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1970

# Experimental Results 1970-71 - Phosphorus-Sulphur Maintenance Trials.

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PLANT RESEARCH DIVISION

EXPERIMENTAL RESULTS 1970-71

R.N. GLENCROSS

1. Phosphorus-Sulphur Maintenance Trials.

PLANT RESEARCH DIVISION

EXPERIMENTAL RESULTS 1970-71

R.N. GLENCROSS

Phosphorus-Sulphur Maintenance Trials

Medium Rainfall Zone Trials

Eleven replications of the basic rate of P, rate of  $SO_4-S$  and S experiments were maintained during 1970 in the 20 in. - 30 in. rainfall zone. Soil types examined were the very gravelly soils (5 reps, 4 sites), sands or loamy sands over gravel or clay (3 sites) and sandplain soils (3 reps, 2 sites).

In all cases except one, fertiliser history was not reliable, but in every case well over one ton of super had been applied over a period of over 15 years.

Management problems, despite extra inspections, were the main cause for unreliable results for 1970 (see table). In some cases the experiments were variable due to pasture composition and minor soil type changes.

No conclusive results were obtained, except to the fact that it will be essential to have within plot spot trials to overcome the between plot variability.

Suggestions from erratic trends in the results could be that on gravelly soils P need would be about 10 lb per acre and an S need of under 5 lb per acre.

On loamy sand soils about 10 lb P and 20 lb S tend to be the levels, whereas on sandplain soils there appeared to be small gradual responses to 20 lb of P and S levels.

Relative Mean of Assessments - Phosphorus Need

Rate (lb/ac. P)	Gravel Soils	Sdy-lmy Sands	Sandplain Soils
Nil	100	100	Rated only. (Small response to highest levels.)
5	107	116	
7.5	-	136	
10	125	160	
15	109	147	
20	108	125	

Relative Means of Assessments - Sulphur Need and Soil Types

Rate (lb/ac. $SO_4-S$ )	Gravel Soils	Sandy Loams	Sandplain Soils
Nil	100	100	Rated only. (Gradual res- ponse to highest level.)
2.5	116	165	
8.5	113	132	
13.5	123	190	
19.5	107	130	
25	118	166	

Rates of elemental S show benefits above the control but none between high and low levels.

Data in all cases are very variable, despite a meaningful trend of the overall site and sampling means.

Gravel and sandy loams responded similarly to P, but sandy loams responded greater to S and perhaps to a higher level.

#### Higher Rainfall (over 30 in.) Zone Trials

Ten replications of a standard rate of P and S experiment exist on three basic soils in the over 30 in. annual rainfall areas. Gravel soils (2 sites, 3 reps), sand/sandy loam over clay (5 reps, 5 sites) and sand over gravel depth 12 in. to 30 in. (2 reps, 2 sites) soils represent most of the soils in the zone. There are obviously some important soils - red-brown loams - not covered.

Like those trials in the 20 in. - 30 in. areas, management of the grazing animal has been the limiting factor for best results from this series. Severe weed problems have resulted on some trials and the 1970 season has been one in which correct management, spraying with weedicides and reseeded has been the main activity aimed at getting conditions right for an effective assessment period.

Results indicated by seasonal rating and dry matter cuts on four replications are not conclusive. Some sites are variable; some will need longer to run down super residues to establish a responsive situation.

On the gravel sites at Bramley and Rocky Gully, the latter shows responses to 30 lb per acre P and no response to S. The older Bramley site shows no responses to P or S.

The meadow pozolic type soils, Busselton and Coolup sands, show a suggested response to 10-20 lb of P. Sulphur need was not dramatic as would have been expected after two years of leaving S fertiliser off and the small S requirement seeded satisfied by super sulphate to 10-15 lb S, elemental S not being any superior.

Observations on other trials readily differentiate the no-phosphorus or no-sulphur treatments but differences between rates have been very variable and difficult to pick.

#### Relative Mean of Dry Matter Cuts - 2 Sites, Meadow Pozolic Soils (Busselton and Pinjarra).

Lb P/ac.	Relative Level of Growth	Lb S/ac	Relative Level of Growth
Nil	100	Nil	100
5	150	7.5	98
10	143	15	119
15	139	22	114
20	179	33	118
30	158	45	122
40	162		

No recommendations could follow from the 1970 results because of lack of replication, variability and the problems associated with management and the large effects this appears to have on pasture.

1st April, 1971.  
RNG:LMM.

1970 EXPERIMENTAL SUMMARIES

Maintenance Phosphorus and Sulphur Experiments

20 in. - 30 in. Annual Rainfall Areas

Experiment		66N07 - 67N011 D. Tighe, Bakers Hill				68N037 W. Hobbs, Dale Hall	68N05 W. Hobbs, Dale Hall	
Treatment lb/ac.		66N07 Kg/ha	67N011 July '70	Kg/ha 26.8:70	Visual Rating Oct. '70		Kg/ha July '70	
Phosphorus	Sulphur							
Nil	Nil	-	-	-	-	-	1,400	
Nil	25	700	720	2,060	1	1	2,050	
5	25	750	1,070	4,300	3	3	2,200	
7.5	25	-	-	-	-	-	2,050	
10	25	1,390	1,680	4,960	2	3	2,220	
15	25	1,750	1,400	4,860	1	3	2,110	
20	25	NS*	1,500	3,680	5	3**	2,020	
20	Nil Aerophos	930	820	3,990	3	2	1,440	
20	2.5 Hyphos	NS*	1,600	4,910	4	5	1,600	
20	8.5 Super	1,100*	1,320	4,100	5	3	1,830	
20	13.5 Super	NS*	1,970	5,000	3	2	1,800	
20	19.5 Super	1,200	1,680	4,240	2	1**	1,960	
20	25 Super	1,320	1,900	4,570	2	4	2,020	
20	25 <sub>4</sub> 6.2S	-	-	-	-	-	-	
20	" 12.5S	-	-	-	-	-	1,720	
20	" 18.7S	-	-	-	-	-	-	
20	" 25S	-	-	-	-	-	1,700	
Soil type		Brown gravelly sandy loam				Gray sand/ hard setting Y.B. clay 15 in.		Gravelly brown sandy loam
History - super		2,000 lb: (duplicated)				3,000 lb		2,500 lb
Vegetation		Redgum, jarrah				Whitegum, sheoak		Whitegum, jarrah

\* Grazed by a horse.

\*\* Differential grazing.

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Experiment		69NA6 K. Palmer, Williams			68BR6 Johnson, Bokal		
Treatment lb/ac.		Visual Rating		Kg/ha Oct. '70 Cages	Kg/ha 21.8.70	Oct. '70	
Phosphorus	Sulphur	Aug. '70	Oct. '70 Plot			Rating 1-5	Kg/ha
Nil	Nil	-	-	-	-	-	-
Nil	25	5	1.5	3,390	2,540	4	2,100
5	25	5	2.5	3,550	3,250	2.5	1,720
7.5	25	9.5	5	5,510	4,050	2	1,350
10	25	10	5	7,090	3,490	3	2,310
15	25	10	3	4,880	4,640	4.5	2,310
20	25	10	4.5	5,000	3,940	4.0	1,080
20	Nil Aerophos	7.5	4.5	2,930	1,370	4.0	1,750
20	2.5 Hyphos	6	1	1,270	4,620	3.5	3,200
20	8.5 Super	8	4.5	3,690	2,270	5	2,050
20	13.5 Super	6.5	3.5	1,740	5,000	2.5	4,750
20	19.5 Super	7.5	3.5	3,550	2,580	4.5	1,750
20	25 Super	10	4.5	5,000	3,940	4.0	1,080
20	2 $\frac{1}{2}$ S <sub>0</sub> 4 6.2S	8.5	4	3,300	4,450	3	4,310
20	" 12.5S	5	3	3,160	3,450	3.5	2,290
20	" 18.7S	6	2	2,430	2,810	4	740
20	" 25S	8	4	3,620	1,790	3.5	1,840
Soil type		Grey sand - loamy sand over gravel/clay 18 in.			Grey brown sand - loamy sand, Clay 12 in.		
History - super		2,800 lb			3,000 lb		
Vegetation		Whitegum			Whitegum		

Experiment		69BR9 Johnson, Bokal					68BR5 A.V. Henderson, Mayanup				
Treatment lb/ac.		Kg/ha 21.8.70	Rating 1-5 Oct. '70			Kg/ha Oct. '70	Kg/ha 21.8.70	Rating 1-5 Oct. '70			Kg/ha Oct. '70
Phosphorus	Sulphur		Outside A	B	Cages			Outside A	B	Cages	
Nil	Nil	-	-	-	-	-	-	-	-	-	
Nil	25	4,420	1	5	3	1,590	4,050	2	1.5	3	3,690
5	25	4,780	1	1.5	3	1,940	3,480	4	3	4	4,340
7.5	25	3,370	4	4	4	2,700	4,290	4	2.5	4	5,640
10	25	5,390	4	2	5	2,420	3,840	4	4.5	5	5,180
15	25	4,030	2	1.5	4	2,110	4,540	2	2	4	4,050
20	25	3,350	1.5	2.5	5	3,150	4,090	5	5	5	5,740
20	Nil Aerophos	3,780	2	3.5	4	2,520	3,680	2	1.5	4	5,090
20	2.5 Hyphos	3,890	2	1.5	4	2,330	5,300	3	3	3	4,480
20	8.5 Super	3,880	3	4	5	3,620	-	3	1.5	4	5,100
20	13.5 Super	4,370	3	3	5	2,610	4,340	4	3.5	4	5,550
20	19.5 Super	4,430	4	3	6	2,820	3,400	2	1	3	3,970
20	25 Super	3,350	1.5	2.5	5	3,150	4,090	5	5	5	5,740
20	2.5S 4 6.2S	4,930	2	2.5	5	3,190	3,580	3	3	4	4,570
20	" 12.5S	3,730	2	3.5	3	3,740	3,900	2	1	3	4,260
20	" 18.7S	3,980	1	2.5	3	3,500	4,030	2	1	2	4,440
20	" 25S	3,600	2	2	4	2,600	4,010	1	1	4	4,770
Soil type		Dark brown loamy sand - very gravelly.					Brown gravelly sand - sandy loam.				
History - super		3,000 lb					3,000 lb				
Vegetation		Whitegum, redgum, jarrah					Whitegum, jarrah				

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Experiment		68AL3 W. Ovens, Sth Stirlings	69E6 (2 reps) Esperance Downs Res. Stn, Gibson	
Treatment lb/ac.		Rating 1-4 29.9.70	Rating 1-5 11.11.70	Sheep - Spring body wt change (kg)
Phosphorus	Sulphur			
Nil	Nil	-	-	-
Nil	25	3	2.9	5.88
5	25	1*	2.7	7.38
7.5	25	3	2.3	7.88
10	25	1*	3.7	6.38
15	25	3	3.8	6.25
20	25	2	4.2	7.63
20	Nil Aerophos	2	2.9	7.13
20	2.5 Hyphos	2	2.9	8.25
20	8.5 Super	3	3.3	9.25
20	13.5 Super	3	3.4	5.25
20	19.5 Super	3	3.5	4.38
20	25 Super	2	4.2	7.63
20	2 $\frac{1}{2}$ SO <sub>4</sub> 6.2S	2	3.7	7.63
20	" 12.5S	2	3.8	6.63
20	" 18.7S	2	3.2	8.16
20	" 25S	1*	3.6	8.00
Soil type		Grey sand with surface gravel gravel and clay 18 in.	Grey sand - gravel 6 in., clay 30 in.	
History - super		1,700 lb	2,500 lb	
Vegetation		Mallee scrub	Blue mallee, chittock	

\* Grazed by extra sheep.

1970 EXPERIMENTAL SUMMARIES

Maintenance Phosphorus and Sulphur Experiments

Higher Rainfall (over 30 in. p.a.) Areas:

Experiment		68B1 Bramley R.S.		68BU1 Turner, Ambergate			68BU2 Skerrow, Yoongarillup.		
Treatment lb/ac.		Aug. 12	Oct. 28	Aug. 28	Sept. 25	Nov. 2	July 14	Sept. 25	November
Phosphorus	Sulphur	Rating 1-5	Kg/ha	Rating 1-5	Rating 1-5	Kg/ha	Rating 1-5	Rating 1-5	Rating 1-5
Nil	33	3.2	7,600	2	1	3,100	4	1	3.7
5	33	3.5	7,010	3	1	5,440	4	3	3
10	33	2.2	8,180	4	4	4,660	4.5	4	3.7
15	33	2.7	7,660	4	5	4,840	3.5	3	3
20	33	2.7	7,370	4	5	6,400	5	4	4.2
30	33	4.5	7,630	3	4	5,840	3.5	5	3.2
40	45	2.5	6,950	5	4	5,850	4.5	5	4.2
30	Nil (Aerophos)	3.5	7,650	3	3	4,960	3.5	2	3.2
30	7.5 (Double Super)	2.5	7,480	2	1	4,620	1	1	2
30	15 (Super)	3.7	7,320	3	1	5,220	3	3	2.5
30	22 (Super)	4.0	7,470	5	4	5,680	2	4	2.5
30	33 (Super)	4.5	7,630	3	4	5,840	3.5	5	3.2
40	45 (Super)	2.5	6,950	5	4	5,850	4.5	5	4.2
30	10*	2.2	6,490	4	4	5,180	1	1	1
30	20*	3.7	7,750	4	5	4,390	2.5	3	1.5
30	30*	2.2	7,180	4	2	5,220	2	4	1.7
30	45*	3.5	6,640	5	5	5,130	4	5	3.7
Soil type	Brown very gravelly sand - lmy sand. Forest Grove gravel sd		Grey fine sand } Busselton sand Pale brown sand } ton sdy clay 30 in. ) sand		Busselton sand - clay 20 in.				
Fertiliser history	> 4,000 lb since 1945		> 4,000 lb		> 3,000 lb				
Vegetation	Redgum, jarrah		Redgum		Redgum				
1970 Management	Hay cut		Sprayed, resown to clover		Grazed and hay cut				

\* Elemental S + 7.5 lb SO<sub>4</sub>-S

Experiment		68HA1 Williamson, Waroona	69HA8 Beacham, Pinjarra	69AL3 J.M. Summers, Rocky Gully	
Treatment lb/ae.		Oats Rating 1-5 Nov. '70	Rating 1-5		Rating 1-5 12.8.70
Phosphorus	Sulphur		Oct. '70	Kg/ha Nov. '70	
Nil	33	2.5	1.2	1,990	3
5	33	3.0	1.5	2,190	4
10	33	4.0	4.7	2,600	2.5
15	33	2.7	3	2,220	3
20	33	4.7	4	2,500	2.5
30	33	3.5	3.2	2,220	3.5
40	45	4	4	2,420	2.5
30	Nil (Aerophos)	3.0	1	1,840	3
30	7.5 (Double Super)	4.2	2.7	2,010	2.5
30	15 (Super)	3.2	4	2,860	1.5
30	22 (Super)	2.5	3.2	2,050	2
30	33 (Super)	3.5	3.2	2,220	3.5
40	45 (Super)	4	4	2,420	2.5
30	10*	3.5	4	2,480	2.5
30	20*	2.7	3	1,960	4
30	30*	4.5	4.2	2,250	3
30	45*	4.2	4	2,210	2
Soil type		Grey sand - pale brown sand/clay 15 in. (Coolup sand)	Coolup sand - clay 24 in.		Dark grey sand, pale sand, coffee rock 36 in. Frankland sand.
Fertiliser history		> 4,000 lb	> 4,000 lb		> 3,000 lb
Vegetation		Redgum, Xmas tree	Redgum		Paper bark, redgum
1970 Management		Spring oats	Sprayed and resown to clover		Sprayed and resown

\* Elemental S + 7.5 lb S<sub>0</sub><sub>4</sub>-S

Experiment		69AL2 White, Rocky Gully			68AL4 Pugh, Narrikup			68AL3 Griddle, Manypeaks
Treatment lb/ac.		Rating 1-5			Rating 1-5			
Phosphorus	Sulphur	22.6.'70	Aug. '70	Oct. '70	Aug. '70	Sept. '70	Nov. '70	Total sprayed. Resown, but unsuccessful. Very weedy,  To be terminated 1971.
Nil	33	1.7	0.7		2	3	1	
5	33	3.0	1.3	Grazed too hard for assess- ment.	3	3	3	
10	33	3.0	1.5		4	3	1.5	
15	33	3.3	1.7		5	4	4	
20	33	3.3	2.8		3	2.5	1	
30	33	3.3	4.0		2	3.5	3	
40	45	3.0	3.7		3	3	2	
30	Nil (Aerophos)	3.3	3.7		1	1.5	1	
30	7.5 (Double Super)	3.7	3.2	2	1	1		
30	15 (Super)	3.0	4.7	3	2.5	1.5		
30	22 (Super)	3.3	4.0	2	1	1		
30	33 (Super)	3.3	4.0	2	3.5	3		
40	45 (Super)	3.0	3.7	3	3	2		
30	10*	3.0	3.7	3	3	3		
30	20*	3.3	4.0	2	2	1		
30	30*	3.3	3.3	5	2	1		
30	45*	3.3	3.7	2	3	3		
Soil type	Very gravelly brown sand - loamy sand. Bangalup gravel			Dark grey sand, fine pale sand, gravel 12 in. Sleeman sand			Grey sand/ loamy sand - clay 6 in. Waychinocup sand	
Fertiliser history	> 2,500 lb			> 3,000 lb			> 3,500 lb	
Vegetation	Jarrah, redgum			Stunted jarrah			Mallee & scrub	
1970 Management	Grazed			≠ Grazed. Sprayed and grazed			Sprayed and resown	

\* Elemental S + 7.5 lb SO<sub>4</sub>-S