ROTHAMSTED RESEARCH

Yields of the Field Experiments 1994

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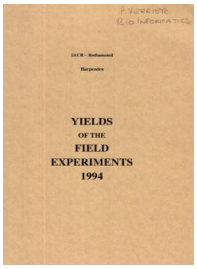

94/R/BK/1 Broadbalk - W. Wheat, Potatoes

Rothamsted Research

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94/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 151st 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 74-93/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00351
	1	0.00645
	2,3,5 and 6	0.00533
	9	0.00561
Potatoes:	7	0.00348

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
17N1+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK Mg)+
18N0+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N0+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. From 1968, ten strips of sub-plots (sections) were started with the following cropping:-

SECTION	1/W28	9/W36	0/W43	8/F	6/W17	5/W3	3/W2	7/POTS	4/F	2/W1
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1968	W	W	W	W	F	W	W	P	W	BE
1969	W	W	W	W	W	F	W	BE	P	W
1970	W	W	W	W	W	W	F	W	BE	P
1971	W	W	W	W	F	W	W	P	W	BE
1972	W	W	W	W	W	F	W	BE	P	W
1973	W	W	W	W	W	W	F	W	BE	P
1974	W	W	W	W	F	W	W	P	W	BE
1975	W	W	W	W	W	F	W	BE	P	W
1976	W	W	W	W	W	W	F	W	BE	P
1977	W	W	W	W	F	W	W	P	W	BE
1978	W	W	W	W	W	F	W	BE	P	W
1979	W	W	W	W	W	W	F	W	P	F
1980	W	W	W	W	W	W	W	F	W	P
1981	W	W	W	F	W	W	W	P	F	W
1982	W	W	W	W	W	W	W	W	P	F
1983	W	W	W	W	W	W	W	F	W	P
1984	W	W	W	W	W	W	W	P	F	W
1985	W	W	W	W	W	F	W	W	P	W
1986	W	W	W	W	W	P	F	W	W	W
1987	W	W	W	W	W	W	P	W	W	F
1988	W	W	W	F	W	W	W	F	W	P
1989	W	W	W	W	W	W	W	P	F	W
1990	W	W	W	W	W	F	W	W	P	W

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SECTION	1/W28	9/W36	0/W43	8/F	6/W17	5/W3	3/W2	7/POTS	4/F	2/W1
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1991	W	W	W	W	W	P	F	W	W	W
1992	W	W	W	W	W	W	P	W	W	F
1993	W	W	W	W	W	W	W	F	W	P
1994	W	W	W	F	W	W	W	P	F	W

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

* Straw incorporated since autumn 1986. ** No sprays except weedkillers since 1985. + No weedkillers.

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 or autumn 1993.

Experimental diary:

All sections:
21-Oct-93 : **T** : P applied.
25-Oct-93 : **T** : K, Na and Mg applied.
26-Oct-93 : **T** : FYM applied.
28-Oct-93 : B : Ploughed.
02-Nov-93 : B : Rotary harrowed, twice.

Cropped Sections:

W. wheat:
19-Aug-93 : **T** : Straw chopped (section 0 only).
21-Oct-93 : **T** : Autumn N treatments applied.
03-Nov-93 : **T** : Rotary harrowed, Apollo, dressed Fonofos Seed Treatment, drilled at 380 seeds per m^2.
21-Dec-93 : **T** : Draza at 5.5 kg, (except section 6).
18-Apr-94 : **T** : Spring N treatments applied.
09-May-94 : **T** : Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
: **T** : Sportak 45 at 0.7 l with Standen Tridemorph at 0.5 l and New 5C Cycocel at 2.5 l in 200 l, (except section 6).
13-Jun-94 : **T** : Starane 2 at 1.5 l in 200 l.
: **T** : Halo at 2.0 l with Mallard 750 EC at 1.0 l in 200 l (except section 6).
15-Jun-94 : **T** : Hostathion at 840 ml in 200 l (except section 6).
28-Jun-94 : **T** : Delsene M Powder at 2.5 kg with Mistral at 0.5 l in 200 l (except section 6).
22-Aug-94 : **T** : Combine harvested.

Potatoes:
18-Apr-94 : **T** : Spring N treatments applied.
28-Apr-94 : **T** : Heavy spring-tine cultivated twice, rotary harrowed, planted Estima, dressed Fungazil 100 SL.
16-May-94 : **T** : Rotary ridged.

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Experimental diary:

Cropped Sections:

Potatoes:

23-May-94 : **T** : Farmon PDQ at 2.0 l with Rotalin at 5.0 l in 200 l.
23-Jun-94 : **T** : Dithane 945 at 1.7 kg with Intracrop BLA at 0.2 l in 200 l.
07-Jul-94 : **T** : Dithane 945 at 1.7 kg with Pirimicarb 50 DG at 0.28 kg and Intracrop BLA at 0.2 l in 200 l.
25-Jul-94 : **T** : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
15-Aug-94 : **T** : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
30-Aug-94 : **T** : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
26-Sep-94 : **T** : Chiltern Super-Tin 4L at 560 ml with Reglone at 4.0 l in 200 l.
06-Oct-94 : **T** : Lifted.

Fallow:

28-Apr-94 : **T** : Heavy spring-tine cultivated, twice.
16-Jun-94 : **T** : Cultivated by rotary grubber.
07-Jul-94 : **T** : Cultivated by rotary grubber.

NOTES: (1) Correction: Areas of wheat harvested in 1991, 1992 and 1993 should be corrected to read the same as the areas of wheat harvested in 1994. When cropped with wheat, the harvested areas on sections 4 and 7 were 0.00533 ha. and the harvested areas on section 8 were 0.00561 ha. Harvested areas of potatoes remained unchanged.

(2) Section 9 was drained between 31 August and 4 September, 1993. An interceptor drain of perforated plastic (260 mm diameter) was laid at 1 m depth between sections 8 and 9. Drains of perforated plastic (80 mm diameter) were laid at 0.75 m depth in the centre of each plot of section 9; these drains discharged into the open drain to the east of section 9. All the drains were laid by a track-laying trenching machine, which delivered gravel backfill to within 0.3 m of the soil surface.

(3) Samples of grain and straw from sections 1 and 2 and samples of potato tubers from section 7 were taken for chemical analysis.

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GRAIN TONNES/HECTARE

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

SECTION PLOT	2/W1	3/W2	5/W3	6/W17	1/W28	9/W36	0/W43
01DN4PK	10.64	9.47	8.66	7.84	*	*	*
21DN2	9.58	7.93	7.65	6.86	7.22	7.07	5.94
22D	7.88	4.75	4.38	5.03	5.92	4.22	5.01
030	1.71	0.40	0.23	0.90	0.68	0.27	0.86
05F	1.87	0.51	0.29	0.96	0.75	0.53	0.69
06N1F	4.58	3.53	2.30	2.88	2.89	3.05	2.79
07N2F	6.82	5.11	4.11	4.60	5.14	4.39	5.01
08N3F	8.50	6.62	4.34	5.33	6.32	5.62	6.40
09N4F	8.25	7.42	6.06	5.76	5.93	5.79	6.56
10N2	5.43	3.24	2.26	2.35	2.38	1.95	2.30
11N2P	5.31	4.58	3.67	3.24	3.43	2.79	3.47
12N2PNA	5.48	4.79	4.39	3.67	3.42	4.19	4.03
13N2PK	6.69	5.13	3.57	4.55	4.70	5.28	4.99
14N2PKMG	6.08	4.92	3.73	4.50	5.22	5.45	5.22
15N5F	8.04	7.78	7.05	5.98	7.33	7.36	7.12
16N6F	7.55	7.99	7.42	6.38	7.08	7.62	7.21
17N1+3FN	7.55	6.82	6.69	5.92	6.35	6.11	6.21
18N0+3FN	7.31	6.51	6.18	5.98	5.37	6.62	5.54
19C	1.68	0.82	1.26	1.69	1.12	1.45	0.96
20NKMG	*	*	*	*	2.82	*	2.91

GRAIN MEAN DM% 86.4

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94/R/BK/1 W. WHEAT

STRAW TONNES/HECTARE

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

SECTION PLOT	2/W1	1/W28
01DN4PK	7.68	*
21DN2	5.80	4.58
22D	3.54	3.05
030	0.55	0.10
05F	0.45	0.13
06N1F	2.12	1.38
07N2F	3.59	2.56
08N3F	4.91	3.47
09N4F	5.24	3.36
10N2	2.89	1.89
11N2P	2.52	2.04
12N2PNA	2.75	2.24
13N2PK	3.67	2.74
14N2PKMG	2.36	2.45
15N5F	5.28	4.31
16N6F	4.88	4.17
17N1+3FN	4.18	3.38
18N0+3FN	4.27	2.66
19C	0.21	0.18
20NKMG	*	1.68

STRAW MEAN DM% 90.4

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94/R/BK/1 POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	15.6	83.1
21DN2	17.0	79.8
22D	17.6	80.2
030	4.2	56.2
05F	6.1	63.8
06N1F	9.2	72.6
07N2F	13.0	76.9
08N3F	16.9	83.3
09N4F	22.8	90.5
10N2	3.7	55.8
11N2P	3.2	34.2
12N2PNA	4.6	49.1
13N2PK	8.7	71.9
14N2PKMG	29.4	91.0
15N5F	25.4	90.3
16N6F	23.7	87.8
17N3FH	16.3	84.5
18N3FH	17.2	80.9
19C	5.3	50.8

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