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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/EX/4 Exhaustion Land

### Rothamsted Research

Rothamsted Research (2013) *R/EX/4 Exhaustion Land* ; Yields Of The Field Experiments 2012, pp 24 - 28 - DOI: <https://doi.org/10.23637/ERADOC-1-222>

12/R/EX/4

EXHAUSTION LAND

**Object:** To study the residual effects of manures applied 1856 - 1901, and of additional phosphate applied since 1986 (P test) and of additional potassium since 2007 (K test); on the yield of continuous s. barley up to 1991, w. wheat since – Hoosfield.

The 157<sup>th</sup> year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-11/R/EX/4

**Treatments:** All combinations of:-

Whole plots (P test)

1. **OLD RES** Residues of manures applied annually 1876 – 1901:

|         |  |
|---------|--|
| O       | None   |
| D       | Farmyard manure at 35 t  |
| N       | 96 kg N as ammonium salts  |
| P       | 34 kg P as superphosphate  |
| NPKNAMG | N and P as above plus 137 kg K as sulphate of potash, 16 kg Na as sulphate of soda, 11 kg Mg as sulphate of magnesia |

2. **P** Maintenance P (20 kg P) applied annually from 2000 to maintain existing levels of available P in the soil. (P1) (P2) and (P3) are residues of P applied annually 1986–1992:

|        | 2000-12 | 1986-92  |
|--------|---------|----------|
| O      | None    | None     |
| P (P1) | 20 kg P | 44 kg P  |
| P (P2) | 20 kg P | 87 kg P  |
| P (P3) | 20 kg P | 131 kg P |

**NOTE:** P treatments were applied at 61.5 kg P in error in 2000.

Plus

Whole plots (K test, previously N test until 1991)

1. **OLD RES** Residues of manures applied annually 1876 – 1901:

|      |   |
|------|---|
| O    | None  |
| D    | Farmyard manure at 35 t                                   |
| N*   | 96 kg N as nitrate of soda                                |
| PK   | 34 kg P as superphosphate, 137 kg K as sulphate of potash |
| N*PK | N, P and K as above                                       |

## 12/R/EX/4

2. K Potassium applied annually from 2007 as muriate of potash

|    |                                      |
|----|--------------------------------------|
| O  | None                                 |
| K1 | 75 kg K <sub>2</sub> O (62.2 kg K)   |
| K2 | 150 kg K <sub>2</sub> O (124.5 kg K) |

Whole plots

Nitrogen: 50 kg N as ammonium sulphate (to supply sufficient S) during first two weeks in March, 200 kg N as ammonium nitrate at GS31/mid-April (whichever comes first) and 50 kg N as ammonium nitrate at GS37 (not later than mid-May)

### Experimental diary

| Date      |   | Application   | Rate  | Units         |
|-----------|---|---|---|---------------|
| 15-Aug-11 | a | Combined for yields   | -   |               |
| 15-Aug-11 | a | Straw weights   | -   |               |
| 29-Sep-11 | f | Applied Triple Super Phosphate, as per plan.                                      | -   |               |
| 29-Sep-11 | f | Applied Muriate of Potash, as per plan  | -   |               |
| 30-Sep-11 | a | Applied Chalk, as per plan  |   |               |
|           |   | Plots 022,024,074.  | 2   | t/ha          |
|           |   | Plots 011,023,044,061,062,063,064, 071, 082,083,084,103.                          | 4   | t/ha          |
|           |   | Plots 021, 041,042,043, 051,054,081,101,102,104.                                  | 6   | t/ha          |
| 03-Oct-11 | a | Ploughed  | -   |               |
| 04-Oct-11 | a | Cultipressed  | -   |               |
| 12-Oct-11 | a | Rolled  | -   |               |
| 14-Oct-11 | p | Sprayed Liberator in 200l/ha of water   | 0.6   | l/ha          |
| 16-Mar-12 | f | Applied Ammonium Sulphate Fertiliser  | 238   | kg/ha         |
| 22-Mar-12 | p | Sprayed Cherokee SE and Justice in 200l/ha  | Ch1.0<br>Ju 0.125                                       | l/ha          |
| 11-Apr-12 | f | Applied Nitram Fertiliser   | 580   | kg/ha         |
| 05-May-12 | p | Sprayed AllyMax, Bravo 500, Tracker, Agriguard and Starane in 200l/ha of water    | Al@ 42*<br>Br@ 1.0<br>Tr@ 1.0<br>Ag@ 2.25<br>St@0.5     | *g/ha<br>l/ha |
| 05-May-12 | p | Sprayed AllyMax, Bravo 500, Tracker, Agriguard and Starane 2 in 200 l/ha of water | Al@ 42*,<br>Br@ 1.0,<br>Tr@ 1.0,<br>Ag@ 2.25,<br>St@0.5 | *g/ha<br>l/ha |
| 17-May-12 | a | Cut Paths   | -   |               |
| 17-May-12 | f | Applied Nitram  | 145   | kg/ha         |
| 23-May-12 | p | Sprayed Comet, Bravo 500 and Opus   | Co@0.6<br>Br@1.0<br>Op@0.8                              | l/ha          |
| 13-Jun-12 | p | Sprayed w/ Amistar and Prosaro in 100l/ha of water                                | Am@0.3<br>P@0.7   | l/ha          |
| 14-Jun-12 | a | Cut paths   | -   |               |
| 20-Jun-12 | a | Cut Paths   | -   |               |

|           |   |   |     |       |
|-----------|---|---|-----|-------|
| 06-Aug-12 | a | Cut Paths   | -   |       |
| 07-Aug-12 | p | Sprayed w/ Samurai  | 3   | l/ha  |
| 23-Aug-12 | a | Harvested.  | -   |       |
| 24-Aug-12 | a | Harvested O+E's   | -   |       |
| 24-Aug-12 | a | Sampled Baled and Weighed                                       | -   |       |
| 20-Sep-12 | p | Sprayed Whole field w/ Weedazol EW                              | 20  | l/ha  |
| 28-Sep-12 | f | Spread Muriate of Potash - plots 103,83,63,43,23                | 125 | kg/ha |
| 28-Sep-12 | f | Spread Muriate of Potash - plots 104-94,87-73,64-54,44-34,24-14 | 250 | kg/ha |
| 28-Sep-12 | f | Spread TSP as on sheet on plots 101-93,81-73,61-53,41-33,21-13  | 75  | kg/ha |

**NOTE:** Samples of grain and straw were taken for chemical analysis.

**P TEST**

**Grain tonnes/hectare**

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

| P_RES          | O    | P1   | P2   | P3   | Mean |
|----------------|------|------|------|------|------|
| <b>OLD_RES</b> |      |      |      |      |      |
| O              | 2.43 | 7.22 | 8.36 | 8.72 | 6.68 |
| D              | 4.94 | 8.66 | 8.66 | 8.64 | 7.72 |
| N              | 1.43 | 7.78 | 8.21 | 8.45 | 6.47 |
| P              | 3.64 | 8.23 | 8.42 | 8.77 | 7.26 |
| NPKNAMG        | 3.45 | 8.02 | 8.60 | 8.52 | 7.15 |
| Mean           | 3.18 | 7.98 | 8.45 | 8.62 | 7.06 |

Grain mean DM% 86.5

Plot area harvested 0.00538

**Straw tonnes/hectare**

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

| P_RES          | O    | P1   | P2   | P3   | Mean |
|----------------|------|------|------|------|------|
| <b>OLD_RES</b> |      |      |      |      |      |
| O              | 1.61 | 4.01 | 5.18 | 5.73 | 4.13 |
| D              | 2.89 | 5.21 | 6.49 | 6.41 | 5.25 |
| N              | 0.97 | 4.51 | 4.95 | 5.43 | 3.96 |
| P              | 2.09 | 4.79 | 5.21 | 5.87 | 4.49 |
| NPKNAMG        | 2.22 | 4.19 | 5.08 | 6.03 | 4.38 |
| Mean           | 1.96 | 4.54 | 5.38 | 5.89 | 4.44 |

Straw mean DM% 86.3

Plot area harvested 0.00538

12/R/EX/4

K TEST

Grain tonnes/hectare

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

| K_Test<br>OLD_RES | K0   | K1   | K2   | Mean |
|-------------------|------|------|------|------|
| O                 | 6.23 | 8.03 | 8.51 | 7.25 |
| D                 | 6.43 | 7.91 | 8.35 | 7.28 |
| N*                | 6.53 | 8.27 | 8.36 | 7.42 |
| PK                | 7.48 | 8.53 | 8.65 | 8.03 |
| N*PK              | 6.86 | 8.35 | 8.49 | 7.64 |
| Mean              | 6.70 | 8.22 | 8.47 | 7.53 |

Standard errors of differences of means

| Table               | OLD_RES | K_Test | OLD_RES<br>K_Test |         |
|---------------------|---------|--------|-------------------|---------|
| s.e.d.              |         | 0.316  | 0.707             | min.rep |
|                     | 0.354   | 0.274  | 0.612             | max-min |
| Grain mean DM% 86.6 |         |        |                   |         |

12/R/EX/4

K TEST

Straw tonnes/hectare

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

| K_Test<br>OLD_RES | K0   | K1   | K2   | Mean |
|-------------------|------|------|------|------|
| O                 | 4.00 | 5.74 | 5.71 | 4.86 |
| D                 | 5.15 | 6.51 | 6.66 | 5.87 |
| N*                | 4.79 | 5.63 | 5.94 | 5.29 |
| PK                | 5.69 | 6.32 | 6.37 | 6.02 |
| N*PK              | 4.58 | 5.65 | 6.13 | 5.24 |
| Mean              | 4.84 | 5.97 | 6.16 | 5.45 |

Standard errors of differences of means

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| Table  | OLD_RES | K_Test | OLD_RES<br>K_Test |         |
|--------|---------|--------|-------------------|---------|
| s.e.d. |         | 0.217  | 0.486             | min.rep |
|        | 0.243   | 0.188  | 0.421             | max-min |
|        |         | 0.154X | 0.344             | max.rep |

Stratum standard errors and coefficients of variation

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Straw85% Straw (at 85% dry matter) tonnes/hectare

| Stratum      | d.f. | s.e.  | cv% |
|--------------|------|-------|-----|
| Blocks.Plots | 5    | 0.344 | 6.3 |

Straw mean DM% 88.6

Plot area harvested 0.005