ROTHAMSTED RESEARCH

Yields of the Field Experiments 2012

Full Table of Content

R/PG/5 Park Grass

Rothamsted Research

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12/R/PG/5

PARK GRASS

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

The 157th year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-11/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
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
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

https://doi.org/10.23637/ERADOC-1-222

12/R/PG/5

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
22-Nov-11	a	Cut and baled	-	
23-Nov-11	a	Cut and baled - finished, bales removed.	-	
28-Nov-11	f	Applied Triple Superphosphate to plots 11/2, 11/1, 10, 9/2, 9/1, 8, 7, 6, 4/2, 4/1, 14/2, 14/1, 15 and 16.	171	kg/ha
28-Nov-11	f	Applied Triple Superphosphate applied to plot 20	73	kg/ha
11-Jan-12	a	Repair fence	-	
17-Jan-12	f	Applied Sulphate of Potash to plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	542	kg/ha
17-Jan-12	f	Applied Sulphate of Soda to plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	43	kg/ha
17-Jan-12	f	Applied Magnesium Sulphate to plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	111	kg/ha

https://doi.org/10.23637/ERADOC-1-222 *pp 3*

17-Jan-12	a	Applied Chalk to plots 6 - 13/2	See rates	
19-Jan-12	a	Applied Chalk to plots 17a, 16a, 15a	below	
23-Jan-12	a	Applied Chalk to plots 15b - 4/2a and plot 18		
24-Jan-12	a	Chalk applications completed		
23-Jan-12	f	Applied Sulphate of Potash, 11/2 only	542	kg/ha
23-Jan-12	f	Applied Sulphate of Soda	43	kg/ha
23-Jan-12	f	Applied Sulphate Magnesia	111	kg/ha
23-Jan-12	f	Applied silicate of soda, plot 11/2 only	450	kg/ha
25-Jan-12	f	Applied Sulphate of Potash, plot 2/1	542	kg/ha
25-Jan-12	f	Applied Sulphate of Potash, plot 20	108	kg/ha
05-Apr-12	a	Cutting Paths	-	
10-Apr-12	a	Cutting Paths	-	-
16-Apr-12		Applied Sodium Nitrate to plots:		
	f	20	188	kg/ha
	f	16 17	300	
	f	14/2	600	
	f	Applied Ammonium Sulphate Fertiliser to plots: 1, 6, 4/2, 9/2, 10, 18, 11/11, 11/2, as per plan	-	
18-May-12	a	Cut Paths	-	
20-Jun-12	a	Cut Paths	-	
25-Jun-12	a	Started Cutting Plots For Yield	-	
26-Jun-12	a	Cut for Yield	-	
26-Jun-12	a	Mowed Discards	-	
26-Jun-12	a	Grass turned for Hay	-	
27-Jun-12	a	Hay Rowed up	-	
02-Jul-12	a	Topped Tracks/Paths	-	
04-Jul-12	a	Put out corner posts	-	
01-Aug-12	a	Marking out Experiment	-	
06-Aug-12	a	Measured and Cut Paths	-	
07-Aug-12	a	Topped O+E's	-	
17-Oct-12	a	Paths Cut	-	
30-Oct-12	a	Harvest Cut for Samples- see sheet	-	
31-Oct-12	a	Harvested/Cut for Samples	-	
06-Nov-12	a	O+E's cut and bales removed from field	-	
07-Nov-12	a	Baled cut grass, bales removed from field	-	
18-Dec-12	f	Applied TSP to finish	171	kg/ha
19-Dec-12	f	Applied TSP, 200kg	171	kg/ha

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

https://doi.org/10.23637/ERADOC-1-222

12/R/PG/5

Chalk applications (t/ha) to Park Grass in 20011/2012 are given below (to include internal paths).

Plot	a	b	c
1	1.75	0.50	0.75
2/1	1.50	0.75	0.30
2/2	0.30	0.30	0.00
3	0.50	0.00	0.00
4/1	1.50	0.30	0.00
4/2	4.00	0.75	0.75
6	3.00	2.50	-
7	2.50	0.75	0.30
8	2.50	0.50	0.30
9/1	1.50	0.50	0.50
9/2	2.50	1.50	1.50
10	3.00	1.00	0.50
11/1	4.00	1.00	1.50
11/2	2.50	1.50	1.00
12	1.50	0.75	0.30
13/1	1.50	0.75	0.30
13/2	2.00	0.30	0.00
14/1	2.00	0.50	0.00
14/2	2.00	0.00	0.00
15	3.00	0.75	0.30
16	3.00	0.00	0.00
17	1.50	0.00	0.00
18	4.00	1.50	0.50

https://doi.org/10.23637/ERADOC-1-222

12/R/PG/5

1ST CUT (23-24/6/12) DRY MATTER TONNES/HECTARE

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

Grand mean 3.79

Manure	Lime	a	b	c	d	Mean
N1	1	3.19	3.07	2.40	1.60	2.56
K	2/1	2.64	2.98	1.96	1.57	2.29
None(FYM)	2/2	2.69	2.72	1.82	2.06	2.32
None	3	2.75	2.83	1.40	1.93	2.23
P	4/1	3.90	4.09	3.49	3.39	3.72
N2P	4/2	3.04	3.30	3.47	2.51	3.08
N1PKNaMg	6	5.32	5.02			5.17
PKNaMg	7	5.15	5.08	5.01	3.94	4.80
PNaMg	8	3.27	3.33	3.52	3.29	3.36
PKNaMg(N2)	9/1	4.95	5.09	4.44	1.49	3.99
N2PKNaMg	9/2	4.47	4.68	4.58	3.79	4.38
N2PNaMg	10	4.01	3.88	3.73	2.69	3.58
N3PKNaMg	11/1	6.67	5.11	5.26	3.10	5.03
N3PKNaMgSi	11/2	5.85	5.06	5.16	3.86	4.98
None	12	2.46	2.38	1.45	1.32	1.90
(FYM/F)	13/1	3.54	3.78	3.28	2.80	3.35
FYM/PM	13/2	3.45	3.63	3.40	2.91	3.35
PKNaMg(N2*)	14/1	4.99	5.20	5.07	4.87	5.03
N2*PKNaMg	14/2	5.31	6.40	5.96	5.48	5.78
PKNaMg(N2*)	15	5.33	5.20	4.45	4.55	4.88
N1*PKNaMg	16	5.22	5.05	4.84	4.13	4.81
N1*	17	3.35	3.50	2.75	3.17	3.19
N2KNaMg	18	2.80	3.26	2.50	2.55	2.78
N2KNaMg	18/2					3.52
FYM	19/1					4.49
FYM	19/2					4.54
FYM	19/3					4.44
FYM/N*PK	20/1					5.50
FYM/N*PK	20/2					4.64
FYM/N*PK	20/3					4.68

1ST CUT MEAN DM% 23.50

https://doi.org/10.23637/ERADOC-1-222

12/R/PG/5

2ND CUT (2/11/12) DRY MATTER TONNES/HECTARE

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

Grand mean 2.08

Manure	Lime	a	b	c	d	Mean
N1	1	1.41	1.23	0.72	0.79	1.04
K	2/1	1.49	1.53	0.74	0.66	1.10
None(FYM)	2/2	1.57	1.57	1.09	1.16	1.35
None	3	1.41	1.61	0.54	0.75	1.08
P	4/1	2.08	2.20	1.67	1.63	1.89
N2P	4/2	0.84	0.98	1.20	0.75	0.94
N1PKNaMg	6	2.70	2.88			2.79
PKNaMg	7	2.73	2.77	2.94	2.77	2.80
PNaMg	8	1.88	2.28	1.99	2.24	2.10
PKNaMg(N2)	9/1	2.73	3.23	2.37	0.88	2.30
N2PKNaMg	9/2	2.66	2.62	1.99	1.45	2.18
N2PNaMg	10	1.20	1.27	1.62	1.07	1.29
N3PKNaMg	11/1	2.72	2.70	2.24	2.87	2.63
N3PKNaMgSi	11/2	3.02	3.27	2.79	3.39	3.12
None	12	1.86	1.81	1.44	1.51	1.65
(FYM/F)	13/1	2.30	2.84	2.63	2.67	2.61
FYM/PM	13/2	2.18	3.11	3.01	2.73	2.76
PKNaMg(N2*)	14/1	2.28	2.66	2.88	3.01	2.71
N2*PKNaMg	14/2	1.86	2.44	2.57	2.55	2.35
PKNaMg(N2*)	15	2.28	2.85	3.05	2.89	2.77
N1*PKNaMg	16	2.15	2.53	2.94	2.20	2.45
N1*	17	1.10	1.36	0.91	0.98	1.09
N2KNaMg	18	3.12	1.47	1.46	2.50	2.14
N2KNaMg	18/2					1.64
FYM	19/1					3.53
FYM	19/2					2.86
FYM	19/3					2.55
FYM/N*PK	20/1					2.86
FYM/N*PK	20/2					3.23
FYM/N*PK	20/3					2.83

2ND CUT MEAN DM% 21.43

https://doi.org/10.23637/ERADOC-1-222

12/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

Grand mean 5.87

Manure		Lime	a	b	c	d	Mean
N1	1		4.60	4.30	3.12	2.40	3.60
K	2/1		4.13	4.52	2.70	2.23	3.39
None(FYM)	2/2		4.26	4.29	2.92	3.22	3.67
None	3		4.16	4.44	1.94	2.69	3.31
P	4/1		5.98	6.29	5.16	5.02	5.61
N2P	4/2		3.88	4.29	4.66	3.25	4.02
N1PKNaMg	6		8.01	7.91			7.96
PKNaMg	7		7.88	7.86	7.95	6.71	7.60
PNaMg	8		5.16	5.61	5.51	5.54	5.45
PKNaMg(N2)	9/1		7.68	8.32	6.81	2.37	6.30
N2PKNaMg	9/2		7.12	7.31	6.57	5.24	6.56
N2PNaMg	10		5.21	5.14	5.35	3.75	4.86
N3PKNaMg	11/1		9.39	7.81	7.49	5.96	7.66
N3PKNaMgSi	11/2		8.88	8.33	7.95	7.25	8.10
None	12		4.32	4.19	2.89	2.83	3.56
(FYM/F)	13/1		5.84	6.62	5.91	5.47	5.96
FYM/PM	13/2		5.63	6.74	6.41	5.64	6.10
PKNaMg(N2*)	14/1		7.27	7.87	7.95	7.88	7.74
N2*PKNaMg	14/2		7.17	8.84	8.52	8.03	8.14
PKNaMg(N2*)	15		7.61	8.05	7.49	7.44	7.65
N1*PKNaMg	16		7.37	7.58	7.77	6.33	7.26
N1*	17		4.45	4.86	3.66	4.14	4.28
N2KNaMg	18		5.92	4.73	3.96	5.05	4.92
N2KNaMg	18/2						5.15
FYM	19/1						8.02
FYM	19/2						7.40
FYM	19/3						6.99
FYM/N*PK	20/1						8.36
FYM/N*PK	20/2						7.86
FYM/N*PK	20/3						7.51

TOTAL OF 2 CUTS MEAN DM% 22.48

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