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# Yields of the Field Experiments 1977

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

### Rothamsted Research

Rothamsted Research (1978) *77/R/BK/1 Broadbalk - Wheat, Potatoes, Beans* ; Yields Of The Field Experiments 1977, pp 8 - 12 - DOI: <https://doi.org/10.23637/ERADOC-1-29>

77/R/BK/1

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 134th year, wheat, potatoes, beans. The tenth 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 74-76/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00434
	1	0.00798
	3, 4 and 5	0.00659
	8 and 9	0.00694
Potatoes:	7	0.00659
Beans:	2	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

77/R/BK/1

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 kierserite 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
SCO/W26	Section 0 W (last fallowed 1951)	W	W	W	W	W	W	W	W	W
SC1/W11	Section 1 W (last fallowed 1966)	W	W	W	W	W	W	W	W	W
BEANS	Section 2 BE	W	P	BE	W	P	BE	W	P	BE
SC3/W1F	Section 3 W (fallowed 1967)	W	F	W	W	F	W	W	F	W
SC4/W1BE	Section 4 W (fallowed 1965)	P	BE	W	P	BE	W	P	BE	W
SC5/W2F	Section 5 W (fallowed 1965)	F	W	W	F	W	W	F	W	W
-	Section 6 F	W	W	F	W	W	F	W	W	F
POTATOES	Section 7 P	BE	W	P	BE	W	P	BE	W	P
SC8/W5	Section 8* W (fallowed 1963)	W	W	W	F	W	W	W	W	W
SC9/W19	Section 9 W (last fallowed 1958)	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: Sections 8 and 9: Chalk at 2.9 t. Weedkillers: Section 4: Diquat at 0.59 kg ion in 450 l. Sections 0, 1 and 9: Glyphosate at 1.7 kg in 220 l. Sections 0, 1, 3, 4, 5 and 9: Ioxynil at 0.53 kg with mecoprop at 1.6 kg in 220 l applied in spring. Insecticide: Pirimicarb at 0.14 kg in 280 l.

Potatoes: Manures: Chalk at 2.9 t. Weedkillers: Linuron at 1.3 kg plus paraquat at 0.42 kg ion in 340 l. Fungicide: Mancozeb at 1.3 kg in 340 l.

Insecticide: Pirimicarb at 0.14 kg applied with the fungicide.

Beans: Insecticide: Pirimicarb at 0.14 kg in 280 l.

Fallow: Chalk at 2.9 t.

Seed: Wheat: Cappelle, dressed with chlorfenvinphos, sown at 200 kg.

Potatoes: Pentland Crown.

Spring beans: Minden sown at 220 kg.



77/R/BK/1

Cultivations, etc.:-

ALL SECTIONS: Superphosphate, sulphate of potash applied: 5 Oct, 1976.  
Sulphate of soda, kieserite, castor meal applied: 8 Oct. FYM applied:  
11 Oct. Ploughed: 11-13 Oct.

CROPPED SECTIONS:

Winter wheat: Diquat applied: 6 Aug. Glyphosate applied: 6 Sept. Chalk applied: 7 Sept. Sections 8 and 9 rotary harrowed: 3 Nov. Sections 0 and 1 rotary harrowed: 4 Nov. Sections 3, 4 and 5 heavy spring-tine cultivated: 4 Nov. Sections 3, 4 and 5 rotary harrowed: 22 Nov. Seed sown, spring-tine cultivated: 24 Nov. N applied: 18 Apr, 1977. Spring weedkillers applied to Sections 3, 4, 5 and 9: 10 May. Spring weedkillers applied to Sections 0 and 1: 23 May. Insecticide applied: 12 July. Combine harvested: 8 Sept.

Potatoes: Chalk applied: 6 Sept, 1976. Spring-tine cultivated and N applied: 18 Apr, 1977. Spike rotary cultivated and potatoes machine planted: 19 Apr. Grubbed: 21 Apr, 21 June. Weedkillers applied: 23 May. FYM plots rotary ridged: 22 June. Fungicide applied: 23 June, 5 July. Remaining plots grubbed and rotary ridged: 30 June. Fungicide with insecticide applied: 26 July, 10 Aug. Lifted: 14 Sept.

Spring beans: N applied: 7 Mar. Rotary harrowed: 9 Mar. Seed sown: 10 Mar. Tractor hoed: 18 May. Insecticide applied: 19 July. Combine harvested: 15 Sept.

FALLOW SECTION: Chalk applied: 6 Sept, 1976. Spring-tine cultivated: 29 Apr, 11 Aug. Ploughed: 25 May, 20 July.

77/R/BK/1

WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC4/W1BE	SC3W1F	SC5/W2F	SC1/W11	SC9/W19	SC0/W26	SC8/W5	MEAN
01DN2PK	5.68	4.17	7.26	*	*	*	*	5.70
21DN2	5.78	5.89	6.03	3.92	4.62	3.20	3.84	4.75
22D	5.16	4.58	5.97	5.38	5.88	5.17	4.64	5.25
030	2.54	2.27	1.78	1.64	1.94	1.79	2.00	1.99
05MIN	2.99	2.92	1.69	1.24	1.38	2.50	2.57	2.18
06N1MIN	4.40	2.84	3.41	2.98	2.53	2.78	3.02	3.14
07N2MIN	5.57	4.03	5.51	4.23	3.94	4.69	4.09	4.58
08N3MIN	5.58	4.67	4.78	4.99	5.42	4.73	4.50	4.95
09N4MIN	5.77	3.27	5.33	4.96	4.01	4.96	4.73	4.72
10N2	4.98	2.20	0.78	3.63	3.07	2.86	3.86	3.05
11N2P	5.46	1.99	3.27	2.19	1.14	3.49	2.45	2.86
12N2PNA	5.12	1.85	3.84	3.75	1.88	3.79	2.87	3.30
13N2PK	5.44	2.35	5.00	4.44	2.84	4.28	2.91	3.89
14N2PKMG	6.12	2.95	5.15	4.42	3.11	4.03	3.25	4.15
15N3MIN	5.47	2.87	5.70	4.89	4.16	4.42	4.43	4.56
16N2MIN	5.87	2.99	4.64	4.27	3.70	4.15	4.10	4.25
17N2MINH	6.00	3.89	5.49	4.35	2.73	5.20	4.23	4.56
18N2MINH	5.90	4.16	5.10	4.62	3.89	4.49	3.10	4.47
19C	5.17	4.41	4.33	4.03	2.72	4.20	2.99	3.98
20NKMG	*	*	*	4.87	*	4.37	*	4.62

GRAIN MEAN DM% 81.3

STRAW TONNES/HECTARE

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

SECTION PLOT	SC4/W1BE	SC3W1F	SC5/W2F	SC1/W11	SC9/W19	SC0/W26	SC8/W5	MEAN
01DN2PK	4.93	4.39	5.55	*	*	*	*	4.96
21DN2	5.26	5.55	5.03	5.83	5.17	5.89	5.00	5.39
22D	4.22	3.67	4.44	4.13	3.79	4.16	4.08	4.07
030	1.34	0.89	0.90	1.23	1.01	1.26	1.07	1.10
05MIN	1.18	1.25	0.73	1.23	0.92	1.64	2.60	1.36
06N1MIN	3.96	2.66	2.47	3.15	2.38	2.86	2.83	2.90
07N2MIN	4.94	4.36	4.60	3.49	3.64	4.69	4.21	4.27
08N3MIN	4.69	4.57	3.41	4.22	4.64	4.06	5.06	4.38
09N4MIN	4.65	3.73	3.54	4.21	4.07	4.56	4.63	4.20
10N2	2.51	2.06	1.45	2.05	1.64	2.23	2.87	2.12
11N2P	2.95	2.34	1.75	2.03	1.80	2.46	2.64	2.28
12N2PNA	2.84	2.31	2.22	2.64	2.11	3.25	2.73	2.59
13N2PK	3.98	3.20	3.22	4.48	3.38	4.48	3.80	3.79
14N2PKMG	3.99	3.25	3.89	4.57	3.34	4.98	3.34	3.91
15N3MIN	4.19	3.87	4.18	4.04	4.44	4.06	4.47	4.18
16N2MIN	4.29	3.83	3.58	4.27	4.49	4.29	4.81	4.22
17N2MINH	4.94	4.15	3.91	4.47	3.89	4.39	4.93	4.38
18N2MINH	4.61	4.48	4.39	4.15	4.68	5.04	4.72	4.58
19C	3.24	2.79	2.23	2.77	1.99	2.75	3.01	2.68
20NKMG	*	*	*	3.02	*	2.89	*	2.96

STRAW MEAN DM% 88.2

77/R/BK/1

PLOT	POTATOES		SPRING BEANS	
	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE	GRAIN TONNES/ HECTARE	STRAW TONNES/ HECTARE
01DN2PK	25.0	90.0	3.17	3.73
21DN2	30.2	92.6	3.04	3.39
22D	26.9	92.4	3.34	3.74
030	7.0	88.4	2.38	1.18
05MIN	8.8	81.5	3.87	2.94
06N1MIN	14.6	84.9	3.45	3.25
07N2MIN	19.3	88.5	3.26	3.44
08N3MIN	26.1	92.8	3.52	3.60
09N4MIN	34.9	94.1	3.81	3.27
10N2	6.4	83.3	1.41	0.36
11N2P	4.3	43.3	0.63	1.66
12N2PNA	5.0	56.8	0.56	1.26
13N2PK	14.8	75.3	2.68	3.09
14N2PKMG	20.1	88.5	2.77	1.99
15N3MIN	28.6	94.8	2.81	3.24
16N2MIN	24.0	90.8	2.95	2.69
17N2MINH	20.7	92.7	2.82	2.62
18N2MINH	23.0	90.0	2.76	2.52
19C	17.8	87.4	2.43	1.91
MEAN DM%			81.7	89.0