ROTHAMSTED RESEARCH

Yields of the Field Experiments 2001

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01/R/PG/5 - Park Grass

Rothamsted Research

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PARK GRASS

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

The 146th year, hay.

For previous years see 'Details' 1977 and 1973 and 74-00/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)
O(D)	Plot 2/2	None (D until 1863)
O	Plot 3	None
P	Plot 4/1	P
N2P	Plot 4/2	N2 P
N1MN	Plot 6	N1 P K Na Mg
MN	Plot 7	P K Na Mg
PNAMG	Plot 8	P Na Mg
MN(N2)	Plot 9/1	P K Na Mg (N2 until 1989)
N2MN	Plot 9/2	N2 P K Na Mg
N2PNAMG	Plot 10	N2 P Na Mg
N3MN	Plot 11/1	N3 P K Na Mg
N3MNSI	Plot 11/2	N3 P K Na Mg Si
O	Plot 12	None
(D/F)	Plot 13/1	None (D/F until 1994)
D/F	Plot 13/2	D/F
MN(N2*)	Plot 14/1	P K Na Mg (N2* until 1989)
N2*MN	Plot 14/2	N2* P K Na Mg
MN(N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*MN	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNAMG	Plot 18	N2 K Na Mg
D	Plot 19	D
D/N*PK	Plot 20	D/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
D:	Farmyard manure at 35 t every fourth year
F:	Fishmeal every fourth year to supply 63 kg N
MN:	P K Na Mg as above

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Sub-plots

2. **LIME** Liming plots 1-17:

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 1975 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 2000, the third application in a triennial scheme of soil pH analysis and remedial chalk applications.

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 1978; plot 18/2 no further chalk after 1972.

Experimental diary:

18-Jan-01	**T**	P applied.
19-Feb-01	**T**	K, Mg, Na and Si applied.
20-Feb-01	**T**	FYM applied.
12-Apr-01	**T**	N applied.
26-Jun-01	**T**	Cut, sampled and weighed yield areas, plots 4/1-13, 18-20.
27-Jun-01	**T**	Cut, sampled and weighed, plots 1-3, 14-17, completed.
30-Jun-01	B	Mowed discards for hay, excluding s and w of plots 13, 18-20.
02-Jul-01	B	Turned hay.
03-Jul-01	B	Turned hay.
04-Jul-01	B	Turned, rowed up, baled and carted hay bales.
05-Jul-01	B	Topped.
06-Jul-01	B	Baled.
	B	Rowed up remaining grass.
03-Oct-01	**T**	Cut weighed and sampled yield areas and discards, started.
04-Oct-01	**T**	Cut weighed and sampled yield areas and discards completed.

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 (26,27/6/01) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	3.43	2.05	2.06	0.77	2.08
K	2/1	2.87	2.82	1.09	1.13	1.98
O(D)	2/2	2.39	2.47	1.12	1.16	1.79
O	3	2.31	2.14	0.70	1.04	1.55
P	4/1	2.69	3.33	1.68	1.43	2.28
N2P	4/2	5.54	3.61	5.13	1.32	3.90
N1MN	6	5.79	5.13			5.46
MN	7	6.23	5.63	4.40	2.15	4.60
PNAMG	8	1.91	3.47	1.55	1.48	2.10
MN(N2)	9/1	4.36	4.69	4.80	1.45	3.82
N2MN	9/2	6.31	6.83	6.42	2.55	5.53
N2PNAMG	10	4.67	4.47	5.13	1.72	4.00
N3MN	11/1	8.14	7.19	6.65	2.42	6.10
N3MNSI	11/2	7.62	7.59	6.16	4.83	6.55
O	12	2.01	1.59	0.93	1.07	1.40
(D/F)	13/1	3.19	4.95	3.24	3.74	3.78
D/F	13/2	3.98	5.63	5.40	5.02	5.01
MN(N2*)	14/1	5.25	5.17	4.77	4.51	4.93
N2*MN	14/2	6.52	6.51	5.72	5.88	6.15
MN(N2*)	15	5.92	5.19	3.72	2.60	4.36
N1*MN	16	6.49	6.80	4.62	4.40	5.58
N1*	17	2.33	1.71	1.49	1.58	1.78
N2KNAMG0	18/1			4.93	1.84	3.39
N2KNAMG2	18/2					2.66
N2KNAMG1	18/3	2.05	2.39			2.22
D0	19/1					4.47
D2	19/2					6.76
D1	19/3					5.09
D/N*PK0	20/1					5.25
D/N*PK2	20/2					7.51
D/N*PK1	20/3					6.06

1ST CUT MEAN DM% 29.2

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2ND CUT (3,4/10/01) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	1.31	1.47	0.61	0.09	0.87
K	2/1	1.78	1.75	1.03	0.74	1.32
O(D)	2/2	1.35	1.69	0.91	0.93	1.22
O	3	1.09	1.22	0.81	0.94	1.01
P	4/1	1.44	1.54	1.56	1.36	1.47
N2P	4/2	1.27	1.29	1.14	0.56	1.06
N1MN	6	2.53	2.44			2.49
MN	7	2.90	2.85	1.58	0.85	2.04
PNAMG	8	1.06	1.77	1.01	1.18	1.25
MN(N2)	9/1	2.24	2.11	1.30	0.17	1.45
N2MN	9/2	2.30	2.78	1.55	2.02	2.16
N2PNAMG	10	1.63	1.74	1.38	1.68	1.61
N3MN	11/1	3.34	3.37	2.95	3.26	3.23
N3MNSI	11/2	3.59	3.35	3.03	3.27	3.31
O	12	0.88	1.02	0.86	0.94	0.93
(D/F)	13/1	1.58	2.50	1.40	0.99	1.62
D/F	13/2	2.90	3.47	2.59	2.20	2.79
MN(N2*)	14/1	1.89	2.60	2.42	2.10	2.25
N2*MN	14/2	2.20	2.45	2.44	2.26	2.34
MN(N2*)	15	2.30	2.22	1.15	0.66	1.58
N1*MN	16	2.53	2.58	1.82	1.31	2.06
N1*	17	1.47	1.68	1.45	1.38	1.50
N2KNAMG0	18/1			0.92	0.08	0.50
N2KNAMG2	18/2					2.16
N2KNAMG1	18/3	1.47	1.66			1.57
D0	19/1					2.14
D2	19/2					3.22
D1	19/3					2.42
D/N*PK0	20/1					2.58
D/N*PK2	20/2					2.93
D/N*PK1	20/3					2.54

2ND CUT MEAN DM% 21.3

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TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	4.73	3.52	2.67	0.86	2.95
K	2/1	4.64	4.57	2.12	1.88	3.30
O(D)	2/2	3.73	4.16	2.03	2.09	3.01
O	3	3.40	3.36	1.51	1.98	2.56
P	4/1	4.13	4.87	3.23	2.79	3.76
N2P	4/2	6.82	4.90	6.27	1.87	4.96
N1MN	6	8.32	7.57			7.95
MN	7	9.13	8.48	5.98	3.01	6.65
PNAMG	8	2.97	5.25	2.55	2.66	3.36
MN(N2)	9/1	6.60	6.80	6.10	1.61	5.28
N2MN	9/2	8.61	9.61	7.97	4.57	7.69
N2PNAMG	10	6.31	6.22	6.51	3.40	5.61
N3MN	11/1	11.48	10.56	9.60	5.68	9.33
N3MNSI	11/2	11.21	10.94	9.19	8.10	9.86
O	12	2.89	2.62	1.80	2.01	2.33
(D/F)	13/1	4.77	7.44	4.64	4.73	5.40
D/F	13/2	6.88	9.09	7.99	7.22	7.79
MN(N2*)	14/1	7.14	7.77	7.19	6.61	7.18
N2*MN	14/2	8.72	8.95	8.16	8.14	8.49
MN(N2*)	15	8.22	7.40	4.87	3.26	5.94
N1*MN	16	9.01	9.37	6.44	5.71	7.63
N1*	17	3.80	3.39	2.95	2.96	3.27
N2KNAMG0	18/1			5.86	1.92	3.89
N2KNAMG2	18/2					4.81
N2KNAMG1	18/3	3.52	4.05			3.79
D0	19/1					6.62
D2	19/2					9.98
D1	19/3					7.51
D/N*PK0	20/1					7.83
D/N*PK2	20/2					10.44
D/N*PK1	20/3					8.60

TOTAL OF 2 CUTS MEAN DM% 25.2