ROTHAMSTED RESEARCH

Yields of the Field Experiments 1981

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

Rothamsted Research

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81/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 138th year, w. wheat, fallow, potatoes. The 14th year of the rotations.

For previous years see 'Details' 1967 & 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, and 74-80/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00434
	1	0.00798
	2,3,5 & 6	0.00659
	9	0.00694
Potatoes:	7	0.00659

Treatments:

Whole plots

PLOT	Plot	Fertilisers 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	-
17NO+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	NO+3 1/2(PK (Na) Mg)+
18N1+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N1+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 & 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		1968	69	70	71	72	73	74	75	76	77	78	79	80	81
SC0/W30	Section 0	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W15	Section 1	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC2/W1	Section 2	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W
SC3/W2	Section 3	W	W	F	W	W	F	W	W	F	W	W	F	W	W
-	Section 4	W	P	BE	W	P	BE	W	P	BE	W	P	P	W	F
SC5/W3	Section 5	W	F	W	W	F	W	W	F	W	W	F	W	W	W
SC6/W4	Section 6	F	W	W	F	W	W	F	W	W	F	W	W	W	W
POTATOES	Section 7	P	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P
-	Section 8*	W	W	W	W	F	W	W	W	W	W	W	W	W	F
SC9/W23	Section 9	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 & 9. Year 3: Sections 0,4,5. Chalk is applied to all plots of each section.

Standard applications:
W. wheat: Manures: Sections 0 and 5 only: Chalk at 2.9 t. Weedkillers: (Not applied to section 8): Chlortoluron at 5.6 l in 250 l. Mecoprop with bromoxynil and ioxynil (as 'Brittox' at 3.7 l) in 250 l. Section 9 only: Glyphosate at 1.5 l in 250 l. Fungicides: Prochloraz at 0.4 l in 250 l. Prochloraz at 0.4 l with maneb at 1.2 kg and zineb at 0.13 kg in 250 l applied on two occasions; to sections 0,1,2,3 and plots 01,21,22 and 03 of sections 5 and 6 on the first and second occasions and to remaining wheat on the second occasion only. (Rain was believed to have washed off the first application).

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Potatoes: Weedkillers: Linuron at 1.1 kg and paraquat at 0.6 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l applied on five occasions, with pirimicarb. Insecticides: Phorate at 1.7 kg at planting. Pirimicarb at 0.14 kg. Desiccant: BOV at 170 l.
Fallow: Manures: Chalk at 2.9 t to section 4 only.

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: 8 Sept, 1980. FYM applied: 10 Sept. Ploughed: 11 Sept. Rolled: 15 Sept.
CROPPED SECTIONS: W. wheat: Glyphosate applied: 2 Sept, 1980. Rotary harrowed: 30 Sept. Seed sown: 1 Oct. Chlortoluron applied: 3 Oct. N applied: 15 Apr, 1981. 'Brittox' applied: 21 Apr. Prochloraz applied alone: 5 May. Prochloraz, maneb, and zineb applied: 19 June, 22 June. Combine harvested: 19 Aug.
potatoes: Chisel ploughed: 16 Jan, 1981. Spring-tine cultivated: 16 Apr. N applied: 17 Apr. Spike rotary cultivated, potatoes planted: 13 May. Weedkillers applied: 1 June. Fungicide applied with pirimicarb: 23 June, 1 July, 13 July, 27 July, and 11 Aug. Ridged: 9 July. Haulm mechanically destroyed: 24 Aug. Desiccant applied: 25 Aug. Lifted: 14 Sept.
FALLOW: Chalk applied: 4 Sept, 1980. Chisel ploughed section 4 only: 6 Jan, 1981. Chisel ploughed section 8 only: 16 Jan. Spring-tine cultivated four times: 16 Apr, 30 June, 20 July, 11 Aug. Rotary harrowed: 15 May. Ploughed twice: 16 June, 16 July. Heavy spring-tine cultivated: 19 June.

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81/R/BK/1 WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC2/W1	SC3/W2	SC5/W3	SC6/W4	SC1/W15	SC9/W23	SC0/W30	MEAN
01DN2PK	8.03	8.53	8.62	8.46	*	*	*	8.41
21DN2	8.50	8.64	10.13	8.71	8.57	8.95	8.47	8.85
22D	8.70	6.56	7.68	5.91	7.71	7.99	7.29	7.41
030	3.81	1.29	1.27	1.12	1.66	1.49	1.71	1.76
05F	4.01	1.33	1.09	1.20	1.62	1.74	1.41	1.77
06N1F	6.54	4.47	4.17	3.33	4.28	4.69	4.45	4.56
07N2F	8.16	6.36	6.12	4.91	6.39	6.45	5.81	6.32
08N3F	8.55	7.45	6.01	6.24	6.36	6.77	6.14	6.79
09N4F	8.37	7.78	7.59	7.35	6.96	7.29	6.55	7.41
10N2	5.39	5.01	3.43	3.81	3.72	2.79	3.54	3.96
11N2P	6.34	5.77	5.19	4.30	3.58	3.14	3.31	4.52
12N2PNA	6.18	5.80	5.58	4.40	4.58	3.98	4.47	5.00
13N2PK	7.76	6.39	6.06	5.08	6.20	6.88	5.64	6.29
14N2PKMG	7.58	6.00	5.83	5.23	6.28	6.08	5.76	6.11
15N3F	8.09	7.17	6.95	6.40	6.71	6.71	6.52	6.94
16N2F	7.49	6.16	5.82	5.62	5.93	6.25	5.69	6.14
17N0+3FH	7.86	6.84	6.58	6.36	6.50	6.71	6.20	6.72
18N1+3FH	8.29	6.72	7.27	6.98	6.72	6.74	6.94	7.09
19C	6.67	3.76	4.06	3.09	4.25	4.84	4.09	4.40
20NKMG	*	*	*	*	3.07	*	3.78	3.43

GRAIN MEAN DM% 83.9

STRAW TONNES/HECTARE

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

SECTION PLOT	SC2/W1	SC1/W15	MEAN
01DN2PK	7.68	*	7.68
21DN2	9.39	7.60	8.50
22D	8.64	5.96	7.30
030	2.35	1.00	1.68
05F	2.81	0.89	1.85
06N1F	5.21	2.83	4.02
07N2F	6.11	3.76	4.94
08N3F	6.52	3.85	5.19
09N4F	6.97	3.96	5.46
10N2	2.44	2.38	2.41
11N2P	3.84	1.97	2.90
12N2PNA	3.92	2.84	3.38
13N2PK	6.15	4.01	5.08
14N2PKMG	5.11	4.39	4.75
15N3F	6.02	4.43	5.23
16N2F	5.40	3.74	4.57
17N0+3FH	5.55	4.25	4.90
18N1+3FH	6.00	4.33	5.17
19C	4.07	2.76	3.42
20NKMG	*	1.93	1.93

STRAW MEAN DM% 90.8

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POTATOES

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

	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM(1.5 INCH) RIDDLE
01DN2PK	27.7	95.4
21DN2	29.9	92.3
22D	21.9	93.5
030	5.4	82.5
05F	10.4	87.5
06N1F	13.9	90.2
07N2F	17.0	89.2
08N3F	22.6	91.6
09N4F	25.4	88.9
10N2	5.6	75.4
11N2P	8.0	71.7
12N2PNA	10.1	75.3
13N2PK	14.4	86.6
14N2PKMG	18.0	88.0
15N3F	21.6	90.7
16N2F	20.3	91.4
17N3FH	19.0	89.5
18N3FH	19.3	91.5
19C	13.1	87.4

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