ROTHAMSTED RESEARCH

# Yields of the Field Experiments 1976

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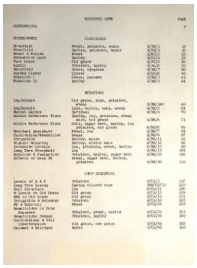

## 76/R/BK/1 Broadbalk - Wheat, Potatoes, Beans

### 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 133rd year, wheat, potatoes, beans. The ninth year of the revised scheme.

For previous years see 'Details' 1967, Station Report for 1966, pp.229-231, Station Report for 1968, Part 2, 68/A/1(t) and 69-75/R/BK/1.

Areas harvested:

| | Section | |
|---|---|---|
| Wheat: | 0 | 0.00434 |
| | 1 | 0.00798 |
| | 5, 6 and 7 | 0.00659 |
| | 8 and 9 | 0.00694 |
| Potatoes: | 2 | 0.00659 |
| Beans: | 4 | 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 |
| 03O | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| SC0/W25 | Section 0 | W (last fallowed 1951) | W | W | W | W | W | W | W | W |
| SC1/W10 | Section 1 | W (last fallowed 1966) | W | W | W | W | W | W | W | W |
| POTATOES | Section 2 | BE | W | P | BE | W | P | BE | W | P |
| - | Section 3 | W (fallowed 1967) | W | F | W | W | F | W | W | F |
| BEANS | Section 4 | W (fallowed 1965) | P | BE | W | P | BE | W | P | BE |
| SC5/W1F | Section 5 | W (fallowed 1965) | F | W | W | F | W | W | F | W |
| SC6/W2F | Section 6 | F | W | W | F | W | W | F | W | W |
| SC7/W1BE | Section 7 | P | BE | W | P | BE | W | P | BE | W |
| SC8/W4 | Section 8* | W (fallowed 1963) | W | W | W | F | W | W | W | W |
| SC9/W18 | Section 9 | W (last fallowed 1958) | 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 1: Chalk at 3.1 t. Weedkillers: Sections 0, 1 and 9: Glyphosate at 1.7 kg in 220 l. Sections 0, 1, 5, 6, 7 and 9: Terbutryne and related triazines ('Prebane' at 4.5 kg in 220 l). Dicamba with mecoprop and MCPA ('Banlene Plus' at 5.6 l in 220 l). Insecticides: Pirimicarb at 0.14 kg in 220 l. Section 9 only: Dimethoate at 0.11 kg in 220 l.
Potatoes: Manures: Chalk at 3.1 t. Weedkillers: Linuron at 1.2 kg plus paraquat at 0.42 kg ion in 220 l. Fungicide: Mancozeb at 1.3 kg in 450 l. Insecticide: Pirimicarb at 0.14 kg in 450 l.
Fallow Section: Manures: Chalk at 3.1 t.



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Seed: Winter wheat: Cappelle, dressed with chlorfenvinphos, sown at 200 kg.
Potatoes: Pentland Crown.
Spring beans: Minden, sown at 220 kg.

Cultivations, etc.:-
ALL SECTIONS: Autumn fertilisers and castor meal applied: 30 Sept, 1975.
FYM applied: 9 Oct. Ploughed: 11 Oct.
CROPPED SECTIONS:
Winter wheat: Glyphosate applied: 24 Sept. Chalk applied: 29 Sept. Rotary harrowed sections 5, 6, 7, 8 and 9, spring-tine cultivated and rotary harrowed twice sections 0 and 1: 14 Oct. Seed sown: 16 Oct. 'Prebane' applied: 18 Oct. N applied: 31 Mar, 1976. Dimethoate applied: 8 Apr. 'Banlene Plus' applied: 29 Apr. Pirimicarb applied: 24 June. Combine harvested: 30 July.
Potatoes: Chalk applied: 29 Sept, 1975. Deep-tine cultivated: 9 Dec. Spring-tine cultivated: 22 Mar, 1976. N applied: 25 Mar. Rotary cultivated and potatoes machine planted: 29 Mar. Grubbed: 30 Mar. Weedkillers applied: 5 May. Insecticide applied: 17 June. Grubbed and rotary ridged: 21 June. Fungicide applied: 28 July. Haulm mechanically destroyed: 13 Sept. Lifted: 24 Sept.
Spring beans: Deep-tine cultivated: 9 Dec, 1975. N applied: 27 Feb. Heavy spring-tine cultivated: 3 Mar, 1976. Seed sown: 4 Mar. Tractor hoed: 27 Apr, 25 May. Combine harvested: 20 July.
FALLOW SECTION: Chalk applied: 29 Sept, 1975. Deep-tine cultivated: 9 Dec. Spring-tine cultivated: 22 Mar, 1976, 20 July. Heavy spring-tine cultivated: 20 Apr, 11 June. Ploughed: 2 June, 8 July.

NOTES: (1) On Section 9 extensive damage by larvae of the Crambid moth, Agriphila straminella, was caused to Plot 10. Other plots in this section were also affected but much less severely. Dimethoate was applied as a control measure.
(2) All wheat sections suffered a massive invasion of cereal aphids which was controlled by pirimicarb.



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WHEAT

GRAIN TONNES/HECTARE

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

| SECTION PLOT | SC7/W1BE | SC5/W1F | SC6/W2F | SC1/W10 | SC9/W18 | SC0/W25 | SC8/W4 | MEAN |
|---|---|---|---|---|---|---|---|---|
| 01DN2PK | 4.11 | 4.10 | 4.66 | * | * | * | * | 4.29 |
| 21DN2 | 3.86 | 4.06 | 4.21 | 4.46 | 3.43 | 4.58 | 2.73 | 3.91 |
| 22D | 4.61 | 4.68 | 4.32 | 4.63 | 4.09 | 4.75 | 2.61 | 4.24 |
| 030 | 2.34 | 3.06 | 1.10 | 1.61 | 1.12 | 1.85 | 1.34 | 1.77 |
| 05MIN | 2.05 | 3.22 | 1.17 | 1.48 | 1.77 | 2.00 | 1.55 | 1.89 |
| 06N1MIN | 3.64 | 4.05 | 2.82 | 2.61 | 2.68 | 3.42 | 1.65 | 2.98 |
| 07N2MIN | 4.25 | 4.38 | 4.01 | 3.72 | 3.21 | 3.92 | 1.75 | 3.61 |
| 08N3MIN | 3.86 | 4.22 | 4.44 | 4.02 | 3.40 | 4.04 | 2.53 | 3.79 |
| 09N4MIN | 3.82 | 3.78 | 4.33 | 4.30 | 4.01 | 4.04 | 3.08 | 3.91 |
| 10N2 | 3.10 | 3.97 | 3.49 | 2.52 | 0.65 | 1.86 | 2.02 | 2.52 |
| 11N2P | 3.35 | 3.25 | 3.78 | 2.55 | 2.05 | 2.05 | 1.79 | 2.69 |
| 12N2PNA | 3.85 | 3.32 | 3.97 | 3.15 | 2.64 | 3.13 | 1.82 | 3.13 |
| 13N2PK | 4.18 | 4.25 | 4.11 | 4.04 | 3.50 | 3.96 | 2.21 | 3.75 |
| 14N2PKMG | 4.58 | 4.21 | 4.05 | 4.01 | 3.48 | 3.77 | 2.20 | 3.76 |
| 15N3MIN | 4.64 | 3.96 | 4.08 | 4.10 | 3.25 | 4.27 | 2.38 | 3.81 |
| 16N2MIN | 4.22 | 4.22 | 4.10 | 3.57 | 3.61 | 3.66 | 1.93 | 3.62 |
| 17N2MINH | 4.49 | 4.41 | 4.03 | 3.42 | 3.46 | 3.53 | 1.90 | 3.61 |
| 18N2MIN | 4.57 | 4.22 | 4.22 | 3.14 | 3.46 | 3.49 | 2.15 | 3.61 |
| 19C | 4.79 | 4.19 | 4.38 | 3.78 | 3.42 | 4.22 | 2.09 | 3.84 |
| 20NKMG | * | * | * | 2.37 | * | 2.92 | * | 2.65 |

GRAIN MEAN DM% 87.7

STRAW TONNES/HECTARE

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

| SECTION PLOT | SC7/W1BE | SC5/W1F | SC6/W2F | SC1/W10 | SC9/W18 | SC0/W25 | SC8/W4 | MEAN |
|---|---|---|---|---|---|---|---|---|
| 01DN2PK | 6.00 | 4.96 | 5.75 | * | * | * | * | 5.57 |
| 21DN2 | 5.90 | 5.97 | 6.02 | 6.05 | 5.36 | 5.60 | 4.75 | 5.66 |
| 22D | 6.12 | 6.51 | 5.28 | 5.77 | 5.38 | 5.78 | 5.55 | 5.77 |
| 030 | 2.13 | 2.51 | 0.74 | 1.20 | 1.02 | 1.48 | 1.24 | 1.47 |
| 05MIN | 1.95 | 3.68 | 0.99 | 1.14 | 1.51 | 1.47 | 1.34 | 1.73 |
| 06N1MIN | 3.98 | 4.22 | 2.79 | 2.08 | 2.22 | 2.97 | 1.72 | 2.86 |
| 07N2MIN | 4.70 | 5.21 | 3.84 | 3.63 | 3.36 | 3.83 | 2.93 | 3.93 |
| 08N3MIN | 4.82 | 5.54 | 5.29 | 4.27 | 3.84 | 4.58 | 3.78 | 4.59 |
| 09N4MIN | 5.01 | 4.88 | 5.56 | 4.66 | 4.98 | 4.72 | 4.74 | 4.94 |
| 10N2 | 2.35 | 3.75 | 2.89 | 2.06 | 0.63 | 1.64 | 1.91 | 2.17 |
| 11N2P | 2.95 | 2.95 | 3.22 | 2.02 | 2.00 | 2.14 | 1.82 | 2.44 |
| 12N2PNA | 3.66 | 3.35 | 3.89 | 2.92 | 2.41 | 2.89 | 2.24 | 3.05 |
| 13N2PK | 3.81 | 4.08 | 3.69 | 4.12 | 3.79 | 4.16 | 2.88 | 3.79 |
| 14N2PKMG | 3.49 | 3.96 | 3.81 | 3.71 | 3.03 | 4.13 | 2.00 | 3.45 |
| 15N3MIN | 4.41 | 4.40 | 4.11 | 4.55 | 3.25 | 5.01 | 3.04 | 4.11 |
| 16N2MIN | 3.52 | 4.31 | 3.62 | 3.35 | 3.02 | 3.77 | 2.93 | 3.50 |
| 17N2MINH | 3.67 | 4.29 | 3.35 | 2.90 | 3.13 | 3.14 | 2.90 | 3.34 |
| 18N2MIN | 4.25 | 3.94 | 4.08 | 2.65 | 3.36 | 3.16 | 2.79 | 3.46 |
| 19C | 4.08 | 4.33 | 4.18 | 3.11 | 2.71 | 3.56 | 2.61 | 3.51 |
| 20NKMG | * | * | * | 1.67 | * | 2.50 | * | 2.09 |

STRAW MEAN DM% 92.8



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| PLOT | POTATOES TOTAL TUBERS: TONNES/ HECTARE | POTATOES % WARE 3.81 CM (1.5 INCH) RIDDLE | SPRING BEANS GRAIN: TONNES/ HECTARE |
|---|---|---|---|
| 01DN2PK | 30.3 | 95.0 | 0.95 |
| 21DN2 | 36.6 | 95.4 | 1.10 |
| 22D | 37.5 | 97.8 | 1.20 |
| 030 | 11.6 | 93.8 | 0.35 |
| 05MIN | 18.7 | 96.9 | 0.86 |
| 06N1MIN | 25.6 | 97.1 | 0.80 |
| 07N2MIN | 30.6 | 97.8 | 0.97 |
| 08N3MIN | 32.0 | 97.2 | 0.89 |
| 09N4MIN | 29.2 | 96.5 | 1.03 |
| 10N2 | 10.6 | 91.1 | 0.32 |
| 11N2P | 8.3 | 88.3 | 0.44 |
| 12N2PNA | 10.5 | 90.7 | 0.21 |
| 13N2PK | 22.4 | 96.9 | 1.20 |
| 14N2PKMG | 22.4 | 94.8 | 0.97 |
| 15N3MIN | 31.8 | 98.0 | 1.40 |
| 16N2MIN | 27.9 | 96.5 | 1.34 |
| 17N2MINH | 25.6 | 98.1 | 1.10 |
| 18N2MINH | 25.6 | 97.9 | 1.24 |
| 19 | 15.6 | 95.0 | 0.68 |
| MEAN DM% | | | 82.4 |



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