures stocked at 9/ha had less pasture than those stocked at 3/ha. There was no significant difference between pastures stocked at 3, 5 and 7/ha. The October sampling revealed less pasture at 9/ha as compared to 3 and 5 sheep/ha and less pasture at 7/ha as compared to 3/ha. At the January sampling there were significant differences between all stocking rates.

There was no significant effect of stocking rate on seed yield, however, stocking rates of 7 and 9/ha reduced seed yield by 16 and 39% respectively when compared to 3/ha (Table 3).

Table 1. The effect of stocking rate on seed production of burr medic

Stocking rate	Seed yield
3	887
5	635
7	747
9	549

LSD ($P < 0.05$) $\pm$ 250 kg/ha
CV = 22%

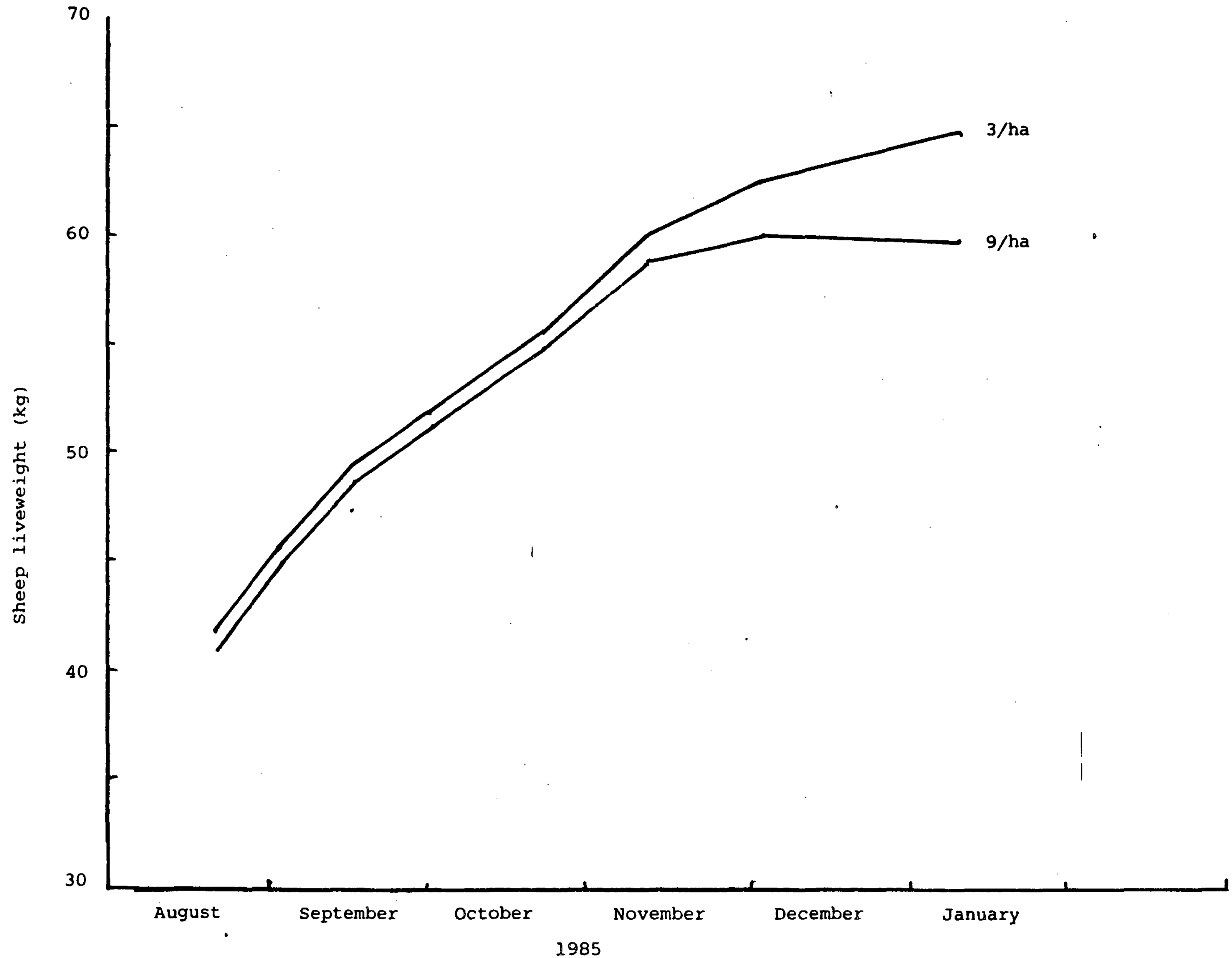


Figure 1. Liveweight of sheep grazing Circle Valley medic at 3 and 9 sheep/ha

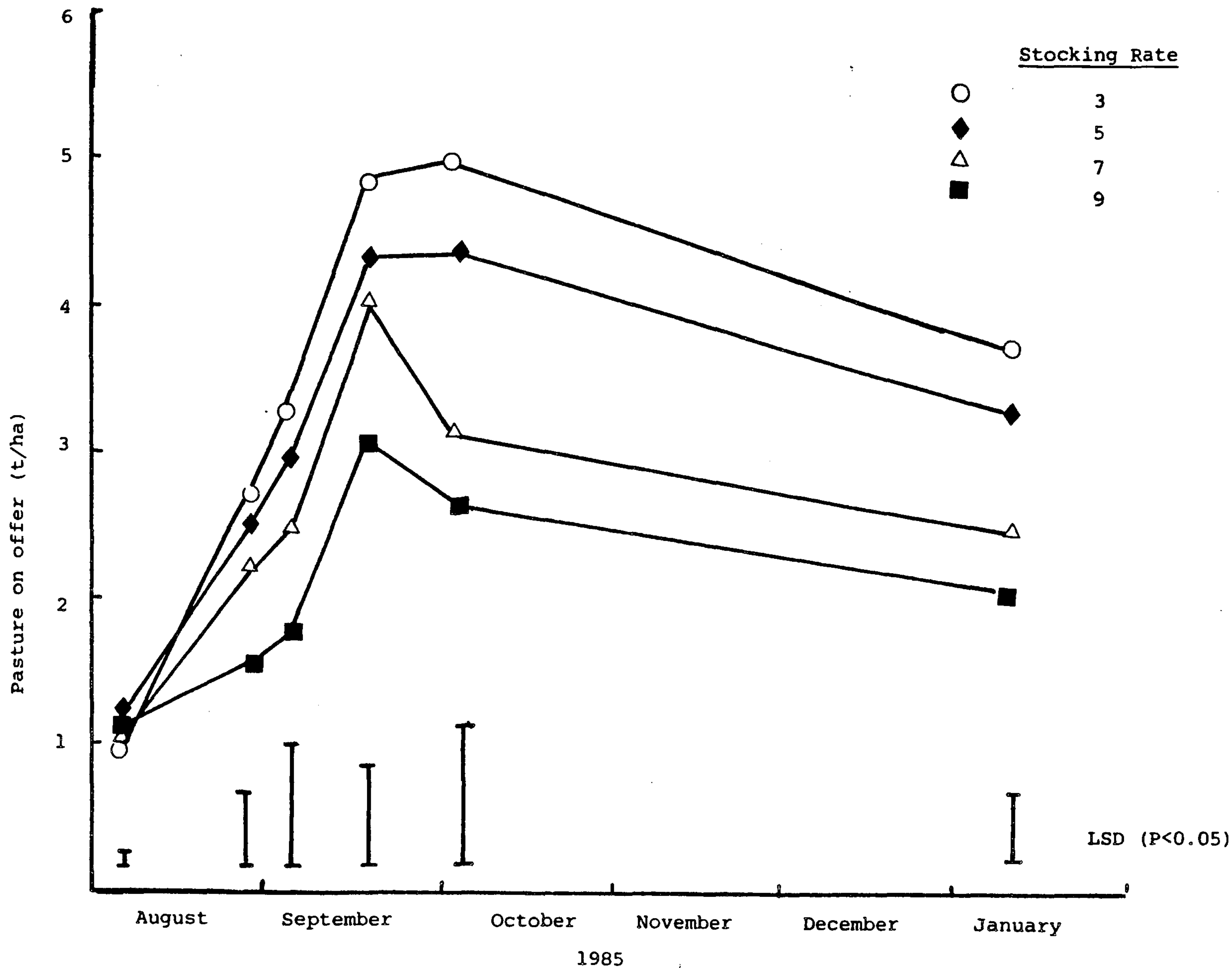


Figure 2. Circle Valley pasture on offer at 4 stocking rates

ROTATION SYSTEMS FOR BURR MEDIC

Aim: 1. To evaluate the effect of 1:1, 1:2, 2:2 crop:pasture rotations on the production and persistence of burr medic.

2. To evaluate the benefit of burr medic to a following cereal crop.

TRIAL SITES

84 KA 35 - Gnowangerup
85 LG 44 - Pingrup
84 KA 37 - Dumbleyung

TREATMENTS

1:1
1:2 crop:pasture rotations
2:2

DETAILS

1. Second year pasture allowed to regenerate.
2. Areas to be cropped were sprayed with 2.0 L/ha Sprayseed® + 1.0 L/ha Dicamba on the 25.6.85.
3. The crop was sown on the 27.6.85 using 150 kg/ha plain superphosphate. No nitrogen was applied.
4. The crops were direct drilled with a 12 run combine.
5. Medics under the crop were sprayed out at the Pingrup site.
6. Sites were free of grass weeds.

RESULTS

The trials are in the early stages of development. Pasture dry matter, seed yield, residual seed yield and density were measured (Table 1). Crop yield and yield components were also measured on the crop phase of the 1:1 rotation in 1985 (Table 2).

Table 1. Pasture production parameters for 3 rotations at 3 sites

	Location	Gnowangerup		Pingrup		Dumbleyung	
1984	Dry Matter (t/ha)*	466		-		-	
1984	Seed Yield (kg/ha)	464		703		525	
1985	Residual Seed						
	1:1 Crop 85	173	(37%)	590	(84%)	-	
	1:2 Pasture 85**)					-	
	2:2 Pasture 85)	327	(70%)	512	(72.8%)	-	
1985	Density (plants/m^2)						
	1:1 (under crop)	64	(0.5%)	670	(3.8%)	108	(0.8%)
	1:2) 2:2) Pasture 85	1,501	(13%)	461	(2.6%)	16	
1985	Seed Yield (kg/ha)						
	1:1 (under crop)	126		419		133	
	1:2) 2:2) Pasture 85	224		467		224	

* Trials were placed on an existing bulk area of burr medic sown in 1984

** The 1:2 and 2:2 pasture data was averaged as they are both in their second pasture year

( ) % of seed set in 1984

Burr medic density varied greatly across the three sites even though 1984 seed production was similar. This was thought to be associated with the type of seasonal break. At Gnowangerup where the break resulted in moist soil for 1-2 weeks, 13% of seed set in 1984 germinated and good establishment was achieved, however, at Pingrup and Dumbleyung where the surface dried out after the break only 1-3% of seed produced in 1984 established as seedlings.

Where the Dumbleyung and Pingrup sites were cropped in 1985 (i.e. 1:1 rotation) a large medic regeneration was observed under the crop. This effect was thought to be due to the burial of potentially germinable seeds, thereby creating a more favourable environment for germination than at the soil surface. It is postulated that the moisture conditions around the burr appear to be important in terms of successfully establishing seedlings from burrs on hard setting soils.

These observations have resulted in trials being planned for 1986 to study the effects of an autumn tickle on subsequent medic regeneration. This may result in more reliable burr medic regeneration in longer pasture phases.

In 1985, residual seed plus established seedlings accounted for 83% and 76% of the total seed set at Gnowangerup and Pingrup respectively. The loss of seed over summer/autumn requires further study.

In 1985 the 1:1 rotation was in the crop phase. Cereal crops were sown at 50 kg/ha with 150 kg/ha of superphosphate. No nitrogen fertiliser was used. The crops were all sown using a sprayseed/direct drilling technique.

Grain yield at the three sites reflected the marked differences in seasonal conditions (Table 2). All sites were sown on the same day (26 June, 1985).

Table 2. Crop production following 1 year of burr medic pasture (1:1 rotation)

Location	Gnowangerup	Pingrup	Dumbleyung
Dry Matter (kg/ha)	8,247	5,239	4,516
Grain Yield (*H.H.)(kg/ha)	3,169	2,203	1,608
Grain Yield (**M.H.)(kg/ha)	2,599	2,125	1,329
Heads/m^2	358	264	308
Grains/m^2	8,958	6,388	4,705
Grains/head	25.0	24.1	15.3
Grain weight (mg)	35.4	34.7	34.2
H.I.	38.4	42.0	35.6
	(Wheat)	(Wheat)	(Barley)

*H.H. = hand harvest for yield components
**M.H. = machine harvest
(Wheat) = Aroona
(Barley) = Stirling

Gnowangerup experienced an excellent growing season with good late spring rains. Dumbleyung experienced a dry start to the season and a dry September, while Pingrup experienced a dry start to the season but good spring rains.

Excellent grain yields were achieved at both Pingrup and Gnowangerup. Head number/m^2 and grains/head were the two yield parameters that had most influence on yield (Table 2).

It is too early in the rotational cycle to make much of this data at this point.

421

THE EFFECT OF GYPSUM, TILLAGE AND NITROGEN ON CEREAL YIELDS IN A CONTINUOUS CROP SYSTEM

TRIAL: 84 KA 28

LOCATION: E. Garlick, Katanning

FILE: 4721 EX

INTRODUCTION

Twenty per cent of the soils in the Katanning Advisory District are hard setting grey clay loamy sands. Crop establishment problems and waterlogging are a feature of this soil type. The use of gypsum to improve soil structure coupled with continuous cropping using the direct drilling method should enable these soils to become more productive.

TRIAL DETAILS

Treatments: Gypsum - 1.0 t/ha
2.5 t/ha

Tillage - 1. Conventional (2 workings and a seeding)
2. Direct drill

Nitrogen - 1. 0 kg/ha
2. 20 kg/ha
3. 40 kg/ha
4. 80 kg/ha
5. 160 kg/ha

Replicates - 3

DETAILS 1984, 1985

Conventional - 1st working 5/6/85
2nd working 2/6/84, 10/6/85
Sown 1/6/84, 10/6/85

Direct Drill - Sprayseed 2 l/ha 31/5/84, 9/6/85
Sown 1/6/84, 10/6/85

Gypsum - Topdressed 11/5/84

Crop Details - sown 1/6/84, 10/6/84
Super 143 kg/ha
Nitrogen applied as Agran at seeding at above rates
Herbicides: 1984 Hoegrass 1.5 l/ha on 5/7/84 (wild oats)
Igran 1.0 l/ha on 6/8/84 (wireweed)
1985 Hoegrass 1.5 l/ha on 3/7/85
Igran 1.0 l/ha on 13/8/85

RESULTS AND DISCUSSION

Table 1. Crop density plants/m^2

	Gypsum rate t/ha	Plants/m^2
Conventional	0	117
	5	116
Direct Drill	0	117
	5	122
Significance		N.S.

(Data mean of nitrogen treatments) LSD $P < 0.05 = 16.7$

Table 2. Machine harvested grain yield (t/ha)

Rate of gypsum rate of nitrogen (N) kg/ha	Grain yield t/ha Conventional 0	5 t/ha	Direct drill 0	5 t/ha
0	1.62	1.57	1.80	1.50
20	2.00	1.84	2.32	1.86
40	2.48	2.19	2.48	2.30
80	2.66	2.88	2.87	2.71
160	2.76	2.90	2.73	2.92

There was a significant ($P < 0.01$) effect of nitrogen rate on grain yield. Tillage and gypsum treatments were not significantly different.

Table 3. Yield components based on hand cuts prior to harvesting

Rate of nitrogen (N) kg/ha	Yield components: Conventional 0	5 t/ha	Direct drill 0	5 t/ha
	Final dry matter t/ha			
0	3.05	3.15	3.24	3.26
20	3.97	5.07	5.13	4.15
40	4.46	6.26	6.13	5.26
80	6.28	9.10	7.54	9.06
160	7.34	7.15	7.88	8.28

423

Table 3 continued ...

Rate of nitrogen (N) kg/ha	Conventional 0	Conventional 5 t/ha	Direct drill 0	Direct drill 5 t/ha
	Yield components			
	Head number/m^2			
0	147	163	192	173
20	196	211	278	212
40	222	272	283	244
80	304	380	355	340
160	452	362	378	343
	Grain wt (mg)			
0	35.3	38.5	34.4	35.1
20	36.2	37.4	35.0	35.7
40	35.0	36.9	33.5	32.9
80	33.2	32.3	31.2	32.4
160	26.2	26.0	27.0	33.3
	Harvest Index			
0	41.3	43.5	48.3	43.0
20	42.1	32.8	45.5	41.4
40	39.0	38.0	39.6	35.5
80	41.5	32.3	38.1	31.7
160	37.1	29.1	27.9	36.6
	Grains/head			
0	24.3	21.7	23.7	23.1
20	23.5	21.1	24.0	22.7
40	22.4	23.6	25.6	23.2
80	25.9	23.9	26.0	26.1
160	22.9	22.1	21.5	26.5
	Hand harvest grain yield (t/ha)			
0	1.26	1.37	1.57	1.40
20	1.67	1.67	2.34	1.72
40	1.74	2.38	2.43	1.87
80	2.61	2.94	2.88	2.87
160	2.72	2.08	2.20	3.03
	Grain number/m^2 (x 100)			
0	35.7	35.5	45.5	40.0
20	46.1	44.6	66.8	48.1
40	49.8	64.4	72.5	56.8
80	78.6	91.0	92.2	88.6
160	103.7	80.1	81.6	91.0

COMMENTS:

1. There was no significant effect of either tillage or gypsum treatment on crop establishment density. Like 1984 the excellent seasonal opening resulted in good crop establishment.

2. There was a significant effect ($P < 0.01$) of nitrogen rate on grain yield only. Tillage and gypsum effects were non significant.

3. Analysis of yield components showed that the most important factors influencing final grain yield were head numbers and individual grain weight.

4. Infiltration rate was increased by 105% (0.85-1.74 mm/min) on direct drilled plots after only 2 years. Gypsum application resulted in an infiltration rate increase of approximately 20%. Soil bulk density was reduced from 1.55 g/cm^3 to 1.45 g/cm^3 by direct drilling but more noticeably to 1.18 g/cm^3 with the addition of gypsum.

5. One significant fact to arise from this trial is that there is no yield penalty associated with direct drilling on heavy Salmon gum/Morrell soils.

6. The optimum rate of nitrogen is 40-80 kg/ha of nitrogen. Nitrogen rates used by most farmers on these soils are generally in the order of 15-20 kg/ha of nitrogen. There is scope for improving cereal crop yields by using more nitrogen. Farmer experience of hayed off crops due to excessive nitrogen use in poor seasons has led to farmer reluctance to apply 40 units of nitrogen/ha.

u25

THE EFFECT OF GYPSUM AND SEEDING RATE ON THE SEED YIELD OF PASTURE LEGUMES

Aim: To evaluate the effect of seeding density and the use of gypsum for soil amelioration on the seed production of pasture legumes.

BACKGROUND

The use of gypsum on hardsetting grey clay soils has been observed to increase cereal yields by increasing water infiltration and hence water use efficiency. By increasing water infiltration with gypsum it may be possible to increase the optimum seeding rate of pasture legumes (i.e. higher density more growth potential and more water to use on gypsum plots). It is also possible that later maturing cultivars may benefit from greater stored moisture in gypsum treated soils. This trial was designed to examine some of these relationships.

TRIAL DESIGN

Three pasture treatments (*M. polymorpha* cv. Serena (early 80 days to flowering (dtf); cv. Circle Valley (later type 100 dtf); *Trifolium subterraneum* cv. Dalkeith (100 dtf). Five seeding rates; 2, 4, 8, 16, 32 kg/ha and two rates of gypsum 0, 5 t/ha. The trial was replicated 3 times in a split plot design. Only 2 replicates were used in the trial as rep 1 had poor emergence due to depth of seeding problems.

RESULTS

Table 1. The effect of gypsum application on the dry matter and seed production of three pasture legumes.

Cultivar	Rate	Dry matter 18/9/85 (t/ha)			Dry matter 9/10/85 (t/ha)			Seed yield (kg/ha)		
		+G	-G	$\bar{x}$	+G	-G	$\bar{x}$	+G	-G	$\bar{x}$
Serena	2	0.93	1.83	1.38	2.27	4.23	3.25	540	673	606
	4	1.70	2.00	1.85	3.82	4.62	4.22	484	759	621
	8	2.70	4.14	2.29	4.96	5.02	4.99	1,122	1,071	1,096
	16	4.27	3.79	4.03	6.66	7.08	6.87	1,761	1,117	1,439
	32	4.52	4.56	4.54	6.72	6.93	6.83	1,554	1,037	1,295
C. Valley	2	1.36	1.82	1.59	2.37	3.77	3.07	448	231	339
	4	1.22	2.00	1.61	2.52	4.46	3.49	641	586	613
	8	1.61	1.63	1.62	4.33	3.44	3.89	806	607	706
	16	2.66	2.57	2.38	5.01	6.05	5.53	763	596	679
	32	3.17	3.27	3.22	7.23	7.36	7.29	574	396	485
Dalkeith	2	0.04	0.42	0.24	2.82	3.30	3.06	69	19	44
	4	0.73	0.41	0.57	3.23	3.08	3.15	70	58	64
	8	0.37	1.67	1.03	2.69	4.10	3.40	89	247	168
	16	2.00	1.10	1.55	3.90	4.03	3.97	212	321	266
	32	2.20	1.88	2.04	4.51	4.32	4.41	251	179	215

* Note ungrazed all year (i.e. yields are potential yields)

Comments

1. Establishment density was not counted.

2. Establishment of seed at low rates was poor due to cone seeder distribution problems.

3. The optimum seeding rate of medics would appear to be between 4-8 kg/ha for Circle Valley and 8-16 kg/ha for Serena. On grazed stands 8-10 kg/ha recommendations would be adequate.

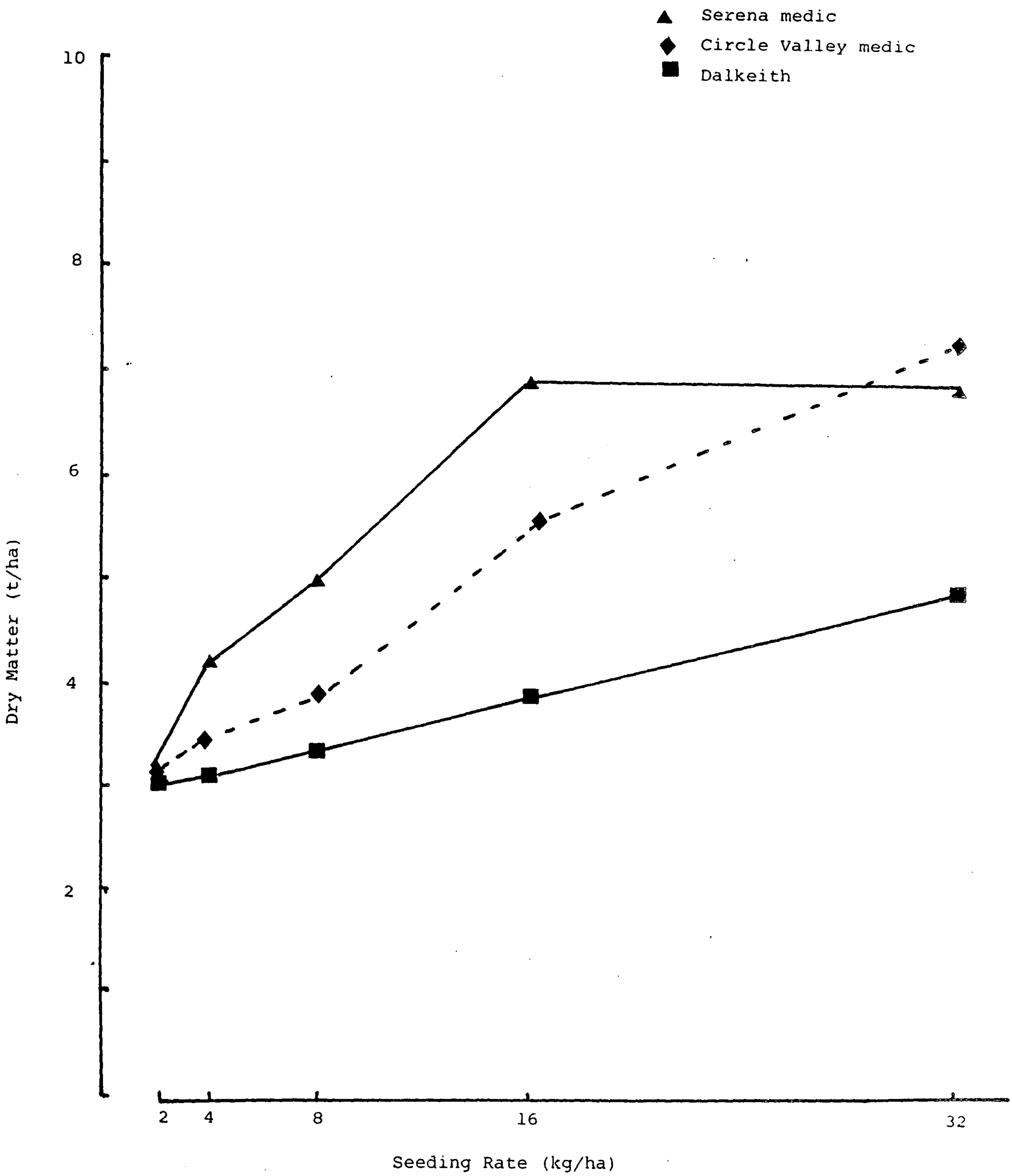
4. In terms of absolute seed yield Serena outyielded Circle Valley, however, the seed yield of both medics was far in excess of Dalkeith sub.clover.

5. At high sowing rates (16, 32 kg/ha) the later medic Circle Valley had reduced seed yield, probably due to higher water use early in the season and hence water limitations in spring.

6. Gypsum treated soil resulted in increased seed yields for both Serena and Circle Valley, particularly at 8-32 kg/ha. There was little effect below as seeding rate of 8 kg/ha. This reflects the better water infiltration on gypsum treated soil and hence better water utilisation (similar story to gypsum on wheat yield 84 Ka 28).

7. Further studies will be conducted in 1986 to test the effects of gypsum and seeding rate under grazed conditions.

Figure 1. Pasture dry matter (9.10.85) for 3 pasture legumes sown at varying rates and meaned for 2 rates of gypsum



RESULTS

Table 1. Ratings of herbicide damage to pasture species 3 weeks after early time rating

	Herbicide	Rate	Rating (0-5) 21/8/85 Daliak	0 = unaffected Circle Valley	5 = total death Serena	Beenong
1.	Tribunil	850 g	0	1	1	0
2.	2,4 D-B	1.5 L	0	1	1	0
3.	Tribunil + 2,4 D-B	600 g + 750 ml	4	3	5	1
4.	Bromoxynil	2 L	0	0	0	1
5.	Bromoxynil + MCPA	1 L	1	1	2	1
6.	Bromoxynil + Isoproturon	1 L + 1 L	4	4	5	4
7.	Diuron + 2,4 D-B	350 ml + 750 ml	1	1	1	2
8.	Igran	350 ml	1	0	0	0
9.	Basagran	1 L	1	0	0	0
10.	Treflan	2 L	0	0	0	0
11.	Diflufenican	200 ml	2	2	2	1
12.	Bladex	1.5 L	1	2	1	4
13.	Kerb	1.5 kg	0	0	0	0
Sprayed 23 September, 1985						
14.	Hoegrass					
15.	Sprayseed					
16.	Roundup					
17.	Fusilade					
18.	Sertin					
19.	Dowco 453					
20.	PP604					
21.	Untreated					

429

Table 2. Pasture species seed yield (kg/ha) following herbicide application

Pasture species Cultivar Herbicide	Rate	Seed yield kg/ha) M. polymorpha Serena		T. subterraneum Circle Valley		Daliak		T. cherleri Beenong	
Untreated	-	1,094		1,182		275		776	
Tribunil	850 g	1,046	(96)	1,019	(86)	403	(146)	900	(116)
2,4 D-B	1.5 L	804	(74)	608	(51)	-		165	(21)
Tribunil + 2,4 D-B	600 g + 750 ml	514	(47)	776	(66)	165	(60)	95	(12)
Bromoxynil	2 L	1,199	(110)	1,270	(107)	157	(57)	460	(59)
Bromoxynil + MCPA	1 L	898	(82)	734	(62)	264	(96)	372	(48)
Bromoxynil + Isoproturon	1 L + 1 L	428	(39)	777	(66)	116	(42)	456	(59)
Diuron + 2,4 D-B	350 + 750 ml	967	(88)	1,041	(88)	275	(100)	140	(18)
Igran	350 ml	1,121	(102)	649	(55)	324	(118)	565	(73)
Basagran	1 L	1,043	(95)	1,176	(100)	377	(137)	830	(107)
Treflan	2 L	1,076	(98)	1,219	(103)	293	(106)	605	(78)
Deflufenican	200 ml	1,185	(108)	871	(74)	311	(113)	467	(60)
Bladex	1.5 L	1,200	(110)	428	(36)	426	(155)	77	(10)
Kerb	1.5 kg	1,311	(120)	1,146	(97)	295	(107)	1,014	(131)
Hoegrass	1.0 L	1,147	(105)	1,103	(93)	294	(107)	555	(71)
Srayseed	500 ml	609	(56)	620	(52)	387	(141)	486	(63)
Roundup	350 ml	784	(72)	265	(22)	115	(42)	509	(65)
Fusilade	250 ml	1,144	(105)	917	(78)	256	(93)	678	(87)
Sertin	350 ml	1,077	(98)	950	(80)	457	(166)	524	(67)
Dowco 453	150 ml	1,049	(96)	980	(83)	321	(117)	525	(67)
PP 604	350 ml	1,073	(98)	775	(66)	238	(86)	379	(49)

( ) = % of untreated

DISCUSSION

This very preliminary study of the effects of various herbicides on the seed production of three pasture species was conducted with the aim to develop ideas for a future trial program.

Tribunil: Tribunil at 850 g resulted in excellent seed yields and at the present time it should be recommended ahead of 2,4 D-B on all 3 pasture species tested. Further rate x time of application studies are needed.

2,4 D-B: This herbicide, currently recommended at 0.750 - 1.5 L/ha, proved to be detrimental to pasture seed production. Cupped clover appeared to be very sensitive. Serena medic seed yield was reduced by 27% and Circle Valley by 49%. This effect was due to the time of application, Serena being well into flowering when the 2,4 D-B was applied.

Tribunil + 2,4 D-B: There appeared to be a synergistic effect of mixing these two herbicides. All species were affected badly and future work with this mixture is needed to verify this result.

Bromoxynil: Bromoxynil appeared to be safe on medics but not on sub.clovers. This effect needs to be studied in more detail in 1986.

Bromoxynil + MCPA: This mixture reduced medic and cupped clover seed yield compared to straight Bromoxynil. Medics appear to be sensitive to MPCA.

Bromoxynil + Isoproturon: This mixture was extremely damaging to all pasture species. Isoproturon is not considered suitable for use in pastures.

Diuron + 2,4 D-B: This mixture appeared safe on sub.clover, but led to some reduction in medic seed yield (12%) and was very damaging on cupped clover.

Igran: Variable results with Igran. No effect on Serena as it was sprayed too late. No effect on sub.clover.

Basagran: Appears safe on both *Medicago* and *Trifolium* species. Requires further evaluation.

Treflan: Safe on legumes.

Diflufenican: Appears safe on sub.clover and Serena but reduced seed yields of Circle Valley and Beenong. Produces very obvious white lesions (blanched look) on leaves of pasture plants. Very active on capeweed. Requires further evaluation.

Bladex: Totally unsafe on Circle Valley and Beenong but may be useful in sub.clover. Serena probably missed its effect due to application time. Further evaluation on sub.clover needed.

Kerb: Excellent herbicide in terms of safety and increasing seed set of all species (i.e. weed control).

Sprayseed - Roundup: In general reduced seed yield of all species by 50% at spray/topping time. Further rates and times work required.

Fusilade, Sertin, Dowco 453, PP 604: Applied too late to affect Serena. No effect on sub-clover, but reduced cupped clover and Circle Valley seed yields by 20-30%. Application of these herbicide when pastures are flowering needs further evaluation. PP 604 appears to be more detrimental to seed production than the other three herbicides.

There are obvious pasture species differences in herbicide tolerance. This requires further evaluation with a wider range of species and herbicides. Tribunil appears to be a herbicide we should recommend for broadleaf control in legume pastures. The phenoxy 2,4 D-B recommendation of 750 ml - 1.5 L appears to be inadequate and requires revision, if it should be recommended at all.

Basagran, Diflufenican, Diuron + 2,4 D-B, and Bromoxynil require further evaluation under a weedy pasture situation.

Observations of Cinch® on medics in 1985 showed that Circle Valley medic would tolerate up to 2.0 L of Cinch. Beenong cupped clover appeared to be more sensitive to Cinch. Further work in 1986 using this herbicide is required as it may be useful in establishing new pasture stands.

CIRCLE VALLEY UNDERSOWING TRIAL

Aim: To evaluate the effect of undersowing Circle Valley medic under a cereal crop on medic seed production and crop production.

INTRODUCTION

Burr medic (*Medicago polymorpha* var *brevispina*) has been identified as a suitable pasture legume species for replacing ryegrass on many of the heavy soils of the central and eastern wheatbelt.

Many farmers attempted the 'old jam tin of clover seed' per box of wheat in the old days with little success. However the use of this technique to sow pastures is still practiced today. The erect habit of the burr medics may enable them to be a more serious competitor than sub.clover under a wheat crop. This trial attempts to demonstrate the effects of undersowing on the cereal and the effect of the crop on the medics ability to set seed.

TRIAL DETAILS

1. Sown 27th May 1985.
2. Site sprayseeded at 2 L/ha 10 days prior to sowing.
3. Wheat (Aroona sown at 50 kg/ha).
4. Medic sown at 0, 2, 4, 8 kg/ha with the wheat.
5. Super phosphate drilled at seeding at 150 kg/ha.
6. 40 kg/ha nitrogen topdressed on wheat on the 29th July, 1985.
7. Hoegrass applied to the site at 1.5 L/ha 3rd July, 1985.

RESULTS

Burr medic was observed to compete with wheat at an early stage as wheat density was reduced by 26% when sown with 8 kg/ha of burr medic as compared to a wheat monoculture. Wheat was also observed to reduce medic density by 21% where undersown medic at 8 kg/ha had a density of 79 plants/m^2 and the monoculture a density of 100 plants/m^2. These effects were reflected in wheat and medic dry matter and grain and seed yields (Table 1). Wheat dry matter and grain yield was reduced by 48% and 49% when undersown with 8 kg/ha of medic. Dry matter and seed yields of medic sown at 8 kg/ha were reduced by 29% and 38% respectively when compared to a medic monoculture.

Undersowing may provide one means of establishing a burr medic pasture as 2 kg/ha sown under a cereal crop gave in excess of 100 kg/ha of seed for regeneration, however, the benefits to pasture establishment have to be weighed against the loss of both crop and medic production if both were sown as monocultures. Other factors such as the flexibility for in-crop broadleaf herbicide control and medic regeneration in the second year also need to be considered.

Table 1. The effect of undersowing burr medic on wheat and medic production

	Establishment count plants/m^2 Wheat	CV	Dry matter (7.10) t/ha Wheat	CV	Grain yield t/ha Wheat	Seed yield kg/ha CV
Wheat	120		4.46		1.67	
Wheat + 2 CV	99	25	3.78	2.26	1.41	144.7
Wheat + 4 CV	103	44	3.05	2.76	1.13	125.3
Wheat + 8 CV	89	79	2.33	3.68	0.85	318.3
CV (2 kg/ha)		33		3.28		159.3
CV (4 kg/ha)		52		4.30		280.0
CV (8 kg/ha)		100		5.22		512.7

CV = Circle Valley burr medic

433