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# Yields of the Field Experiments 2013

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Results of the  
Classical and other  
Long-term Experiments  
2013

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## R/HB/2 Hoos Barley

### Rothamsted Research

Rothamsted Research (2014) *R/HB/2 Hoos Barley*; Yields Of The Field Experiments 2013, pp 15 - 20  
- DOI: <https://doi.org/10.23637/ERADOC-1-223>

13/R/HB/2

HOOS BARLEY

**Object:** To study the effects of organic manures and inorganic fertilizers on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised on parts of the experiment. The rotation was discontinued in 1979 and the whole experiment reverted to continuous s. barley. The experiment was modified for 2003. The main plots continue as previously. The Silicate Test plots continue but are not split to test rates of N (basal N is applied). The remaining plots are to be used to study the effect on yield of P residues, (basal N applied).

The 162<sup>nd</sup> year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-12/R/HB/2.

**Main plots**

**Treatments:**

Whole plots

| 1. MANURE            | Plot              | Fertilizers and Organic Manures<br>Form of N<br>1852-1966 | Additional<br>treatments<br>1852-2002 | Treatments<br>since 2003 |
|----------------------|-------------------|---|---------------------------------------|--------------------------|
| ---                  | 11                | None  | -                                     | -                        |
| -P-                  | 21                | None  | P                                     | (P)                      |
| --K                  | 31                | None  | K (Na) Mg                             | K(Mg)                    |
| -PK                  | 41                | None  | PK (Na) Mg                            | (P) K (Mg)               |
| A--                  | 12                | A   | -                                     | -                        |
| AP-                  | 22                | A   | P                                     | (P)                      |
| A-K                  | 32                | A   | K (Na) Mg                             | K(Mg)                    |
| APK                  | 42                | A   | PK (Na) Mg                            | (P) K (Mg)               |
| D1852                | 72                | None  | D                                     | D                        |
| (D)                  | 71                | None  | (D)                                   | (D)                      |
| (A)                  | 62                | None  | (Ashes)                               | (Ashes)                  |
| -                    | 61                | None  | -                                     | -                        |
| D2001 <sup>(a)</sup> | 73 <sup>(a)</sup> | -   | D                                     | D                        |
| P2KMg <sup>(a)</sup> | 63 <sup>(a)</sup> | -   | P2KMg                                 | P2KMg                    |

<sup>(a)</sup> Plots 63 and 73 started in 2001

- Form of N: A, sulphate of ammonia to supply 48kg N
- P: 35 kg P as triple superphosphate in 1974 and from 1988 to 2002, single superphosphate in other years
- (P): (none), P application to be reviewed for 2013
- P2: 44kg P as triple superphosphate
- K: 90 kg K as sulphate of potash
- (Na): (none), 16 kg Na as sulphate of soda until 1973
- Mg: 35kg Mg as kieserite every third year since 1974 (applied at 30 kg in 1992, 1995 and 1998) (sulphate of magnesia annually until 1973). Annually to new plot 63.
- (Mg): (none), Mg application to be reviewed for 2013

D1852: Farmyard manure at 35t since 1852  
 D2001: Farmyard manure at 35t since 2001  
 (D): Farmyard manure 1852 – 1871 only  
 (Ashes): Weed ash 1852-1916, furnace ash 1917-1932, none since

Sub-Plots

(2) N Nitrogen fertilizer (kg N), as 'Nitro-Chalk', since 1968 (cumulative N applications until 1973, on a cyclic system since 1974):  
 0  
 48  
 96  
 144

**Silicate Test plots**

**Treatments:**

Whole plots

| MANURE | Plot | Fertilizers:<br>Additional<br>treatment<br>1852-1979 | Changes since<br>1980 | Treatments since<br>2003 |
|--------|------|--|-----------------------|--------------------------|
| N----  | 131  | -  | -                     | N3                       |
| NP---  | 231  | P  | -                     | N3 (P)                   |
| N-K--  | 331  | K(Na)Mg  | -                     | N3 K(Mg)                 |
| NPK--  | 431  | PK(Na)Mg   | -                     | N3(P)K(Mg)               |
| N—S-   | 134  | Si   | Si omitted            | N3 (Si)                  |
| NP-S-  | 234  | P Si   | Si omitted            | N3(P) (Si)               |
| N-KS-  | 334  | K(Na)MgSi  | Si omitted            | N3 K(Mg)(Si)             |
| NPKS-  | 434  | PK(Na)MgSi   | Si omitted            | N3(P)K(Mg)(Si)           |
| N---S  | 132  | -  | Si added              | N3 Si                    |
| NP--S  | 232  | P  | Si added              | N3(P) Si                 |
| N-K-S  | 332  | K(Na)Mg  | Si added              | N3 K(Mg) Si              |
| NPK-S  | 432  | PK(Na)Mg   | Si added              | N3(P)K(Mg) Si            |
| N--SS  | 133  | Si   | -                     | N3 Si                    |
| NP-SS  | 233  | P Si   | -                     | N3(P) Si                 |
| N-KSS  | 333  | K(Na)MgSi  | -                     | N3 K(Mg) Si              |
| NPKSS  | 433  | PK(Na)MgSi   | -                     | N3(P)K(Mg) Si            |

N: From 1852-1966 whole plots received 48kg N as nitrate of soda. Between 1968-2002 whole plots were split to test 4 rates of N as "Nitro-chalk" (cumulative applications until 1973, on a cyclic system from 1974).  
 N3: Basal N, 144kg as "Nitro-chalk" since 2003  
 Si: Silicate of soda at 450kg (Note: S also refers to silicate of soda)  
 (Si): Silicate of soda omitted since 1980  
 P, (P), K, Mg, (Mg), (Na): as above

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### P Test plots

#### Treatments:

Since 2003 the remaining plots [ex-Castor meal (plots 14, 24, 34 & 44) and those testing combinations of NPK with and without Mg (plots 55, 56, 57 & 58)] have been used to study the effect of P residues on yield. Previous treatments have resulted in different levels of available P in the soil. Large dressing of K were applied to some plots to increase levels of exchangeable K in the soil such that K should not limit yield; plots 141 and 241 were sacrificed and used as discard areas so that the K application did not encroach on adjacent no K plots on the Silicate Test. Other plots received the normal rate of K. The level of exchangeable Mg in the soil is such that Mg should not limit yield; the need to apply Mg will be reviewed for 2014.

#### Whole plots

##### Manure

| Plot | Treatment since<br>2003 |
|------|-------------------------|
| 142  | N3K*                    |
| 143  | N3K*                    |
| 144  | N3K*                    |
| 242  | N3K*                    |
| 243  | N3K*                    |
| 244  | N3K*                    |
| 341  | N3K                     |
| 342  | N3K                     |
| 343  | N3K                     |
| 344  | N3K                     |
| 441  | N3K                     |
| 442  | N3K                     |
| 443  | N3K                     |
| 444  | N3K                     |
| 551  | N3K                     |
| 552  | N3K                     |
| 561  | N3K                     |
| 562  | N3K                     |
| 571  | N3K*                    |
| 572  | N3K*                    |
| 581  | N3K*                    |
| 582  | N3K*                    |

N3: Basal N, 144kg as "Nitro-chalk"  
K: 90kg K as sulphate of potash  
K\*: 450kg K as sulphate of potash

In 2005 the extra dressings of K (i.e. K\*) was stopped and the whole experiment reverted to K dressings of 90 kg K/ha/year.

**13/R/HB/2**

**Experimental Diary**

| <b>Date</b> |   | <b>Application</b>  | <b>Rate</b>          | <b>Unit</b>          |
|-------------|---|---|----------------------|----------------------|
| 20-Sep-12   | p | Sprayed Whole field w/ Weedazol EW  | 20                   | l/ha                 |
| 28-Sep-12   | f | Spread Fert SOP as on sheet 631-634 411-444 311-344 241-244 141-144 + Strip 5               | 217                  | kg/ha                |
| 28-Sep-12   | f | Spread Fert TSP and Kieserite as on sheet, sections 631-634                                 | TSP@215<br>KIE@233   | kg/ha<br>kg/ha       |
| 01-Oct-12   | f | Spread Soda Silicate onto plots 432-132, 433-133  | 450                  | kg/ha                |
| 03-Oct-12   | a | Applied FYM to 734 to 731 and 724 to 721  | 35                   | t/ha                 |
| 08-Oct-12   | a | Ploughed  | —                    | —                    |
| 01-Mar-13   | a | Drilling W Barley var Tipple  | 350                  | Seeds m <sup>2</sup> |
| 04-Mar-13   | a | Ring Rolled   | —                    | —                    |
| 30-Apr-13   | a | Rotated Paths   | —                    | —                    |
| 01-May-13   | f | Applied N as Nitro Chalk<br>Plots 113,124,211,222,313,321,412,421,611,621, 631,712,721,732. | 178                  | kg/ha                |
|             |   | Plots 112,123,212,223,314,324,414,422,613, 624,634,711,722,731.                             | 356                  | kg/ha                |
|             |   | Plots 114,122,213,224,312,323,411,424,612, 622,632,714,723,733.                             | 533                  | kg/ha                |
| 01-May-13   | f | Applied Nitram - Plots: Series AA old plots, Series C and Strip 5, as per plan              | 417                  | kg/ha                |
| 02-Jun-13   | p | Sprayed Mobius, Clyfamid  | mo@0.6,<br>cly@0.125 | l/ha                 |
| 26-Jun-13   | p | Sprayed Mobius  | 0.4                  | l/ha                 |
| 09-Jul-13   | a | Cut/Cultivated Paths  | —                    | —                    |
| 10-Jul-13   | a | Pulling Wild Oats, 7 in plots   | —                    | —                    |
| 12-Aug-13   | a | Claas - Harvested (opened up exp)   | —                    | —                    |
| 27-Aug-13   | a | Claas – Harvested discards  | OE's                 | —                    |
| 27-Aug-13   | a | Sampo – Harvested for yield   | All plots            | —                    |
| 28-Aug-13   | a | Baled Sampled and Weighed   | All Plots            | —                    |
| 28-Aug-13   | a | Claas - Harvested opened up and cut OE's  | —                    | —                    |

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MAIN PLOTS

Grain tonnes/hectare

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

| N              | 0    | 48   | 96   | 144  | Mean |
|----------------|------|------|------|------|------|
| MANURE         |      |      |      |      |      |
| ---            | 1.20 | 1.73 | 1.75 | 1.91 | 1.65 |
| -P-            | 1.72 | 3.85 | 4.11 | 4.10 | 3.44 |
| --K            | 0.66 | 1.37 | 1.40 | 1.52 | 1.24 |
| -PK            | 1.78 | 3.63 | 4.51 | 5.00 | 3.73 |
| A--            | 1.18 | 1.65 | 1.44 | 1.66 | 1.48 |
| AP-            | 2.24 | 3.52 | 3.71 | 3.95 | 3.36 |
| A-K            | 0.33 | 0.80 | 1.35 | 0.82 | 0.83 |
| APK            | 1.84 | 3.24 | 4.04 | 4.45 | 3.39 |
| FYM1852onwards | 6.31 | 7.00 | 7.23 | 7.37 | 6.98 |
| FYM1852-1871   | 1.07 | 1.80 | 2.11 | 5.37 | 2.59 |
| (A)            | 0.77 | 1.45 | 2.82 | 1.93 | 1.74 |
| -              | 0.67 | 0.95 | 1.05 | 1.49 | 1.04 |
| FYM2001onwards | 4.40 | 5.73 | 6.77 | 6.27 | 5.79 |
| P2K            | 1.61 | 3.76 | 4.11 | 5.63 | 3.78 |
| Mean           | 1.84 | 2.89 | 3.32 | 3.68 | 2.93 |

Grain Mean DM% 86.3

Straw tonnes/hectare

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

| N              | 0    | 48   | 96   | 144  | Mean |
|----------------|------|------|------|------|------|
| MANURE         |      |      |      |      |      |
| ---            | 0.23 | 0.59 | 0.50 | 0.60 | 0.48 |
| -P-            | 0.30 | 1.07 | 1.16 | 1.31 | 0.96 |
| --K            | 0.16 | 0.35 | 0.31 | 0.29 | 0.28 |
| -PK            | 0.37 | 1.39 | 1.54 | 1.82 | 1.28 |
| A--            | 0.30 | 0.42 | 0.36 | 0.48 | 0.39 |
| AP-            | 0.35 | 1.00 | 1.29 | 1.36 | 1.00 |
| A-K            | 0.10 | 0.24 | 0.24 | 0.17 | 0.18 |
| APK            | 0.42 | 0.85 | 1.31 | 1.65 | 1.05 |
| FYM1852onwards | 2.11 | 2.77 | 3.46 | 3.53 | 2.97 |
| FYM1852-1871   | 0.21 | 0.46 | 0.39 | 1.91 | 0.74 |
| (A)            | 0.16 | 0.30 | 0.79 | 0.52 | 0.44 |
| -              | 0.10 | 0.25 | 0.31 | 0.34 | 0.25 |
| FYM2001onwards | 1.43 | 2.35 | 2.73 | 2.72 | 2.31 |
| P2K            | 0.30 | 1.06 | 1.51 | 2.44 | 1.33 |
| Mean           | 0.47 | 0.94 | 1.14 | 1.37 | 0.98 |

Straw Mean DM% 82.5

Plot area harvested 0.0192, 0.00256

## 13/R/HB/2

### PHOSPHATE PLOTS

Grain tonnes/hectare

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

| PLOTS |      |
|-------|------|
| 142   | 2.41 |
| 143   | 2.19 |
| 144   | 2.20 |
| 242   | 5.76 |
| 243   | 5.43 |
| 244   | 5.16 |
| 341   | 2.27 |
| 342   | 2.66 |
| 343   | 3.02 |
| 344   | 3.58 |
| 441   | 4.91 |
| 442   | 5.51 |
| 443   | 5.62 |
| 444   | 5.34 |
| 551   | 4.90 |
| 552   | 5.02 |
| 561   | 4.88 |
| 562   | 4.82 |
| 571   | 2.24 |
| 572   | 3.03 |
| 581   | 0.91 |
| 582   | 1.00 |
| Mean  | 3.77 |

Grain Mean DM% 83.4

Plot area harvested 0.00256

### SILICATE PLOTS

Grain tonnes/hectare

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

|          | PK | N3-- | N3P- | N3-K | N3PK |
|----------|----|------|------|------|------|
| Silicate |    |      |      |      |      |
| (-)-     |    | 1.52 | 4.54 | 1.68 | 4.91 |
| (Si)-    |    | 2.16 | 4.93 | 1.50 | 5.47 |
| (-)Si    |    | 2.59 | 4.57 | 1.65 | 4.83 |
| (Si)Si   |    | 2.59 | 4.61 | 1.54 | 4.38 |

Grain Mean DM% 83.0

Plot area harvested 0.00256