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1971

# Maintenance P and S for pastures in the low rainfall areas.

Tony Albertsen

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1971 FIELD EXPERIMENTAL RESULTS

T.O. ALBERTSEN

PLANT RESEARCH DIVISION

**TITLE:** Maintenance P and S for pastures in the low rainfall areas - 1923EX

**AIM:** To determine the best rates of Gypsum and a Phosphate Fertiliser required to maintain optimum pasture growth on old land.

**SITE HISTORY:** All sites on old pasture country (Geraldton sub clover/Cyprus Barrel Medic). Super application high and regular. Super history 1700 kg super/ha.

**COMMENCEMENT YEAR:**

1965	3 trials - 3 reps.	Res. Stn.
1966	7 trials - 1 rep.	Farm
1967	4	} to provide the 2nd rep. } of the 1966 trials. Farm.
1968	3	
1969	1 trial.	3 Rep. Res. Stn.

**1971 PROGRESS:** During the 1971 growing season

- a) 12 trials were under pasture. 11 of these were assessed by pasture cutting in winter. Overall poor growth due to moisture stress prevented a spring pasture cut assessment.
- On 3 trials (66M06, 67M01 and 68N05) P and S spot trials were applied. Again poor growth made assessment meaningless.
- b) 3 trials were cropped for the first time since their commencement. No fertiliser was used.
- c) 3 trials were cropped for the second time in succession, only two of which were harvested.

In 1970 these trials received no fertiliser. However in 1971 the trials had the pasture P and S rates drilled with the wheat. Here the farmers decided to crop the "trial's" paddock. Consequently these trials had to follow suit.

**1971 RESULTS:**

- a) Pasture

Equations of best fitting curves were calculated for the total available pasture and for the available clover for both the P and the S responses, on all the 11 assessed trials.

In all cases the P and S responses were non-significant.

However, from the highest point on each curve the corresponding P and S level was obtained and tabulated as the maximum P or S response (See Table 1).

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Moisture stress throughout the greater part of the growing season, as in 1969 and in 1970, has again resulted in poor growth and reduced the possibility of obtaining good results.

b) Crop

Statistical analysis have yet to be done, however it appears that significant quadratic curves may occur in two trials, viz. 67GE2 and 67NO5. (See Table 2).

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TABLE-1

MAINTENANCE P x S (LOW RAINFALL) /1923EX

## 1971 PASTURE RESULTS

Max P and Max S Response of the total Available Pasture and also the available clover.

EXPT NO.	66M06	67M01	68N05	68TS1	65A1	65C5	69WH15	66KA7	66LG1	68LG1	65N5
LOCATION	Pithara		Dangin	T. Springs	Beverley	Chapman	Wongan	Nyabing	Newdegate		N.Res.Stn
NAME	E. Butcher		A. Blake	M. Hebiton				R.Charsley	R. Lloyd		
SOIL TYPE	Sandy loam over clay and lime		Sandy clay loam	Clay loam over clay	Loamy sand over loam		Loamy sand	S. loam over G. loam	3-6" sand over clay		Sand over gravel
VEGETATION	Salmon Gum		York Gum Jam	Salmon Gum	York Gum Jam		Tamma	White Gum Salmon Gum	Salmon Gum Mallee		Mallee
PASTURE YEAR	6		5	6	1	2	5	1	1		1
DATE CUT	19.7.71		14.7.71	18.8.71	2.8.71	8.9.71	20.7.71	31.8.71	30.8.71	30.8.71	13.10.71
Total Pasture											
Max P Response	13.5 (Kg/ha)		3.4	3.4	3.4	13.5	5.2	6.7	6.9	8.3	10.1
Corr Coeff(R)	0.942		0.309	0.643	0.545	0.962	0.847	0.504	0.720	0.970	0.819
Max S Response	4.7 (Kg/Ha)		8.2	10.2	16.9	2.7	7.7	2.7	8.6	9.9	2.7
Corr Coeff(R)	0.159		0.722	0.774	0.986	0.536	0.734	0.718	0.782	0.580	0.788
Total Clover											
Max P Response	13.5 (Kg/Ha)		6.7	4.5	13.5	13.5	6.7	13.5	1.9	10.8	3.4
Corr Coeff(R)	0.949		0.632	0.303	0.850	0.962	0.576	0.567	0.984	0.372	0.592
Max S Response	9.3 (Kg/Ha)		5.5	9.0	13.1	2.7	11.3	9.3	6.9	2.7	2.7
Corr Coeff(R)	0.228		0.451	0.446	0.776	0.536	0.229	0.911	0.752	0.446	0.960

TABLE 2

4.  
 MAINTENANCE P x S (LOW RAINFALL)/1923EX.  
 1971 CROP RESULTS (Kg wheat/Ha).

EXPT NO.	67GE2		66 NA3	66ME3	1970*	66N09		67N05		
	Mendel		Narrogin	Belka		Tammin		Tammin		
LOCATION	E. Jacobs		R. Weiss	H. Perkins	J. S. Rodgers		A. Rodgers			
NAME	1971*		1971*	1971*	1970*	1971**	1970*	1971**		
CROPPING YEAR	Red Sandy loam		Grey loamy sand over clay	Gravelly sand over gravel	Mean (9 Trials)		Sand over gravel.			
SOIL TYPE	York Gum Salmon		White Gum Jam	Mallee	Tamma		Salmon Gum			
VEGETATION	TR	P S (Kg/Ha)								
	1	0 16.14	2070	665	2245	1560	2010	1465	1615	1680
	2	3.36 16.14	2050	875	2305	1540	2065	1465	1825	1795
	3	6.72 16.14	2325	805	1990	1575	1925	1350	1870	2415
	4	10.09 16.14	2280	590	2320	1600	2050	1465	1870	2085
	5	13.49 16.14	2170	250	2140	1655	2085	1540	1700	1650
	6	13.49 2.69	1975	410	2400	1585	2130	1575	1660	1680
	7	13.49 5.49	2235	845	2225	1505	2090	1390	1730	2200
	8	13.49 9.30	2160	465	2355	1720	2125	1350	1690	1650
	9	13.49 13.11	2130	190	2240	1720	1995	1605	1755	1605
	10	13.49 16.93	2260	755	2235	1675	2245	1280	1650	1905

\* No fertiliser used here. P & S rates refer to pasture years.

\*\* Wheat drilled with the pasture P & S application rate.

TITLE: Stocking rate and rate of super on  
Cyprus Barrel Medic Pasture 66M30/1749EX.

AIM: To determine if topdressing annual medic  
pasture on heavy wheatbelt land increases  
carrying capacity or animal production per  
head. Also to determine the relationship  
between super rate and animal production.

SITE: Paddock 5AW/5AE. Merredin Res. Station.

SOIL TYPE: Red-brown clay loam.

VEGETATION: Salmon Gum/Gimlet

SITE HISTORY: Old Cyprus Barrel Medic Paddock.  
Super history 2250 kg/ha.

COMMENCEMENT  
YEAR: 1966.

1971 PROGRESS: Pasture composition measured at three  
times during the growing season.  
Pasture availability measured (by cutting)  
twice. Seed production also measured.  
Central plots cropped with 67 kg super/ha  
and harvested, as scheduled. Sheep weighed  
and shorn as scheduled. The original 1966  
sheep were replaced in October 1971 by  
young wethers.

1971 RESULTS: Pasture

Moisture stress throughout the growing  
season severely reduced the availability  
of pasture. Consequently large differences  
in pasture availability between treatments  
were not established as in previous years.  
However the treatment trends were :

- a) increasing super rates produced an  
increase in both total available  
pasture and available medic. (non-  
significant).
- b) Increasing stocking rates produced a  
decrease in available pasture which  
was significant at 12.7.71 on the  
total available pasture ( $p < 0.01$ ) and  
also on the available medic ( $p < 0.05$ ).

Pasture composition trends were

- a) % medic decreased with increasing  
super, this being quite variable and  
non-significant.
- b) No apparent effect with increasing  
stocking rate.

Seed weights are not yet available.

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TABLE 3  
1971 WHEAT YIELDS (Kg/Ha)

CROP

S.R.	(SUPER)			TOTAL	MEAN
	0(Kg/Ha)	67.3	168.1		
2.55 sh/ha	549	771	795	2115	705
3.16	492	636	638	1765	588
3.78	552	593	723	1868	623
4.18	478	650	294	1422	474
4.67	586	414	744	1744	582
TOTAL	2657	3064	3194	8915	
MEAN	531	613	639		595

Although statistical analysis have yet to be done it appears that both the previous pasture phase effects of S.R. and super rates will be non-significant. Interplot variation continues to be excessively large.

SHEEP

No treatment trends are evident yet with the new flock.

TITLE: Continuous Cropping with N.P.S. 2245EX

AIM: To determine the number of continuous cropping on different soil types using N.P. and S fertilisers.

COMMENCEMENT

YEAR: 1969

1971 PROGRESS: Four trials were sown, three were harvested.

TABLE 4.

EXPT NO.	69N01	69NA1	69ME1	69TS1
LOCATION	QUELAGETTING	KWEEDA	WESTONIA	THREE SPRINGS
NAME	T. Henderson	B. Edwards	K. Leach	J. Lane
SOIL/TYPE	6-12" Yellow sand over gravel	Grey gritty sand over gravel over clay 15"	4" grey brown sandy loam over yellow sandy loam	Red brown clay loam
VEGETATION	Tamma	White Gum	Wodgil	Salmon Gum Gimlet
SITE HISTORY	Cleared 1954 1 in 4 rotation. Last crop 1968.	Old pasture land	Cleared 40 years. Last crop 1968.	Frequent cropping 1962, 64, 66, 67, 68.
SUPER HISTORY	1700 kg/ha	1400 kg/ha	1230 kg/ha (1000 kg between 1960-1968)	1350 kg/ha
1969 CROP	Grazed just prior to harvest.	Harvested	Harvested	Harvested
1970 CROP	Harvested	Severe Rye Grass. Not Harvested	Harvested	False break split sowings. Half harvested.
1971 CROP	Harvested	Harvested	Rabbits not harvested	Harvested

DISCUSSION

Although statistical analysis have yet to be done on the 1971 results, and also on time comparison of the 1969, 1970 and 1971 results it appears that after three successive crops N, P fertiliser treatments are equal if not better than N.P.S. fertiliser treatments at equivalent N.P. application rates.

This finding supports the hypothesis that the S requirement for crops is relatively low, and particularly so on non S responsive soil sites.

The relative treatment ratings meaned over the four trials are  
 N.P Compound (28:14) > Compound + Gypsum  
 > Compound + Mineral S > Super + Urea.

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8.

TABLE 5

69N01/2245EX T. HENDERSON QUELAGETTING

1970, 1971 MEAN WHEAT YIELDS (Kg/Ha)

			Control or Mineral Sulphur		Compound (28:14)		Super and Urea		Compound and Gypsum		Compound and Mineral Sulphur		TOTAL		MEAN	
N	P	S	1970	1971	1970	1971	1970	1971	1970	1971	1970	1971	1970	1971	1970	1971
(Kg/Ha)																
0	0	0	1527	1493									1527	1493	1527	1493
12.89	2.80	0			1977	1775							1977	1775	1977	1775
25.78	5.60	0			2199	1796							2199	1796	2199	1796
38.67	8.41	0			2233	1977							2233	1977	2233	1977
12.89	2.80	3.47					1695	1580	1923	1621	1910	1708	5528	4910	1843	1634
25.78	5.60	7.06					1890	1802	2186	1870	2219	1856	6295	5528	2098	1843
38.67	8.41	10.53					2125	1923	2206	1923	2367	1843	6698	5690	2233	1897
0	0	10.53	1527	1466									1527	1466	1527	1466
TOTAL			3054	2959	6409	5548	5710	5306	6315	5414	6497	5407	27984	24635		
MEAN			1527	1479	2137	1849	1903	1769	2105	1802	2166	1802			1964	1897

9.

TABLE 6

69NA1/2245EX B. EDWARDS KWEEDA  
 1969, 1971 MEAN WHEAT YIELDS (Kg/Ha)

			Control or Mineral Sulphur		Compound (28:14)		Super and Urea		Compound and Gypsum		Compound and Mineral Sulphur		TOTAL		MEAN	
N	P	S	1969	1971	1969	1971	1969	1971	1969	1971	1969	1971	1969	1971	1969	1971
(Kg/Ha)																
0	0	0	1231	1997									1231	1997	1231	1997
12.89	2.80	0			1426	2562							1426	2562	1426	2562
25.78	5.60	0			1533	2219							1533	2219	1533	2219
38.67	8.41	0			1533	2488							1533	2488	1533	2488
12.89	2.80	3.47					1399	2287	1493	2455	1311	2233	4203	6974	1401	2327
25.78	5.60	7.06					1392	2307	1695	3094	1614	2636	4701	8037	1567	2677
38.67	8.41	10.53					1708	2663	1762	3134	1567	2704	5037	8501	1679	2831
0	0	10.53	1264	2024									1264	2024	1264	2024
TOTAL			2495	4022	4592	7270	4499	7257	4950	8682	4492	7573				
MEAN			1247	2011	1531	2423	1500	2421	1650	2892	1497	2522			1454	2488

TABLE 7

69ME1/2245EX K. LEACH WESTONIA  
1969, 1970 MEAN WHEAT YIELDS (Kg/Ha)

			Control or Mineral Sulphur	Compound (28: 14)	Super and Urea	Compound and Gypsum	Compound and Mineral Sulphur	TOTAL		MEAN		
N	P	S	1969	1970	1969	1970	1969	1970	1969	1970	1969	1970
(Kg/Ha)												
0	0	0	417	1096					417	1096	417	1096
12.89	2.80	0			592	1654			592	1654	592	1654
25.78	5.60	0			659	1742			659	1742	659	1742
38.67	8.41	0			659	1829			659	1829	659	1829
12.89	2.80	3.47			524	1459	545	1419	531	1432	1600	4310
25.78	5.60	7.06			558	1668	558	1628	625	1614	1741	4910
38.68	8.41	10.53			572	1823	632	1715	632	1789	1836	1776
0	0	10.53	417	1049					417	1049	417	1049
T O T A L			834	2145	1910	5225	1654	4950	1735	4762	1788	4835
M E A N			417	1072	637	1742	551	1650	578	1587	596	1612

11.

TABLE 8

69TS1/2245EX J. LANE THREE SPRINGS

			Control or Mineral Sulphur		Compound (28:14)		Super and Urea		Compound and Gypsum		Compound and Mineral Sulphur		T O T A L		M E A N	
N	P	S	1969	1971	1969	1971	1969	1971	1969	1971	1969	1971	1969	1971	1969	1971
(Kg/Ha)																
0	0	0	1002	720									1002	720	1002	720
12.89	2.80	0			1029	693							1029	693	1029	693
25.78	5.60	0			962	787							962	787	962	787
38.67	8.41	0			1042	760							1042	760	1042	760
12.89	2.80	3.47					948	652	989	740	1036	619	2973	2011	991	673
25.78	5.60	7.06					989	632	1177	726	1110	592	3276	1950	1092	652
38.67	8.41	10.53					1042	625	1036	740	1056	599	3134	1964	1045	652
0	0	10.53	968	558									968	558	968	558
T O T A L			1970	1278	3033	2240	2979	1910	3202	2206	3202	1809				
M E A N			985	639	1011	746	993	639	1067	733	1067	605			1016	686

**TITLE:** Super rates for wheat. 2977EX.

**AIM:** To determine the optimum super rate for wheat.  
(Specifically for District Office demonstrations.)

**RESULTS** See Table 9.

**DISCUSSION:** Yield responses to increasing rates of super are evident in all trials except 71N15. The yield increment (450 kg wheat/ha) is noticeably small over a 300 kg super/ha range in 71GE6. This suggests that another factor is limiting the super response.

Levels of significance and economic optimums have yet to be calculated.

In two trials 71GE5 and 71GE6 C.S.B.P's soil P test appears to have underestimated the super requirement by approx 30 and 160 kg super/ha resp. In contrast in 71GE40 the soil P test is approx. 100 kg super/ha too high.

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TABLE 9SUPER RATES FOR WHEAT/2977EX  
MEAN 1971 YIELDS (Kg/Ha)

EXPT NO.		71GE5	71GE6	71GE40	71J22	71N15
NAME		J. Edwards	C. Matsen	G. Barnetson	J. Treeby	Newdegate
LOCATION		BOOKARA		Pindar	Jacup	Research Stn.
SOIL TYPE		Fine grey/black sand with limestone pH 8-9		Red sandy loam	Gritty grey sand 0-15" sandy gravel 15-36"	Gritty, quartz sand over gravel over clay
VEGETATION		Black wattle		Mallee	Blue Mallee	Mallee
SITE HISTORY		Old Cyprus pasture	Cleared 1964 Cyprus pasture	Cleared 1965 Sown Ger sub 1968	Cleared 1965 Wheat 1966. Pasture	Old land, crop in 1954, 61, 65, 67.
SUPER HISTORY		2500 Kg/Ha	450 Kg/Ha	840 Kg/Ha	840 Kg/Ha	2500 Kg/Ha
C.S.B.P's TEST		99 Kg/Ha	115 Kg/Ha	258 Kg/Ha	-	-
TREAT	SUPER					
1	0 Kg/Ha	1993	669	2093	2475	2065
2	67.25	2107	783	2167	2825	2038
3	100.88	2135	811	2242		2125
4	134.51	2249	911	2359	2919	2078
5	168.13	2236	922	2423		
6	201.77	2235	996	2349	2959	2118
7	235.39	2249	1053	2413		
8	269.02	2420	1096	2391	3080	
9	302.64	2292	1124	2466		
10	336.27	2362	1082	2466		



**TITLE:** Gypsum Rates on Rape /2971EX

**AIM:** To study the effect of gypsum on rape in the first crop on old land.

**SITE HISTORY:** All sites on old land with appreciable super histories ( 1500 kg super/ha).

**COMMENCEMENT YEAR:** 1971.

**RESULTS:** See Table 10 and 11.

**DISCUSSION:** Most trials produced poor yields due to

- a) insufficient N basal
- b) weather/insects
- c) harvesting problems.

It appears unlikely that any significant treatment responses will result from these trials. However on S responsive soils large positive interactions between S and N have been cited in the literature.

TABLE 10

GYPSUM RATES ON RAPE/2971EX  
1971 MEAN YIELDS (Kg/Ha)

EXPT NO.		71GE31	71TS24	71TS25	71NO22	71NA22	71NA23
NAME		A. Pate	G. Broad	M. Correy	W. Hill	D. Noske	B. Boxsell
LOCATION		Eradu	T.Springs	Eneabba	W. York	Williams	Narrogin
SOIL TYPE		Deep earthy yellow sand	Red brown clay loam	Sand over gravel	Loamy sand over gravel	Sand over clay	Loamy sand over clay
VEGETATION		Sand plain Scrub	York Gum	Sand plain Scrub	White Gum	White/Red Gum	Jam
TREAT	GYPSUM (Kg/ha)						
1	0	224	373	409	947	740	1537
2	67.25	224	336	400	981	857	1756
3	89.67	272	373	405	981	933	1376
4	134.50	248	368	420	869	861	1654
5	179.34	216	363	428	930	892	1478
6	269.02	232	357	441	947	874	1654

TABLE 11

GYPSUM RATES ON RAPE/2971EX  
1971 MEAN YIELDS (Kg/Ha)

EXPT NO.		71KA13	71KA14	71BY1	71BR15	71AL9
NAME		D.L. Brown	R. O'Keefe	Maidment	D. O'Connell	R. Hall
LOCATION		Katanning	Tambellup	Capel	Duranillin	Frankland
SOIL TYPE		Sand over clay at 15"	Sand over clay at 10"	Grey brown over yellow sand	Gravelly S.L. over sandy gravel	Gravelly loam over clay
VEGETATION		Jam. York Gum	Mallee	Tuart Peppermint	Jarraah Red Gum	Jarraah White Gum
TREAT	GYPSUM (Kg/Ha)					
1	0	1729	1313	989	1129	328
2	67.25	1702	1413	1202	1021	536
3	89.67	1761	1385	753	1105	512
4	134.50	1597	1348	1298	1149	594
5	179.34	1428	1417	947	1173	595
6	269.02	1629	1313	788	1205	550

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**TITLE:** Rates of Phosphorus and Sulphur on Rape and Wheat 71A16/2977EX.

**AIM:** To study the P and S responses on rape and wheat.

**SITE HISTORY:** Paddock 1.C 1. Avondale Res. Stn.  
Cleared 1925  
Cropped 1926, '27, '28, '36, '43, '46, '52, '57.

**SUPER HISTORY:** 2500 kg super/ha.

**SOIL TYPE:** Red brown sandy loam.

**VEGETATION:** Jam. White Gum.

TABLE 12

**RESULTS:** 1971 Mean Rape and Wheat Yields.

A) Phosphorus Response	Treat		P (Kg/Ha)	S	Rape (Kg/Ha)	Wheat (Kg/Ha)
		2	9	0	16.14	808
	3	10	4.48	16.14	755	1838
	4	11	8.97	16.14	730	1929
	5	12	13.45	16.14	780	1821

  

B) Sulphur Response	Treat		P (Kg/Ha)	S	Rape (Kg/Ha)	Wheat (Kg/Ha)
		7	14	13.45	0	783
	6	13	13.45	10.76	769	1879
	5	12	13.45	16.14	780	1821

  

C) P x S Interaction	Treat		P (Kg/Ha)	S	Rape (Kg/Ha)	Wheat (Kg/Ha)
		1	8	0	0	954
	2	9	0	16.14	808	1797
	7	14	13.45	0	783	1821
	5	12	13.45	16.14	780	1821

DISCUSSION:

No P or S responses evident in either the rape or the wheat. P and S interactions are negative with both rape and wheat.

Moisture stress throughout the growing season undoubtedly contributed to the low rape yields.

February 22, 1972  
TOA:EC