

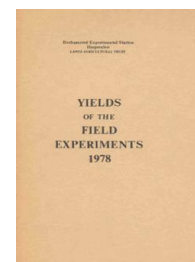
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Yields of the Field Experiments 1978

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

Rothamsted Research

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78/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 14th year, old grass.

For previous years see 'Details' 1973 and 74-77/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 x 2 additional plots.

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
 67.2
2. P Phosphate (kg P) as superphosphate annually:
 0.0
 16.8
 33.6
 67.2
3. K Potassium (kg K) as potassium chloride annually:
 0
 112
 224
 448

78/R/CS/14

together with extra treatments, all combinations of:

1. NPERCUT Nitrogen fertiliser (kg N for each cut):
33.6
67.2
2. P Phosphate (kg P) as superphosphate:
(34)34 33.6 kg P in 1965, none 1966-1976, 33.6 kg P annually since 1977
(34)67 33.6 kg P in 1965, none 1966-1976, 67.2 kg P annually since 1977
3. K Potassium (kg K) as potassium chloride:
(56) 56 56 kg K in 1965, none 1966-1976, 56 kg K annually since 1977
(336)336 336 kg K in 1965, none 1966-1976, 336 kg K annually since 1977

Cultivations, etc.:— Test P and K applied: 15 Dec, 1977. N applied: 28 Feb, 1978, 9 June, 31 June. Cut: 9 June, 31 June, 30 Oct.

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

EXCLUDING EXTRA TREATMENTS

1ST CUT (9/6/78) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	2.85	4.23	4.09	3.98	3.79
67.2	2.97	5.54	5.49	5.07	4.77
MEAN	2.91	4.89	4.79	4.52	4.28
K	0	112	224	448	MEAN
NPERCUT					
33.6	3.17	3.93	4.17	3.88	3.79
67.2	3.02	5.11	5.48	5.45	4.77
MEAN	3.09	4.52	4.83	4.67	4.28
K	0	112	224	448	MEAN
P					
0.0	2.39	3.42	2.93	2.90	2.91
16.8	3.62	5.07	5.71	5.14	4.89
33.6	3.22	5.10	5.71	5.12	4.79
67.2	3.14	4.48	4.96	5.51	4.52
MEAN	3.09	4.52	4.83	4.67	4.28
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	2.86	3.35	2.52	2.67
	16.8	3.33	4.53	4.74	4.34
	33.6	3.02	4.30	4.79	4.24
	67.2	3.46	3.55	4.63	4.27
67.2	0.0	1.92	3.50	3.34	3.12
	16.8	3.92	5.61	6.68	5.94
	33.6	3.42	5.91	6.64	6.00
	67.2	2.81	5.41	5.29	6.75

1ST CUT MEAN DM% 23.5

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

EXCLUDING EXTRA TREATMENTS

2ND CUT (25/7/78) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.59	1.47	1.32	1.36	1.43
67.2	1.60	2.11	2.10	2.16	1.99
MEAN	1.60	1.79	1.71	1.76	1.71
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.26	1.41	1.48	1.59	1.43
67.2	1.36	2.19	2.28	2.15	1.99
MEAN	1.31	1.80	1.88	1.87	1.71
K	0	112	224	448	MEAN
P					
0.0	1.36	1.79	1.69	1.55	1.60
16.8	1.20	2.08	1.97	1.92	1.79
33.6	1.27	1.47	2.12	1.97	1.71
67.2	1.41	1.85	1.74	2.04	1.76
MEAN	1.31	1.80	1.88	1.87	1.71
NPERCUT	K	0	112	224	448
	P				
33.6	0.0	1.42	1.64	1.52	1.79
	16.8	1.12	1.61	1.52	1.63
	33.6	1.09	1.09	1.53	1.57
	67.2	1.41	1.29	1.35	1.38
67.2	0.0	1.29	1.95	1.87	1.31
	16.8	1.27	2.55	2.41	2.22
	33.6	1.46	1.85	2.71	2.37
	67.2	1.42	2.41	2.12	2.69

2ND CUT MEAN DM% 17.5

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

EXCLUDING EXTRA TREATMENTS

3RD CUT (30/10/78) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.57	1.36	1.37	1.47	1.44
67.2	1.81	2.02	1.80	2.07	1.93
MEAN	1.69	1.69	1.59	1.77	1.68
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.13	1.42	1.75	1.47	1.44
67.2	1.27	2.03	2.59	1.81	1.93
MEAN	1.20	1.72	2.17	1.64	1.68
K	0	112	224	448	MEAN
P					
0.0	0.81	1.99	2.24	1.72	1.69
16.8	1.38	1.46	2.22	1.70	1.69
33.6	1.04	1.83	1.80	1.68	1.59
67.2	1.57	1.62	2.43	1.47	1.77
MEAN	1.20	1.72	2.17	1.64	1.68
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	0.99	1.38	2.19	1.73
	16.8	1.43	1.44	1.11	1.44
	33.6	1.05	1.45	1.72	1.26
	67.2	1.04	1.41	1.98	1.45
67.2	0.0	0.63	2.60	2.29	1.71
	16.8	1.32	1.48	3.33	1.95
	33.6	1.03	2.20	1.87	2.11
	67.2	2.10	1.82	2.89	1.49

3RD CUT MEAN DM% 33.3

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

EXCLUDING EXTRA TREATMENTS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	6.02	7.06	6.78	6.81	6.66
67.2	6.38	9.67	9.39	9.30	8.69
MEAN	6.20	8.37	8.08	8.05	7.68
K	0	112	224	448	MEAN
NPERCUT					
33.6	5.56	6.76	7.40	6.95	6.66
67.2	5.65	9.33	10.36	9.42	8.69
MEAN	5.60	8.04	8.88	8.18	7.68
K	0	112	224	448	MEAN
P					
0.0	4.56	7.21	6.86	6.17	6.20
16.8	6.20	8.61	9.89	8.76	8.37
33.6	5.53	8.40	9.63	8.78	8.08
67.2	6.12	7.95	9.13	9.02	8.05
MEAN	5.60	8.04	8.88	8.18	7.68
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	5.27	6.37	6.23	6.20
	16.8	5.89	7.57	7.37	7.41
	33.6	5.15	6.84	8.04	7.07
	67.2	5.91	6.25	7.95	7.11
67.2	0.0	3.85	8.05	7.49	6.14
	16.8	6.51	9.65	12.41	10.11
	33.6	5.91	9.96	11.22	10.48
	67.2	6.33	9.64	10.30	10.93

TOTAL OF 3 CUTS MEAN DM% 24.4

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

EXTRA TREATMENTS

1ST CUT (9/6/78) DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	4.99	4.45	4.72
67.2	5.27	5.74	5.51

MEAN	5.13	5.09	5.11
------	------	------	------

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	4.47	4.97	4.72
67.2	5.17	5.84	5.51

MEAN	4.82	5.41	5.11
------	------	------	------

K	(56)56	(336)336	MEAN
P			
(34)34	4.78	5.48	5.13
(34)67	4.85	5.34	5.09

MEAN	4.82	5.41	5.11
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1ST CUT MEAN DM% 22.9

2ND CUT (25/7/78) DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	1.51	1.41	1.46
67.2	1.80	1.65	1.73

MEAN	1.66	1.53	1.59
------	------	------	------

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	1.43	1.49	1.46
67.2	1.64	1.81	1.73

MEAN	1.53	1.65	1.59
------	------	------	------

K	(56)56	(336)336	MEAN
P			
(34)34	1.62	1.69	1.66
(34)67	1.45	1.61	1.53

MEAN	1.53	1.65	1.59
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2ND CUT MEAN DM% 17.9

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

EXTRA TREATMENTS

3RD CUT (30/10/78) DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	1.95	1.33	1.64
67.2	2.11	2.46	2.28

MEAN	2.03	1.90	1.96
------	------	------	------

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	1.32	1.97	1.64
67.2	1.69	2.88	2.28

MEAN	1.50	2.42	1.96
------	------	------	------

K	(56)56	(336)336	MEAN
P			
(34)34	1.49	2.57	2.03
(34)67	1.52	2.27	1.90

MEAN	1.50	2.42	1.96
------	------	------	------

3RD CUT MEAN DM% 33.4

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	8.45	7.18	7.82
67.2	9.18	9.86	9.52

MEAN	8.82	8.52	8.67
------	------	------	------

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	7.21	8.43	7.82
67.2	8.50	10.53	9.52

MEAN	7.86	9.48	8.67
------	------	------	------

K	(56)56	(336)336	MEAN
P			
(34)34	7.89	9.74	8.82
(34)67	7.82	9.21	8.52

MEAN	7.86	9.48	8.67
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TOTAL OF 3 CUTS MEAN DM% 24.4

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

EXCLUDING EXTRA TREATMENTS

1ST CUT (9/6/78) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	4.76	4.70	4.67	4.27	4.60
67.2	6.88	6.59	6.75	6.22	6.61
MEAN	5.82	5.65	5.71	5.24	5.61
K	0	112	224	448	MEAN
NPERCUT					
33.6	4.55	4.59	4.78	4.49	4.60
67.2	6.66	6.35	6.88	6.56	6.61
MEAN	5.60	5.47	5.83	5.52	5.61
K	0	112	224	448	MEAN
P					
0.0	5.79	5.57	6.04	5.88	5.82
16.8	5.55	5.61	6.08	5.35	5.65
33.6	5.78	5.81	5.75	5.51	5.71
67.2	5.28	4.90	5.44	5.35	5.24
MEAN	5.60	5.47	5.83	5.52	5.61
K	0	112	224	448	
P					
NPERCUT					
33.6	0.0	4.77	4.66	4.94	4.67
	16.8	4.42	5.07	4.86	4.46
	33.6	4.63	4.62	4.89	4.55
	67.2	4.38	4.02	4.43	4.26
67.2	0.0	6.82	6.49	7.14	7.09
	16.8	6.69	6.15	7.30	6.23
	33.6	6.93	7.00	6.62	6.47
	67.2	6.18	5.79	6.45	6.44

1ST CUT MEAN DM% 24.1

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

EXCLUDING EXTRA TREATMENTS

2ND CUT (25/7/78) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.90	1.79	1.86	1.76	1.83
67.2	2.71	2.73	2.77	2.61	2.70
MEAN	2.30	2.26	2.32	2.19	2.27
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.85	1.90	1.71	1.84	1.83
67.2	2.81	2.61	2.96	2.43	2.70
MEAN	2.33	2.26	2.34	2.14	2.27
K	0	112	224	448	MEAN
P					
0.0	2.07	2.20	2.49	2.46	2.30
16.8	2.17	2.18	2.38	2.29	2.26
33.6	2.75	2.37	2.35	1.80	2.32
67.2	2.33	2.28	2.14	1.99	2.19
MEAN	2.33	2.26	2.34	2.14	2.27
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	1.93	1.94	1.74	1.99
	16.8	1.70	1.65	1.73	2.06
	33.6	1.87	2.18	1.66	1.72
	67.2	1.88	1.85	1.73	1.59
67.2	0.0	2.21	2.46	3.23	2.93
	16.8	2.64	2.70	3.04	2.52
	33.6	3.62	2.56	3.03	1.88
	67.2	2.78	2.72	2.55	2.39

2ND CUT MEAN DM% 16.1

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

EXCLUDING EXTRA TREATMENTS

3RD CUT (30/10/78) DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	1.39	1.17	1.28	1.00	1.21
67.2	1.93	1.99	1.83	1.89	1.91
MEAN	1.66	1.58	1.56	1.44	1.56
K	0	112	224	448	MEAN
NPERCUT					
33.6	1.24	1.19	1.27	1.14	1.21
67.2	1.68	1.98	1.97	2.00	1.91
MEAN	1.46	1.58	1.62	1.57	1.56
K	0	112	224	448	MEAN
P					
0.0	1.71	1.56	1.80	1.57	1.66
16.8	1.35	1.40	1.71	1.84	1.58
33.6	1.50	1.70	1.46	1.55	1.56
67.2	1.27	1.67	1.52	1.31	1.44
MEAN	1.46	1.58	1.62	1.57	1.56
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	1.49	1.43	1.53	1.11
	16.8	1.31	0.74	1.38	1.25
	33.6	1.32	1.43	1.27	1.11
	67.2	0.84	1.15	0.92	1.09
67.2	0.0	1.93	1.68	2.07	2.04
	16.8	1.40	2.06	2.05	2.44
	33.6	1.69	1.97	1.65	2.00
	67.2	1.71	2.20	2.12	1.53

3RD CUT MEAN DM% 32.3

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

EXCLUDING EXTRA TREATMENTS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

P	0.0	16.8	33.6	67.2	MEAN
NPERCUT					
33.6	8.05	7.65	7.82	7.03	7.64
67.2	11.52	11.31	11.35	10.71	11.22
MEAN	9.78	9.48	9.58	8.87	9.43
K	0	112	224	448	MEAN
NPERCUT					
33.6	7.64	7.68	7.77	7.46	7.64
67.2	11.15	10.94	11.81	10.99	11.22
MEAN	9.39	9.31	9.79	9.23	9.43
K	0	112	224	448	MEAN
P					
0.0	9.57	9.33	10.33	9.91	9.78
16.8	9.08	9.18	10.17	9.48	9.48
33.6	10.03	9.88	9.56	8.87	9.58
67.2	8.89	8.86	9.10	8.65	8.87
MEAN	9.39	9.31	9.79	9.23	9.43
	K	0	112	224	448
NPERCUT	P				
33.6	0.0	8.18	8.03	8.21	7.76
	16.8	7.43	7.46	7.96	7.77
	33.6	7.82	8.23	7.83	7.38
	67.2	7.10	7.02	7.08	6.94
67.2	0.0	10.95	10.63	12.45	12.06
	16.8	10.73	10.91	12.39	11.20
	33.6	12.24	11.53	11.30	10.35
	67.2	10.67	10.70	11.13	10.36

TOTAL OF 3 CUTS MEAN DM% 24.4

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

EXTRA TREATMENTS

1ST CUT (9/6/78) DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	4.96	5.17	5.06
67.2	7.26	7.29	7.27
MEAN	6.11	6.23	6.17

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	4.82	5.30	5.06
67.2	7.19	7.36	7.27
MEAN	6.00	6.33	6.17

K	(56)56	(336)336	MEAN
P			
(34)34	6.13	6.09	6.11
(34)67	5.88	6.58	6.23
MEAN	6.00	6.33	6.17

1ST CUT MEAN DM% 22.8

2ND CUT (25/7/78) DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	2.06	1.67	1.87
67.2	2.94	2.92	2.93
MEAN	2.50	2.30	2.40

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	1.78	1.96	1.87
67.2	3.03	2.83	2.93
MEAN	2.40	2.39	2.40

K	(56)56	(336)336	MEAN
P			
(34)34	2.73	2.27	2.50
(34)67	2.08	2.51	2.30
MEAN	2.40	2.39	2.40

2ND CUT MEAN DM% 15.4

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

EXTRA TREATMENTS

3RD CUT (30/10/78) DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	1.42	1.31	1.37
67.2	2.01	1.78	1.89

MEAN	1.71	1.54	1.63
------	------	------	------

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	1.30	1.43	1.37
67.2	1.79	1.99	1.89

MEAN	1.55	1.71	1.63
------	------	------	------

K	(56)56	(336)336	MEAN
P			
(34)34	1.79	1.64	1.71
(34)67	1.31	1.78	1.54

MEAN	1.55	1.71	1.63
------	------	------	------

3RD CUT MEAN DM% 31.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

P	(34)34	(34)67	MEAN
NPERCUT			
33.6	8.44	8.15	8.30
67.2	12.21	11.99	12.10

MEAN	10.32	10.07	10.20
------	-------	-------	-------

K	(56)56	(336)336	MEAN
NPERCUT			
33.6	7.90	8.70	8.30
67.2	12.01	12.18	12.10

MEAN	9.95	10.44	10.20
------	------	-------	-------

K	(56)56	(336)336	MEAN
P			
(34)34	10.64	10.00	10.32
(34)67	9.26	10.87	10.07

MEAN	9.95	10.44	10.20
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TOTAL OF 3 CUTS MEAN DM% 24.4

PLOT AREA HARVESTED 0.00086