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## Yields of the Field Experiments 1990

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### 90/W/RN/12 Organic Manuring - W. Wheat, W. Beans

#### Rothamsted Research

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90/W/RN/12

## ORGANIC MANURING

**Object:** To study, from crop yields and soil analyses, the effects of a range of types of organic matter - Woburn, Stackyard B.

**Sponsor:** P.R. Poulton.

The 26th year, w. wheat, w. beans.

For previous years see 'Details' 1973 and 74-89/W/RN/12.

**Design for each crop:** 2 blocks of 8 plots split into 6

**Whole plot dimensions:** 8.53 x 30.5.

**Treatments:** From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. An arable rotation was started on two blocks in 1972 and the remaining two blocks in 1973. After a period of testing the residues built up, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. On the first pair leys were ploughed for 1st test crop in 1987, on the second pair for 1st test crop in 1988.

3rd test crop w. wheat, after w. wheat 1988, potatoes 1989, tested all combinations of:

### Whole plots

|             |                                                                                          |
|-------------|------------------------------------------------------------------------------------------|
| 1. TREATMNT | Previous treatments:                                                                     |
| LC 8 GM     | Eight-year clover/grass ley until 1987, green manure in the preliminary period           |
| LC 8 PT     | As above, peat in the preliminary period                                                 |
| LC 6 LC     | Six-year clover/grass ley until 1987, clover/grass ley in the preliminary period         |
| LC 6 LN     | As above, grass ley with N in the preliminary period                                     |
| FYM         | Farmyard manure annually 1981 to 1986 and in the preliminary period                      |
| STRAW       | Straw in both periods                                                                    |
| FERT-FYM    | Fertilizers only in both periods, rates of P, K & Mg equivalent to amounts in FYM        |
| FERT-STR    | Fertilizers only in both periods, rates of P, K & Mg equivalent to amounts in straw (+P) |

### Sub plots

|      |                                                      |
|------|------------------------------------------------------|
| 2. N | Nitrogen fertilizer in 1990 (kg N) as 'Nitro-Chalk': |
| 0    |                                                      |
| 50   |                                                      |
| 100  |                                                      |
| 150  |                                                      |
| 200  |                                                      |
| 250  |                                                      |

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4th test crop w. beans, after w.wheat 1987, potatoes 1988, w. wheat 1989, tested all combinations of:

Whole plots

1. **TREATMNT** Previous treatments:  
  
LC 8 GM Eight-year clover/grass ley until 1986, green manure in the preliminary period  
LC 8 PT As above, peat in the preliminary period  
LC 6 LC Six-year clover/grass ley until 1986, clover/grass ley in the preliminary period  
LC 6 LN As above, grass ley with N in the preliminary period  
FYM Farmyard manure annually 1981 to 1985 and in the preliminary period  
STRAW Straw in both periods  
FERT-FYM Fertilizers only in both periods, rates of P, K and Mg equivalent to amounts in FYM  
FERT-STR Fertilizers only in both periods rates of P, K and Mg equivalent to amounts in straw (+P)

Sub plots

2. **N RES** Residues of nitrogen fertilizer to w. wheat in 1989 (kg N):  
  
(0)  
(50)  
(100)  
(150)  
(200)  
(250)

#### Standard applications:

3rd test crop:

W. wheat: Manures: (0:18:36) at 560 kg. Weedkillers: Bromoxynil at 0.34 kg and clopyralid at 0.07 kg with isoproturon at 2.1 kg and fluroxypyr at 0.15 kg in 220 l. Fungicides: Propiconazole at 0.12 kg with chlorothalonil at 0.50 kg in 300 l. Insecticide: Carbofuran at 7.5 k. Molluscicide: Methiocarb at 0.20 kg applied with seed.

4th test crop:

W. beans: Manures: (0:24:24) at 420 kg. Muriate of potash at 170 kg. Manganese at 0.19 kg in 220 l. Weedkillers: Paraquat at 0.80 kg ion in 220 l. Propyzamide at 0.85 kg with simazine at 0.85 kg in 220 l. Fungicide: Fenpropimorph at 0.75 kg in 220 l. Insecticide: Deltamethrin at 7.5 g in 220 l applied on two occasions.

**Seed:** W. wheat: Mercia, sown at 180 kg with methiocarb pellets.  
W. beans: Banner, sown at 18 seeds per square metre.

#### Cultivations, etc.:-

W. wheat: Ploughed: 20 Oct, 1989. Carbofuran applied, spring-time cultivated: 30 Oct. PK applied: 31 Oct. Seed sown: 1 Nov. N applied: 27 Mar, 1990. Weedkillers applied: 24 Apr. Fungicides applied: 22 May. Combine harvested: 3 Aug.

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**Cultivations, etc.:-**

W. beans: Subsoiled with tines, 50 cm apart and 40 cm deep: 13 Sept, 1989. Discd: 15 Sept. PK and K applied: 19 Sept. Paraquat applied: 10 Oct. Discd: 11 Oct. Seed broadcast by drill, ploughed in and rolled: 13 Oct. Propyzamide and simazine applied: 15 Oct. Mn applied: 5 Apr, 1990. Deltamethrin applied: 23 Apr and 18 May. Fenpropimorph applied: 11 July. Combine harvested: 10 Aug.

- NOTES:** (1) W. wheat. Because of bird damage and errors in harvesting, the yields of one whole plot and 2 sub plots were lost, with treatment combinations
- | TREATMNT | FERT-STR | FERT-STR |
|----------|----------|----------|
| N        | 100      | 150      |
- and FERT-FYM whole plot (6 sub plots)  
Estimated values were used in the analysis.
- (2) W. beans. Because of bird damage the yields of one block were treated as lost. The means presented are those of the remaining block.

**W.WHEAT**

**GRAIN TONNES/HECTARE**

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

| N               | 0    | 50   | 100  | 150  | 200  | 250  | Mean |
|-----------------|------|------|------|------|------|------|------|
| <b>TREATMNT</b> |      |      |      |      |      |      |      |
| LC 8 GM         | 3.00 | 4.53 | 5.65 | 4.95 | 5.53 | 5.68 | 4.89 |
| LC 8 PT         | 3.11 | 5.47 | 7.02 | 6.63 | 6.38 | 6.53 | 5.86 |
| LC 6 LC         | 3.65 | 5.65 | 7.00 | 6.41 | 6.28 | 6.63 | 5.94 |
| LC 6 LN         | 3.72 | 5.88 | 6.70 | 6.79 | 6.37 | 6.32 | 5.96 |
| FYM             | 3.23 | 5.17 | 5.02 | 6.13 | 6.02 | 5.25 | 5.14 |
| STRAW           | 3.18 | 5.20 | 6.25 | 6.63 | 6.08 | 6.23 | 5.59 |
| FERT-FYM        | 2.99 | 4.62 | 5.97 | 6.81 | 5.10 | 5.61 | 5.18 |
| FERT-STR        | 2.53 | 4.87 | 5.15 | 4.74 | 6.38 | 5.68 | 4.89 |
| Mean            | 3.18 | 5.17 | 6.09 | 6.14 | 6.02 | 5.99 | 5.43 |

\*\*\* Standard errors of differences of means \*\*\*

| TREATMNT                                              | N     | TREATMNT |
|-------------------------------------------------------|-------|----------|
|                                                       |       | N        |
|                                                       | 0.419 | 0.150    |
|                                                       |       | 0.570    |
| Except when comparing means with the same level(s) of |       |          |
| <b>TREATMNT</b>                                       |       | 0.424    |

\*\*\*\*\* Stratum standard errors and coefficients of variation \*\*\*\*\*

| Stratum     | d.f. | s.e.  | cv% |
|-------------|------|-------|-----|
| BLOCK.WP    | 6    | 0.419 | 7.7 |
| BLOCK.WP.SP | 33   | 0.424 | 7.8 |

GRAIN MEAN DM% 90.4

SUB PLOT AREA HARVESTED 0.00183

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W.BEANS

GRAIN TONNES/HECTARE

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

| N RES           | (0)  | (50) | (100) | (150) | (200) | (250) | Mean |
|-----------------|------|------|-------|-------|-------|-------|------|
| <b>TREATMNT</b> |      |      |       |       |       |       |      |
| LC 8 GM         | 5.60 | 4.87 | 4.61  | 4.48  | 5.64  | 4.32  | 4.92 |
| LC 8 PT         | 5.43 | 5.38 | 4.74  | 4.64  | 4.75  | 5.31  | 5.04 |
| LC 6 LC         | 4.98 | 4.58 | 3.83  | 5.10  | 3.56  | 4.41  | 4.41 |
| LC 6 LN         | 3.72 | 5.63 | 5.58  | 3.25  | 4.43  | 4.65  | 4.54 |
| FYM             | 3.73 | 3.14 | 3.60  | 2.30  | 1.99  | 3.56  | 3.05 |
| STRAW           | 4.41 | 2.46 | 2.57  | 3.79  | 2.30  | 2.31  | 2.97 |
| FERT-FYM        | 4.51 | 3.88 | 4.46  | 3.68  | 4.41  | 3.52  | 4.08 |
| FERT-STR        | 6.05 | 3.67 | 3.61  | 3.16  | 1.78  | 2.10  | 3.40 |
| Mean            | 4.80 | 4.20 | 4.13  | 3.80  | 3.61  | 3.77  | 4.05 |

GRAIN MEAN DM% 89.7

SUB PLOT AREA HARVESTED 0.00202