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Yields of the Field Experiments 2002

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Yields of the
Classical
and other
Long-term Experiments
2002

IACR - Rothamsted

02/R/PG/5 - Park Grass

Rothamsted Research

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02/R/PG/5

PARK GRASS

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

The 147th year, hay.

For previous years see 'Details' 1977 and 1973 and 74-01/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 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 2000, the third 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:

12-Dec-01	: T	: P applied.
19-Dec-01	: T	: K and P applied to plot 20 only.
08-Jan-02	: T	: K, Mg, Na, Si applied.
25-Apr-02	: T	: N applied.
01-May-02	: P	: Cut external paths.
22-May-02	: P	: Cut paths.
20-Jun-02	: T	: Cut sample areas for yield, sampled and weighed, and carted cut grass.
23-Jun-02	: T	: Mowed for hay, except plot 5.
25-Jun-02	: B	: Turned hay.
26-Jun-02	: B	: Turned hay, twice.
27-Jun-02	: B	: Turned hay.
	: B	: Rowed up hay.
	: B	: Baled hay.
28-Jun-02	: B	: Carted bales.
02-Jul-02	: B	: Topped, where run down by mower.
24-Oct-02	: T	: Cut, weighed and sampled yield strips, started.
25-Oct-02	: T	: Cut, weighed and sampled yield strips, completed.
04-Nov-02	: B	: Cut discards, started.
19-Nov-02	: B	: Cut 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.

02/R/PG/5

1ST CUT (20/6/02) DRY MATTER TONNES/HECTARE

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

	LIME	A	B	C	D	MEAN
	MANURE					
N1	1	3.62	3.25	2.41	1.40	2.67
K	2/1	2.83	2.92	1.88	2.01	2.41
O(D)	2/2	2.72	2.68	1.91	2.51	2.46
O	3	2.75	2.50	1.67	2.56	2.37
P	4/1	4.46	4.40	3.37	3.28	3.88
N2P	4/2	5.27	4.85	5.82	3.74	4.92
N1MN	6	6.36	5.74			6.05
MN	7	6.59	5.75	5.77	4.32	5.61
PNAMG	8	4.96	5.37	4.32	4.57	4.80
MN(N2)	9/1	5.32	5.93	6.89	1.99	5.03
N2MN	9/2	6.59	7.40	6.65	6.48	6.78
N2PNAMG	10	5.62	5.35	7.01	4.19	5.55
N3MN	11/1	6.89	7.31	6.50	6.38	6.77
N3MNSI	11/2	7.22	7.74	6.50	6.81	7.07
O	12	3.00	3.12	3.09	2.20	2.85
(D/F)	13/1	4.61	5.19	5.29	5.09	5.05
D/F	13/2	3.80	5.58	7.14	6.58	5.77
MN(N2*)	14/1	4.31	5.33	4.82	4.10	4.64
N2*MN	14/2	5.35	4.97	5.13	5.47	5.23
MN(N2*)	15	4.99	5.00	4.33	3.25	4.39
N1*MN	16	6.18	6.15	5.07	4.38	5.44
N1*	17	3.00	3.30	3.01	2.81	3.03
N2KNAMG0	18/1			5.69	1.64	3.66
N2KNAMG2	18/2					4.08
N2KNAMG1	18/3	2.83	3.03			2.93
D0	19/1					5.66
D2	19/2					5.83
D1	19/3					4.84
D/N*PK0	20/1					6.18
D/N*PK2	20/2					6.70
D/N*PK1	20/3					5.91
1ST CUT MEAN DM%		25.0				

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2ND CUT (24-25/10/02) DRY MATTER TONNES/HECTARE

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

LIME MANURE	A	B	C	D	MEAN
N1 1	1.80	2.01	1.43	0.69	1.48
K 2/1	2.14	2.46	1.39	1.47	1.87
O(D) 2/2	1.99	2.59	1.64	2.02	2.06
O 3	1.88	2.24	1.46	1.95	1.88
P 4/1	2.59	2.92	2.14	2.09	2.43
N2P 4/2	1.93	1.63	1.61	0.92	1.52
N1MN 6	2.45	2.66			2.56
MN 7	3.18	3.10	2.70	1.87	2.71
PNAMG 8	3.12	2.68	2.50	2.78	2.77
MN(N2) 9/1	2.68	2.54	2.44	0.43	2.02
N2MN 9/2	2.62	2.79	3.01	2.84	2.82
N2PNAMG 10	2.70	2.58	7.60	1.85	3.68
N3MN 11/1	3.65	3.33	4.24	3.59	3.70
N3MNSI 11/2	4.53	3.76	3.39	3.33	3.75
O 12	2.69	4.03	3.38	2.24	3.09
(D/F) 13/1	5.83	3.78	3.49	3.25	4.09
D/F 13/2	2.82	4.38	4.00	4.95	4.04
MN(N2*) 14/1	2.44	2.80	2.51	2.43	2.54
N2*MN 14/2	5.00	3.00	2.87	2.65	3.38
MN(N2*) 15	2.69	2.39	2.29	1.52	2.23
N1*MN 16	2.90	3.00	2.85	2.05	2.70
N1* 17	2.42	2.77	2.15	2.15	2.37
N2KNAMG0 18/1			2.54	0.51	1.53
N2KNAMG2 18/2					3.09
N2KNAMG1 18/3	2.24	2.36			2.30
D0 19/1					3.71
D2 19/2					8.37
D1 19/3					3.68
D/N*PK0 20/1					3.41
D/N*PK2 20/2					5.33
D/N*PK1 20/3					3.41

2ND CUT MEAN DM% 26.9

02/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

	LIME	A	B	C	D	MEAN
	MANURE					
N1	1	5.42	5.26	3.84	2.09	4.15
K	2/1	4.96	5.38	3.28	3.49	4.28
O(D)	2/2	4.71	5.27	3.55	4.53	4.51
O	3	4.63	4.74	3.13	4.51	4.25
P	4/1	7.05	7.31	5.51	5.37	6.31
N2P	4/2	7.19	6.48	7.43	4.66	6.44
N1MN	6	8.81	8.40			8.61
MN	7	9.77	8.85	8.47	6.19	8.32
PNAMG	8	8.08	8.05	6.82	7.34	7.57
MN(N2)	9/1	8.00	8.48	9.32	2.42	7.05
N2MN	9/2	9.21	10.20	9.66	9.32	9.60
N2PNAMG	10	8.33	7.93	14.61	6.04	9.23
N3MN	11/1	10.54	10.64	10.74	9.97	10.47
N3MNSI	11/2	11.75	11.50	9.89	10.14	10.82
O	12	5.69	7.15	6.48	4.45	5.94
(D/F)	13/1	10.44	8.97	8.78	8.35	9.13
D/F	13/2	6.62	9.96	11.14	11.54	9.81
MN(N2*)	14/1	6.75	8.13	7.33	6.53	7.18
N2*MN	14/2	10.36	7.97	8.00	8.12	8.61
MN(N2*)	15	7.68	7.39	6.63	4.77	6.62
N1*MN	16	9.08	9.14	7.92	6.43	8.14
N1*	17	5.42	6.07	5.16	4.95	5.40
N2KNAMG0	18/1			8.23	2.15	5.19
N2KNAMG2	18/2					7.17
N2KNAMG1	18/3	5.07	5.39			5.23
D0	19/1					9.37
D2	19/2					14.20
D1	19/3					8.52
D/N*PK0	20/1					9.60
D/N*PK2	20/2					12.04
D/N*PK1	20/3					9.33

TOTAL OF 2 CUTS MEAN DM% 25.9