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# Yields of the Field Experiments 2011

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Results of the  
Classical and other  
Long-term Experiments  
2011

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## R/PG/5 Park Grass

### Rothamsted Research

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11/R/PG/5

PARK GRASS

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

The 156<sup>th</sup> year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-10/R/PG/5.

**Treatments:** Combinations of:-

Whole plots

|    |               |   |
|----|---------------|---|
| 1. | <b>Manure</b> | Fertilizers and organic manures:  |
|    | N1            | Plot 1  |
|    | K             | Plot 2/1  |
|    | None (FYM)    | Plot 2/2  |
|    | None          | Plot 3  |
|    | P             | Plot 4/1  |
|    | N2P           | Plot 4/2  |
|    | N1PKNaMg      | Plot 6  |
|    | PKNaMg        | Plot 7  |
|    | PNaMg         | Plot 8  |
|    | PKNaMg(N2)    | Plot 9/1  |
|    | N2PKNaMg      | Plot 9/2  |
|    | N2PNaMg       | Plot 10   |
|    | N3PKNaMg      | Plot 11/1   |
|    | N3PKNaMgSi    | Plot 11/2   |
|    | None          | Plot 12   |
|    | (FYM/F)       | Plot 13/1   |
|    | FYM/PM        | Plot 13/2   |
|    | PKNaMg (N2*)  | Plot 14/1   |
|    | N2*PKNaMg     | Plot 14/2   |
|    | PKNaMg (N2*)  | Plot 15   |
|    | N1*PKNaMg     | Plot 16   |
|    | N1*           | Plot 17   |
|    | N2KNaMg       | Plot 18   |
|    | FYM           | Plot 19   |
|    | FYM/N*PK      | Plot 20   |
|    | 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   |

## 11/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. | <b>Lime</b> | 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 2008-2009; the sixth 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.]

|             |                    |
|-------------|--------------------|
| <b>Lime</b> | Liming plots 18-20 |
|-------------|--------------------|

**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.]

## 11/R/PG/5

### Experimental diary

|           |   |  | Rate | Unit  |
|-----------|---|--|------|-------|
| 29-Nov-10 | f | Applied Triple Super Phosphate - As treatment (see plan for details)   | 171  | kg/ha |
| 29-Nov-10 | f | Applied Triple Super Phosphate - As treatment (see plan for details)   | 73   | kg/ha |
| 19-Jan-11 | a | Removed fallen branch  |      |       |
| 09-Feb-11 | f | Applied Potassium Sulphate - Plots 6, 7, 9-1, 9-2, 11-1, 14-1, 14-2, 15, 16, 18 and 20 only                              | 542  | kg/ha |
| 09-Feb-11 | f | Applied Sodium Sulphate - Plots 6, 7, 9-1, 9-2, 11-1, 14-1, 14-2, 15, 16 and 18 only                                     | 43   | kg/ha |
| 09-Feb-11 | f | Applied Magnesium Sulphate - Plots 6, 7, 9-1, 9-2, 11-1, 14-1, 14-2, 15, 16 and 18 only                                  | 111  | kg/ha |
| 24-Feb-11 | f | Applied Sodium Sulphate - plots 8,10 and 11-2  | 43   | kg/ha |
| 24-Feb-11 | f | Applied Magnesium Sulphate - plots 8,10 and 11-2   | 111  | kg/ha |
| 24-Feb-11 | f | Applied Potassium Sulphate - plot 11-2   | 542  | kg/ha |
| 24-Feb-11 | f | Applied silicate of soda - plot 11-2   | 450  | kg/ha |
| 25-Feb-11 | f | Applied Potassium Sulphate - plots 2-1 and 20 (plot 20 received a total of 542 kg/ha in two applications on Feb 9 & 25). | 542  | kg/ha |
| 24-Mar-11 | f | Applied Ammonium Sulphate Fertiliser - See plan for details of treatments  |      |       |
| 24-Mar-11 | f | Applied Sodium Nitrate - See plan for details of treatments  |      |       |
| 25-Mar-11 | a | Applied Poultry manure - To plot 13/2  | 2    | t/ha  |
| 13-Apr-11 | p | Phostoxin - Gassed moles   |      |       |
| 18-Apr-11 | a | Cut surrounds - Cut round trial  |      |       |
| 19-Apr-11 | a | Cut paths  |      |       |
| 04-May-11 | a | Cut around edge of trial   |      |       |
| 05-May-11 | a | Cut paths  |      |       |
| 17-May-11 | a | Cut paths  |      |       |
| 25-May-11 | a | Cut around edge of trial   |      |       |
| 08-Jun-11 | a | Cut paths  |      |       |
| 22-Jun-11 | a | Cut yields - to finish   |      |       |
| 23-Jun-11 | a | Cut yields - 1st Cut yields.   |      |       |
| 23-Jun-11 | a | Cut discards   |      |       |
| 23-Jun-11 | a | Turned grass - Hay making  |      |       |
| 24-Jun-11 | a | Turned hay - Turned twice  |      |       |
| 24-Jun-11 | a | Rowed up hay   |      |       |
| 24-Jun-11 | a | Baled by contractor and removed.   |      |       |
| 29-Jun-11 | a | Cut paths  |      |       |
| 30-Jun-11 | a | Put out marker posts   |      |       |
| 01-Aug-11 | a | Cut paths  |      |       |
| 03-Nov-11 | a | Cut paths  |      |       |

21-Nov-11 a Cut yields - 2nd cut, herbage weighed and sampled  
 22-Nov-11 a Cut yields - 2nd cut. herbage weighed and sampled;  
 finished  
 22-Nov-11 a Cut and baled - removed grass

**1<sup>ST</sup> CUT (22-24/6/11) DRY MATTER TONNES/HECTARE**

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

Grand mean 2.87

|              | Manure | Lime | a    | b    | c    | d    | Mean |
|--------------|--------|------|------|------|------|------|------|
| N1           | 1      |      | 2.04 | 1.28 | 0.96 | 0.81 | 1.27 |
| K            | 2/1    |      | 1.06 | 1.32 | 0.42 | 0.38 | 0.80 |
| None (FYM)   | 2/2    |      | 1.08 | 1.25 | 0.53 | 0.62 | 0.87 |
| None         | 3      |      | 0.93 | 1.39 | 0.35 | 0.58 | 0.81 |
| P            | 4/1    |      | 2.95 | 2.49 | 1.85 | 1.87 | 2.29 |
| N2P          | 4/2    |      | 2.63 | 2.83 | 2.60 | 1.32 | 2.34 |
| N1PKNaMg     | 6      |      | 4.75 | 4.81 |      |      | 4.78 |
| PKNaMg       | 7      |      | 4.44 | 4.51 | 3.91 | 1.99 | 3.71 |
| PNaMg        | 8      |      | 2.68 | 2.70 | 2.35 | 2.57 | 2.58 |
| PKNaMg (N2)  | 9/1    |      | 4.00 | 4.23 | 2.59 | 0.69 | 2.88 |
| N2PKNaMg     | 9/2    |      | 5.47 | 5.56 | 3.56 | 2.28 | 4.22 |
| N2PNaMg      | 10     |      | 2.67 | 3.14 | 3.04 | 1.53 | 2.59 |
| N3PKNaMg     | 11/1   |      | 6.18 | 4.80 | 4.91 | 2.35 | 4.56 |
| N3PKNaMgSi   | 11/2   |      | 5.07 | 4.57 | 4.20 | 3.28 | 4.28 |
| None         | 12     |      | 1.99 | 1.35 | 0.96 | 0.94 | 1.31 |
| (FYM/F)      | 13/1   |      | 3.56 | 3.54 | 2.52 | 1.38 | 2.75 |
| FYM/PM       | 13/2   |      | 4.28 | 5.07 | 3.66 | 3.29 | 4.08 |
| PKNaMg (N2*) | 14/1   |      | 3.95 | 3.91 | 3.93 | 4.25 | 4.01 |
| N2*PKNaMg    | 14/2   |      | 4.67 | 4.41 | 4.10 | 3.46 | 4.16 |
| PKNaMg (N2*) | 15     |      | 4.55 | 4.24 | 4.19 | 1.75 | 3.68 |
| N1*PKNaMg    | 16     |      | 5.01 | 5.45 | 4.83 | 3.59 | 4.72 |
| N1*          | 17     |      | 1.83 | 1.74 | 1.48 | 1.84 | 1.72 |
| N2KNaMg      | 18     |      | 1.35 | 1.74 | 1.65 | 0.61 | 1.34 |
| N2KNaMg      | 18/2   |      |      |      |      |      | 2.56 |
| FYM          | 19/1   |      |      |      |      |      | 2.73 |
| FYM          | 19/2   |      |      |      |      |      | 3.68 |
| FYM          | 19/3   |      |      |      |      |      | 3.16 |
| FYM/N*PK     | 20/1   |      |      |      |      |      | 4.39 |
| FYM/N*PK     | 20/2   |      |      |      |      |      | 3.97 |
| FYM/N*PK     | 20/3   |      |      |      |      |      | 4.67 |

1ST CUT MEAN DM% 27.9



11/R/PG/5

2<sup>ND</sup> CUT (21-22/11/11) DRY MATTER TONNES/HECTARE

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

Grand Mean 1.14

|              | Manure | Lime | a    | b    | c    | d    | Mean |
|--------------|--------|------|------|------|------|------|------|
| N1           | 1      |      | 1.02 | 0.77 | 0.76 | 0.74 | 0.82 |
| K            | 2/1    |      | 0.76 | 0.56 | 0.48 | 0.44 | 0.56 |
| None (FYM)   | 2/2    |      | 0.63 | 0.65 | 0.49 | 0.70 | 0.62 |
| None         | 3      |      | 0.70 | 0.95 | 0.46 | 0.78 | 0.72 |
| P            | 4/1    |      | 1.27 | 1.04 | 1.26 | 1.21 | 1.20 |
| N2P          | 4/2    |      | 1.31 | 1.19 | 1.24 | 1.21 | 1.24 |
| N1PKNaMg     | 6      |      | 0.84 | 0.81 |      |      | 0.83 |
| PKNaMg       | 7      |      | 1.01 | 1.04 | 1.50 | 1.02 | 1.14 |
| PNaMg        | 8      |      | 1.35 | 1.32 | 1.42 | 1.47 | 1.39 |
| PKNaMg (N2)  | 9/1    |      | 1.16 | 1.31 | 1.04 | 0.32 | 0.96 |
| N2PKNaMg     | 9/2    |      | 1.33 | 1.26 | 1.20 | 1.97 | 1.44 |
| N2PNaMg      | 10     |      | 0.70 | 1.01 | 1.13 | 1.63 | 1.12 |
| N3PKNaMg     | 11/1   |      | 1.41 | 1.07 | 1.04 | 2.72 | 1.56 |
| N3PKNaMgSi   | 11/2   |      | 1.63 | 1.24 | 1.23 | 3.18 | 1.82 |
| None         | 12     |      | 1.12 | 0.78 | 0.75 | 0.61 | 0.81 |
| (FYM/F)      | 13/1   |      | 1.51 | 1.53 | 1.10 | 0.61 | 1.19 |
| FYM/PM       | 13/2   |      | 1.52 | 2.19 | 2.01 | 1.65 | 1.84 |
| PKNaMg (N2*) | 14/1   |      | 0.94 | 1.10 | 1.34 | 1.44 | 1.21 |
| N2*PKNaMg    | 14/2   |      | 0.94 | 1.01 | 0.95 | 1.32 | 1.06 |
| PKNaMg (N2*) | 15     |      | 1.01 | 1.19 | 1.42 | 1.01 | 1.16 |
| N1*PKNaMg    | 16     |      | 1.27 | 1.44 | 1.70 | 1.28 | 1.42 |
| N1*          | 17     |      | 1.04 | 1.13 | 0.93 | 1.18 | 1.07 |
| N2KNaMg      | 18     |      | 0.73 | 0.81 | 0.91 | 0.29 | 0.68 |
| N2KNaMg      | 18/2   |      |      |      |      |      | 1.15 |
| FYM          | 19/1   |      |      |      |      |      | 1.32 |
| FYM          | 19/2   |      |      |      |      |      | 1.34 |
| FYM          | 19/3   |      |      |      |      |      | 1.11 |
| FYM/N*PK     | 20/1   |      |      |      |      |      | 1.66 |
| FYM/N*PK     | 20/2   |      |      |      |      |      | 1.32 |
| FYM/N*PK     | 20/3   |      |      |      |      |      | 1.39 |

2<sup>ND</sup> CUT MEAN DM% 24.55

11/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

Grand Mean 4.01

|              | Manure | Lime | a    | b    | c    | d    | Mean |
|--------------|--------|------|------|------|------|------|------|
| N1           | 1      |      | 3.06 | 2.05 | 1.72 | 1.54 | 2.09 |
| K            | 2/1    |      | 1.82 | 1.89 | 0.90 | 0.82 | 1.36 |
| None (FYM)   | 2/2    |      | 1.71 | 1.90 | 1.02 | 1.31 | 1.49 |
| None         | 3      |      | 1.63 | 2.34 | 0.81 | 1.36 | 1.54 |
| P            | 4/1    |      | 4.21 | 3.53 | 3.12 | 3.09 | 3.49 |
| N2P          | 4/2    |      | 3.94 | 4.02 | 3.85 | 2.54 | 3.58 |
| N1PKNaMg     | 6      |      | 5.59 | 5.62 |      |      | 5.61 |
| PKNaMg       | 7      |      | 5.45 | 5.56 | 5.41 | 3.01 | 4.86 |
| PNaMg        | 8      |      | 4.03 | 4.02 | 3.76 | 4.04 | 3.96 |
| PKNaMg (N2)  | 9/1    |      | 5.16 | 5.54 | 3.63 | 1.01 | 3.84 |
| N2PKNaMg     | 9/2    |      | 6.80 | 6.83 | 4.76 | 4.25 | 5.66 |
| N2PNaMg      | 10     |      | 3.37 | 4.15 | 4.17 | 3.16 | 3.71 |
| N3PKNaMg     | 11/1   |      | 7.59 | 5.87 | 5.96 | 5.07 | 6.12 |
| N3PKNaMgSi   | 11/2   |      | 6.70 | 5.81 | 5.43 | 6.46 | 6.10 |
| None         | 12     |      | 1.10 | 2.13 | 1.71 | 1.54 | 2.12 |
| (FYM/F)      | 13/1   |      | 5.07 | 5.07 | 3.62 | 1.99 | 3.94 |
| FYM/PM       | 13/2   |      | 5.80 | 7.25 | 5.67 | 4.94 | 5.92 |
| PKNaMg (N2*) | 14/1   |      | 4.89 | 5.01 | 5.27 | 5.69 | 5.22 |
| N2*PKNaMg    | 14/2   |      | 5.61 | 5.42 | 5.05 | 4.78 | 5.21 |
| PKNaMg (N2*) | 15     |      | 5.55 | 5.42 | 5.61 | 2.76 | 4.84 |
| N1*PKNaMg    | 16     |      | 6.28 | 6.88 | 6.53 | 4.87 | 6.14 |
| N1*          | 17     |      | 2.87 | 2.86 | 2.41 | 3.02 | 2.79 |
| N2KNaMg      | 18     |      | 2.08 | 2.55 | 2.56 | 0.90 | 2.02 |
| N2KNaMg      | 18/2   |      |      |      |      |      | 3.71 |
| FYM          | 19/1   |      |      |      |      |      | 4.06 |
| FYM          | 19/2   |      |      |      |      |      | 5.03 |
| FYM          | 19/3   |      |      |      |      |      | 4.27 |
| FYM/N*PK     | 20/1   |      |      |      |      |      | 6.06 |
| FYM/N*PK     | 20/2   |      |      |      |      |      | 5.29 |
| FYM/N*PK     | 20/3   |      |      |      |      |      | 6.06 |

TOTAL OF 2 CUTS MEAN DM% 26.25