ROTHAMSTED RESEARCH

Yields of the Field Experiments 1986

Full Table of Content

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

Rothamsted Research

Rothamsted Research (1987) *86/R/BK/1 Broadbalk - W. Wheat, Fallow, Potatoes ;* Yields Of The Field Experiments 1986, pp 9 - 13 **- DOI: https://doi.org/10.23637/ERADOC-1-36**

86/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 143rd 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, 74-85/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00434
	1	0.00798
	2,4,6,and 7	0.00659
	8 and 9	0.00694
Potatoes:	5	0.00659

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)+
18NO+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	NO+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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86/R/BK/1

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' in 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 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	Section	68	69	70, 71, 72, 73, 74, 75, and 76	77	78	79	80	81	82	83	84	85	86
SC0/W35	0	W	W	W	W	W	W	W	W	W	W	W	W	W
SC1/W20	1	W	W	W	W	W	W	W	W	W	W	W	W	W
SC2/W3	2	BE	W	P	BE	W	F	P	W	F	P	W	W	W
-	3	W	W	F	W	W	F	W	W	W	W	W	W	F
SC4/W1	4	W	P	BE	W	P	P	W	F	P	W	F	P	W
POTATOES	5	W	F	W	W	F	W	W	W	W	W	W	F	P
SC6/W9	6+	F	W	W	F	W	W	W	W	W	W	W	W	W
SC7/W2	7	P	BE	W	P	BE	W	F	P	W	F	P	W	W
SC8/W5	8*	W	W	W	W	W	W	W	F	W	W	W	W	W
SC9/W28	9	W	W	W	W	W	W	W	W	W	W	W	W	W

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

+ No sprays, except weedkillers, since 1985 * 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.

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86/R/BK/1

Standard applications:
W. wheat: Manures: Sections 6, 7, 8 and 9 only: Chalk at 2.9 t. Weedkillers (not applied to section 8): Isoproturon at 2.0 kg with clopyralid at 0.07 kg, bromoxynil octanoate 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 applied with the growth regulator. Fenpropimorph at 0.75 kg with captafol at 1.4 kg in 200 l. Propiconazole at 0.12 kg with carbendazim and maneb (as 'Septal' at 2.5 kg) in 200 l. Insecticide (to section 4 only): Chlorfenvinphos at 1.0 kg in 200 l. Growth regulator (not applied to section 6): Chlormequat chloride at 1.3 kg.
Potatoes: Weedkillers: Linuron at 1.3 kg in 500 l. Fungicides: Mancozeb at 1.4 kg on four occasions, in 200 l on the first and second occasion and applied with the insecticide in 500 l and 200 l on the third and fourth occasion respectively. Insecticide: Pirimicarb at 0.14 kg on two occasions. Haulm desiccant: Diquat at 0.80 kg ion in 500 l.

Seed: W. wheat: Brimstone, sown at 200 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-
All Sections:
Superphosphate, sulphate of potash, sulphate of soda and castor meal applied: 23 Sept, 1985. Kieserite applied: 24 Sept. FYM applied: 25 Sept. Ploughed: 26 Sept. Rotary harrowed: 30 Sept.
Cropped Sections:
W. wheat: Chalk to sections 6, 7, 8 and 9: 19 Sept, 1985. Autumn N treatment applied: 23 Sept. Rotary harrowed, seed sown: 3 Oct. Insecticide applied (to section 4 only): 31 Oct. Weedkillers applied (except section 8): 28 Apr, 1986. Prochloraz, carbendazim and the growth regulator applied (except section 6): 1 May. Spring N treatments applied: 2 May. Fenpropimorph and captafol applied (except section 6): 16 June. Propiconazole and 'Septal' applied (except section 6): 1 July. Combine harvested: 2 Sept.
Potatoes: N treatments applied: 6 May, 1986. Rotary harrowed, potatoes planted: 7 May. Weedkiller applied: 30 May. Mancozeb applied: 30 June, 14 July. Mancozeb with insecticide applied: 28 July, 12 Aug. Haulm desiccant applied: 29 Aug. Haulm mechanically destroyed: 15 Sept. Lifted: 16 Sept.
Fallow: Spring-tine cultivated: 13 May, 1986, 6 June, 19 June, 28 July. Cultivated with thistle bar: 4 July, 22 Aug.

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86/R/BK/1 W. WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	SC4/W1	SC7/W2	SC2/W3	SC8/W5	SC6/W9	SC1/W20	SC9/W28	SC0/W35	MEAN
01DN4PK	9.49	9.86	6.86	*	9.11	*	*	*	8.83
21DN2	9.92	8.29	7.41	3.53	8.55	6.15	7.39	5.70	7.12
22D	8.40	5.51	6.12	3.44	6.41	4.68	5.55	4.90	5.63
030	1.98	1.44	1.83	1.04	1.40	1.12	1.50	1.44	1.47
05F	2.44	1.94	2.18	2.49	1.97	1.45	1.89	1.78	2.02
06N1F	5.61	3.67	3.97	3.10	3.85	2.70	3.69	3.24	3.73
07N2F	7.98	5.64	5.90	3.21	5.24	4.74	5.05	4.52	5.29
08N3F	9.11	6.88	6.86	3.95	6.64	5.20	5.74	5.05	6.18
09N4F	8.94	7.93	6.99	4.19	6.55	4.37	5.78	4.87	6.21
10N2	0.26	3.69	3.08	1.22	2.05	0.41	0.73	0.53	1.50
11N2P	6.37	6.74	5.39	2.73	4.74	4.09	3.71	3.53	4.66
12N2PNA	7.12	6.71	5.63	2.90	5.34	4.23	4.43	4.55	5.11
13N2PK	7.64	5.98	5.47	2.91	5.12	5.10	4.83	4.35	5.18
14N2PKMG	7.74	5.67	5.44	2.74	5.19	5.02	5.19	4.68	5.21
15N5F	9.32	6.99	6.14	3.07	6.67	5.37	5.28	4.43	5.91
16N6F	9.24	7.87	6.92	2.66	7.18	4.86	5.89	4.55	6.15
17N1+3FH	9.08	7.46	6.76	3.00	7.08	5.09	5.91	4.77	6.14
18N0+3FH	8.45	7.02	6.31	2.50	6.55	4.32	6.05	4.06	5.66
19C	6.47	2.93	3.46	2.15	2.61	2.29	2.95	1.96	3.10
20NKMG	*	*	*	*	*	0.68	*	0.38	0.53

GRAIN MEAN DM% 81.2

STRAW TONNES/HECTARE

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

SECTION PLOT	SC4/W1	SC1/W20	MEAN
01DN4PK	5.60	*	5.60
21DN2	5.41	3.67	4.54
22D	4.35	3.03	3.69
030	0.97	0.41	0.69
05F	1.23	0.75	0.99
06N1F	2.88	1.78	2.33
07N2F	3.95	2.20	3.08
08N3F	4.38	2.35	3.36
09N4F	4.05	2.09	3.07
10N2	0.02	0.27	0.14
11N2P	2.42	1.52	1.97
12N2PNA	3.06	1.79	2.43
13N2PK	3.49	2.36	2.92
14N2PKMG	3.55	2.15	2.85
15N5F	4.50	2.56	3.53
16N6F	4.05	2.22	3.13
17N1+3FH	4.24	2.13	3.18
18N0+3FH	4.03	1.71	2.87
19C	2.85	1.36	2.11
20NKMG	*	0.13	0.13

STRAW MEAN DM% 92.5

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86/R/BK/1

POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM(1.5 INCH) RIDDLE
01DN2PK	46.1	98.6
21DN2	46.6	98.1
22D	39.8	99.0
030	10.8	95.9
05F	14.8	97.2
06N1F	29.9	98.7
07N2F	38.6	97.5
08N3F	39.1	98.2
09N4F	38.4	99.2
10N2	16.1	94.8
11N2P	15.6	85.4
12N2PNA	17.8	86.5
13N2PK	29.9	98.0
14N2PKMG	36.0	96.4
15N5F	39.7	97.1
16N6F	39.1	98.1
17N3FH	33.8	97.7
18N3FH	37.6	97.7
19C	21.0	96.7

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