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# Results of the Classical and Other Long-term Experiments 2005

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Rothamsted Research

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## 05/R/PG/5 - Park Grass

### Rothamsted Research

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05/R/PG/5

PARK GRASS

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

The 150th year, hay.

For previous years see 'Details' 1977 and 1973 and 74-04/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
PKNaMg	Plot 7	P K Na Mg
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
N2FNaMg	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 (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
PKNaMg (N2*)	Plot 15	P K Na Mg (N2* until 1875)
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 kg N as nitrate of soda (30 kg N to plot 20 in years with no farmyard manure)	
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	
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)	

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1. **Manure** Fertilizers and organic manures(cont.)
- 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 2003, the fourth 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** Liming plots 18-20:

**NOTE:** Differential rates of lime were applied to sub-plots 2 and 3 regularly 1920-1974. 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:**

31-Jan-05 : T : : P applied.  
: T : : K applied to plot 2/1.  
02-Feb-05 : T : : K (remainder), Si, Na, Mg applied.  
04-Feb-05 : T : : FYM applied.  
~~27-Apr-05 : T : : N applied.~~  
15-Mar-05 : B : : Rolled.  
05-Apr-05 : T : : N applied (N\* applied to plot 20 in error).  
09-May-05 : : : Cut paths.  
07-Jun-05 : : : Cut paths.  
20-Jun-05 : T : : Cut sample areas for yield, sampled and weighed, and carted cut grass.  
21-Jun-05 : T : : Cut sample areas for yield, sampled and weighed, and carted cut grass. Cut discards.  
22-Jun-05 : B : : Turned hay.  
23-Jun-05 : B : : Turned hay.  
: B : : Rowed up and baled hay.  
01-Nov-05 : T : : Cut sample areas for yield, sampled and weighed, and carted cut grass.  
14-Nov-04 : B : : Cut discards and baled.

**NOTE:** Samples of herbage from both cuts were taken for chemical analysis. Unground samples of herbage from all plots from both cuts were archived.

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1ST CUT (20-21/6/05) DRY MATTER TONNES/HECTARE

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

Manure	Lime	a	b	c	d	Mean
N1	1	3.03	2.24	1.78	0.82	1.97
K	2/1	1.96	2.15	1.04	1.11	1.56
None (FYM)	2/2	1.87	2.29	0.94	1.04	1.53
None	3	1.86	2.26	1.20	1.30	1.65
P	4/1	2.79	2.84	2.09	1.90	2.40
N2P	4/2	3.35	2.89	3.53	2.14	2.98
N1PKNaMg	6	6.18	5.74			5.96
PKNaMg	7	5.88	6.15	4.18	2.67	4.72
PNaMg	8	2.48	2.56	2.34	2.16	2.38
PKNaMg (N2)	9/1	5.58	5.50	4.51	2.90	4.62
N2PKNaMg	9/2	6.52	6.40	5.09	4.45	5.62
N2PNaMg	10	3.56	3.17	3.42	3.32	3.37
N3PKNaMg	11/1	6.79	6.47	5.30	4.69	5.82
N3PKNaMgSi	11/2	7.01	7.11	5.61	5.68	6.35
None	12	2.46	2.28	1.53	1.41	1.92
(FYM/F)	13/1	4.00	4.00	3.12	2.83	3.49
FYM/PM	13/2	4.41	5.70	4.95	4.31	4.84
PKNaMg (N2*)	14/1	4.42	4.94	4.53	4.09	4.50
N2*PKNaMg	14/2	5.05	5.27	4.79	6.03	5.29
PKNaMg (N2*)	15	5.31	5.61	3.41	2.62	4.24
N1*PKNaMg	16	4.87	5.39	4.45	3.95	4.67
N1*	17	2.48	2.83	2.25	2.38	2.48
N2KNaMg	18	3.07	4.23	4.10	2.02	3.36
N2KNaMg	18/2					3.84
FYM	19/1					4.24
FYM	19/2					5.08
FYM	19/3					3.76
FYM/N*PK	20/1					5.80
FYM/N*PK	20/2					6.30
FYM/N*PK	20/3					5.53

1ST CUT MEAN DM% 30.1

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2ND CUT (1/11/05) DRY MATTER TONNES/HECTARE

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

	Manure	Lime	a	b	c	d	Mean
	N1	1	0.73	0.63	0.38	0.11	0.46
	K	2/1	0.76	0.62	0.50	0.39	0.56
	None (FYM)	2/2	0.51	0.77	0.47	0.39	0.53
	None	3	0.60	0.93	0.53	0.50	0.64
	P	4/1	0.87	0.62	0.57	0.37	0.61
	N2P	4/2	0.72	0.91	0.68	0.84	0.79
	N1PKNaMg	6	1.07	1.12			1.09
	PKNaMg	7	1.30	1.37	0.93	0.50	1.02
	PNaMg	8	0.44	0.56	0.57	0.58	0.54
	PKNaMg (N2)	9/1	1.29	1.17	0.85	0.29	0.90
	N2PKNaMg	9/2	1.12	1.28	1.05	2.11	1.39
	N2PNaMg	10	0.64	0.86	1.00	1.57	1.02
	N3PKNaMg	11/1	1.94	1.82	1.64	2.12	1.88
	N3PKNaMgSi	11/2	2.20	1.78	1.62	1.97	1.89
	None	12	0.81	1.07	0.94	0.64	0.87
	(FYM/F)	13/1	2.05	1.77	1.52	0.81	1.54
	FYM/PM	13/2	1.54	2.52	1.56	1.40	1.76
	PKNaMg (N2*)	14/1	1.30	1.38	1.06	0.91	1.16
	N2*PKNaMg	14/2	1.11	1.62	1.72	1.45	1.47
	PKNaMg (N2*)	15	1.10	1.15	0.70	0.37	0.83
	N1*PKNaMg	16	1.04	1.21	1.07	0.82	1.03
	N1*	17	0.62	0.86	0.81	0.82	0.78
	N2KNaMg	18	1.04	1.33	1.11	0.45	0.98
	N2KNaMg	18/2					1.66
	FYM	19/1					1.56
	FYM	19/2					1.77
	FYM	19/3					1.08
	FYM/N*PK	20/1					1.41
	FYM/N*PK	20/2					1.56
	FYM/N*PK	20/3					1.24

2ND CUT MEAN DM% 27.0

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**TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE**

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

	Manure	Lime	a	b	c	d	Mean
	N1	1	3.76	2.87	2.16	0.93	2.43
	K	2/1	2.72	2.76	1.54	1.49	2.13
	None (FYM)	2/2	2.37	3.05	1.41	1.43	2.06
	None	3	2.46	3.19	1.72	1.79	2.29
	P	4/1	3.65	3.46	2.66	2.27	3.01
	N2P	4/2	4.07	3.79	4.21	2.98	3.76
	N1PKNaMg	6	7.25	6.86			7.05
	PKNaMg	7	7.18	7.52	5.11	3.16	5.74
	PNaMg	8	2.92	3.12	2.90	2.74	2.92
	PKNaMg (N2)	9/1	6.88	6.67	5.36	3.19	5.52
	N2PKNaMg	9/2	7.64	7.68	6.14	6.56	7.01
	N2PNaMg	10	4.20	4.03	4.42	4.90	4.39
	N3PKNaMg	11/1	8.73	8.29	6.95	6.81	7.70
	N3PKNaMgSi	11/2	9.21	8.89	7.23	7.65	8.24
	None	12	3.26	3.35	2.48	2.05	2.79
	(FYM/F)	13/1	6.05	5.78	4.64	3.64	5.03
	FYM/PM	13/2	5.95	8.22	6.51	5.71	6.60
	PKNaMg (N2*)	14/1	5.72	6.32	5.59	5.00	5.66
	N2*PKNaMg	14/2	6.16	6.89	6.51	7.48	6.76
	PKNaMg (N2*)	15	6.42	6.77	4.12	2.99	5.07
	N1*PKNaMg	16	5.91	6.59	5.52	4.77	5.70
	N1*	17	3.10	3.68	3.05	3.20	3.26
	N2KNaMg	18	4.11	5.56	5.21	2.48	4.34
	N2KNaMg	18/2					5.50
	FYM	19/1					5.79
	FYM	19/2					6.85
	FYM	19/3					4.84
	FYM/N*PK	20/1					7.21
	FYM/N*PK	20/2					7.86
	FYM/N*PK	20/3					6.76

TOTAL OF 2 CUTS MEAN DM% 28.6