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# Yields of the Field Experiments 1978

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

### Rothamsted Research

Rothamsted Research (1979) *78/R/BK/1 Broadbalk - Wheat, Potatoes, Beans* ; Yields Of The Field Experiments 1978, pp 9 - 13 - DOI: <https://doi.org/10.23637/ERADOC-1-30>

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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:

Wheat:	Section	
	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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PLOT	POTATOES		SPRING BEANS	
	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