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# Yields of the Field Experiments 2013

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Results of the  
Classical and other  
Long-term Experiments  
2013

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## R/PG/5 Park Grass

### Rothamsted Research

Rothamsted Research (2014) *R/PG/5 Park Grass* ; Yields Of The Field Experiments 2013, pp 26 - 31 -  
DOI: <https://doi.org/10.23637/ERADOC-1-223>

13/R/PG/5

**PARK GRASS**

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

The 158<sup>th</sup> year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-12/R/PG/5.

**Treatments:** Combinations of:-  
Whole plots

1.	<b>Manure</b>	Fertilizers and organic manures:
	N1	Plot 1
	K	Plot 2/1
	None (FYM)	Plot 2/2
	None	Plot 3
	P	Plot 4/1
	N2P	Plot 4/2
	N1PKNaMg	Plot 6
	(P)KNaMg	Plot 7/1
	PKNaMg	Plot 7/2
	PNaMg	Plot 8
	PKNaMg(N2)	Plot 9/1
	N2PKNaMg	Plot 9/2
	N2PNaMg	Plot 10
	N3PKNaMg	Plot 11/1
	N3PKNaMgSi	Plot 11/2
	None	Plot 12
	(FYM/F)	Plot 13/1
	FYM/PM	Plot 13/2
	PKNaMg (N2*)	Plot 14/1
	N2*PKNaMg	Plot 14/2
	N3*PKNaMg (N2*)	Plot 15
	N1*PKNaMg	Plot 16
	N1*	Plot 17
	N2KNaMg	Plot 18
	FYM	Plot 19
	FYM/N*PK	Plot 20
	N1, N2, N3:	48, 96, 144 kg N as sulphate of ammonia
	N1*, N2*, N3*:	48, 96, 144 kg N as nitrate of soda (30 kg N to plot 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 other years
	(P):	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

1. Manure, fertilisers and organic manures (cont'd)

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. **Lime** 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.]

**Lime** Lime was applied at rates shown below.

**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	Unit
18-Dec-12	f	Applied TSP – plots 4/1, 4/2, 6 (a & b)	171	kg/ha
19-Dec-12	f	Applied TSP – plots 7/2, 8, 9/1, 9/2, 10, 11/1, 11/2, 14/1, 14/2, 15 and 16.	171	kg/ha
18/19-Feb-13	f	Applied powders - sodium sulphate, magnesium sulphate and silicate of soda. Applied sulphate of potash & FYM (19 <sup>th</sup> Feb) to finish.	See details above.	
05-Apr-13	f	Applied Nitrogen, Ammonium Sulphate and Sodium Nitrate.	See details above	
13-May-13	a	Cut Paths	—	
14-May-13	a	Cut Paths, also cut path into crop for accessibility	—	
22-May-13	a	Cut Paths	—	
05-Jun-13	a	Cut paths	—	
20-Jun-13	a	Repairing Fencing - corner nearest manor	—	
20-Jun-13	a	Cut Paths and Surrounds	—	
21-Jun-13	a	Fence Repairs	—	
24-Jun-13	a	Fence repairs	—	
25-Jun-13	a	Cut plots for yield - 1st Cut	—	
26-Jun-13	a	Cut Plots For Yield- Finished 1st Cut	—	
26-Jun-13	a	Mowed Discards	—	
27-Jun-13	a	Mown Discards	—	
01-Jul-13	a	Turned Mown Grass	—	
04-Jul-13	a	Baled and Removed	—	
25-Jul-13	a	Cut Paths with iSeki	—	
21-Nov-13	a	Cut plots for yield - 2nd Cut	—	
22-Nov-13	a	Completed cutting plots for yield - 2nd Cut	—	
25-Nov-13	a	Mowed OE's- all grass	—	
25-Nov-13	a	Cut all grass on Park Grass - long ways across all plots and OE's	—	
25-Nov-13	a	Rowed and baled all grass - on all plots and oe's	—	

**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 (23-24/6/12) DRY MATTER TONNES/HECTARE

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

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

Grand mean 3.39

	Manure	Lime	a	b	c	d	Mean
	N1	1	2.17	1.51	1.04	0.65	1.35
	K	2/1	2.08	2.19	0.96	0.82	1.51
	None (FYM)	2/2	1.81	1.96	0.91	1.04	1.43
	None	3	1.96	1.76	0.66	0.95	1.33
	P	4/1	3.00	3.11	1.93	1.84	2.47
	N2P	4/2	2.52	2.71	2.88	1.62	2.43
	N1PKNaMg	6	4.80	5.78			5.29
	(P)KNaMg	7/1	4.79	4.98	4.92	3.24	4.48
	PKNaMg	7/2	4.62	4.97	4.56	3.89	4.51
	PNaMg	8	2.56	2.83	2.36	2.40	2.54
	PKNaMg (N2)	9/1	5.28	4.90	4.13	0.96	3.82
	N2PKNaMg	9/2	5.14	5.07	4.77	2.75	4.43
	N2PNaMg	10	2.93	3.35	3.39	1.55	2.80
	N3PKNaMg	11/1	6.43	6.08	5.81	1.48	4.95
	N3PKNaMgSi	11/2	6.68	6.57	6.45	2.55	5.56
	None	12	2.33	1.71	1.07	1.03	1.54
	(FYM/F)	13/1	3.43	3.31	2.97	2.71	3.10
	FYM/PM	13/2	3.94	4.49	4.32	3.98	4.18
	PKNaMg (N2*)	14/1	4.50	4.88	5.02	4.83	4.81
	N2*PKNaMg	14/2	5.37	4.77	4.89	4.87	4.98
	N3*PKNaMg (N2*)	15	5.55	5.88	5.26	5.40	5.52
	N1*PKNaMg	16	4.77	4.85	5.66	4.38	4.92
	N1*	17	1.94	2.11	1.36	1.79	1.80
	N2KNaMg	18	1.89	1.79	1.81	0.40	1.47
	N2KNaMg	18/2					2.51
	FYM	19/1					4.32
	FYM	19/2					4.19
	FYM	19/3					4.11
	FYM/N*PK	20/1					4.31
	FYM/N*PK	20/2					4.31
	FYM/N*PK	20/3					4.28

1<sup>st</sup> CUT MEAN DM% 25.80

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

2ND CUT (2/11/13) DRY MATTER TONNES/HECTARE

Grand mean 0.82

Manure	Lime	a	b	c	d	Mean
N1 1		0.36	0.38	0.40	0.25	0.35
K 2/1		0.47	0.39	0.20	0.31	0.34
None (FYM) 2/2		0.38	0.27	0.25	0.34	0.31
None 3		0.34	0.28	0.14	0.29	0.26
P 4/1		0.56	0.44	0.28	0.37	0.41
N2P 4/2		0.59	0.52	0.53	0.55	0.55
N1PKNaMg 6		0.63	0.88			0.76
(P)KNaMg 7/1		0.95	1.14	1.61	0.96	1.17
PKNaMg 7/2		1.06	1.15	1.47	1.00	1.17
PNaMg 8		0.70	0.48	0.52	0.51	0.55
PKNaMg (N2) 9/1		1.04	1.07	0.50	0.17	0.69
N2PKNaMg 9/2		0.84	0.99	0.70	0.89	0.85
N2PNaMg 10		0.34	0.46	0.76	0.70	0.56
N3PKNaMg 11/1		1.46	1.19	0.76	0.58	0.99
N3PKNaMgSi 11/2		1.79	1.59	1.17	1.54	1.52
None 12		0.60	0.24	0.27	0.30	0.35
(FYM/F) 13/1		1.05	1.07	0.57	0.47	0.79
FYM/PM 13/2		1.61	2.51	1.52	1.31	1.74
PKNaMg (N2*) 14/1		1.22	1.28	1.39	1.56	1.36
N2*PKNaMg 14/2		0.74	0.97	1.29	1.51	1.13
N3*PKNaMg (N2*) 15		1.35	1.52	1.35	1.11	1.33
N1*PKNaMg 16		1.03	1.30	1.24	1.01	1.15
N1* 17		0.60	0.51	0.31	0.45	0.47
N2KNaMg 18		0.24	0.32	0.28	0.21	0.26
N2KNaMg 18/2						0.45
FYM 19/1						1.41
FYM 19/2						1.57
FYM 19/3						1.26
FYM/N*PK 20/1						1.40
FYM/N*PK 20/2						1.52
FYM/N*PK 20/3						1.37

2ND CUT MEAN DM% 23.60

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

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

Grand mean 4.21

	Manure	Lime	a	b	c	d	Mean
	N1	1	2.53	1.89	1.45	0.90	1.69
	K	2/1	2.54	2.58	1.16	1.14	1.85
	None (FYM)	2/2	2.19	2.23	1.15	1.39	1.74
	None	3	2.31	2.04	0.80	1.24	1.60
	P	4/1	3.57	3.55	2.21	2.21	2.88
	N2P	4/2	3.11	3.23	3.41	2.17	2.98
	N1PKNaMg	6	5.43	6.66			6.05
	(P)KNaMg	7/1	5.74	6.13	6.54	4.21	5.65
	PKNaMg	7/2	5.67	6.12	6.03	4.89	5.68
	PNaMg	8	3.26	3.32	2.88	2.91	3.09
	PKNaMg (N2)	9/1	6.32	5.97	4.63	1.13	4.51
	N2PKNaMg	9/2	5.98	6.07	5.47	3.64	5.29
	N2PNaMg	10	3.27	3.80	4.15	2.25	3.37
	N3PKNaMg	11/1	7.89	7.27	6.56	2.06	5.94
	N3PKNaMgSi	11/2	8.47	8.15	7.62	4.09	7.08
	None	12	2.93	1.95	1.34	1.33	1.89
	(FYM/F)	13/1	4.49	4.37	3.54	3.18	3.89
	FYM/PM	13/2	5.55	7.00	5.84	5.29	5.92
	PKNaMg (N2*)	14/1	5.71	6.16	6.41	6.39	6.17
	N2*PKNaMg	14/2	6.12	5.74	6.18	6.38	6.10
	N3*PKNaMg (N2*)	15	6.91	7.40	6.61	6.51	6.86
	N1*PKNaMg	16	5.81	6.15	6.90	5.39	6.06
	N1*	17	2.55	2.62	1.67	2.24	2.27
	N2KNaMg	18	2.12	2.11	2.09	0.61	1.73
	N2KNaMg	18/2					2.96
	FYM	19/1					5.72
	FYM	19/2					5.76
	FYM	19/3					5.37
	FYM/N*PK	20/1					5.71
	FYM/N*PK	20/2					5.83
	FYM/N*PK	20/3					5.65

TOTAL OF 2 CUTS MEAN DM% 24.62