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

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82/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 139th year, w. wheat, fallow, potatoes. The 15th year of the rotations.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, and 74-81/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00434
	1	0.00798
	3,5,6,and 7	0.00659
Potatoes:	8 and 9	0.00694
	4	0.00659

Treatments:

Whole plots

PLOT	Fertilizers and organic manures:-			
	Plot	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	-
17N1+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK (Na) Mg)+
18N0+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N0+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 and 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		68	69	70	71	72	73	74	75	76	77	78	79	80	81	82
SC0/W31	Section 0	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W16	Section 1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
-	Section 2	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W	F
SC3/W3	Section 3	W	W	F	W	W	F	W	W	F	W	W	F	W	W	W
POTATOES	Section 4	W	P	BE	W	P	BE	W	P	BE	W	P	P	W	F	P
SC5/W4	Section 5	W	F	W	W	F	W	W	F	W	W	F	W	W	W	W
SC6/W5	Section 6	F	W	W	F	W	W	F	W	W	F	W	W	W	W	W
SC7/W1P	Section 7	P	BE	W	P	BE	W	P	BE	W	P	BE	W	F	P	W
SC8/W1F	Section 8*	W	W	W	W	F	W	W	W	W	W	W	W	W	F	W
SC9/W24	Section 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

* 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 and 9.
 Year 3: Sections 0,4,5. Chalk is applied to all plots of each section.
 (3) On many plots of Section 8 the yields presented include a substantial proportion of weed seeds.

Standard applications:

W. wheat: Manures: Sections 1 and 3 only: Chalk at 2.9 t. Weedkillers: (not applied to section 8): Chlortoluron at 5.6 l in 250 l; mecoprop, bromoxynil and ioxynil (as 'Brittox' at 3.5 l) in 250 l.
 Plots 03, 05 and 06, sections 0,1,5,6 and 7 and plot 05, section 9: Glyphosate at 1.4 kg in 250 l. Fungicide: Propiconazole at 0.12 kg in 250 l applied twice, with the insecticide on the second occasion.
 Insecticide: Pirimicarb at 0.14 kg.

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Potatoes: Weedkillers: Linuron at 1.1 kg and paraquat at 0.5 kg ion in 250 l. Fungicide: Mancozeb at 1.4 kg in 250 l on three occasions, with the insecticide on the first two. Ofurace at 0.12 kg and maneb at 1.2 kg in 250 l, on two occasions with the insecticide on the first. Insecticide: Pirimicarb at 0.14 kg. Desiccant: BOV at 220 l. Fallow: Manures: Chalk at 2.9 t.

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: 21 Sept, 1981. FYM applied: 25 Sept. Ploughed: 28 Sept. Disced: 14 Oct.

Cropped Sections:

W. wheat: Rotary harrowed: 14 Oct, 1981. Seed sown: 16 Oct.
Chlortoluron applied: 17 Oct. N applied: 15 Apr, 1982. Mecoprop, bromoxynil and ioxynil applied: 16 Apr. Propiconazole applied: 26 May. Propiconazole with insecticide applied: 17 June.
Glyphosate applied: 10 Aug. Combine harvested: 20 Aug.

Potatoes: Spring-tine cultivated: 16 Apr, 1982. N applied: 17 Apr.
Spiked rotary cultivated, potatoes planted: 20 Apr. Rotary ridged: 10 May. Weedkillers applied: 17 May. Mancozeb with the insecticide applied: 14 June, 30 June. Mancozeb applied: 12 July. Ofurace and maneb with the insecticide applied: 26 July. Ofurace and maneb applied: 9 Aug. Haulm mechanically destroyed: 21 Aug. Desiccant applied: 24 Aug. Lifted: 13 Sept.

Fallow: Chalk applied: 11 Sept, 1981. Spring-tine cultivated: 16 Apr, 1982. Ploughed: 4 May. Rolled, spring-tine cultivated: 12 May. Ploughed: 21 June. Spring-tine cultivated: 30 June. Rotary harrowed: 28 July.

82/R/BK/1 WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC7/W1P	SC8/W1F	SC3/W3	SC5/W4	SC6/W5	SC1/W16	SC9/W24	SC0/W31	MEAN
01DN2PK	8.55	*	7.09	7.14	7.08	*	*	*	7.47
21DN2	8.69	5.49	7.39	7.75	7.48	8.04	8.20	7.83	7.61
22D	7.18	6.59	4.99	5.05	5.20	5.59	6.37	5.23	5.77
030	3.49	2.03	1.03	1.04	0.89	1.23	1.28	1.26	1.53
05F	4.11	4.60	1.32	1.08	1.03	1.10	1.40	1.59	2.03
06N1F	6.03	4.72	3.36	3.22	3.29	3.36	3.83	3.73	3.94
07N2F	7.32	4.98	4.76	4.70	5.17	5.47	5.84	5.47	5.46
08N3F	7.86	4.54	5.88	5.52	5.71	5.76	6.38	5.98	5.96
09N4F	7.88	5.48	6.51	6.20	5.80	6.60	6.73	6.29	6.44
10N2	4.66	2.19	3.10	3.87	3.70	2.78	2.52	2.71	3.19
11N2P	5.55	2.25	3.49	3.75	3.09	3.34	1.96	3.80	3.40
12N2PNA	6.51	2.79	4.19	4.28	3.22	4.34	3.46	5.03	4.23
13N2PK	6.86	4.49	4.67	4.76	4.11	5.15	5.17	5.05	5.03
14N2PKMG	7.35	4.89	4.19	4.63	4.11	5.31	5.81	5.27	5.19
15N3F	7.46	5.11	5.68	6.17	5.71	6.22	6.61	6.17	6.14
16N2F	6.98	4.19	4.81	4.72	4.24	5.34	5.48	5.15	5.11
17N1+3FH	7.31	4.80	6.27	6.38	5.52	6.44	6.02	6.43	6.14
18N0+3FH	7.23	4.53	5.81	6.73	5.93	6.03	6.26	6.02	6.07
19C	5.33	4.88	2.33	2.88	2.10	3.20	3.14	2.74	3.32
20NKMG	*	*	*	*	*	2.80	*	3.07	2.93

GRAIN MEAN DM% 79.9

STRAW TONNES/HECTARE

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

SECTION PLOT	SC7/W1P	SC1/W16	MEAN
01DN2PK	5.88	*	5.88
21DN2	5.75	5.59	5.67
22D	4.17	3.62	3.89
030	1.44	0.59	1.02
05F	1.97	0.75	1.36
06N1F	3.26	2.35	2.81
07N2F	4.13	3.14	3.63
08N3F	4.22	3.50	3.86
09N4F	4.31	3.97	4.14
10N2	1.66	2.03	1.85
11N2P	2.53	2.02	2.28
12N2PNA	3.18	2.25	2.71
13N2PK	3.57	3.03	3.30
14N2PKMG	3.35	3.07	3.21
15N3F	3.89	3.52	3.70
16N2F	4.09	2.87	3.48
17N1+3FH	3.93	3.72	3.83
18N0+3FH	4.41	2.83	3.62
19C	2.63	2.00	2.31
20NKMG	*	1.76	1.76

STRAW MEAN DM% 87.5

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POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	3.81 CM(1.5 INCH) % WARE RIDDLE
01DN2PK	41.0	93.4
21DN2	49.4	92.8
22D	39.9	96.0
030	9.2	92.0
05F	16.5	93.1
06N1F	32.7	93.7
07N2F	38.2	94.4
08N3F	43.8	95.3
09N4F	43.3	94.9
10N2	8.5	87.8
11N2P	18.1	78.0
12N2PNA	19.9	78.7
13N2PK	32.2	87.8
14N2PKMG	41.3	91.8
15N3F	45.0	95.7
16N2F	41.6	93.7
17N3FH	32.4	93.6
18N3FH	38.3	94.2
19C	18.8	91.3