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# Yields of the Field Experiments 2014



Results of the  
Classical and other  
Long-term Experiments  
2014

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## R/PG/5 Park Grass

### Rothamsted Research

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## 14/R/PG/5

### PARK GRASS

**Object:** To study the effects of organic manures and inorganic fertilisers and lime on old grass for hay.

The 159<sup>th</sup> year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-13/R/PG/5.

**Treatments:** Combinations of:-

Whole plots

#### 1. Manure

Fertilizers and organic manures:

N1	Plot 1	N1
K	Plot 2/1	K since 1996 (as 2/2 before)
None (FYM)	Plot 2/2	None (FYM until 1863)
None	Plot 3	None
P	Plot 4/1	P
N2P	Plot 4/2	N2 P
N1PKNaMg	Plot 6	N1 P K Na Mg
(P)KNaMg	Plot 7/1	K Na Mg (P until 2012)
PKNaMg	Plot 7/2	P K Na Mg (P continued)
PNaMg	Plot 8	P Na Mg
PKNaMg(N2)	Plot 9/1	P K Na Mg (+ N2 until 1989)
N2PKNaMg	Plot 9/2	N2 P K Na Mg
N2PNaMg	Plot 10	N2 P Na Mg
N3PKNaMg	Plot 11/1	N3 P K Na Mg
N3PKNaMgSi	Plot 11/2	N3 P K Na Mg Si
None	Plot 12	None
(FYM/F)	Plot 13/1	None (FYM/F until 1993/1995)
FYM/PM	Plot 13/2	FYM/PM (FYM/F until 1999)
PKNaMg (N2*)	Plot 14/1	P K Na Mg (+ N2* until 1989)
N2*PKNaMg	Plot 14/2	N2* P K Na Mg
N3*PKNaMg (N2*)	Plot 15	N3*P K Na Mg (N2* until 1875; P K Na Mg 1876-2012)
N1*PKNaMg	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNaMg	Plot 18	N2 K Na Mg
FYM	Plot 19	FYM
FYM/N*PK	Plot 20	FYM/N*P K

N1, N2, N3: 48, 96, 144 kg N as sulphate of ammonia  
 N1\*, N2\*, 48, 96, 144 kg N as nitrate of soda (30 kg N to plot  
 N3\*: 20 in years with no farmyard manure). In 2013 plot  
 15 started to receive 144 kg N/ha as nitrate of  
 soda to provide a comparison with plot 11/1, which  
 receives 144 kg N/ha as sulphate of ammonia.  
 P: 35 kg P (15 kg P to plot 20 in years with no  
 farmyard manure) as triple superphosphate in  
 1974 and since 1987, single superphosphate in  
 (P): other years  
 In 2013 plot 7 was split into 7/1 & 7/2. P was  
 withheld from plot 7/1 to evaluate the effect of  
 withholding P on plant biodiversity in 2013-2015.  
 7/2 continues to receive P as above.

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K:	225 kg K (45 kg K to plot 20 in years with no farmyard manure) as sulphate of potash
Na:	15 kg Na as sulphate of soda
Mg:	10 kg Mg as sulphate of magnesia
Si:	Silicate of soda at 450 kg
FYM:	Farmyard manure at 35 t every fourth year
F:	Fishmeal every fourth year to supply 63 kg N (stopped 1999; replaced by PM)
PM	Pelleted poultry manure at 2 t, every fourth year to supply 63 kg N (started 2003)

### Sub-plots

2.	<b>Lime</b>	Liming plots 1-18 (excluding 18/2):
	a	Ground chalk applied as necessary to achieve pH7
	b	Ground chalk applied as necessary to achieve pH6
	c	Ground chalk applied as necessary to achieve pH5
	D	None

**NOTE:** Lime was applied regularly at the same rate, to all 'a' and 'b' sub-plots of plots 1 to 17 (except 12) from 1924. Differential liming started in 1965 on certain 'b' and 'c' sub-plots (except on plot 12) and in 1976 on certain 'a' sub-plots (including plot 12) and 12b. Lime was applied in 2011-2012; the seventh application in a triennial scheme of soil pH analysis and remedial chalk applications.

[This note was incorrect in 97-01/R/PG/5 Yield book entries.]

**NOTE:** Differential rates of lime were applied to sub-plots 2 and 3 regularly 1920-1964. Since 1975 plot 18-1 has been split into two for treatments 'c' and 'd' as above and plot 18-3 split into two for treatments 'a' and 'b'. Plots 19 and 20 received no further chalk after 1968; plot 18/2 no further chalk after 1972.

[This note was incorrect in 97-01/R/PG/5 Yield book entries.]

### Experimental Diary

Date		Application	Rate	Units
13-Nov-13	a	Cut Paths	-	-
05-Dec-13	f	Applied TSP - Plots 4-1, 4-2, 6, 7-2, 8, 9-1, 9-2, 10, 11-1, 11-2, 14/1, 14/2, 15 & 16	171	kg/ha
05-Dec-13	f	Applied TSP - Plot 20	73	kg/ha
10-Dec-13	f	Applied Sulphate of Potash - Plots 2-1, 6, 7/1, 7/2, 9-1, 9-2, 11-1, 11-2, 14-1, 14-2, 15, 16, 18.	542	kg/ha
10-Dec-13	f	Applied Sulphate of Potash - Plots 20	108	kg/ha
10-Dec-13	f	Applied Sulphate of Soda - Plots 6, 7/1, 7/2, 8, 9-1, 9-2, 10, 11-1, 11-2, 14-1, 14-2, 15, 16, 18	43	kg/ha
10-Dec-13	f	Applied Sulphate of Magnesia (Epsom Salts) - Plots 6, 7/1, 7/2, 8, 9-1, 9-2, 10, 11-1, 11-2, 14-1, 14-2, 15, 16, 18	111	kg/ha
10-Dec-13	f	Applied Silicate of Soda - Plots 11-2	450	kg/ha
19-Feb-14	a	Clearing Fallen trees and branches	-	-

14-Apr-14	f	Applied Ammonium Sulphate Fertiliser @ 21%N – Plots 1 and 6	229	kg/ha
14-Apr-14	f	Applied Ammonium Sulphate Fertiliser @ 21%N - Plot 4/2, 9/2, 10, 18	457	kg/ha
14-Apr-14	f	Applied Ammonium Sulphate Fertiliser @ 21%N - Plot 11/1 and 11/2	686	kg/ha
15-Apr-14	f	Applied Sodium Nitrate @ 16%N - Plot 16 and 17	300	kg/ha
15-Apr-14	f	Applied Sodium Nitrate @ 16%N - Plot 14/2	600	kg/ha
15-Apr-14	f	Applied Sodium Nitrate @ 16%N - Plot 15	900	kg/ha
15-Apr-14	f	Applied Sodium Nitrate @ 16%N - Plot 20	188	kg/ha
14-May-14	a	Mowed surrounds of trial & cut paths	-	-
23-Jun-14	a	Started Cutting Plots For Yield	-	-
24-Jun-14	a	Completed cutting plots for yield	-	-
24-Jun-14	a	Mowed all field discards	-	-
25-Jun-14	a	Mowed Discards	-	-
25-Jun-14	a	turned all cuttings on field	-	-
26-Jun-14	a	turned all cuttings on field	-	-
27-Jun-14	a	turned all hay on field, baled and removed grass	-	-
11-Nov-14	a	Cut All Paths with Iseki and Mower	-	-
19-Nov-14	a	2nd Cut - Started Cutting Plots For Yield	-	-
20-Nov-14	a	2nd Cut - Completed cutting plots for yield	-	-

**NOTE:** Samples of herbage (1<sup>st</sup> and 2<sup>nd</sup> Cut) were taken for chemical analysis. Unground herbage samples from all plots were archived.

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1ST CUT (23-24/6-14) DRY MATTER TONNES/HECTARE

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

1ST CUT (25-26/6-13) DRY MATTER TONNES/HECTARE

Grand mean 3.81

Manure	Lime	a	b	c	d	Mean
N1 1		2.56	2.41	1.69	1.25	1.98
K 2/1		2.09	2.36	1.72	1.27	1.86
None (FYM) 2/2		2.68	2.72	2.01	2.26	2.42
None 3		2.55	2.84	1.46	1.68	2.13
P 4/1		3.32	3.33	2.68	2.74	3.02
N2P 4/2		3.47	3.82	3.71	2.06	3.26
N1PKNaMg 6		5.38	5.33			5.35
(P)KNaMg 7/1		4.74	5.28	5.17	3.05	4.56
PKNaMg 7/2		5.05	5.21	5.22	3.84	4.83
PNaMg 8		3.22	3.08	2.78	2.97	3.01
PKNaMg (N2) 9/1		5.18	5.27	4.30	0.89	3.91
N2PKNaMg 9/2		5.16	5.17	4.52	4.60	4.86
N2PNaMg 10		3.82	3.68	3.84	2.65	3.50
N3PKNaMg 11/1		5.74	5.34	4.92	5.15	5.29
N3PKNaMgSi 11/2		6.21	6.04	5.85	5.84	5.99
None 12		3.00	2.54	2.44	2.21	2.55
(FYM/F) 13/1		3.73	3.81	3.48	3.67	3.67
FYM/PM 13/2		4.23	4.69	5.43	5.36	4.93
PKNaMg (N2*) 14/1		4.66	4.57	4.50	4.63	4.59
N2*PKNaMg 14/2		4.63	4.12	4.40	4.42	4.39
N3*PKNaMg (N2*) 15		4.89	5.08	5.11	6.00	5.27
N1*PKNaMg 16		4.53	4.61	4.60	3.32	4.27
N1* 17		2.41	2.94	2.52	2.57	2.61
N2KNaMg 18		2.83	3.15	2.96	0.88	2.45
N2KNaMg 18/2						3.60
FYM 19/1						4.99
FYM 19/2						4.87
FYM 19/3						4.45
FYM/N*PK 20/1						4.94
FYM/N*PK 20/2						5.42
FYM/N*PK 20/3						5.34

1ST CUT MEAN DM% 26.4

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\*\*\*\*\* Tables of means

2ND CUT (19-20-Nov-14) DRY MATTER TONNES/HECTARE

Grand mean 0.89

Manure	Lime	a	b	c	d	Mean
N1 1		0.56	0.55	0.29	0.22	0.40
K 2/1		0.56	0.46	0.43	0.32	0.44
None (FYM) 2/2		0.51	0.50	0.42	0.66	0.52
None 3		0.52	0.64	0.46	0.57	0.55
P 4/1		0.85	0.77	0.68	0.79	0.77
N2P 4/2		0.60	0.65	0.69	0.61	0.64
N1PKNaMg 6		0.74	0.83			0.78
(P)KNaMg 7/1		0.68	0.90	0.75	0.69	0.76
PKNaMg 7/2		1.03	1.00	0.81	0.63	0.87
PNaMg 8		1.03	0.85	0.60	0.83	0.83
PKNaMg (N2) 9/1		0.96	1.07	0.50	0.09	0.65
N2PKNaMg 9/2		1.21	1.30	0.78	0.67	0.99
N2PNaMg 10		0.55	0.67	0.90	0.78	0.72
N3PKNaMg 11/1		1.17	0.95	0.85	1.63	1.15
N3PKNaMgSi 11/2		1.66	1.24	0.97	1.73	1.40
None 12		0.82	0.54	0.59	0.63	0.64
(FYM/F) 13/1		1.52	1.24	0.71	0.57	1.01
FYM/PM 13/2		1.74	1.99	1.52	1.30	1.64
PKNaMg (N2*) 14/1		1.24	1.15	1.16	0.98	1.13
N2*PKNaMg 14/2		0.80	1.10	1.56	1.41	1.22
N3*PKNaMg (N2*) 15		1.37	1.35	1.46	1.06	1.31
N1*PKNaMg 16		1.26	1.42	1.18	1.17	1.26
N1* 17		0.67	0.60	0.48	0.67	0.61
N2KNaMg 18		0.34	0.45	0.40	0.34	0.38
N2KNaMg 18/2						0.52
FYM 19/1						1.34
FYM 19/2						1.86
FYM 19/3						1.34
FYM/N*PK 20/1						1.32
FYM/N*PK 20/2						1.63
FYM/N*PK 20/3						1.53

2ND CUT MEAN DM% 18.74

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\*\*\*\*\* Tables of means

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

Grand mean 4.70

	Manure	Lime	a	b	c	d	Mean
	N1	1	3.12	2.96	1.99	1.46	2.38
	K	2/1	2.65	2.82	2.15	1.59	2.30
	None (FYM)	2/2	3.18	3.22	2.43	2.91	2.94
	None	3	3.08	3.47	1.93	2.25	2.68
	P	4/1	4.18	4.10	3.36	3.53	3.79
	N2P	4/2	4.07	4.47	4.40	2.67	3.90
	N1PKNaMg	6	6.12	6.15			6.14
	(P)KNaMg	7/1	5.42	6.18	5.92	3.75	5.32
	PKNaMg	7/2	6.08	6.21	6.03	4.47	5.70
	PNaMg	8	4.25	3.93	3.39	3.81	3.84
	PKNaMg (N2)	9/1	6.14	6.34	4.80	0.98	4.56
	N2PKNaMg	9/2	6.37	6.47	5.30	5.27	5.85
	N2PNaMg	10	4.36	4.34	4.74	3.42	4.22
	N3PKNaMg	11/1	6.91	6.29	5.77	6.78	6.44
	N3PKNaMgSi	11/2	7.87	7.28	6.83	7.57	7.39
	None	12	3.83	3.08	3.03	2.84	3.19
	(FYM/F)	13/1	5.25	5.05	4.20	4.24	4.68
	FYM/PM	13/2	5.98	6.67	6.95	6.65	6.57
	PKNaMg (N2*)	14/1	5.90	5.72	5.66	5.61	5.72
	N2*PKNaMg	14/2	5.43	5.22	5.96	5.83	5.61
	N3*PKNaMg (N2*)	15	6.25	6.42	6.58	7.06	6.58
	N1*PKNaMg	16	5.78	6.04	5.79	4.49	5.52
	N1*	17	3.08	3.54	3.00	3.25	3.22
	N2KNaMg	18	3.17	3.60	3.36	1.22	2.84
	N2KNaMg	18/2					4.11
	FYM	19/1					6.33
	FYM	19/2					6.74
	FYM	19/3					5.80
	FYM/N*PK	20/1					6.26
	FYM/N*PK	20/2					7.05
	FYM/N*PK	20/3					6.88

TOTAL OF 2 CUTS MEAN DM% 22.58