ROTHAMSTED RESEARCH

# Yields of the Field Experiments 1982

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## 80/R/BK/1 Broadbalk - W. Wheat, Fallow, Potatoes

### Rothamsted Research

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82/R/BK/1

BROADBALK

Object: To study the effects of organic and inorganic manures on continuous w. wheat. From 1968 two three-year rotations were included: potatoes, beans, w. wheat and fallow, w. wheat, w. wheat. In 1979 the first rotation was changed to fallow, potatoes, w. wheat. In 1980 the second rotation reverted to continuous w. wheat.

The 139th year, w. wheat, fallow, potatoes. The 15th year of the rotations.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, and 74-81/R/BK/1.

Areas harvested:

| | Section | |
|---|---|---|
| Wheat: | 0 | 0.00434 |
| | 1 | 0.00798 |
| | 3,5,6,and 7 | 0.00659 |
| | 8 and 9 | 0.00694 |
| Potatoes: | 4 | 0.00659 |

Treatments:

Whole plots

| PLOT | Plot | Fertilizers and organic manures:- Treatments until 1967 | Treatments from 1968 | Changes from 1980 |
|---|---|---|---|---|
| 01DN2PK | 01 | - | D N2 P K | - |
| 21DN2 | 21 | D | D N2 | - |
| 22D | 22 | D | D | - |
| 030 | 03 | None | None | - |
| 05F | 05 | P K Na Mg | P K (Na) Mg | - |
| 06N1F | 06 | N1 P K Na Mg | N1 P K (Na) Mg | - |
| 07N2F | 07 | N2 P K Na Mg | N2 P K (Na) Mg | - |
| 08N3F | 08 | N3 P K Na Mg | N3 P K (Na) Mg | - |
| 09N4F | 09 | N*1 P K Na Mg | N4 P K (Na) Mg | - |
| 10N2 | 10 | N2 | N2 | - |
| 11N2P | 11 | N2 P | N2 P | - |
| 12N2PNA | 12 | N2 P Na | N2 P Na | - |
| 13N2PK | 13 | N2 P K | N2 P K | - |
| 14N2PKMG | 14 | N2 P Mg | N2 P K Mg | - |
| 15N3F | 15 | N2 P K Na Mg | N3 P K (Na) Mg | - |
| 16N2F | 16 | N*2 P K Na Mg | N2 P K (Na) Mg | - |
| 17N1+3FH | 17 | N2(A) | N2 1/2(P K (Na) Mg) | N1+3 1/2(PK (Na) Mg)+ |
| 18N0+3FH | 18 | P K Na Mg(A) | N2 1/2(P K (Na) Mg) | N0+3 1/2(PK (Na) Mg)+ |
| 19C | 19 | C | C | - |
| 20NKMG | 20 | N2 K Na Mg | N2 K (Na) Mg | - |

(A) Alternating

\+ To w. wheat only; autumn N alternates. Potatoes receive N3 1/2(PK (Na) Mg) on both plots 17 and 18.



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N1,N2,N3,N4: 48, 96, 144, 192 kg N (as sulphate of ammonia until 1967, except N* which was nitrate of soda. All as 'Nitro-Chalk' in spring from 1968).
NO+3; N1+3: None in autumn + 144 kg N in spring; 48 kg N in autumn combine drilled + 144 kg N in spring.
P: 35 kg P as single superphosphate (triple superphosphate in 1974)
K: 90 kg K as sulphate of potash
Na: 55 kg Na as sulphate of soda
(Na): 16 kg Na as sulphate of soda until 1973
Mg: 30 kg Mg annually to Plot 14, 35 kg Mg every third year to other plots since 1974. All as kieserite since 1974, previously as sulphate of magnesia annually
D: Farmyard manure at 35 tonnes
C: Castor meal to supply 96 kg N
F: P K (Na) Mg H: Half rate

Strips of sub-plots: Until 1967 wheat alone was grown on the experiment, with some bare fallowing on strips of sub-plots. From 1968, ten sub-plots were started with the following cropping:-

| SECTION | | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SC0/W31 | Section 0 | W | W | W | W | W | W | W | W | W | W | W | W | W | W | W |
| SC1/W16 | Section 1 | W | W | W | W | W | W | W | W | W | W | W | W | W | W | W |
| - | Section 2 | BE | W | P | BE | W | P | BE | W | P | BE | W | F | P | W | F |
| SC3/W3 | Section 3 | W | W | F | W | W | F | W | W | F | W | W | F | W | W | W |
| POTATOES | Section 4 | W | P | BE | W | P | BE | W | P | BE | W | P | P | W | F | P |
| SC5/W4 | Section 5 | W | F | W | W | F | W | W | F | W | W | F | W | W | W | W |
| SC6/W5 | Section 6 | F | W | W | F | W | W | F | W | W | F | W | W | W | W | W |
| SC7/W1P | Section 7 | P | BE | W | P | BE | W | P | BE | W | P | BE | W | F | P | W |
| SC8/W1F | Section 8* | W | W | W | W | F | W | W | W | W | W | W | W | W | F | W |
| SC9/W24 | Section 9 | W | W | W | W | W | W | W | W | W | W | W | W | W | W | W |

W = w. wheat, P = potatoes, BE = s. beans, F = fallow

* No weedkillers

NOTES: (1) For a fuller record of treatments see 'Details' etc.
(2) Since autumn 1975 chalk is applied at 2.9 t each autumn to sets of Sections on a three-year cycle.
Year 1: Sections 1,2,3. Year 2: Sections 6,7,8 and 9.
Year 3: Sections 0,4,5. Chalk is applied to all plots of each section.
(3) On many plots of Section 8 the yields presented include a substantial proportion of weed seeds.

Standard applications:
W. wheat: Manures: Sections 1 and 3 only: Chalk at 2.9 t. Weedkillers: (not applied to section 8): Chlortoluron at 5.6 l in 250 l; mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l.
Plots 03, 05 and 06, sections 0,1,5,6 and 7 and plot 05, section 9: Glyphosate at 1.4 kg in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l applied twice, with the insecticide on the second occasion.
Insecticide: Pirimicarb at 0.14 kg.



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Potatoes: Weedkillers: Linuron at 1.1 kg and paraquat at 0.5 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l on three occasions, with the insecticide on the first two. Ofurace at 0.12 kg and maneb at 1.2 kg in 250 l, on two occasions with the insecticide on the first. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 220 l.
Fallow: Manures: Chalk at 2.9 t.

Seed: W. wheat: Flanders, dressed chlorfenvinphos, sown at 200 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-
All Sections: Superphosphate, sulphate of potash, sulphate of soda, kieserite, and castor meal applied: 21 Sept, 1981. FYM applied: 25 Sept. Ploughed: 28 Sept. Disced: 14 Oct.
Cropped Sections:
W. wheat: Rotary harrowed: 14 Oct, 1981. Seed sown: 16 Oct. Chlortoluron applied: 17 Oct. N applied: 15 Apr, 1982. Mecoprop, bromoxynil and ioxynil applied: 16 Apr. Propiconazole applied: 26 May. Propiconazole with insecticide applied: 17 June. Glyphosate applied: 10 Aug. Combine harvested: 20 Aug.
Potatoes: Spring-tine cultivated: 16 Apr, 1982. N applied: 17 Apr. Spiked rotary cultivated, potatoes planted: 20 Apr. Rotary ridged: 10 May. Weedkillers applied: 17 May. Mancozeb with the insecticide applied: 14 June, 30 June. Mancozeb applied: 12 July. Ofurace and maneb with the insecticide applied: 26 July. Ofurace and maneb applied: 9 Aug. Haulm mechanically destroyed: 21 Aug. Desiccant applied: 24 Aug. Lifted: 13 Sept.
Fallow: Chalk applied: 11 Sept, 1981. Spring-tine cultivated: 16 Apr, 1982. Ploughed: 4 May. Rolled, spring-tine cultivated: 12 May. Ploughed: 21 June. Spring-tine cultivated: 30 June. Rotary harrowed: 28 July.



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82/R/BK/1 WHEAT

GRAIN TONNES/HECTARE

***** TABLES OF MEANS *****

| SECTION PLOT | SC7/W1P | SC8/W1F | SC3/W3 | SC5/W4 | SC6/W5 | SC1/W16 | SC9/W24 | SC0/W31 | MEAN |
|---|---|---|---|---|---|---|---|---|---|
| 01DN2PK | 8.55 | * | 7.09 | 7.14 | 7.08 | * | * | * | 7.47 |
| 21DN2 | 8.69 | 5.49 | 7.39 | 7.75 | 7.48 | 8.04 | 8.20 | 7.83 | 7.61 |
| 22D | 7.18 | 6.59 | 4.99 | 5.05 | 5.20 | 5.59 | 6.37 | 5.23 | 5.77 |
| 030 | 3.49 | 2.03 | 1.03 | 1.04 | 0.89 | 1.23 | 1.28 | 1.26 | 1.53 |
| 05F | 4.11 | 4.60 | 1.32 | 1.08 | 1.03 | 1.10 | 1.40 | 1.59 | 2.03 |
| 06N1F | 6.03 | 4.72 | 3.36 | 3.22 | 3.29 | 3.36 | 3.83 | 3.73 | 3.94 |
| 07N2F | 7.32 | 4.98 | 4.76 | 4.70 | 5.17 | 5.47 | 5.84 | 5.47 | 5.46 |
| 08N3F | 7.86 | 4.54 | 5.88 | 5.52 | 5.71 | 5.76 | 6.38 | 5.98 | 5.96 |
| 09N4F | 7.88 | 5.48 | 6.51 | 6.20 | 5.80 | 6.60 | 6.73 | 6.29 | 6.44 |
| 10N2 | 4.66 | 2.19 | 3.10 | 3.87 | 3.70 | 2.78 | 2.52 | 2.71 | 3.19 |
| 11N2P | 5.55 | 2.25 | 3.49 | 3.75 | 3.09 | 3.34 | 1.96 | 3.80 | 3.40 |
| 12N2PNA | 6.51 | 2.79 | 4.19 | 4.28 | 3.22 | 4.34 | 3.46 | 5.03 | 4.23 |
| 13N2PK | 6.86 | 4.49 | 4.67 | 4.76 | 4.11 | 5.15 | 5.17 | 5.05 | 5.03 |
| 14N2PKMG | 7.35 | 4.89 | 4.19 | 4.63 | 4.11 | 5.31 | 5.81 | 5.27 | 5.19 |
| 15N3F | 7.46 | 5.11 | 5.68 | 6.17 | 5.71 | 6.22 | 6.61 | 6.17 | 6.14 |
| 16N2F | 6.98 | 4.19 | 4.81 | 4.72 | 4.24 | 5.34 | 5.48 | 5.15 | 5.11 |
| 17N1+3FH | 7.31 | 4.80 | 6.27 | 6.38 | 5.52 | 6.44 | 6.02 | 6.43 | 6.14 |
| 18N0+3FH | 7.23 | 4.53 | 5.81 | 6.73 | 5.93 | 6.03 | 6.26 | 6.02 | 6.07 |
| 19C | 5.33 | 4.88 | 2.33 | 2.88 | 2.10 | 3.20 | 3.14 | 2.74 | 3.32 |
| 20NKMG | * | * | * | * | * | 2.80 | * | 3.07 | 2.93 |

GRAIN MEAN DM% 79.9

STRAW TONNES/HECTARE

***** TABLES OF MEANS *****

| SECTION PLOT | SC7/W1P | SC1/W16 | MEAN |
|---|---|---|---|
| 01DN2PK | 5.88 | * | 5.88 |
| 21DN2 | 5.75 | 5.59 | 5.67 |
| 22D | 4.17 | 3.62 | 3.89 |
| 030 | 1.44 | 0.59 | 1.02 |
| 05F | 1.97 | 0.75 | 1.36 |
| 06N1F | 3.26 | 2.35 | 2.81 |
| 07N2F | 4.13 | 3.14 | 3.63 |
| 08N3F | 4.22 | 3.50 | 3.86 |
| 09N4F | 4.31 | 3.97 | 4.14 |
| 10N2 | 1.66 | 2.03 | 1.85 |
| 11N2P | 2.53 | 2.02 | 2.28 |
| 12N2PNA | 3.18 | 2.25 | 2.71 |
| 13N2PK | 3.57 | 3.03 | 3.30 |
| 14N2PKMG | 3.35 | 3.07 | 3.21 |
| 15N3F | 3.89 | 3.52 | 3.70 |
| 16N2F | 4.09 | 2.87 | 3.48 |
| 17N1+3FH | 3.93 | 3.72 | 3.83 |
| 18N0+3FH | 4.41 | 2.83 | 3.62 |
| 19C | 2.63 | 2.00 | 2.31 |
| 20NKMG | * | 1.76 | 1.76 |

STRAW MEAN DM% 87.5



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POTATOES

***** TABLES OF MEANS *****

| PLOT | TOTAL TUBERS TONNES/ HECTARE | % WARE 3.81 CM(1.5 INCH) RIDDLE |
|---|---|---|
| 01DN2PK | 41.0 | 93.4 |
| 21DN2 | 49.4 | 92.8 |
| 22D | 39.9 | 96.0 |
| 030 | 9.2 | 92.0 |
| 05F | 16.5 | 93.1 |
| 06N1F | 32.7 | 93.7 |
| 07N2F | 38.2 | 94.4 |
| 08N3F | 43.8 | 95.3 |
| 09N4F | 43.3 | 94.9 |
| 10N2 | 8.5 | 87.8 |
| 11N2P | 18.1 | 78.0 |
| 12N2PNA | 19.9 | 78.7 |
| 13N2PK | 32.2 | 87.8 |
| 14N2PKMG | 41.3 | 91.8 |
| 15N3F | 45.0 | 95.7 |
| 16N2F | 41.6 | 93.7 |
| 17N3FH | 32.4 | 93.6 |
| 18N3FH | 38.3 | 94.2 |
| 19C | 18.8 | 91.3 |



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