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# Yields of the Field Experiments 2012

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Results of the  
Classical and other  
Long-term Experiments  
2012

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## 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 157<sup>th</sup> 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. | <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   |

**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 |

|           |   |   |           |       |
|-----------|---|---|-----------|-------|
| 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 (1<sup>st</sup> and 2<sup>nd</sup> Cut) were taken for chemical analysis. Unground herbage samples from all plots were archived.

## 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 |

**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

**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

**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