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Yields of the Field Experiments 1973

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73/R/CS/14 - NPK to Old Grass - Old Grass

Rothamsted Research

Rothamsted Research (1974) *73/R/CS/14 - NPK to Old Grass - Old Grass* ; Yields Of The Field Experiments 1973, pp 159 - 176 - DOI: <https://doi.org/10.23637/ERADOC-1-98>

73/R/CS/14

NPK TO OLD GRASS

Object: To study the effects of a range of P and K levels on yields of permanent pasture on sites with much or little P and K in the soil - Park Grass Old Plots 5/1 and 5/2.

Sponsor: A.E. Johnston.

The ninth year, old grass.

For previous years see 65/C/22(t), 66/C/13(t), 67/C/9(t), 68/C/7 and 69-72/R/CS/14.

Design: On each site:- A single replicate of 2 x 4 x 4 in 2 blocks of 16 plots each, with 2 x 2 additional plots in each block.

Whole plot dimensions: 1.83 x 10.1. Area harvested: 0.00090.

Treatments:

The experiment is duplicated on sites differing in previous history:-

	PLOT
• Park Grass Plot 5/1: No P or K 1856-1964	5/1NORES
• Park Grass Plot 5/2: Superphosphate to supply 34 kg P, sulphate of potash to supply 224 kg K. Annually 1856-1964	5/2PKRES

On each site, all combinations of:-

1. Nitrogen fertiliser (kg N for each cut):	NPERCUT
33.6	33.6
67.2	67.2
2. Phosphate (kg P) as superphosphate annually:	P
None	0
16.8	16.8
33.6	33.6
67.2	67.2
3. Potassium (kg K) as potassium chloride annually:	K
None	0
112	112
224	224
448	448

73/R/C5/14

together with extra treatments, all combinations of:-

1. Nitrogen fertiliser (kg N for each cut):	NPERCUT
33.6	33.6
67.2	67.2
2. Residues of PK fertilisers applied 1965 only:	PKRES65
33.6 kg P, 56 kg K	34P56K
33.6 kg P, 336 kg K	34P336K

Cultivations, etc.: - P and K applied: 8 Dec, 1972. Cut: 4 June, 1973,
24 July, 9 Oct. N applied: 2 Mar and after first two cuts.

Standard errors per plot. Dry matter, tonnes/hectare:

Plot 5/1:	1st cut:	0.332 or 10.3% (11 d.f.)
	2nd cut:	0.216 or 11.2% (11 d.f.)
	3rd cut:	0.168 or 17.9% (11 d.f.)
	Total of 3 cuts:	0.572 or 9.4% (11 d.f.)
Plot 5/2:	1st cut:	0.433 or 10.5% (11 d.f.)
	2nd cut:	0.429 or 15.2% (11 d.f.)
	3rd cut:	0.208 or 11.0% (11 d.f.)
	Total of 3 cuts:	0.683 or 7.7% (11 d.f.)

73/R/CS/14

TABLES OF MEANS

PLOT 5/1: DRY MATTER, TONNES/HECTARE

1ST CUT

Excluding PKRES65 plots

	P				Mean
	0.0	16.8	33.6	67.2	
K					
0	1.96	2.63	2.84	2.86	2.57
112	2.13	4.13	4.78	4.23	3.82
224	1.90	4.96	4.15	4.64	3.91
448	1.77	4.46	4.32	4.45	3.75
NPERCUT					
33.6	1.95	3.43	3.35	3.60	3.08
67.2	1.93	4.66	4.69	4.49	3.94
Mean	1.94	4.04	4.02	4.05	3.51

	K			
	0	112	224	448
NPERCUT				
33.6	2.60	3.30	3.23	3.19
67.2	2.54	4.34	4.60	4.31

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.117	0.166	0.166	0.234	0.234	0.332

73/R/CS/14

PLOT 5/1: DRY MATTER, TONNES/HECTARE

1ST CUT

PKRES65 plots

	PKRES65		Mean
	34P56K	34P336K	
NPERCUT			
33.6	2.36	2.15	2.26
67.2	1.39	1.99	1.94
Mean	2.13	2.07	2.10

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.234	0.234	0.332
Grand mean	3.23	
Mean D.M. %	2.45	

73/R/CS/14

PLOT 5/1: DRY MATTER, TUNNES/HECTARE

2ND CUT

Excluding PKRES65 plots

	P				Mean
	0.0	16.8	33.6	67.2	
K					
0	1.32	1.37	1.04	0.73	1.12
112	1.99	2.13	2.11	2.20	2.11
224	2.27	2.21	2.43	2.33	2.31
448	2.17	2.29	3.87	2.49	2.71
NPERCUT					
33.6	1.81	1.99	2.16	1.96	1.98
67.2	2.06	2.01	2.57	1.92	2.14
Mean	1.94	2.00	2.36	1.94	2.06
		K			
	0	112	224	448	
NPERCUT					
33.6	1.33	1.95	2.15	2.49	
67.2	0.90	2.26	2.47	2.92	

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.076	0.108	0.108	0.153	0.153	0.216

73/R/CS/14

PLOT 5/1: DRY MATTER, TONNES/HECTARE

2ND CUT

PKRES65 plots

NPERCUT	PKRES65		Mean
	34P56K	34P336K	
33.6	1.37	1.58	1.47
67.2	1.32	1.36	1.34
Mean	1.34	1.47	1.41

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.153	0.153	0.216

Grand mean 1.93
Mean D.M. % 20.6

73/R/CS/14

PLOT 5/1: DRY MATTER, TONNES/HECTARE

3RD CUT

Excluding PKRES65 plots

	P				Mean
	0.0	16.8	33.6	67.2	
K					
0	0.50	0.56	0.57	0.81	0.61
112	0.79	1.09	1.21	0.93	1.01
224	0.66	1.44	1.31	1.54	1.24
448	0.70	1.30	1.55	1.63	1.30
NPERCUT					
33.6	0.67	1.15	1.01	1.23	1.02
67.2	0.66	1.05	1.31	1.23	1.06
Mean	0.66	1.10	1.16	1.23	1.04
		K			
	0	112	224	448	
NPERCUT					
33.6	0.64	0.98	1.18	1.26	
67.2	0.57	1.04	1.30	1.34	

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.059	0.084	0.084	0.119	0.119	0.168

73/R/CS/14

PLOT 5/1: DRY MATTER, TONNES/HECTARE

3RD CUT

PKRES65 plots

	PKRES65		Mean
	34P56K	34P336K	
NPERCUT			
33.6	0.60	0.60	0.60
67.2	0.46	0.48	0.47
Mean	0.53	0.54	0.53

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.119	0.119	0.168

Grand mean 0.94
Mean D.M. % 20.5

73/R/CS/14

PLOT 5/1: DRY MATTER, TONNES/HECTARE

TOTAL OF 3 CUTS

Excluding PKRES65 plots

	P				Mean
	0.0	16.8	33.6	67.2	
K					
0	3.78	4.56	4.45	4.40	4.30
112	4.92	7.35	8.11	7.36	6.93
224	4.83	8.61	7.89	8.51	7.46
448	4.64	8.05	9.74	8.58	7.75
NPERCUT					
33.6	4.44	6.56	6.52	6.79	6.08
67.2	4.65	7.72	8.57	7.64	7.15
Mean	4.54	7.14	7.55	7.21	6.61
	K				
	0	112	224	448	
NPERCUT					
33.6	4.58	6.23	6.56	6.94	
67.2	4.01	7.64	8.37	8.57	

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.202	0.286	0.286	0.405	0.405	0.572

73/R/CS/14

PLOT 5/1: DRY MATTER, TONNES/HECTARE

TOTAL OF 3 CUTS

PKRES65 plots

	PKRES65		Mean
	34P56K	34P336K	
NPERCUT			
33.6	4.32	4.32	4.32
67.2	3.67	3.83	3.75
Mean	4.00	4.08	4.04

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.405	0.405	0.573

Grand mean 6.10
Mean D.M. % 21.9

73/2/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

1ST CUT

Excluding PKRES65 plots

	P				Mean
	0.0	16.8	33.6	67.2	
K					
0	3.55	4.25	3.69	4.06	3.89
112	4.25	4.54	4.56	4.02	4.34
224	4.04	4.30	4.35	3.80	4.12
448	3.92	4.49	3.94	4.20	4.14
NPERCUT					
33.6	3.03	3.28	3.10	2.94	3.09
67.2	4.85	5.51	5.16	5.10	5.15
Mean	3.94	4.39	4.13	4.02	4.12
		K			
	0	112	224	448	
NPERCUT					
33.6	2.97	3.34	3.00	3.03	
67.2	4.80	5.34	5.24	5.24	

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.153	0.216	0.216	0.306	0.306	0.433

73/R/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

1ST CUT

PKRES65 plots

	PKRES65		Mean
	34P56K	34P336K	
NPERCUT			
33.6	3.43	3.15	3.29
67.2	5.03	5.10	5.07
Mean	4.23	4.13	4.18

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.306	0.306	0.433

Grand mean 4.13
Mean D.M. % 26.2

73/R/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

2ND CUT

Excluding PKRES65 plots

	P				Mean
	0.0	16.8	33.6	67.2	
K					
0	2.74	2.71	2.68	3.30	2.86
112	2.68	2.71	2.95	2.58	2.73
224	3.19	3.27	2.69	2.32	2.87
448	3.46	2.63	2.58	2.96	2.91
NPERCUT					
33.6	2.70	2.38	2.52	2.61	2.55
67.2	3.34	3.27	2.93	2.98	3.13
Mean	3.02	2.83	2.73	2.79	2.84
		K			
	0	112	224	448	
NPERCUT					
33.6	2.61	2.63	2.47	2.50	
67.2	3.10	2.84	3.27	3.31	

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.152	0.215	0.215	0.303	0.303	0.429

73/R/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

2ND CUT

PKRES65 plots

	PKRES65		Mean
	34P56K	34P336K	
NPERCUT			
33.6	2.71	2.71	2.71
67.2	2.80	2.71	2.80
Mean	2.80	2.71	2.75

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.303	0.303	0.429

Grand mean 2.83
Mean D.M. % 18.8

73/R/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

3RD CUT

Excluding PKRES65 plots

	P				Mean
	0.0	16.8	33.6	67.2	
K					
0	1.93	1.83	1.74	1.96	1.87
112	1.78	1.98	2.07	1.76	1.90
224	1.84	2.05	1.85	1.86	1.90
448	1.98	1.84	1.86	1.83	1.88
NPERCUT					
33.6	1.87	1.80	1.85	1.59	1.78
67.2	1.89	2.05	1.91	2.12	1.99
Mean	1.88	1.92	1.88	1.86	1.89
		K			
	0	112	224	448	
NPERCUT					
33.6	1.64	1.88	1.77	1.82	
67.2	2.09	1.91	2.03	1.93	

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.074	0.104	0.104	0.147	0.147	0.208

73/R/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

3RD CUT

PKRES65 plots

	PKRES65		Mean
	34P56K	34P336K	
NPERCUT			
33.6	1.84	1.86	1.85
67.2	2.02	2.08	2.05
Mean	1.93	1.97	1.95

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.147	0.147	0.208

Grand mean 1.90
Mean D.M. % 20.5

73/R/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

TOTAL OF 3 CUTS

Excluding PKRES65 plots

	F				Mean
	0.0	16.8	33.6	67.2	
K					
0	8.22	8.79	8.11	9.32	8.61
112	8.71	9.23	9.58	8.37	8.97
224	9.07	9.62	8.89	7.99	8.89
448	9.36	8.96	8.38	8.99	8.92
NPERCUT					
33.6	7.60	7.46	7.48	7.14	7.42
67.2	10.08	10.83	10.00	10.19	10.28
Mean	8.84	9.15	8.74	8.67	8.85
	K				
	0	112	224	448	
NPERCUT					
33.6	7.22	7.85	7.24	7.36	
67.2	10.00	10.09	10.54	10.48	

STANDARD ERRORS OF DIFFERENCES

NPERCUT	P	K	NPERCUT P	NPERCUT K	P K
0.241	0.341	0.341	0.483	0.483	0.683

73/R/CS/14

PLOT 5/2: DRY MATTER, TONNES/HECTARE

TOTAL OF 3 CUTS

PKRES65 plots

	PKRES65		Mean
	34P56K	34P336K	
NPERCUT			
33.6	7.98	7.72	7.85
67.2	9.94	9.89	9.91
Mean	8.96	8.81	8.88

STANDARD ERRORS OF DIFFERENCES

NPERCUT	PKRES65	NPERCUT PKRES65
0.483	0.483	0.683

Grand mean 8.85
Mean D.M. % 21.8