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

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93/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 150th 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, Station Report for 1982, Part 2, pp. 5-44 and 74-92/R/BK/1.

Areas harvested:

Wheat:	Section	
	0	0.00311
	1	0.00572
	3,4,5 and 6	0.00473
	8 and 9	0.00497
Potatoes:	2	0.00348

Treatments:

Whole plots

PLOT	Plot	Fertilizers and organic manures:-		
		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
17N0+3FH	17	N2 (A)	N2 1/2 (P K (Na) Mg)	N0+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
20N2KMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating

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+ 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.

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 34.5% N 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 triple superphosphate in 1974 and since 1988, single superphosphate in other years
 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 until 1988, none since
 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:-

70,71,72,
73,74,75,
& & &

SECTION	Section	68	69	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
0/W42	0*	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1/W27	1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
POTATOES	2	BE	W	P	BE	W	F	P	W	F	P	W	W	W	F	P	W	W	W	F	P
3/W1	3	W	W	F	W	W	F	W	W	W	W	W	W	F	P	W	W	W	F	P	W
4/W3	4	W	P	BE	W	P	P	W	F	P	W	F	P	W	W	W	F	P	W	W	W
5/W2	5	W	F	W	W	F	W	W	W	W	W	W	F	P	W	W	W	F	P	W	W
6/W16	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
-	7	P	BE	W	P	BE	W	F	P	W	F	P	W	W	W	F	P	W	W	W	F
8/W5	8+	W	W	W	W	W	W	W	F	W	W	W	W	W	W	F	W	W	W	W	W
9/W35	9	W	W	W	W	W	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.

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- NOTES:** (1) For a fuller record of treatments see 'Details' etc.
(2) From autumn 1975 to autumn 1986, chalk was applied at 2.9 t each autumn to all plots in 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. From autumn 1988 until autumn 1992 a five-year cycle was used. Year 1: Sections 1,3. Year 2: Sections 2,8. Year 3: Sections 7,9. Year 4: Sections 4,6. Year 5: Sections 0,5. None applied in autumn 1992.

Experimental diary:

All sections:

- 08-Oct-92 : T : P applied.
13-Oct-92 : T : Mg, K and Na applied.
14-Oct-92 : T : FYM applied.
15-Oct-92 : B : Ploughed.
19-Oct-92 : T : Rotary harrowed, plots 21 to 11.
04-Nov-92 : T : Heavy spring-tine cultivated plots 01 & 12-20.

Cropped Sections:

W. wheat:

- 07-Aug-92 : T : Straw chopped (section 0 only).
08-Oct-92 : T : Autumn N treatments applied.
06-Nov-92 : T : Rotary harrowed, Apollo, dressed Fonofos Seed Treatment, drilled at 380 seeds per square metre.
19-Mar-93 : T : Rolled.
20-Apr-93 : T : Spring N treatments applied.
22-Apr-93 : T : Astix at 2.0 l and Oxytril CM at 1.5 l in 200 l (except section 8).
06-May-93 : T : Mistral at 1.0 l, Sportak 45 at 0.90 l and Tripart Brevis at 2.25 l in 200 l (except section 6).
10-May-93 : T : Cheetah R at 2.5 l in 200 l (except section 8).
04-Jun-93 : T : Starane 2 at 1.5 l in 200 l (except section 8).
 : T : Bombardier at 2.0 l and Mistral at 1.0 l in 200 l (except section 6).
22-Jun-93 : T : Corbel at 1.0 l and Radar at 0.50 l in 200 l (except section 6).
04-Aug-93 : T : Roundup at 6.0 l with High Trees Mixture B at 2.9 l in 150 l (except section 8).
17-Aug-93 : B : Combine harvested.

Potatoes:

- 12-Feb-93 : T : Chisel ploughed.
20-Apr-93 : T : Spring N treatments applied.
28-Apr-93 : T : Heavy spring-tine cultivated.
05-May-93 : T : Rotary harrowed twice, planted Pentland Crown AA.
14-May-93 : T : Rotary ridged.
19-May-93 : T : Rotalin at 5.5 l in 200 l.
24-May-93 : T : Cultivated by rotary grubber.
22-Jun-93 : T : Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.
08-Jul-93 : T : Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.
22-Jul-93 : T : Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.

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Experimental diary:

Cropped Sections:

Potatoes:

- 06-Aug-93 : T : Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.
- 25-Aug-93 : T : Chiltern Super-Tin 4L at 0.56 l with Intracrop BLA at 0.20 l in 200 l.
- 15-Sep-93 : T : Stefes Diquat at 4.0 l in 200 l.
- 23-Sep-93 : T : Haulm mechanically destroyed.
- 18-Oct-93 : T : Lifted.

Fallow:

- 12-Feb-93 : T : Chisel ploughed.
- 24-Jun-93 : T : Cultivated by rotary grubber.

NOTE: Samples of grain and straw from sections 1 and 3 and samples of potato tubers from section 2 were taken for chemical analysis.

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GRAIN TONNES/HECTARE

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

SECTION PLOT	3/W1	5/W2	4/W3	8/W5	6/W16	1/W27	9/W35	0/W42
01DN4PK	10.49	9.79	8.81	*	6.92	*	*	*
21DN2	10.22	8.32	7.41	3.98	6.76	8.99	9.33	8.33
22D	7.26	5.22	4.60	2.52	4.55	5.67	6.44	4.93
030	1.27	0.49	0.62	1.01	0.89	1.01	0.60	0.81
05F	1.26	0.60	0.34	2.31	1.08	1.15	0.85	0.84
06N1F	4.76	2.89	2.64	2.31	3.64	3.06	3.46	3.51
07N2F	6.56	4.84	4.42	3.16	4.24	4.80	4.53	4.60
08N3F	8.56	6.08	4.77	2.97	4.20	5.51	5.14	4.34
09N4F	8.97	7.87	5.62	3.26	5.38	5.99	6.97	5.65
10N2	6.16	2.52	3.26	0.98	1.87	1.92	2.11	1.54
11N2P	3.85	4.49	2.73	0.77	1.56	2.39	2.08	2.56
12N2PNA	3.88	3.61	1.74	0.86	1.85	2.48	2.22	2.86
13N2PK	5.96	4.09	3.59	1.67	3.39	4.05	3.53	4.44
14N2PKMG	5.57	4.24	4.18	1.18	3.71	4.85	3.90	4.76
15N5F	8.69	7.33	6.08	2.23	5.27	6.61	6.94	6.25
16N6F	9.22	7.49	7.15	2.64	5.80	7.38	8.21	6.71
17N0+3FN	8.27	6.74	4.75	1.96	4.98	5.96	6.51	5.58
18N1+3FN	8.72	7.10	5.28	2.52	5.35	6.37	6.73	5.86
19C	1.58	1.17	0.93	1.83	1.27	1.47	1.29	1.28
20N2KMG	*	*	*	*	*	1.80	*	2.65

GRAIN MEAN DM% 85.7

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STRAW TONNES/HECTARE

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

SECTION PLOT	3/W1	1/W27
01DN4PK	6.37	*
21DN2	4.82	4.56
22D	1.79	1.72
030	0.20	0.17
05F	0.10	0.25
06N1F	1.63	1.00
07N2F	2.26	1.83
08N3F	3.10	1.98
09N4F	3.26	2.32
10N2	2.18	0.91
11N2P	1.20	0.67
12N2PNA	1.20	0.75
13N2PK	2.25	1.84
14N2PKMG	1.54	1.99
15N5F	3.27	2.69
16N6F	3.36	3.00
17N0+3FN	3.12	2.33
18N1+3FN	3.72	2.47
19C	0.40	0.34
20N2KMG	*	0.84

STRAW MEAN DM% 88.8

CLEAN GRAIN TONNES/HECTARE, AFTER REMOVING WEED SEEDS

SECTION PLOT	8/W5
01DN4PK	*
21DN2	3.75
22D	1.51
030	0.74
05F	1.41
06N1F	1.95
07N2F	2.80
08N3F	2.73
09N4F	3.20
10N2	0.95
11N2P	0.74
12N2PNA	0.84
13N2PK	1.38
14N2PKMG	0.87
15N5F	2.11
16N6F	2.41
17N0+3FN	1.68
18N1+3FN	2.02
19C	1.47
20N2KMG	*

93/R/BK/1 POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	22.1	92.0
21DN2	37.2	92.6
22D	34.2	93.0
030	7.1	93.9
05F	13.2	91.9
06N1F	15.7	82.2
07N2F	19.5	84.8
08N3F	22.9	85.8
09N4F	25.8	90.9
10N2	6.4	89.7
11N2P	8.3	68.4
12N2PNA	9.2	75.2
13N2PK	10.2	74.4
14N2PKMG	22.7	94.5
15N5F	24.0	94.9
16N6F	27.6	96.0
17N3FH	14.2	89.2
18N3FH	20.7	96.3
19C	10.5	93.1