ROTHAMSTED RESEARCH

# Yields of the Field Experiments 1978

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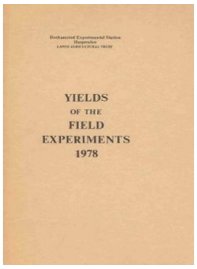


## 78/R/BK/1 Broadbalk - Wheat, Potatoes, Beans

### Rothamsted Research

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BROADBALK

Object: To study the effects of organic and inorganic manures on continuous winter wheat. Since 1968 two three-year rotations have been included: potatoes, beans, wheat and fallow, wheat, wheat.

The 135th year, wheat, potatoes, beans. The 11th year of the revised scheme.

For previous years see 'Details' 1967 & 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, and 74-77/R/BK/1.

Areas harvested:

| | Section | |
|---|---|---|
| Wheat: | 0 | 0.00434 |
| | 1 | 0.00798 |
| | 2, 3 and 6 | 0.00659 |
| | 8 and 9 | 0.00694 |
| Potatoes: | 4 | 0.00659 |
| Beans: | 7 | 0.00741 |

Treatments:

Whole plots

| PLOT | Plot | Fertilisers and organic manures:- Treatments until 1967 | Treatments from 1968 |
|---|---|---|---|
| 01DN2PK | 01 | - | D N2 P K |
| 21DN2 | 21 | D | D N2 |
| 22D | 22 | D | D |
| 030 | 03 | None | None |
| 05MIN | 05 | P K Na Mg | P K (Na) Mg |
| 06N1MIN | 06 | N1 P K Na Mg | N1 P K (Na) Mg |
| 07N2MIN | 07 | N2 P K Na Mg | N2 P K (Na) Mg |
| 08N3MIN | 08 | N3 P K Na Mg | N3 P K (Na) Mg |
| 09N4MIN | 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 |
| 15N3MIN | 15 | N2 P K Na Mg | N3 P K (Na) Mg |
| 16N2MIN | 16 | N*2 P K Na Mg | N2 P K (Na) Mg |
| 17N2MINH | 17 | +N2 | N2 1/2(P K (Na) Mg) |
| 18N2MINH | 18 | + P K Na Mg | N2 1/2(P K (Na) Mg) |
| 19C | 19 | C | C |
| 20NKMG | 20 | N2 K Na Mg | N2 K (Na) Mg |

+ Alternating



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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' from 1968).
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
MIN: P K (Na) Mg

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 | | 1968 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SC0/W27 | Section 0 | W (last fallowed 1951) | W | W | W | W | W | W | W | W | W | W |
| SC1/W12 | Section 1 | W (last fallowed 1966) | W | W | W | W | W | W | W | W | W | W |
| SC2/W1BE | Section 2 | BE | W | P | BE | W | P | BE | W | P | BE | W |
| SC3/W2F | Section 3 | W (fallowed 1967) | W | F | W | W | F | W | W | F | W | W |
| POTATOES | Section 4 | W (fallowed 1965) | P | BE | W | P | BE | W | P | BE | W | P |
| - | Section 5 | W (fallowed 1965) | F | W | W | F | W | W | F | W | W | F |
| SC6/W1F | Section 6 | F | W | W | F | W | W | F | W | W | F | W |
| BEANS | Section 7 | P | BE | W | P | BE | W | P | BE | W | P | BE |
| SC8/W6 | Section 8* | W (fallowed 1963) | W | W | W | F | W | W | W | W | W | W |
| SC9/W20 | Section 9 | W (last fallowed 1958) | W | W | W | W | W | W | W | W | W | W |

W = wheat, P = potatoes, BE = beans, F = fallow

* No weedkillers

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

Standard applications:
Winter wheat: Manures: Section 0: Chalk at 2.9 t. Weedkillers (not applied to Section 8): Terbutryne at 2.8 kg in 220 l. Dicamba with mecoprop and MCPA ('Banlene Plus' at 4.9 l in 220 l). Insecticide (Section 6 only): Omethoate at 0.65 kg in 220 l.
Potatoes: Manures: Chalk at 2.9 t. Weedkillers: Paraquat at 0.84 kg ion in 220 l. Linuron at 1.1 kg in 220 l. Fungicide: Mancozeb at 1.3 kg in 220 l. Fentin acetate and maneb ('Fennite A' at 1.7 kg in 220 l). Insecticide: Pirimicarb at 0.14 kg in 220 l.
Beans: Insecticide: Pirimicarb at 0.14 kg in 220 l. Desiccant: Diquat at 0.59 kg ion with 'Agral' (a wetting agent) at 0.28 kg in 220 l.
Fallow: Manures: Chalk at 2.9 t. Weedkiller: Paraquat at 0.84 kg ion in 220 l.

Seed: Wheat: Cappelle, dressed with chlorfenvinphos, sown at 200 kg.
Potatoes: Pentland Crown.
Beans: Minden, sown at 200 kg.



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Cultivations, etc.:-

ALL SECTIONS: Superphosphate, sulphate of soda, kieserite, and castor meal applied: 22 Sept, 1977. Sulphate of potash applied: 23 Sept. Subsoiled, tines 160 cm apart and 38 cm deep: 28 Sept. FYM applied: 4 Oct. Ploughed: 6 Oct.

CROPPED SECTIONS:

Winter Wheat: Chalk applied: 19 Sept, 1977. Rotary harrowed: 17 Oct. Seed sown: 19 Oct. Terbutryne applied: 24 Oct. Section 6: Insecticide applied: 30 Mar, 1978. N and 'Banlene Plus' applied: 8 May. Sections 0, 1, 2, 3, 8 and 9, combine harvested: 29 Aug. Section 6 combine harvested: 30 Aug.

Potatoes: Chalk applied: 20 Sept, 1977. Heavy spring-tine cultivated: 31 Mar, 1978. N applied: 25 Apr. Paraquat applied: 8 May. Spike rotary cultivated, planted: 9 May. Linuron applied: 15 May. Grubbed and rotary ridged: 26 June. Mancozeb applied: 5 July. Mancozeb and pirimicarb applied twice: 18 July and 4 Aug. 'Fennite A' applied: 17 Aug. Haulm pulverized: 7 Sept. Lifted: 27 Sept.

Spring Beans: Spring-tine cultivated: 9 Mar, 1978. N applied, rotary harrowed, seed sown: 10 Mar. Tractor hoed twice: 19 May and 8 June. Pirimicarb applied: 7 July. Haulm desiccant applied: 19 Sept. Combine harvested: 22 Sept.

FALLOW SECTION: Chalk applied: 20 Sept, 1977. Heavy spring-tine cultivated: 31 Mar, 1978. Paraquat applied: 8 May. Ploughed twice: 24 May and 6 July. Heavy spring-tine cultivated: 15 June. Spring-tine cultivated: 12 July.



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WHEAT

GRAIN TONNES/HECTARE

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

| SECTION PLOT | SC2/W1BE | SC6/W1F | SC3/W2F | SC1/W12 | SC9/W20 | SC0/W27 | SC8/W6 | MEAN |
|---|---|---|---|---|---|---|---|---|
| 01DN2PK | 7.84 | 6.64 | 6.87 | * | * | * | * | 7.12 |
| 21DN2 | 8.05 | 6.55 | 7.19 | 7.06 | 5.97 | 6.81 | 5.03 | 6.67 |
| 22D | 7.86 | 7.55 | 5.97 | 6.83 | 6.62 | 6.23 | 4.84 | 6.56 |
| 030 | 3.21 | 2.66 | 1.25 | 1.60 | 1.65 | 1.74 | 1.94 | 2.01 |
| 05MIN | 4.17 | 3.33 | 1.47 | 1.66 | 2.23 | 1.93 | 3.12 | 2.56 |
| 06N1MIN | 5.55 | 5.24 | 3.39 | 2.92 | 3.94 | 3.22 | 2.62 | 3.84 |
| 07N2MIN | 7.30 | 6.54 | 5.82 | 5.13 | 5.62 | 5.16 | 3.54 | 5.58 |
| 08N3MIN | 6.78 | 5.89 | 6.59 | 5.65 | 6.05 | 5.27 | 4.80 | 5.86 |
| 09N4MIN | 6.43 | 6.24 | 6.78 | 5.89 | 6.30 | 4.90 | 4.89 | 5.92 |
| 10N2 | 4.36 | 3.41 | 4.20 | 2.64 | 3.09 | 2.24 | 2.85 | 3.26 |
| 11N2P | 4.80 | 4.46 | 4.98 | 4.09 | 3.62 | 3.80 | 2.76 | 4.07 |
| 12N2PNA | 4.97 | 4.51 | 4.99 | 4.54 | 3.90 | 4.73 | 2.96 | 4.37 |
| 13N2PK | 6.80 | 6.01 | 5.67 | 5.39 | 6.07 | 4.97 | 4.04 | 5.56 |
| 14N2PKMG | 6.71 | 5.64 | 5.85 | 5.65 | 5.81 | 5.13 | 4.22 | 5.57 |
| 15N3MIN | 6.84 | 6.12 | 6.73 | 5.92 | 5.95 | 5.14 | 4.28 | 5.85 |
| 16N2MIN | 7.04 | 5.97 | 5.97 | 5.26 | 5.84 | 4.76 | 3.99 | 5.55 |
| 17N2MINH | 7.05 | 6.46 | 5.61 | 5.08 | 5.84 | 4.76 | 4.17 | 5.57 |
| 18N2MIN | 7.11 | 5.92 | 5.47 | 5.05 | 5.84 | 5.13 | 4.33 | 5.55 |
| 19C | 5.36 | 5.88 | 3.29 | 4.01 | 3.92 | 4.04 | 3.10 | 4.23 |
| 20NKMG | * | * | * | 2.81 | * | 3.28 | * | 3.04 |

GRAIN MEAN DM% 83.7

STRAW TONNES/HECTARE

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

| SECTION PLOT | SC2/W1BE | SC6/W1F | SC3/W2F | SC1/W12 | SC9/W20 | SC0/W27 | SC8/W6 | MEAN |
|---|---|---|---|---|---|---|---|---|
| 01DN2PK | 7.01 | 6.74 | 6.31 | * | * | * | * | 6.68 |
| 21DN2 | 8.33 | 7.52 | 6.98 | 8.00 | 7.03 | 6.96 | 7.87 | 7.53 |
| 22D | 7.61 | 6.47 | 5.00 | 6.37 | 5.81 | 5.75 | 6.36 | 6.20 |
| 030 | 2.08 | 1.82 | 0.96 | 1.54 | 1.20 | 1.66 | 1.97 | 1.60 |
| 05MIN | 3.04 | 2.22 | 1.17 | 1.77 | 1.42 | 1.73 | 4.42 | 2.25 |
| 06N1MIN | 4.52 | 3.73 | 2.16 | 2.17 | 2.80 | 2.42 | 3.56 | 3.05 |
| 07N2MIN | 5.51 | 4.78 | 4.00 | 3.46 | 4.41 | 3.51 | 4.82 | 4.36 |
| 08N3MIN | 4.67 | 4.63 | 5.70 | 4.22 | 5.11 | 4.14 | 5.60 | 4.87 |
| 09N4MIN | 5.08 | 3.99 | 5.24 | 4.26 | 4.74 | 3.53 | 6.42 | 4.75 |
| 10N2 | 2.78 | 2.33 | 2.48 | 1.71 | 2.26 | 2.24 | 4.36 | 2.59 |
| 11N2P | 3.42 | 3.32 | 3.19 | 2.77 | 3.45 | 2.83 | 4.27 | 3.32 |
| 12N2PNA | 3.43 | 2.66 | 3.25 | 3.25 | 3.55 | 3.64 | 4.27 | 3.44 |
| 13N2PK | 5.23 | 4.10 | 4.18 | 4.02 | 5.41 | 3.69 | 5.72 | 4.62 |
| 14N2PKMG | 5.19 | 4.01 | 3.83 | 3.65 | 4.59 | 4.39 | 5.27 | 4.42 |
| 15N3MIN | 4.85 | 4.19 | 4.81 | 4.18 | 4.79 | 4.34 | 6.14 | 4.76 |
| 16N2MIN | 5.29 | 4.31 | 3.51 | 3.71 | 4.74 | 3.99 | 5.78 | 4.48 |
| 17N2MINH | 5.01 | 4.81 | 3.05 | 3.49 | 5.02 | 4.01 | 5.83 | 4.46 |
| 18N2MIN | 5.14 | 4.45 | 3.80 | 3.48 | 4.77 | 4.03 | 5.98 | 4.52 |
| 19C | 4.11 | 4.14 | 2.36 | 2.68 | 3.06 | 3.34 | 4.29 | 3.43 |
| 20NKMG | * | * | * | 1.97 | * | 2.79 | * | 2.38 |

STRAW MEAN DM% 85.0



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| | POTATOES | | SPRING BEANS | |
|---|---|---|---|---|
| PLOT | TOTAL TUBERS TONNES/ HECTARE | % WARE 3.81 CM(1.5 INCH) RIDDLE | GRAIN TONNES/ HECTARE | STRAW TONNES/ HECTARE |
| 01DN2PK | 29.1 | 98.0 | 2.64 | 2.33 |
| 21DN2 | 40.1 | 96.2 | 3.61 | 2.27 |
| 22D | 32.6 | 97.8 | 5.00 | 2.63 |
| 030 | 11.1 | 95.6 | 2.26 | 1.26 |
| 05MIN | 15.1 | 96.6 | 3.33 | 1.77 |
| 06N1MIN | 21.5 | 96.1 | 3.49 | 1.99 |
| 07N2MIN | 32.3 | 95.0 | 3.72 | 1.92 |
| 08N3MIN | 38.3 | 96.9 | 4.52 | 2.14 |
| 09N4MIN | 48.4 | 97.7 | 3.39 | 2.00 |
| 10N2 | 11.6 | 95.3 | 1.56 | 0.57 |
| 11N2P | 12.2 | 86.3 | 0.62 | 2.01 |
| 12N2PNA | 12.6 | 83.8 | 0.62 | 2.24 |
| 13N2PK | 20.0 | 93.4 | 3.95 | 2.06 |
| 14N2PKMG | 30.7 | 95.6 | 3.18 | 2.19 |
| 15N3MIN | 38.0 | 96.3 | 5.03 | 2.13 |
| 16N2MIN | 29.7 | 95.2 | 2.82 | 2.13 |
| 17N2MINH | 27.5 | 95.1 | 2.51 | 1.91 |
| 18N2MINH | 24.5 | 96.3 | 2.42 | 1.91 |
| 19C | 19.8 | 95.6 | 0.85 | 2.78 |
| MEAN DM% | | | 81.5 | 89.2 |



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