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# Yields of the Field Experiments 2002

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Yields of the  
Classical  
and other  
Long-term Experiments  
2002

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## 02/R/HB/2 - Hoos Barley

### Rothamsted Research

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02/R/HB/2

# HOOS BARLEY

**Object:** To study the effects of organic manures and inorganic fertilisers on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised. The rotation was discontinued in 1979 and continued in s. barley.

The 151st year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-01/HB/2.

**Treatments:** All combinations of:-

Whole plots

1. **MANURE** Plot Fertilizers and organic manures:

|       |     | Form of N<br>1852-1966 | Additional<br>treatments<br>1852-1979 | Changes<br>since<br>1980 | Additional<br>treatments<br>since 2001 |
|-------|-----|------------------------|---------------------------------------|--------------------------|----------------------------------------|
| ---   | 11  | None                   | -                                     | -                        |                                        |
| -P-   | 21  | None                   | P                                     | -                        |                                        |
| --K   | 31  | None                   | K (Na) Mg                             | -                        |                                        |
| -PK   | 41  | None                   | PK (Na) Mg                            | -                        |                                        |
| A--   | 12  | A                      | -                                     | -                        |                                        |
| AP-   | 22  | A                      | P                                     | -                        |                                        |
| A-K   | 32  | A                      | K (Na) Mg                             | -                        |                                        |
| APK   | 42  | A                      | PK (Na) Mg                            | -                        |                                        |
| N---- | 131 | N                      | -                                     | -                        |                                        |
| NP--- | 231 | N                      | P                                     | -                        |                                        |
| N-K-- | 331 | N                      | K (Na) Mg                             | -                        |                                        |
| NPK-- | 431 | N                      | PK (Na) Mg                            | -                        |                                        |
| N--S- | 134 | N                      | Si                                    | Si omitted               |                                        |
| NP-S- | 234 | N                      | P Si                                  | "                        |                                        |
| N-KS- | 334 | N                      | K (Na) MgSi                           | "                        |                                        |
| NPKS- | 434 | N                      | PK (Na) MgSi                          | "                        |                                        |
| N---S | 132 | N                      | -                                     | Si added                 |                                        |
| NP--S | 232 | N                      | P                                     | "                        |                                        |
| N-K-S | 332 | N                      | K (Na) Mg                             | "                        |                                        |
| NPK-S | 432 | N                      | PK (Na) Mg                            | "                        |                                        |
| N--SS | 133 | N                      | Si                                    | -                        |                                        |
| NP-SS | 233 | N                      | P Si                                  | -                        |                                        |
| N-KSS | 333 | N                      | K (Na) MgSi                           | -                        |                                        |
| NPKSS | 433 | N                      | PK (Na) MgSi                          | -                        |                                        |
| C(--) | 14  | C                      | -                                     | PKMg omitted             |                                        |
| C(P-) | 24  | C                      | P                                     | "                        |                                        |
| C(-K) | 34  | C                      | K (Na) Mg                             | "                        |                                        |
| C(PK) | 44  | C                      | PK (Na) Mg                            | "                        |                                        |
| D1852 | 72  | None                   | D                                     | -                        |                                        |
| (D)   | 71  | None                   | (D)                                   | -                        |                                        |
| (A)   | 62  | None                   | (Ashes)                               | -                        |                                        |
| -     | 61  | None                   | -                                     | -                        |                                        |
| D2001 | 73  | -                      | -                                     | -                        | D                                      |
| P2KMg | 63  | -                      | -                                     | -                        | P2KMg                                  |

Form of N: A, sulphate of ammonia; N, nitrate of soda - each to supply 48 kg N; C, castor meal to supply 96 kg N  
P: 35 kg P as triple superphosphate in 1974 and since 1988, single superphosphate in other years  
P2: 44 kg P as triple superphosphate started in 2001.  
K: 90 kg K as sulphate of potash  
(Na): 16 kg Na as sulphate of soda until 1973  
Mg: 35 kg 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.  
 Si: Silicate of soda at 450 kg  
 D1852: Farmyard manure at 35 t since 1852.  
 D2001: Farmyard manure at 35 t since 2001  
 (D): until 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

Plus extra plots testing all combinations of:-

#### Whole plots

1 MANURE Fertilizers other than magnesium:

|         |         |       |
|---------|---------|-------|
| 55AN2PK | Plot 55 | AN2PK |
| 56--PK  | Plot 56 | --PK  |
| 57NN2-- | Plot 57 | NN2   |
| 58NN2-- | Plot 58 | NN2   |

N2: 96 kg N as 'Nitro-Chalk' since 1968. Other symbols as above.

#### Sub-plots

2. MAGNESIUM Magnesium fertilizer (kg Mg) as kieserite every third year since 1974:

0  
 35 (30 in 1992, 1995 and 1998)

NOTE: For a fuller record see 'Details' etc.

#### Experimental diary:

|           |     |   |                                                                                               |
|-----------|-----|---|-----------------------------------------------------------------------------------------------|
| 13-Dec-01 | : T | : | K, P and P2 applied.                                                                          |
| 19-Dec-01 | : T | : | FYM, Si and MG2 applied.                                                                      |
| 20-Dec-01 | : B | : | Ploughed.                                                                                     |
| 18-Feb-02 | : B | : | Combination drilled, Optic, tr. Raxil S, at 350 seeds/m <sup>2</sup> with the Accord 1 drill. |
| 19-Apr-02 | : P | : | Sprayed paths.                                                                                |
| 25-Apr-02 | : T | : | N (27.5% N) applied by hand.                                                                  |
| 03-May-02 | : B | : | tm)Ally at 30 g in 200 l.                                                                     |
|           | : B | : | tm)Duplosan KV at 1.0 l in 200 l.                                                             |
|           | : B | : | tm)Amistar at 0.4 l in 200 l.                                                                 |
|           | : B | : | tm)Unix at 0.5 kg in 200 l                                                                    |
| 04-Jul-02 | : B | : | Rogued wild oats, 3 plants.                                                                   |
| 07-Aug-02 | : B | : | Roundup Biactive at 3.0 l in 200 l.                                                           |
| 27-Aug-02 | : T | : | Combine harvested plots for yield, started. Swathed straw and baled o&e's.                    |
| 28-Aug-02 | : T | : | Combine harvested plots for yield, completed.                                                 |
|           | : T | : | Sampled, baled and weighed straw. Swathed straw.                                              |
| 02-Sep-02 | : B | : | Combine harvested all remaining barley. Swathed and baled straw.                              |
| 03-Sep-02 | : B | : | Carted bales.                                                                                 |

NOTE: Samples of grain and straw were taken for chemical analysis. Unground grain and straw samples from selected treatments were archived.

02/R/HB/2 MAIN PLOTS

GRAIN TONNES/HECTARE

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

| N      | 0     | 48   | 96   | 144  | Mean |
|--------|-------|------|------|------|------|
| MANURE |       |      |      |      |      |
| ---    | 0.56  | 0.39 | 0.67 | 1.11 | 0.68 |
| -P-    | 1.77  | 1.53 | 1.37 | 0.86 | 1.38 |
| --K    | 0.27  | 1.04 | 1.26 | 1.54 | 1.03 |
| -PK    | 1.01  | 3.36 | 3.59 | 4.32 | 3.07 |
| A--    | 0.39  | 0.37 | 0.49 | 0.54 | 0.45 |
| AP-    | 1.19  | 0.68 | 0.80 | 0.57 | 0.81 |
| A-K    | 0.41  | 0.83 | 1.01 | 0.82 | 0.77 |
| APK    | 1.51  | 3.40 | 4.60 | 5.09 | 3.65 |
| N----  | 0.57  | 0.84 | 0.80 | 1.46 | 0.92 |
| NP---  | 2.01  | 2.32 | 1.67 | 2.07 | 2.02 |
| N-K--  | 0.36  | 1.53 | 1.54 | 1.11 | 1.13 |
| NPK--  | 1.63  | 3.76 | 4.62 | 5.41 | 3.86 |
| N--S-  | 0.71  | 1.18 | 2.40 | 1.90 | 1.55 |
| NP-S-  | -0.03 | 0.95 | 1.67 | 1.40 | 1.00 |
| N-KS-  | 1.51  | 2.23 | 1.93 | 3.46 | 2.28 |
| NPKS-  | 1.97  | 4.93 | 5.41 | 7.19 | 4.87 |
| N---S  | 1.61  | 1.73 | 1.79 | 2.06 | 1.80 |
| NP--S  | 2.22  | 3.19 | 3.66 | 3.46 | 3.13 |
| N-K-S  | 1.13  | 1.20 | 2.76 | 2.62 | 1.92 |
| NPK-S  | 1.32  | 3.70 | 5.35 | 5.65 | 4.01 |
| N--SS  | 1.19  | 1.36 | 1.59 | 2.21 | 1.59 |
| NP-SS  | 1.87  | 2.92 | 2.94 | 1.94 | 2.42 |
| N-KSS  | 1.35  | 2.00 | 2.37 | 3.71 | 2.36 |
| NPKSS  | 1.61  | 3.58 | 5.14 | 5.95 | 4.07 |
| C(--)  | 1.13  | 1.94 | 1.60 | 1.63 | 1.58 |
| C(P-)  | 1.69  | 3.47 | 2.08 | 2.94 | 2.54 |
| C(-K)  | 1.41  | 1.79 | 3.51 | 3.91 | 2.66 |
| C(PK)  | 1.15  | 3.75 | 5.55 | 6.09 | 4.14 |
| D1852  | 4.44  | 5.98 | 6.33 | 6.71 | 5.87 |
| (D)    | 0.36  | 0.96 | 4.03 | 1.90 | 1.81 |
| (A)    | 0.50  | 1.39 | 1.29 | 1.31 | 1.12 |
| -      | 0.23  | 0.48 | 0.68 | 1.15 | 0.63 |
| D2001  | 3.83  | 5.22 | 5.10 | 6.29 | 5.11 |
| P2KMg  | 2.60  | 4.60 | 4.80 | 5.14 | 4.29 |
| Mean   | 1.34  | 2.31 | 2.78 | 3.04 | 2.37 |

GRAIN MEAN DM% 82.3

02/R/HB/2 MAIN PLOTS

STRAW TONNES/HECTARE

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

|               | N | 0    | 48   | 96   | 144  | Mean |
|---------------|---|------|------|------|------|------|
| <b>MANURE</b> |   |      |      |      |      |      |
| ---           |   | 0.16 | 0.03 | 0.58 | 0.50 | 0.32 |
| -P-           |   | 0.57 | 0.44 | 0.57 | 0.33 | 0.48 |
| --K           |   | 0.09 | 0.29 | 0.98 | 0.61 | 0.49 |
| -PK           |   | 0.34 | 1.22 | 1.97 | 2.02 | 1.39 |
| A--           |   | 0.08 | 0.12 | 0.04 | 0.16 | 0.10 |
| AP-           |   | 0.33 | 0.29 | 0.25 | 0.17 | 0.26 |
| A-K           |   | 0.04 | 0.27 | 0.35 | 0.37 | 0.26 |
| APK           |   | 0.24 | 1.44 | 2.21 | 2.06 | 1.49 |
| D1852         |   | 1.53 | 2.80 | 3.28 | 3.52 | 2.78 |
| (D)           |   | 0.14 | 0.39 | 1.22 | 1.11 | 0.72 |
| (A)           |   | 0.05 | 0.81 | 0.73 | 0.84 | 0.61 |
| -             |   | 0.16 | 0.29 | 0.47 | 0.65 | 0.39 |
| D2001         |   | 1.39 | 2.20 | 2.25 | 2.93 | 2.19 |
| P2KMg         |   | 0.72 | 1.38 | 2.24 | 2.13 | 1.62 |
| Mean          |   | 0.42 | 0.86 | 1.22 | 1.24 | 0.94 |

STRAW MEAN DM% 82.3

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

|                 | MANURE | 551AN2PK | 561--PK | 571NN2-- | 581NN2-- | Mean |
|-----------------|--------|----------|---------|----------|----------|------|
| <b>MGNESIUM</b> |        |          |         |          |          |      |
| 0               |        | 3.23     | 0.22    | 1.20     | 0.43     | 1.27 |
| 35              |        | 3.46     | 0.20    | 1.05     | 0.46     | 1.29 |
| Mean            |        | 3.34     | 0.21    | 1.13     | 0.44     | 1.28 |

GRAIN MEAN DM% 82.2