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# Yields of the Field Experiments 2020

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## 20/R/PG/5 Park Grass

### Rothamsted Research

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## 20/R/PG/5 PARK GRASS

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

The 165<sup>th</sup> year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-19/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
(P)KNaMg	Plot 7/1	K Na Mg (+P until 2012)
PKNaMg	Plot 7/2	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
N3*PKNaMg (N2*)	Plot 15	N3*P K Na Mg (N2* until 1875; P K Na Mg 1876-2012)
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*, 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:	17 kg P/ha applied as triple superphosphate since 2017, except for plot 20 which receives 15 kg P/ha in years with no farmyard manure. Prior to this, 35 kg P	

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	(15 kg P to plot 20 in years with no farmyard manure) was applied 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 but 7/2 continues to receive P as above.
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)
PM	Pelleted poultry manure at 2 t, every fourth year to supply 63 kg N (started 2003)

Sub-plots

2.	<b>Lime</b>	<b>Liming plots 1-18 (excluding 18/2):</b>
	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: A small amount of chalk was applied to all plots during tests in the 1880s and 1890s. A regular test of liming was started in 1903 when most plots were divided in two and 4 t/ha CaCO<sub>3</sub> was applied every four years to the southern half. In 1965, most plots were divided into four: sub-plots "a" and "b" on the previously limed halves and sub-plots "c" and "d" on the unlimed halves. Sub-plots "a", "b" and "c" now receive different amounts of chalk, when necessary, to achieve and/or maintain soil (0-23 cm) at pH 7, 6 and 5, respectively. Sub-plot "d" receives no lime and its pH reflects inputs from the various treatments and the atmosphere. Lime was last applied in 2018; the ninth application in a triennial scheme of soil pH analysis and remedial chalk applications.

[This note was incorrect in earlier Yield book entries.]

NOTE: A separate scheme of liming was introduced on plots 18, 19 & 20 in 1920; subplot /1, /2 and /3 receive no lime, "high" lime and "light" lime respectively every 4 years. Since 1965 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 earlier Yield book entries. See further details on the e-RA website at <http://www.era.rothamsted.ac.uk>]

## Experimental Diary

Date	Application	Rate	Units
15/08/2019	a Path cutting; ISTH4335 with Kilworth Topper	-	-
17/10/2019	a Path cutting. Topped all paths; ISTH4335 with Kilworth Topper	-	-
28/10/2019	a Mow. Cut all plots and surrounds before baling; JD6230 with Kuhn Mower Conditioner	-	-
12/03/2020	f Applied TSP; Plot 20; By Hand	73	kg/ha
12/03/2020	f Applied TSP; Plots 6; Sections a and b only; By Hand	83	kg/ha
12/03/2020	f Applied TSP; Plots 4/2, 4/1, 8, 7/2, 9/1, 9/2, 10, 11/1, 11/2, 14/2, 14/1, 15, 16; Sections a, b, c; JD5070 with Nordsten box	83	kg/ha
14/04/2020	f Applied ammonium sulphate (21% N); Plot 1; Sections a, b, c; JD5070 with Exactomatic	229	kg/ha
14/04/2020	f Applied ammonium sulphate (21% N); Plot 6; Sections a, b only; JD5070 with Exactomatic	229	kg/ha
14/04/2020	f Applied ammonium sulphate (21% N); Plots 4/2, 9/2, 10, 18; Sections a, b, c; JD5070 with Exactomatic	457	kg/ha
14/04/2020	f Applied ammonium sulphate (21% N); Plots 11/1, 11/2; Sections a, b, c; JD5070 with Exactomatic	686	kg/ha
15/04/2020	f Applied SOP; Plots 2/1, 6, 7/1, 7/2, 9/1, 9/2, 11/1, 11/2, 14/1, 14/2, 15, 16, 18, 20; Sections a, b, c	542	kg/ha
15/04/2020	f Applied SOP; Plot 20	108	kg/ha
15/04/2020	f Applied Silicate of Soda; Plot 11/2; Sections a, b, c	450	kg/ha
15/04/2020	f Applied sodium nitrate (16% N); Plot 20; JD5070 with Exactomatic	188	kg/ha
15/04/2020	f Applied sodium nitrate (16% N); Plots 16, 17; Sections a, b, c; JD5070 with Exactomatic	300	kg/ha
15/04/2020	f Applied sodium nitrate (16% N); Plot 14/2; Sections a, b, c; JD5070 with Exactomatic	600	kg/ha
15/04/2020	f Applied sodium nitrate (16% N); Plot 15; Sections a, b, c; JD5070 with Exactomatic	900	kg/ha
16/04/2020	f Applied Sulphate of Soda; Plots 6, 7/1, 7/2, 8, 9/1, 9/2, 10, 11/1, 11/2, 14/1, 14/2, 15, 16, 18; Sections a, b, c	43	kg/ha
16/04/2020	f Applied Sulphate of Magnesia; Plots 6, 7/1, 7/2, 8, 9/1, 9/2, 10, 11/1, 11/2, 14/1, 14/2, 15, 16, 18; Sections a, b, c	111	kg/ha
22/06/2020	a Park Grass 1st Cut 2020. Harvested plots 20/3 to 4/1a; MF3070 with Wilder Grass Box	-	-
23/06/2020	a Park Grass 1st Cut 2020. Harvested Plots 3d to 17a; MF3070 with Wilder Grass Box	-	-
23/06/2020	a Mowed; JD6830 with Kuhn Mower Conditioner	-	-
23/06/2020	a Turning Over Cut Grass; JD5070 with Tedder	-	-
24/06/2020	a Turning Over Cut Grass; JD5070 with Tedder	-	-
25/06/2020	a Row up; MF3070 with PZ Hay Rake	-	-
25/06/2020	a Turning Over Cut Grass; JD5070 with Tedder	-	-
14/10/2020	a Path cutting; ISTH4335 with Kilworth Topper	-	-
11/01/2021	a Mowed all plots and surrounds; JD6620 with Kuhn Mower Conditioner	-	-
11/01/2021	a Baling off mown material. Material from plot 18d, 18c, 18/2, 18b, 18a, 19/1, 19/2, 19/3, 20/1, 20/2 and 20/3 not baled due to break down with baler (hydraulic pipe burst). Rest of field	-	-

baled and removed, Will return to bale the rest when baler is fixed; JD6230 with Claas Baler

**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.

## Yields

### 1ST CUT (22-23 JUN 2020) DRY MATTER, TONNES/HECTARE

Tables of means

	Grand mean	2.63						
	Manure	Lime	a	b	c	d	Mean	
	N1	1	2.00	1.61	1.21	0.45	1.32	
	K	2/1	1.29	1.82	1.40	0.98	1.37	
	None(FYM)	2/2	2.00	1.82	1.57	1.28	1.67	
	None	3	1.85	1.95	1.11	0.83	1.44	
	P	4/1	2.56	2.71	2.32	1.60	2.30	
	N2P	4/2	2.82	2.95	2.90	1.39	2.51	
	N1PKNaMg	6	4.51	3.72			4.12	
	(P)KNaMg	7/1	3.43	3.34	2.16	1.31	2.56	
	PKNaMg	7/2	4.18	3.86	3.28	2.17	3.37	
	PNaMg	8	1.95	2.07	2.16	1.99	2.04	
	PKNaMg(N2)	9/1	3.51	3.38	2.99	0.47	2.59	
	N2PKNaMg	9/2	4.58	4.44	3.63	1.51	3.54	
	N2PNaMg	10	2.57	2.74	2.68	1.06	2.26	
	N3PKNaMg	11/1	4.25	3.76	3.93	1.60	3.38	
	N3PKNaMgSi	11/2	5.19	4.04	3.69	1.64	3.64	
	None	12	1.77	0.84	1.14	0.84	1.15	
	(FYM/F)	13/1	2.27	1.97	1.69	1.45	1.85	
	FYM/PM	13/2	3.11	3.49	3.15	3.03	3.20	
	PKNaMg(N2*)	14/1	1.79	2.31	2.10	1.97	2.04	
	N2*PKNaMg	14/2	4.91	4.71	4.50	4.46	4.64	
	N3*PKNaMg(N2*)	15	5.47	4.56	5.68	4.40	5.03	
	N1*PKNaMg	16	3.82	3.69	3.63	3.60	3.68	
	N1*	17	1.45	1.91	1.46	1.84	1.67	

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N2KNaMg 18	1.45	1.54	0.84	0.07	0.98	
N2KNaMg 18/2					1.91	
FYM 19/1					2.57	
FYM 19/2					3.52	
FYM 19/3					3.52	
FYM/N*PK 20/1					4.53	
FYM/N*PK 20/2					4.49	
FYM/N*PK 20/3					4.34	
1st cut mean DM%	35.0					

**NO SECOND CUT WAS TAKEN IN 2020 BECAUSE THE BOX MOWER WAS CONDEMNED ON SAFETY GROUNDS**