



1978

## Pasture species investigations, wheat belt.

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SUMMARY REPORT, 1978

PASTURE SPECIES INVESTIGATIONS

WHEAT BELT

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Plant Research  
Division

### 1.0.0 Trials in Progress

The grazing trial at the Wongan Hills Research Station, 71WH13, and 70ME2 Walgoolan, were sown to wheat in 1978. Trial 71LG17, comparing production from medic and volunteer pastures was grazed for the last year before the final wheat crop. In 1977/78, differences in production from sheep on different treatments in trial 68MO23 were small, a feature which in combination with the seriously degraded condition of the lucerne pastures resulted in the termination of the experiment at the end of March 1978.

Dry weather in 1977 reduced the 1976 series of early-maturing subterranean clover trials sown by District Offices to three, and the 1977 series to five. Eight more trials were sown in 1978, but although weather conditions were generally better this year, some trials suffered from a late start and a dry August.

Dwalganup crossbred subterranean clover strains were hand sown into trial 78KA12, east of Katanning, and 78C13 at the Chapman Research Station. Both sites were extremely weedy and growth at Katanning was further retarded by drought.

At Newdegate Research Station the subterranean clover competition trial (75N18) was sown to wheat and the small-plot subterranean clover strain trials were continued.

### 2.0.0 Seasonal Conditions

Although for the most part the season was a good one for crops it was by no means ideal for pastures. In many districts April rains were above average but those for May were little more than half the average. In many districts a tardy opening was followed by below average rains in June, good rains in July, a dry August and further good rains in September. Unfortunately the early rain pattern gave capeweed, erodium and doublegees a good start on the clover and a comparative advantage in the dry August. Weeds were a problem and clover growth disappointing.

This report covers observations on trials during the growing season of 1978, summarised under the following headings:

#### 3.0.0 Grazing Trials

3.1.0 68MO23

3.2.0 71LG17

3.3.0 71WH13

#### 4.0.0 Small-plot Trials

4.1.0 Early-maturing Subterranean Clover Trials

4.1.1 Trials in Collaboration with District Offices

1976 Series

1977 Series

1978 Series

- 4.2.0 Subterranean Clover Trials, Southern Wheatbelt
- 4.2.1 75N18, Subterranean Clover Competition Trial
- 4.2.2 Subterranean Clover Strain Trials, Hand-sown.

1. Lake King

75LG21 and 76LG23

2. Newdegate Research Station

a) 76N16 and supplement 77N23

b) 76N17, 76N18 and supplements

4.3.0 Dwalganup Crossbred Trials, 78KA12 and 78C13

4.4.0 Medic Trials, 75M025 and 75ES23

3.0.0 Grazing Trials

3.1.0 68M023 - Legume Species Grazing Management Trial

Locality: R. Isbister, West Moora

Soil Type: Deep Yellow Sand

History: Original vegetation dominated by blackbutt.  
Trial sown on virgin soil.

Fertilizer: 2,018 kg superphosphate a hectare plus trace elements (including cobalt) have now been applied.

Treatments:

1968 - 1973; Pastures (sub. clover, lucerne, W.A. blue lupins)  
1974; Wheat  
1975; New pastures as follows:

<u>Treatments</u>	<u>Code</u>	<u>Grazing Management</u>
Geraldton sub. clover	S	Continuous grazing
Hunter River Lucerne	L	4 - paddock rotation
Geraldton - lucerne mixture	SLM	4 - paddock rotation
Geraldton 75% + lucerne 25%	S/L $\frac{1}{4}$	2 - paddock strategic
Geraldton 50% + lucerne 50%	S/L $\frac{1}{2}$	2 - paddock strategic
Geraldton 50% + rose clover	S/R $\frac{1}{2}$	2 - paddock deferred spring
Geraldton 50% + serradella	S/Se $\frac{1}{2}$	2 - paddock deferred spring

Pastures

Dry conditions in 1977 reduced pasture growth on all treatments, sheep began to lose weight in December and it was anticipated that they would require supplementary feeding in the autumn. Differences in production between treatments were small and by late summer it was considered that continuation of the trial

would provide little additional information and that it should be terminated. It was indicated in the 1977 report that grass and other weeds were increasing on most of the subterranean clover treatments and that sub. clover was becoming more plentiful in the serradella pastures. By March, although lucerne was still maintaining the sheep, it was at the expense of the lucerne stands. Many of the plants at all stocking rates had been eaten down to the taproot and would not have recovered. It is most inadvisable to exhaustively graze pastures on these deep, yellow sands. Without plant cover the surface readily erodes. Sheep fed grain under these conditions ingest a lot of sand and the problem is aggravated when plants begin to germinate with the opening rains.

#### Soil Nitrogen Content

An important feature of this trial was the low wheat yield from the lucerne treatment (513 kg/ha) compared with subterranean clover (1078 kg/ha) in 1974. Another wheat crop in 1978 might have provided confirmatory evidence but it was not practicable to crop the trial again. As an alternative, the soil on all plots was sampled to a depth of 10 cm in 1978 and the samples analysed for total nitrogen.

#### Soil Nitrogen Content

Treatment	Sub-treatment	Percentage Soil Nitrogen			
		Sheep/hectare			Mean
		3.8	4.4	5.9	
Lucerne	Nil	.044	.044	.045	.044
Lucerne 25%	Lucerne	.039	.049	.045	.044
Sub. clover	Sub. clover	.050	.055	.051	.052
75%					
Lucerne 50%	Lucerne	.055	.051	.041	.049
Sub. clover	Sub. clover	.049	.049	.051	.050
50%					
Lucerne-sub. clover mixture	Nil	.049	.052	.049	.050
Sub. clover	Nil	.057	.054	.042	.051
$\frac{1}{2}$ Sub. clover	Sub. clover	.042	.047	.049	.046
$\frac{1}{2}$ Rose clover	Rose clover	.053	.054	.056	.054
$\frac{1}{2}$ Sub. clover	Sub. clover	.057	.044	.050	.050
$\frac{1}{2}$ Serradella	Serradella	.048	.042	.042	.044
Mean		.049	.049	.047	

In relation to the foregoing table it should be remembered that the trial was restructured in 1975 -

1. to eliminate redundant treatments such as rotationally grazed sub. clover;
2. to reduce the number of stocking rates from five to three; and
3. to duplicate treatments so that an error term could be calculated if warranted.

These changes involved the risk of differential carryover effects from past treatments, but this seemed to be preferable to persisting with the old design. The relationship of old and new treatments is shown below:

Treatments	
1975/78	1968/73*
Sub. clover (continuous) )	Same in both periods
Lucerne (rotational) )	
Sub. clover - lucerne mixture )	
Lucerne 25% + sub. clover 75% )	
Lucerne 50% + sub. clover 50%	Subterranean clover
Sub. clover 50% + serradella 50%	Sub. clover 75% + lupins 25%
Sub. clover 50% + rose clover 50%	Lucerne 75% + lupins 25%

\* At least 5 out of 6 plots of the 1975 treatments were sown on the 1968/73 treatments indicated.

As shown in the table, the most important 1968/73 treatments were resown on the same areas and it can be seen that the nitrogen percentages for Lucerne and Lucerne 25% are similar. The half plots of lucerne in the Lucerne 50% treatment were sown on old clover plots which may explain the slightly higher nitrogen figure.

The Lucerne-Sub. Clover Mixture at .050 per cent is close to the Sub. Clover mean of .051. This would be expected because the treatment in both periods has been dominated by sub. clover, the first period more than the last.

The serradella was mainly sown on old lupin subplots and gave a figure of .044%, the same as lucerne, and compared with a mean of .050% for the associated sub. clover subplots. Wheat following lupins also gave low yields (695 kg/ha) in 1974.

Rose clover subplots were also sown mainly on old lupin plots, but in contrast to serradella, gave a mean of .054% N, two plots averaging .061%.

## Sheep

### 1. Liveweight

Gains and losses in liveweight were similar between treatments from October to the end of January. In January all sheep were grazed in common on the Badgingarra Research Station while being shorn and dipped (Jan. 5 to Feb. 1). The downward trend in the continuously grazed subterranean clover continued until the end of March, but for some unknown reason was checked on the rose clover and to a greater extent on the serradella. The lucerne plots benefited from the respite from grazing and from rain, and the effect is shown in increased weights from February to March. It was surprising that a similar lift was not shown by the sub. clover-lucerne mixture which had consistently given high liveweights since 1976. Though the weights were still good at the end of March, there would have been a rapid decline from then onward.

### 2. Wool

#### Clean Wool and Fibre Diameter per Sheep

(shorn 6/1/78)

Treatment	Clean Wool kg	Fibre dia. $\mu$	Wool wt. Relative to sub. clover = 100	
			1977/78	1976/77
S	3.57	23.59	100	100
L	3.65	24.01	102	104
S/L $\frac{1}{4}$	3.59	23.63	101	103
S/L $\frac{1}{2}$	3.62	24.22	101	102
SLM	3.82	23.82	107	108
S/R $\frac{1}{2}$	3.59	23.20	101	103
S/Se $\frac{1}{2}$	3.61	23.81	101	101

Clean wool yields in 1977 differed little between treatments but showed a further reduction in the influence of lucerne. Very little lucerne was left in the half-plot and quarter-plot treatments, the lucerne sections being dominated by grass. The superiority of the clover-lucerne pasture in promoting live-weight was repeated in wool production.

### 3.2.0 71LG17 - Comparison of Production from Cyprus

#### Barrel Medic and Volunteer Pasture

Locality: H. Marshall & Sons, Lake Grace

Soil Type: Red-brown loam overlying clay at 10-15 cm, originally carrying salmon gum.

History: Not available before 1966. 1966 to 1970 inclusive, Legume Species Grazing Trial, 66LG11.  
1970: Barley.  
1971 to 1974: Grazing trial comparing woolly clover-barley grass pasture and Cyprus medic pasture. Two sub-treatments, superphosphate (101 kg/ha/year) and no superphosphate. Three stocking rates and two replications.  
1975: Wheat. No superphosphate.  
1976: Grazing trial comparing naturalised pasture with Cyprus barrel medic pasture in a wheat:pasture rotation. Superphosphate applied only to the crop. Stocked at 5.9 and 7.4 sheep a hectare. Two replications.  
1977: Wheat  
1978: Pasture

Fertiliser: 706 kg/ha superphosphate applied to experiment from 1966 to 1970.

1971 to 1974: 404 kg/ha on half the area and none on the other half.

#### Wheat 1977

As shown in the last report, the barrel medic treatment yielded no more wheat than the woolly clover pasture, but from results received recently the nitrogen content of the grain was consistently higher:

#### Nitrogen Content of Wheat

Treatment	Sh/ha	Nitrogen (%)			
		Rep. 1	Rep. 2	Rep. 3	Mean
Cyprus medic	4.9	2.84	2.30	2.95	2.70
	7.4	2.64	2.88	2.77	2.76
Mean		2.74	2.59	2.86	2.73
Volunteer	4.9	2.65	2.04	2.20	2.30
	7.4	2.52	2.58	2.30	2.47
Mean		2.59	2.31	2.25	2.38



These results probably indicate that under the prevailing environmental conditions both treatments had sufficient soil nitrogen for maximum crop yield, but that more nitrogen was available on the medic treatment and was expressed as higher grain protein.

### Pastures

Inspection of the pastures in 1978 indicated that the short rotation of alternating wheat and pasture had had the desired effect of reducing grass and increasing clover. In September, following a wheat crop in 1977, all pastures had rarely looked better.

### Percentage Herbage Cover, September 1978 and 1973 and Seed Yield 1977

Treatment	sh/ ha	Seed kg/ ha 1977	Herbage Cover (%)						
			Legume 1978 1974**		Grass 1978 1974		Weeds 1978 1974		Bare Ground 1978
Cyprus medic*	4.9	39.0	54.2	17.6	45.5	81.3	0	1.1	0.3
	7.4	17.5	48.2	30.8	40.3	68.9	1.7	0.3	9.8
Mean		28.3	51.2	24.2	42.9	75.1	0.9	0.7	5.0
Volunteer	4.9	n.a	33.0	18.2	56.0	74.1	2.1	7.7	8.9
	7.4	n.a	44.3	30.5	47.8	69.4	1.9	0.1	6.0
Mean			38.7	24.3	51.9	71.8	2.0	3.9	7.4

\* Woolly clover was present in most plots but below 10% of the legume component except in one high stocking rate plot where it amounted to 45% of total legume.

\*\* The analysis for 1974 is not strictly comparable with that for 1978 because it is based on weight by separation whereas in 1978 the estimates were made visually by placed quadrats. The low-stocking rate results for 1974 are the means of pasture composition at 3.7 and 5.8 sheep a hectare.

The seed yields shown in the table are the residual amounts after grazing through the summer of 1976/77, followed by a wheat crop. This seed produced a very good medic stand in 1978.

## Sheep

### 1. Liveweight

Trial sheep were admitted to the wheat stubbles on February 23. This proved to be too early and critical losses of weight in April made it necessary to feed oat grain from April 17 to May 9 (Figure 2). Supplementary feeding should have continued longer on the high stocking rate treatments which were still producing insufficient feed for maintenance in late June. At this time resumption of grain feeding was contemplated but instead the sheep were taken off the plots for shearing on July 7 and not returned until there was sufficient feed on August 22.

The improvement in liveweight on the low stocking rate medic during March is difficult to explain. It seems unlikely that improved stubble quality would have been responsible and medic burr would have been scarce. Twenty millimetres of rain on April 18 germinated barley grass and ryegrass but it was noted that medic was slow and the plots were relatively bare.

In general the early part of the season was difficult. Eight millimetres of rain fell on May 28 followed by a further dry period until 16 mm fell on June 21 and 22. The decline in liveweight on the 7.4 sheep/hectare plots, which would actually have continued until July 7, indicates the state of the pastures. Relief from grazing for 46 days rectified the position but with little margin on the high stocking rate treatments.

### Wood Production 1977/78

Treatment	S.r.	Greasy Wool (kg/sh)* 11/7/77-10/7/78
Cyprus medic	5.9	5.7
	7.4	5.0
Treatment mean		5.4
Volunteer	5.9	5.5
	7.4	4.8
Treatment mean		5.2

\* Clean wool yields and fibre diameter not yet available.

From April 6, 1977 to February 23, 1978 the trial sheep were off the experiment grazing with a farm flock. From February 23 to July 7, or about 37 per cent of the year, they grazed the trial. This period is short, but as it includes the most difficult time of the year and the sheep had identical feed conditions, the slight advantage indicated for barrel medic was probably a real one caused by the trial pastures. The favourable margin is not as great as last year because the main advantage of medic compared with woolly clover pasture in this environment appears to be its capacity to support sheep better in the summer and autumn.

### 3.3.0 71WH13 - Comparison of Production from Tornafield Medic, Serradella and Subterranean Clover

Locality: Paddock 3, West A, Wongan Hills Research Station.

Soil Type: Yellow, loamy sand to 30 cm depth overlying yellow-brown, gravelly, sandy clay loam. The site originally grew tamma and low mallee.

History: Virgin land cropped to barley in 1970.

Fertiliser: 1515 kg/ha superphosphate (plus trace elements) from 1970 to 1977 inclusive.

Treatments:

1. Geraldton subterranean clover.
2. Tornafield medic.
3. Pitman serradella.
4. Uniserra serradella.

Northam subterranean clover was sown at 22.4 kg/ha into the Pitman serradella plots in May 1973.

Two replications.  
Plot sizes: 1.01 and 1.35 hectares.

1975: Sown to Gamenya wheat at 40 kg/ha with 100 kg/ha superphosphate.

Stocking rates: 3.7 and 4.9 sheep/hectare.  
1976, 1977 Pasture. 1978, Wheat with nitrogen rate trials superimposed.

### Sheep

Dry conditions up to July and again in September, 1977, reduced growth of pastures and sheep had to be removed on February 23, 1978. Mean liveweights of sheep in kilogrammes at that time were Tornafield 59.6; Northam 52.4; Geraldton 49.5 and Uniserra 48.2. The sheep were shorn on March 23, 1978.

Clean Wool Yields and Fibre Diameter, 1977/78

Pasture	S.r. sh/ha	Clean Wool kg	Fibre dia. μ
Tornafield	3.7 5.9	3.7 4.2	24.8 22.8
Mean		3.95	23.78
Northam	3.7 5.9	4.0 3.9	23.8 22.7
Mean		3.95	23.25
Geraldton	3.7 5.9	3.8 3.5	23.5 23.1
Mean		3.65	23.30
Uniserra	3.7 5.9	3.9 2.8	22.9 21.1
Mean		3.35	22.00

The order of clean wool yields between treatments was the same as for 1977 with Tornafield and Northam equal and slightly ahead of Geraldton, and Geraldton better than Uniserra. The differences resulted from the high stocking rate yields.

During the course of this trial Tornafield steadily improved. It showed a capacity to adapt to soil conditions, two plots out of four being on less suitable soil and producing relatively poorly for the first three years. It has persisted well under dry conditions and seeded adequately in difficult years. Provided that aphids do not become a problem, this and other strains of M. tornata appear to have a sound potential in Western Australia. The performance of Northam supports the claim that in certain districts it is as good or better than Geraldton and has the additional advantage of lower oestrogen content.

## Wheat

### (a) Protein Content of Wheat Grain, 1975

Treatment	S.r.	Crude Protein %	Yield of wheat kg/ha
Geraldton	3.7 5.9	12.8 13.8	3039 3399
Mean		13.3	3219
Northam	3.7 5.9	10.8 12.6	2592 2856
Mean		11.7	2724
Tornafield	3.7 5.9	10.6 10.7	2416 2358
Mean		10.7	2387
Uniserra	3.7 5.9	9.9 10.4	1970 2073
Mean		10.1	2022

The above figures for grain protein content were received recently and agree well with the grain yields and with the amount of legume present in the pastures prior to 1975.

### (b) Wheat 1978

In 1978 wheat was sown under good conditions and developed into an even crop of uniform good colour. Weed control was excellent.

Nitrogen trials, comprising 7 rates by 3 replications were superimposed on each grazing trial plot by M. Mason and W. Bowden. Responses could be seen on all grazing trial treatments during the growth of the crop but were most obvious on the high stocking rate serradella. It is hoped that differences in grain yield may give some measure of the effectiveness of legume fixation in terms of fertilizer nitrogen.

71WH13 - WHEAT YIELDS 1978

PASTURE SPECIES	Rate of Ammr. Nitrate on Crop		5.9 Sheep/hectare		3.7 Sheep/hectare	
	REP 1	REP 2	REP 1	REP 2	REP 1	*REP 2
Tornafield Medic	NIL	NIL	1978	1747	2029	1371
	45	40	2007	1673	2062	1422
	75	80	1950	1667	2068	1371
	120	120	1932	1693	1974	1345
	160	165	1874	1659	2007	1393
	225	222	1924	1727	1968	1356
	450	444	1838	1613	1891	1342
Geraldton Subclover	NIL	NIL	2159	1744	1508	1774
	45	40	2140	1758	1460	1787
	75	80	2133	1777	1524	1754
	120	120	2144	1788	1565	1696
	160	165	2082	1780	1404	1693
	225	222	2093	1791	1438	1638
	450	444	1962	1590	1416	1416
Northam A Subclover	NIL	NIL	1988	1558	1908	1864
	45	40	2014	1465	2002	1854
	75	80	1783	1517	1953	1856
	120	120	2067	1654	1950	1799
	160	165	1976	1566	1881	1797
	225	222	1965	1529	1917	1859
	450	444	1828	1427	1832	1697
Unisera Serradella	NIL	NIL	1900	1624	1938	1745
	45	40	1997	1694	1967	1737
	75	80	2037	1663	2035	1764
	120	120	2104	1710	2062	1740
	160	165	2058	1755	2035	1735
	225	222	2067	1685	1973	1725
	450	444	1954	1674	1952	1594

\* Some trampling by kangaroos

MEAN OF NILS = Tornafield 1781 kg/ha, Geraldton 1796 kg/ha,  
Northam A 1830 kg/ha, Serradella 1802 kg/ha.

#### 4.0.0 Small - Plot Trials

#### 4.1.0 Early - Maturing Subterranean Clovers

#### 4.1.1 Trials in Collaboration with District Offices

Five early-maturing subterranean clover strains, Nungarin, 239.2, 584.1B, Northam and Geraldton were sown in randomised blocks with four replications at nine wheatbelt sites in 1976, thirteen sites in 1977 and a final eight in 1978. Average annual rainfall ranged from 275 to 400 mm, average growing seasons from three to four months, and soils were mainly sands and sandy loams. Plot size was 4.22 metres x 40 metres in most trials. Superphosphate was generally applied at 200 kg/ha and seed at 30 kg/ha. Copper, zinc and molybdenum were added where required.

Because under dry conditions and/or grazing there is little measurable growth on wheatbelt pastures, and because the ability to persist is considered to be the most important characteristic in early-maturing clovers, the main criteria used in assessing these trials was plant density or cover and seed yields. Plant counts were used in the year of establishment but were replaced by point quadrat counts or visual rating in later years. The ratings presented in these results are the mean scores of three observers working independently. Varieties were not identified until scores had been recorded. Where percentage clover cover only was visually estimated, judgement was made from 20 random placements of a 0.35 m<sup>2</sup> quadrat. Rating scores given are strictly comparable between varieties but they also indicate the relationship to a well grown sward.

In 1978 it was hoped to estimate dry matter production on at least some of the trials, but drought at some sites and heavy weed infestation at others frustrated the attempt.

#### 1976 Series

Three trials of the 1976 series survived to 1978: 76ME6 (Noongar), 76NA6 (Karlgarin) and 76LG5 (Lake King). The rest either failed in the first year or could not manage two dry years in succession. The failures were absolute and no distinction could be made between clover varieties.

Clover Cover, July and September

Strains	July		September	
	Clover plants/dm <sup>2</sup> Noongar	Clover cover (%) Karlgin	Growth and cover rating 0 - 5 Lake King Karlgin	
Nungarin	1.24	31.0	3.13	2.22
Northam	1.42	23.0	3.60	2.35
Geraldton	1.20	28.8	3.44	2.33
239	1.03	29.0	3.29	3.16
584	0.82	28.5	3.13	2.28

Clover Cover and Botanical Composition

76LG5, Lake King

Strains	Clover Cover (%) July		Plant Cover (%) September - Grazed			
	Not Grazed	Grazed	Clover	Cape-weed	Other weeds	Bare Ground
Nungarin	65.0	66.0	48.7	36.1	3.7	11.5
Northam	49.0	79.0	56.9	29.9	1.0	12.2
Geraldton	71.0	64.0	62.3	23.8	1.4	12.5
239	65.0	69.0	55.0	25.5	1.5	18.0
584	63.6	68.0	53.0	37.1	0.9	9.0
Geraldton buffer			69.5	27.5	0	3.0

Comments:

76ME6, Noongar - This trial was not rated in September but it was noted that despite an admixture of capeweed and doublegees, clover was well distributed through the plots. Growth and cover of Nungarin and 239 appeared to be slightly better than that of Northam and



Geraldton, but the distinction was a fine one.

584 was less growthy, more stemmy and prostrate and did not look as healthy as the other varieties. The trial was in a stubble paddock and had been leniently grazed.

76NA6, Karlgarin - When inspected in the summer of 1977, this trial was very bare and had been scoured by wind. In September, the trial and the surrounding paddock were dominated by a heavy growth of capeweed. Sheep were grazing the area but had no chance of controlling the herbage. 239 was clearly the best looking strain in September and Nungarin was not impressive.

76LG5, Lake King - When the percentage clover cover was estimated in July, an area was still fenced off and the grazed and ungrazed sections were assessed separately. The whole area was being grazed in the spring and no effect of earlier subdivision was noticeable. This trial has been a good one, notable for high seed yields from Nungarin (2 years) and 239 last year. On the other hand, Northam seed yields were relatively low in this trial and very low in 76NA6, but as in a number of earlier trials the disparity in seed yields was not reflected in subsequent clover cover.

The buffer plot of Geraldton in the last table was included as corroborative data for that variety, but also because it was sown with uninoculated seed.

#### 1977 Series

Thirteen trials with the same clover varieties and the same design were sown in 1977, and of these, five set sufficient seed to re-establish in 1978.

# Clover Cover or Density

July 1978

Strains	Cover (%)*		Plants/dm <sup>2</sup>			
	Hyden	Lake King	Yelbeni	South Yilgarn	Mount Walker	Mean
Nungarin	47.8	69.5	3.01	5.60**	1.35	3.32
Northam	43.0	52.0	1.13	3.08	0.92	1.71
Geraldton	47.3	58.0	1.95	4.16	1.30	2.47
239	38.5	57.5	1.67	3.90	0.89	2.15
584	45.5	66.8	2.52	3.17	0.76	2.15

\* Visual estimation by quadrat

\*\* Mean of 6 plots instead of 3 or 4 for other strains, including 2 exceptionally good plots. The mean for the other 4 plots was 3.72.

All these trials except the one at Lake King (77LG7) were in grazed pasture paddocks. Nevertheless, 77LG7 looked well with excellent clover cover and no weed problem. At Hyden there was a reasonable cover of clover under heavy grazing; at Mt. Walker the clover was sparse but healthy, grazed lightly by cattle and tending towards capeweed dominance; at Yilgarn the clover had made little growth and was being leniently grazed by sheep. Cover was good and there were few weeds. Growth of clover at Yelbeni was poor with sparse and uneven cover.

A feature of these regeneration estimates was the consistently good ratings of Nungarin and Geraldton and the relatively poor figures for Northam.

## Plant Cover and Composition

Hyden, September 1978

Strains	Cover and Composition (%)*			
	Clover	Capeweed	Other Weeds	Bare Ground
Nungarin	47.0	26.3	11.2	15.5
Northam	37.8	22.5	15.7	24.0
Geraldton	45.8	24.8	7.9	21.5
239	48.5	21.5	15.3	14.7
584	48.2	17.3	16.5	18.0

\* Estimated by point quadrat

# Growth and Cover Ratings

September 1978

Locality	Growth and Cover Rating (0-5)				
	Nungarin	Northam	Geraldton	239	584
Mt. Walker*	1.50	1.56	2.44	1.75	1.00
S. Yilgarn**	3.60	2.87	2.83	3.33	3.23
Lake King	3.81	3.54	4.04	3.33	3.69
Mean	2.97	2.66	3.10	2.80	2.64

\* Grazed. Dense short capeweed. Poor clover, obviously affected by drought.

\*\* Scored mainly on cover. Growth poor.

In September, Nungarin was more or less on par with Geraldton. Northam had improved slightly but was still generally the least impressive of the five strains.

The trial at Mt. Walker was disappointing. Clover was unhealthy, reddish in colour and sparsely nodulated. Capeweed was short and dense and tended to obliterate the clover. Drought was largely responsible for the poor showing but there may be a case for trying medics such as Tornafield and Harbinger on these soil types.

## 1978 Series

The location of trials sown in 1978 and indications of soil and climate are shown below:

Trial No.	Farmer	District	Surface Soil	Average* Rainfall mm	Growing Season Months
78GE5	Thomas	Pindar	g,y,l-s	275	3-
78TS4	Curtin	E. Bunjil	b,y,s	358	3½
78ME5	Blyth	Bodallin	r,b,l-c	297-	3½
78ME6	Bayly	Wilgoyne	b,s-c-l	287	3-
78MO9	Syme	Wubin	b,l-s	365-	3½
78NA7	Pontifex	Corrigin	r,b,c-l	384	4½
78NO5	Trenorden	Yelbeni	y-b,s-l	333-	3½
78LG7	Pannell	Lake King	g,y,s	348	4+

b = brown r = red y = yellow  
c = clay g = gravel l = loam s = sand

\* Minus signs in this column indicate that the site is east or north of the recording station and may receive less average rainfall than shown.

Early establishment on most of the trials in 1978 was satisfactory. On some trials variability both within and between plots was increased by the roughness of the seedbed and/or faulty drill operation.

Plant Density, July 1978

Locality	Seedlings/dm <sup>2</sup>				
	Nungarin	Northam	Geraldton	239	584
Pindar	2.26	2.66	1.92	1.90	1.53
E. Bunjil	1.49	2.88	1.48	1.53	2.27
Bodallin	2.17	2.02	2.02	1.68	1.82
Wilgoyne	1.81	1.86	1.55	1.55	1.30
Corrigin	2.43	1.74*	2.00	1.97	2.41
Lake King	1.48	1.93	1.32	1.45	1.53

\* Northam seed was spilled and sown at 75% the rate of other varieties.

Plant density was not estimated on the trial at Yelbeni and only eight plots were counted at Wubin. Weeds made direct counting very slow at Wubin, so cores were taken along the rows. Core counts gave numbers of plants per decimetre ranging from 0.97 to 1.79.

Except at Yelbeni and Pindar, the trials were sown in cropped paddocks which gave them the benefit of routine tillage and protection from grazing until after harvest. At Pindar the trial area was fenced to exclude stock.

The trial at Wubin was infested with doublegees, capeweed and wild turnip and was treated with 'Sprayseed' at 700ml/hectare in late July. Apparently the weeds were too far advanced and the herbicide had little effect. Seeding of the Bunjil trial was uneven, with seedlings more than usually discontinuous in the rows and some sections of drill runs entirely devoid of plants.

Growth and Cover Ratings

September 1978

Locality	Growth and Cover (0-5)				
	Nungarin	Northam	Geraldton	239	584
Lake King	4.33	4.45	4.33	4.28	4.63
Bodallin	3.19	3.19	2.57	3.38	2.63
Bunjil	3.13	3.63	2.13	3.12	2.88
Mean	3.55	3.76	3.01	3.59	3.38

Cover and Composition

Wubin, September 1978

Strains	Cover (%)		
	Clover	Weeds	Bare
Nungarin	6.1	37.7	56.2
Northam	17.7	31.9	50.4
Geraldton	6.8	49.5	43.7
239	8.7	34.2	57.1
584	15.4	35.0	49.6

The two best trials in this series were 78NA7, Corrigin and 78LG7, Lake King. 78NA7 was ungrazed and the only trial which justified yield assessment. The treatments were relatively free of weeds, well grown and very similar in growth and cover. Kilogrammes per hectare of dry matter were estimated by capacitance meter to be: Nungarin 4380, Northam 4260, Geraldton 3860, '239' 4420 and '584', 4140. These estimates may appear high but the calibration samples were cut at ground level and contained a large proportion of coarse stem.

78LG7 was the last of three very satisfactory trials planted adjacent to one another at Lake King. Cover and growth was even, weeds were not excessive and had been controlled by timely flash grazing. The Lake Grace office is to be commended for their attention to, and interest in these trials.

4.2.0 Subterranean Clover Trials, Southern Wheat Belt

4.2.1 75N18 - Subterranean Clover Competition Trial

Locality: Paddock S2, Newdegate Research Station  
Average annual rainfall: 363 mm  
Growing season: 5½ months

Soil: Yellow sandy loam with lateritic gravel.  
Setting surface.

Fertiliser: 1975: 150 kg/ha plain superphosphate and  
150 kg/ha No. 2 trace element - super.  
1976, 1977: 135 kg/ha plain superphosphate.

Design: 8 sub. clover strains sown at equal seeding rates with Dwalganup sub. clover in a randomised block replicated three times. Plot size 2.11 m x 20 m.

### Strain Composition and Seed Yields 1977

	Dwalganup		Test Strain		Other Strains		Total Plants/ row	Seed kg/ ha
	Mean plants/ row	%	Mean plants/ row	%	Mean plants/ row	%		
Bellevue	10.7	45.0	12.6	52.9	0.5	2.1	23.8	259
Spencers Brk	8.9	30.4	12.8	43.7	7.6	25.9	29.3	197
Shenton Pk A	7.8	30.7	17.3	68.1	0.33	1.2	25.4	181
Nungarin	10.9	40.5	7.3	27.1	8.7	32.3	26.9	159
Northam	8.7	38.3	13.7	60.3	0.33	1.4	22.7	149
Daliak	3.6	16.4	17.7	80.4	0.7	3.2	22.0	146
Northam F	9.4	30.6	6.3	20.5	15.0	48.9	30.7	143
Northam C	9.0	34.1	7.2	27.3	10.2	38.6	26.4	118

The seed set on this experiment in 1977 was sampled in March 1978 and three rows of 100 scarified seeds planted out from each plot for identification. The mean numbers of plants per row and the percentage composition of the subterranean clover strains are shown in the above table.

The rows were planted at the end of May under good conditions. Germination was poor and early growth was slow. In 1977 about 50% of the seed germinated but in 1978 it was nearer to 25%. Even with this low figure, treatment estimates were based on a mean of about 230 plants which was considered to give a reliable estimate of mixture composition.

Difficulty has always been experienced in the accurate identification of the test strains but in 1975 classification of plants into Dwalganup and 'other' was judged to be adequate. However, in 1976 the spread of strains between plots was noticeable particularly with Spencers Brook and Northam F. In both 1977 (1976 seed) and 1978 (1977 seed), rows of pure strains were planted to assist in the identification of the test strains.

It can be seen in the table that in addition to a high proportion of volunteer strains in Spencers Brook and Northam F, they were also plentiful in the Nungarin and Northam C treatments. The contaminant strains in the Nungarin seed were mainly either Daliak or Shenton Park A. With Northam C the distinction was based on the anthocyanin flush which in the contaminant was quite unlike that described for Northam C or to be seen in the pure strain row; nor could the plants be identified with confidence as any other strain in the trial.

Because no contamination has been shown in Nungarin in previous years and it has constituted a high proportion of the pasture, it is possible that seed of Daliak and Shenton Park A may have been introduced from adjacent plots by faulty sampling.

Unfortunately, no such simple explanation can be suggested for Northam C, nor was there any evidence of incorrect sampling in other strains.

Daliak, Shenton Park A and Northam retained their leading positions in competition with Dwalganup, but with slightly reduced margins compared with the composition shown in 1976.

This trial was sown to wheat in 1978.

#### 4.2.2 Subterranean Clover Strain Trials, Hand-Sown

##### 1. Lake King, 75LG21 and 76LG23

#### Growth and Cover Ratings

September 1978

Strains	Ratings (0 - 10)	
	75LG21	76LG23
Dwalganup	6.4	6.6
301.1.3B	5.7	7.2
92B	5.6	5.6
29B	5.1	3.3
Northam	5.0	6.0
Nungarin	4.7	5.8
Geraldton	4.6	4.0
584.1B	4.6	5.5
547	4.5	3.5
74B	4.4	3.8
239.2	4.2	5.0
492.1.3	4.0	3.7
503.1B	3.8	4.6
337.1.3		

Dwalganup was consistently best over the period of these trials.

301.1.3B showed up well in 1977 and maintained its superiority in 1978. Nungarin improved steadily in 75LG21 from being one of the poorest strains in 1975, and both it and Northam have been consistently good.

These trials have now been mutilated by seed sampling, have spread irregularly into the buffer areas and have never been grazed. They cannot be accurately sampled for seed this year and from the point of view of strains and management are possibly now redundant. It is suggested that if there are any strains of particular interest to the ongoing breeding programme they should be permanently marked and observed, but the trials as such should be terminated.

##### 2. Newdegate Research Station

Some clover plots in 76N16, 76N17 and 76N18 were thought to have suffered bias by being located on shallow soil overlying laterite. The strains sown on these plots were planted

again in 1977 as supplements to provide additional observations. Supplements to 76N16 and 76N17 were sown in duplicate and the supplement to 76N18 in single plots. The latter (77N23) contains plots of strains sown in 1976 and also additional strains.

Growth in these trials has never been spectacular. The soil is stony and shallow and subject to wind erosion. Sampling for seed aggravates erosion on the small plots and it is deemed inadvisable to sample any of these trials routinely in future.

In 1978, immediately following the opening rains and when the erosion risk was low, the trials were disc cultivated to break up clumps of clover and get a better distribution of burr within the plots. The treatment was only partly successful. Although a proposal to graze the area was discussed with the station manager, arrangements were not finalised and the plots were not grazed. If the trials are continued in 1979, some form of grazing should be introduced. For a start, thorough grazing at intervals would be preferable to continuous grazing.

(a) 76N16 and Supplement 77N22

Growth and Cover Ratings

September 1978

Strains	Ratings (0 - 10)	
	76N16	77N22
Mt. Helena A	4.8	5.6
239.2	4.4	2.6
Nungarin	4.2	n.a
Shenton Pk. A	4.2	n.a
Northam C	4.2	n.a
Bellevue	4.2	4.6
19834	3.8	5.0
Geraldton	3.6	3.6
Seaton Pk.	3.4	8.0
Dalkeith	3.2	n.a
Daliak	3.2	n.a
Dwalganup	3.0	5.6
337.1.3	2.8	n.a
584.1B	2.6	n.a
Northam	1.8	3.6

(b) 76N17, 76N18 and Supplements

These trials were sown for long-term observation. Ratings have been made to gauge progress, which was definitely negative in 1978. Neither growth nor cover was good for any of the strains but the best were judged to be as follows :-



<u>76N17</u>	<u>Supp. 77N24</u>	<u>76N18</u>	<u>Supp. 77N23</u>
Canberra 428	Lake Widgeon	Dalk./Nor.A2	Lk. Clare/NorC
Spencers Brk.	Baulkamaugh	Mt.Hel/Dalk.	Daliak/NorC
65328E	Pinjarra A	MidB/NorC	MidA/Lk. Clare
Collie B	Lake Claremont	Ger/Mt. Hel A	Dalk/MidB
Pinjarra A	Northam F	Sh. Pk A/NorC	Dalk/47308E
65381A	Williams C	Sh Pk A/MidB	
12396B	47275		
Baulkamaugh	65328E		

#### 4.3.0 Dwalganup Crossbred Trials

Trials with crossbred strains of Dwalganup subterranean clover were established at Katanning (78KA12) and at the Chapman Research Station (78C13) in early winter, 1978. The design of the trials was a randomised block with 16 strains and 5 replications. Plot size was one metre by three metres.

Seed was inoculated and lime pelleted and broadcast on the plots at a rate of 36.7 kg/ha. Copper, zinc, molybdenum superphosphate No. 2 Mix was applied at 200 kg/ha. The seed and fertilizer were raked into the surface soil.

Plot 3 (BD43.2.3.1), 4 (ND 23.2.2), 5 (8B 19.2.2.2) and 7 (MD 7.4.2) in 78KA12 were not sown in one replication because of a mishap with the packets.

The Katanning trial was sown on May 31 and that at Chapman on June 14. Seeding conditions were good and germination was satisfactory at both sites. Chapman received better early rains than east Katanning and this was shown by the clover on the trials. Weeds rapidly got out of hand at both sites which were mown twice and then hand weeded in August and September. Both experiments were on old pasture land, but the problem at Katanning was caused by a bad opening in which weeds persisted and clover died and was aggravated by later dry spells which continued to discriminate against the clover. Nevertheless it was possible after weeding to rate 78KA12 as shown below, but no worthwhile assessment could be made on 78C13. Both trials are expected to seed adequately.

### Seedling Density and Growth and Cover Rating

Strains	78KA12		78C13
	Plants/dm <sup>2</sup>	Rating 0 - 5 September	Plants/dm <sup>2</sup>
MD 12.2.3	1.63	3.50	2.88
Daliak	2.82	3.15	2.61
8B 40.2.1	2.92	3.10	1.77
Nungarin	0.74	2.85	3.46
HD 20.1.2	2.15	2.80	2.23
8B 19.2.2.2	2.54	2.63	1.75
MD 7.4.2	1.61	2.63	1.97
MD 12.1.3.2	2.49	2.60	2.25
MD 7.1.3	1.58	2.60	2.25
BD 6.2.32	1.09	2.60	2.39
ND 23.2.2	1.05	2.50	2.02
Northam	2.22	2.50	2.59
8B 12.2.1.2	1.31	2.40	2.18
Dwalganup	2.15	2.30	2.12
BD 19.1.1	1.97	2.20	2.01
BD 43.2.3.1	1.67	2.13	2.43

The time and effort spent in controlling weeds in these trials indicated forcibly the need for careful site selection and preparation on old land. Time, suitable herbicides and tillage should be used effectively to give relatively weed-free conditions. Hand weeding of small plots is an expedient, but not an efficient practice.

#### 4.4.0 Medic Trials

##### 4.4.1 75M025 - Evaluation of Murrayland Medic

### Seed Yields 1977

Cultivars	Seed Yields (kg/ha)			
	P1*	P2	P3	Mean
Tornafield	248	327	295	290
Murrayland	138	97	142	126
Harbinger	120	163	130	138
Mixture	158	n.a	n.a	
Mean (excl. Mix.)	169	196	189	

\*Planting times: P1 = May 5  
P2 = May 26  
P3 = June 16

This experiment has been terminated. It was located within the boundaries of 68M023 on Mr. Isbister's property, Moora, and was taken over by the farmer with that trial in the autumn of 1978. Murrayland Medic had been tested for three years and had been shown to be no better than Harbinger and inferior to Tornafield on the yellow sands. The trial was not grazed systematically, but from what is known of Harbinger and Tornafield it is unlikely that hard grazing would have given Murrayland any advantage.

Results from an identical trial at South Perth in 1975 agreed with those at Moora.

#### 4.4.2 75ES23 - Evaluation of T. subterraneum subf.

##### Brachycalycinum and Annual Medics

##### Seed Yields 1977

Strains	Seed (kg/ha)
Geraldton	8.0
Northam	12.0
Tornafield medic	157.2
Murrayland medic	83.8
Harbinger medic	133.6
Burr medic 3121	43.5
Burr medic 4954	37.5
brach. sub. 19451	4.0
brach. sub. 12396B	4.0

There is no obvious justification for continuing this trial. The ranking of varieties over three years has generally been Tornafield > Harbinger > Murrayland > Burr medics = Geraldton and Northam sub. clovers > brachycalycinums. The trial has not been cropped as was originally planned, but cropping could not have made any important difference to the results. Tornafield and Harbinger medics grow well in the locality and there is scant chance that this trial would provide additional useful information, particularly in view of the new medics under test.