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Yields of the Field Experiments 1976

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76/R/CS/14 N P K to Old Grass - Old Grass

Rothamsted Research

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76/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 12th year, old grass.

For previous years see 65/C/22(t), 66/C/13(t), 67/C/9(t), 68/C/7 and 69-75/R/CS/14.

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

Whole plot dimensions: 1.83 x 10.1.

Treatments:

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

5/1NORES	Park Grass Plot 5/1: No P or K
5/2PKRES	Park Grass Plot 5/2: Superphosphate to supply 34 kg P, sulphate of potash to supply 224 kg K, annually 1898-1964

On each site, all combinations of:-

1. NPERCUT Nitrogen fertiliser (kg N for each cut):

33.6	33.6
67.2	67.2

2. P Phosphate (kg P) as superphosphate annually:

0.0	0.0
16.8	16.8
33.6	33.6
67.2	67.2

3. K Potassium (kg K) as potassium chloride annually:

0	0
112	112
224	224
448	448

76/R/CS/14

together with extra treatments, all combinations of:-

1. NPERCUT Nitrogen fertiliser (kg N for each cut):

33.6	33.6
67.2	67.2

2. PKRES65 Residues of PK fertilisers applied 1965 only:

34P56K	33.6 kg P, 56 kg K
34P336K	33.6 kg P, 336 kg K

NOTE: NPERCUT was not applied after the second cut.

Basal applications: Weedkiller: 24-D ester at 3.4 kg acid equivalent in 220 l.

Cultivations, etc.:- P and K applied: 9 Dec, 1975. N applied: 18 Mar, 1976, 18 May. Cut: 17 May, 23 Aug, 9 Nov. Weedkiller applied: 17 Sept.

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.33	2.29	2.38	2.59	2.15
67.2	1.29	3.08	3.34	3.15	2.72
MEAN	1.31	2.69	2.86	2.87	2.43
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.54	2.32	2.59	2.14	2.15
67.2	1.27	3.13	3.46	3.01	2.72
MEAN	1.40	2.72	3.03	2.57	2.43
K	0	112	224	448	MEAN
P					
0.0	1.16	1.65	1.35	1.07	1.31
16.8	1.45	3.15	3.51	2.63	2.69
33.6	1.28	3.16	3.66	3.34	2.86
67.2	1.71	2.93	3.58	3.25	2.87
MEAN	1.40	2.72	3.03	2.57	2.43
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	1.43	1.47	1.25	1.18
	16.8	1.62	2.69	2.50	2.36
	33.6	1.19	2.56	3.45	2.32
	67.2	1.90	2.56	3.19	2.69
67.2	0.0	0.90	1.83	1.46	0.95
	16.8	1.28	3.62	4.52	2.91
	33.6	1.37	3.76	3.87	4.36
	67.2	1.51	3.30	3.98	3.81

1ST CUT MEAN DM% 24.3

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	0.71	0.91	0.76	0.85	0.81
67.2	1.26	0.78	1.18	1.27	1.13
MEAN	0.99	0.85	0.97	1.06	0.97

K	0	112	224	448	MEAN
NPERCUT					
33.6	0.53	0.77	0.96	0.97	0.81
67.2	0.43	1.02	1.45	1.60	1.13
MEAN	0.48	0.90	1.21	1.28	0.97

K	0	112	224	448	MEAN
P					
0.0	0.69	1.14	1.18	0.93	0.99
16.8	0.34	0.83	1.17	1.06	0.85
33.6	0.50	0.63	1.23	1.53	0.97
67.2	0.40	0.98	1.25	1.61	1.06
MEAN	0.48	0.90	1.21	1.28	0.97

	K	0	112	224	448
NPERCUT	P				
33.6	0.0	0.59	0.80	0.69	0.74
	16.8	0.54	0.78	1.17	1.16
	33.6	0.48	0.61	0.90	1.06
	67.2	0.51	0.89	1.09	0.91
67.2	0.0	0.78	1.48	1.67	1.13
	16.8	0.14	0.88	1.16	0.95
	33.6	0.52	0.65	1.56	2.01
	67.2	0.30	1.08	1.41	2.30

2ND CUT MEAN DM% 45.9

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	0.29	0.53	0.80	0.71	0.58
67.2	0.39	0.68	0.62	0.68	0.59
MEAN	0.34	0.60	0.71	0.70	0.59
K	0	112	224	448	MEAN
NPERCUT					
33.6	0.61	0.52	0.56	0.65	0.58
67.2	0.35	0.89	0.68	0.45	0.59
MEAN	0.48	0.70	0.62	0.55	0.59
K	0	112	224	448	MEAN
P					
0.0	0.31	0.29	0.39	0.38	0.34
16.8	0.30	0.79	0.72	0.62	0.60
33.6	0.83	1.01	0.58	0.42	0.71
67.2	0.48	0.73	0.79	0.79	0.70
MEAN	0.48	0.70	0.62	0.55	0.59
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	0.28	0.20	0.16	0.54
	16.8	0.32	0.68	0.56	0.54
	33.6	1.34	0.73	0.68	0.46
	67.2	0.49	0.47	0.82	1.06
67.2	0.0	0.34	0.38	0.61	0.23
	16.8	0.27	0.89	0.88	0.69
	33.6	0.33	1.30	0.49	0.38
	67.2	0.46	0.99	0.75	0.52

3RD CUT MEAN DM% 21.4

76/R/CS/14 PLOT 5/1 NORES

EXCLUDING PKRES65 PLOTS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	2.33	3.73	3.94	4.15	3.54
67.2	2.94	4.55	5.15	5.10	4.43
MEAN	2.63	4.14	4.55	4.62	3.99
K	0	112	224	448	MEAN
NPERCUT					
33.6	2.67	3.61	4.12	3.75	3.54
67.2	2.05	5.04	5.59	5.06	4.43
MEAN	2.36	4.33	4.85	4.41	3.99
K	0	112	224	448	MEAN
P					
0.0	2.16	3.08	2.92	2.38	2.63
16.8	2.08	4.77	5.40	4.30	4.14
33.6	2.62	4.81	5.47	5.30	4.55
67.2	2.59	4.64	5.62	5.65	4.62
MEAN	2.36	4.33	4.85	4.41	3.99
NPERCUT	K	0	112	224	448
	P				
33.6	0.0	2.30	2.47	2.10	2.46
	16.8	2.48	4.16	4.23	4.05
	33.6	3.01	3.90	5.03	3.84
	67.2	2.91	3.91	5.11	4.66
67.2	0.0	2.01	3.70	3.74	2.30
	16.8	1.69	5.38	6.56	4.55
	33.6	2.22	5.72	5.92	6.75
	67.2	2.26	5.37	6.13	6.64

TOTAL OF 3 CUTS MEAN DM% 30.5

PLOT AREA HARVESTED 0.00086

76/R/CS/14 PLOT 5/1 NORES

PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	1.19	1.25	1.22
67.2	1.20	0.89	1.04
MEAN	1.19	1.07	1.13

1ST CUT MEAN DM% 31.2

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	0.60	0.74	0.67
67.2	0.75	0.49	0.62
MEAN	0.68	0.61	0.64

2ND CUT MEAN DM% 47.2

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	0.41	0.40	0.41
67.2	0.37	0.22	0.29
MEAN	0.39	0.31	0.35

3RD CUT MEAN DM% 27.0

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	2.20	2.39	2.29
67.2	2.32	1.60	1.96
MEAN	2.26	1.99	2.13

TOTAL OF 3 CUTS MEAN DM% 35.2

PLOT AREA HARVESTED 0.00086

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	2.73	2.55	2.62	2.33	2.56
67.2	4.25	4.49	4.25	4.08	4.27
MEAN	3.49	3.52	3.43	3.20	3.41
K	0	112	224	448	MEAN
NPERCUT					
33.6	2.58	2.69	2.51	2.45	2.56
67.2	4.12	4.34	4.53	4.08	4.27
MEAN	3.35	3.51	3.52	3.26	3.41
K	0	112	224	448	MEAN
P					
0.0	3.25	3.63	3.71	3.37	3.49
16.8	3.29	3.48	3.81	3.50	3.52
33.6	3.51	3.60	3.45	3.17	3.43
67.2	3.35	3.34	3.10	3.02	3.20
MEAN	3.35	3.51	3.52	3.26	3.41
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	2.53	2.74	2.98	2.67
	16.8	2.40	2.72	2.60	2.46
	33.6	2.74	2.89	2.31	2.55
	67.2	2.64	2.40	2.14	2.13
67.2	0.0	3.97	4.51	4.45	4.06
	16.8	4.17	4.23	5.01	4.54
	33.6	4.28	4.32	4.59	3.79
	67.2	4.07	4.29	4.06	3.91

1ST CUT MEAN DM% 22.5

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.35	1.06	1.16	1.06	1.16
67.2	1.50	1.53	1.43	1.97	1.61
MEAN	1.43	1.30	1.29	1.52	1.38
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.12	1.20	1.11	1.20	1.16
67.2	1.56	1.16	1.96	1.76	1.61
MEAN	1.34	1.18	1.53	1.48	1.38
K	0	112	224	448	MEAN
P					
0.0	1.24	1.03	1.61	1.82	1.43
16.8	1.13	1.15	1.52	1.40	1.30
33.6	1.28	1.20	1.67	1.02	1.29
67.2	1.71	1.33	1.34	1.70	1.52
MEAN	1.34	1.18	1.53	1.48	1.38
NPERCUT	K	0	112	224	448
	P				
33.6	0.0	1.24	1.21	1.42	1.53
	16.8	0.97	1.20	1.23	0.85
	33.6	0.96	1.41	1.05	1.21
	67.2	1.31	0.96	0.74	1.23
67.2	0.0	1.25	0.85	1.80	2.11
	16.8	1.28	1.09	1.81	1.95
	33.6	1.60	0.99	2.29	0.83
	67.2	2.11	1.69	1.93	2.16

2ND CUT MEAN DM% 41.3

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	0.36	0.38	0.47	0.48	0.42
67.2	0.73	0.75	0.70	0.67	0.71
MEAN	0.55	0.57	0.59	0.57	0.57
K	0	112	224	448	MEAN
NPERCUT					
33.6	0.48	0.41	0.41	0.39	0.42
67.2	0.97	0.52	0.76	0.61	0.71
MEAN	0.72	0.46	0.58	0.50	0.57
K	0	112	224	448	MEAN
P					
0.0	0.57	0.58	0.65	0.39	0.55
16.8	0.87	0.42	0.57	0.40	0.57
33.6	0.71	0.49	0.54	0.62	0.59
67.2	0.75	0.36	0.59	0.59	0.57
MEAN	0.72	0.46	0.58	0.50	0.57
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	0.30	0.43	0.42	0.30
	16.8	0.47	0.34	0.38	0.34
	33.6	0.58	0.41	0.41	0.49
	67.2	0.58	0.46	0.43	0.44
67.2	0.0	0.83	0.73	0.88	0.49
	16.8	1.27	0.51	0.76	0.47
	33.6	0.83	0.57	0.66	0.75
	67.2	0.93	0.26	0.75	0.74

3RD CUT MEAN DM% 20.1

76/R/CS/14 PLOT 5/2 PKRES

EXCLUDING PKRES65 PLOTS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	4.44	3.99	4.25	3.86	4.14
67.2	6.49	6.77	6.37	6.73	6.59
MEAN	5.46	5.38	5.31	5.29	5.36
K	0	112	224	448	MEAN
NPERCUT					
3.6	4.18	4.30	4.03	4.05	4.14
67.2	6.65	6.01	7.25	6.45	6.59
MEAN	5.41	5.15	5.64	5.25	5.36
K	0	112	224	448	MEAN
P					
0.0	5.06	5.24	5.97	5.58	5.46
16.8	5.28	5.05	5.89	5.31	5.38
33.6	5.50	5.29	5.66	4.81	5.31
67.2	5.82	5.04	5.02	5.30	5.29
MEAN	5.41	5.15	5.64	5.25	5.36
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	4.06	4.38	4.82	4.49
	16.8	3.85	4.27	4.20	3.65
	33.6	4.28	4.71	3.78	4.24
	67.2	4.53	3.82	3.30	3.80
67.2	0.0	6.06	6.09	7.13	6.66
	16.8	6.72	5.82	7.58	6.97
	33.6	6.71	5.88	7.54	5.38
	67.2	7.11	6.25	6.74	6.81

TOTAL OF 3 CUTS MEAN DM% 28.0

PLOT AREA HARVESTED 0.00086

76/R/CS/14 PLOT 5/2 PKRES

PKRES65 PLOTS

1ST CUT (17/5/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	2.56	2.68	2.62
67.2	3.84	4.14	3.99
MEAN	3.20	3.41	3.30

1ST CUT MEAN DM% 23.8

2ND CUT (23/8/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	1.43	1.17	1.30
67.2	1.30	1.46	1.38
MEAN	1.37	1.31	1.34

2ND CUT MEAN DM% 41.6

3RD CUT (9/11/76) DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	0.43	0.38	0.40
67.2	0.76	0.72	0.74
MEAN	0.59	0.55	0.57

3RD CUT MEAN DM% 20.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

***** TABLES OF MEANS *****

PKRES65 NPERCUT	34P56K	34P336K	MEAN
33.6	4.42	4.23	4.32
67.2	5.90	6.32	6.11
MEAN	5.16	5.27	5.21

TOTAL OF 3 CUTS MEAN DM% 28.7

PLOT AREA HARVESTED 0.00086