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Yields of the Field Experiments 1987

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87/R/BK/1 Broadbalk - W. Wheat, Potatoes

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87/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. Since 1985 part of the second rotation has been added to the first to extend the rotation to fallow, potatoes, w. wheat, w. wheat, w. wheat.

The 144th year, w. wheat, fallow, potatoes.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, 74-86/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00298
	1	0.00548
	4,5,6,and 7	0.00453
	8 and 9	0.00477
Potatoes:	3	0.00695

Treatments:

Whole plots

PLOT	Fertilizers and organic manures:-			
	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985
01DN4PK	01	-	D N2 P K	D N4 P K
21DN2	21	D	D N2	D N2
22D	22	D	D	D
030	03	None	None	None
05F	05	P K Na Mg	P K (Na) Mg	PK Mg
06N1F	06	N1 P K Na Mg	N1 P K (Na) Mg	N1 P K Mg
07N2F	07	N2 P K Na Mg	N2 P K (Na) Mg	N2 P K Mg
08N3F	08	N3 P K Na Mg	N3 P K (Na) Mg	N3 P K Mg
09N4F	09	N*1 P K Na Mg	N4 P K (Na) Mg	N4 P K Mg
10N2	10	N2	N2	N2
11N2P	11	N2 P	N2 P	N2 P
12N2PNA	12	N2 P Na	N2 P Na	N2 P Na
13N2PK	13	N2 P K	N2 P K	N2 P K
14N2PKMG	14	N2 P Mg	N2 P K Mg	N2 P K Mg
15N5F	15	N2 P K Na Mg	N3 P K (Na) Mg	N5 P K Mg
16N6F	16	N*2 P K Na Mg	N2 P K (Na) Mg	N6 P K Mg
17NO+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	NO+3 1/2(PK Mg)+
18N1+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK Mg)+
19C	19	C	C	C
20NKMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating

+ This change since 1980. Treatments shown are those to w. wheat; autumn N alternates. Potatoes receive N3 1/2 (PK Mg) on both Plots 17 and 18.

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N1,N2,N3,N4,N5,N6: 48, 96, 144, 192, 240, 288 kg N (as sulphate of ammonia until 1967, except N* which was nitrate of soda. All as 'Nitro-Chalk' in spring from 1968 to 1985, as 'Nitram' since 1986.)

N0+3; N1+3: None in autumn + 144 kg N in spring; 48 kg N in autumn + 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 subplots: 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	Section	68	69	70, 71, 72, 73, 74, 75, and and and	76	77	78	79	80	81	82	83	84	85	86	87
SC0/W36B	0*	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W21B	1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
-	2	BE	W	P	BE	W	F	P	W	F	P	W	W	W	W	F
POTATOES	3	W	W	F	W	W	F	W	W	W	W	W	W	W	W	P
SC4/W2B	4	W	P	BE	W	P	P	W	F	P	W	F	P	W	W	W
SCS/W1	5	W	F	W	W	F	W	W	W	W	W	W	W	F	P	W
SC6/W10B	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W
SC6/W10S	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W
SC7/W3B	7	P	BE	W	P	BE	W	F	P	W	F	P	W	W	W	W
SC8/W6B	8+	W	W	W	W	W	W	W	W	F	W	W	W	W	W	W
SC9/W29B	9	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W

W = w. wheat, P = potatoes, BE = s. beans, F = fallow

* Straw incorporated since 1987. ** No sprays except weedkillers since 1985. + No weedkillers.

B = Brimstone, S = Squareheads Master

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 and 9.
 Year 3: Sections 0,4,5. Chalk is applied to all plots of each section.

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Standard applications:

- W. wheat: Manures: Chalk at 2.9 t (sections 0, 4 and 5 only).
Weedkillers (not applied to section 8): Methabenzthiazuron at 3.2 kg in 200 l. Clopyralid at 0.07 kg, bromoxynil at 0.34 kg and mecoprop at 2.5 kg in 200 l. Fungicides (not applied to section 6): Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l with the growth regulator. Fenpropimorph at 0.75 kg with chlorothalonil at 1.0 kg in 200 l. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.6 kg in 200 l. Growth regulator (not applied to section 6): Chlormequat chloride at 1.3 kg.
- Potatoes: Weedkiller: Linuron at 1.6 kg in 500 l. Fungicides: Mancozeb at 1.4 kg on four occasions in 200 l, applied with the insecticide on the second. Fentin hydroxide at 0.28 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg. Haulm desiccant: Diquat at 0.80 kg in 500 l.
- Fallow: Weedkiller: Glyphosate at 1.4 kg in 200 l on two occasions.

- Seed: W. wheat: Brimstone, dressed fonofos, and Squareheads Master, untreated, both sown at 190 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-

All Sections:

Kieserite, sulphate of soda and castor meal applied: 19 Sept, 1986. Sulphate of potash applied: 22 Sept. Superphosphate applied: 6 Oct. FYM applied, ploughed, disced, rotary harrowed: 8 Oct.

Cropped Sections:

- W. wheat: Straw chopped (section 0): 5 Sept, 1986. Chalk applied (sections 0, 4 and 5): 26 Sept. Rotary harrowed, seed sown: 10 Oct. Methabenzthiazuron applied (except section 8): 17 Oct. N treatments applied: 14 Apr, 1987. Remaining weedkillers applied (except section 8): 15 Apr. Prochloraz, carbendazim and the growth regulator applied (except section 6): 6 May. Fenpropimorph and chlorothalonil applied (except section 6): 16 June. Propiconazole with carbendazim and maneb applied (except section 6): 10 July. Combine harvested: 8 Sept.
- Potatoes: Heavy spring-tine cultivated: 17 Feb, 1987. N treatments applied: 14 Apr. Rotary harrowed, potatoes planted: 16 Apr. Rotary ridged: 27 Apr. Weedkiller applied: 30 Apr. Mancozeb applied: 24 June, 8 July, 28 July and 10 Aug. Pirimicarb applied: 8 July. Fentin hydroxide applied: 28 Aug. Haulm desiccant applied: 4 Sept. Lifted: 23 Sept.
- Fallow: Heavy spring-tine cultivated: 17 Feb, 1987. Rotary harrowed: 27 Apr. Deep-tine cultivated: 28 Apr. Spring-tine cultivated: 29 Apr. Glyphosate applied: 22 June. Heavy spring-tine cultivated: 30 June. Glyphosate applied: 17 Aug.

87/R/BK/1 W. WHEAT

GRAIN TONNES/HECTARE

***** Tables of means *****

SECTION PLOT	5/W1B	4/W2B	7/W3B	8/W5B	6/W10B	6/W10S	1/W21B	9W29B	0/W36B	Mean
01DN4PK	7.90	8.16	8.74	*	5.69	*	*	*	*	7.62
21DN2	8.92	9.32	8.44	1.88	7.32	*	8.54	8.97	7.42	7.60
22D	9.45	6.44	6.21	2.10	7.05	*	6.67	7.70	6.57	6.53
030	1.86	1.15	1.10	2.29	1.33	1.04	1.47	1.24	1.52	1.44
05F	2.04	1.28	0.93	2.61	1.47	1.02	1.41	1.31	1.28	1.48
06N1F	4.77	4.01	2.01	3.23	3.39	2.22	3.21	3.55	3.28	3.30
07N2F	6.95	5.51	3.99	2.02	4.37	3.04	5.32	4.89	4.62	4.52
08N3F	8.25	6.52	5.50	1.93	6.35	3.05	5.95	6.47	5.70	5.52
09N4F	8.77	7.09	6.53	2.34	5.79	2.87	6.18	6.71	6.01	5.81
10N2	6.46	6.49	3.77	1.55	3.45	2.19	3.18	2.90	2.90	3.66
11N2P	6.11	5.64	5.12	1.97	4.18	3.16	4.69	3.89	4.95	4.41
12N2PNA	6.88	5.58	4.82	2.23	4.89	3.21	4.39	4.88	4.98	4.65
13N2PK	6.86	5.39	4.12	1.65	4.40	2.65	5.24	5.54	4.54	4.49
14N2PKMG	6.82	5.73	3.83	1.95	4.67	2.89	5.22	5.40	5.04	4.62
15N5F	9.06	7.53	4.93	1.29	4.74	2.25	6.84	6.81	6.52	5.55
16N6F	9.32	7.78	6.02	2.13	4.37	2.09	7.54	6.96	4.92	5.68
17N0+3FN	8.16	6.74	4.96	2.03	6.15	3.43	6.91	6.39	6.39	5.68
18N1+3FN	9.03	8.06	5.60	2.37	6.26	2.37	7.10	6.37	7.20	6.04
19C	6.08	4.33	2.30	2.32	2.06	1.62	3.68	2.49	2.61	3.05
20NKMG	*	*	*	*	*	*	1.64	*	2.08	1.86

GRAIN MEAN DM% 78.0

STRAW TONNES/HECTARE

***** Tables of means *****

SECTION PLOT	5/W1B	1/W21B	Mean
01DN4PK	6.52	*	6.52
21DN2	7.30	6.21	6.76
22D	5.57	4.96	5.26
030	0.92	*	0.92
05F	0.91	0.97	0.94
06N1F	2.07	2.50	2.29
07N2F	3.02	2.80	2.91
08N3F	3.68	*	3.68
09N4F	4.44	4.00	4.22
10N2	2.75	3.33	3.04
11N2P	2.67	1.93	2.30
12N2PNA	3.15	1.94	2.55
13N2PK	3.21	2.81	3.01
14N2PKMG	3.67	2.71	3.19
15N5F	4.47	3.76	4.12
16N6F	5.09	4.59	4.84
17N0+3FN	4.47	3.57	4.02
18N1+3FN	5.06	4.42	4.74
19C	2.63	3.32	2.97
20NKMG	*	1.33	1.33

STRAW MEAN DM% 85.6

87/R/BK/1 POTATOES

***** Tables of means *****

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	38.3	94.7
21DN2	36.9	91.3
22D	35.9	96.1
030	9.5	94.4
05F	17.4	94.9
06N1F	25.3	89.8
07N2F	32.0	92.9
08N3F	42.5	94.6
09N4F	43.0	98.0
10N2	5.5	84.2
11N2P	6.6	66.7
12N2PNA	6.9	69.2
13N2PK	22.3	85.4
14N2PKMG	35.3	92.9
15N5F	40.9	94.6
16N6F	40.1	97.1
17N3FH	27.4	97.0
18N3FH	26.8	96.9
19C	17.4	94.3