ROTHAMSTED RESEARCH

Yields of the Field Experiments 1988

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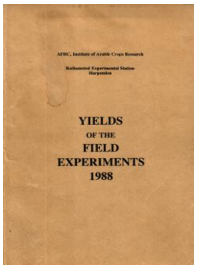

Experiments - Classicals

Rothamsted Research

Rothamsted Research (1989) *Experiments - Classicals ;* Yields Of The Field Experiments 1988, pp 9 - 32 **- DOI: https://doi.org/10.23637/ERADOC-1-43**

88/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 145th 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, and 74-87/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00311
	1	0.00572
	3,4,5 and 6	0.00473
	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
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
20NKMG	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 '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 until 1987, triple superphosphate since and 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, 73 and 76	71, 74 and 77	72, 75 and 78	79	80	81	82	83	84	85	86	87	88
0/W37B	0*	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1/W22B	1	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
3/W1B	3	W	W	F	W	W	F	W	W	W	W	W	W	F	P	W
3/W1S	3	W	W	F	W	W	F	W	W	W	W	W	W	F	P	W
4/W3B	4	W	P	BE	W	P	P	W	F	P	W	F	P	W	W	W
5/W2B	5	W	F	W	W	F	W	W	W	W	W	W	F	P	W	W
6/W11B	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W
6/W11S	6**	F	W	W	F	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
–	8+	W	W	W	W	W	W	W	F	W	W	W	W	W	W	F
9/W30B	9	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
9/W30S	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

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88/R/BK/1

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.

Standard applications:

W. wheat: Weedkillers: Fluroxypyr at 0.20 kg with clopyralid at 0.07 kg and bromoxynil at 0.34 kg in 200 l. Diclofop-methyl at 1.1 kg with fluroxypyr at 0.15 kg in 260 l. Fungicides (not applied to section 6): Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 260 l applied with the growth regulator. Propiconazole at 0.12 kg and tridemorph at 0.25 kg with the pirimicarb in 200 l. Carbendazim at 0.25 kg and maneb at 1.6 kg with propiconazole at 0.12 kg in 200 l. Insecticide (not applied to section 6): Pirimicarb at 0.14 kg. Growth regulator (not applied to section 6): Chlormequat chloride at 1.3 kg.

Potatoes: Weedkiller: Linuron at 1.6 kg in 260 l. Fungicides: Mancozeb at 1.4 kg on five occasions, on the first two with the pirimicarb. Manganese zinc ethylene bisdithiocarbamate at 1.4 kg in 200 l. Fentin hydroxide at 0.27 kg in 200 l. Insecticide: Pirimicarb at 0.14 kg.

Seed: W. wheat: Brimstone (sections 3, 4, 5, 6 and 9 only, dressed fonofos) and Squareheads Master, both sown at 180 kg.
Potatoes: Pentland Crown.

Cultivations, etc.:-

All Sections:
Triple superphosphate, sulphate of potash, sulphate of soda, kieserite, castor meal and FYM applied: 28 Sept, 1987. Ploughed: 30 Sept.

Cropped Sections:

W. wheat: Straw chopped (section 0): 9 Sept, 1987. Autumn N treatment applied: 28 Sept. Rotary harrowed, Brimstone seed sown: 5 Nov. Rotary harrowed, Squareheads Master seed sown: 6 Nov. Spring N treatments applied: 8 Apr, 1988. Fluroxypyr, clopyralid and bromoxynil applied: 26 Apr. Growth regulator with prochloraz and carbendazim applied (except to section 6), diclofop-methyl with fluroxypyr applied: 6 May. Propiconazole with tridemorph and pirimicarb applied (except to section 6): 6 June. Carbendazim, maneb and propiconazole applied (except to section 6): 23 June. Combine harvested Brimstone (except section 9): 5 Sept. Combine harvested Brimstone (section 9) and Squareheads Master: 6 Sept.

Potatoes: N treatments applied: 7 Apr, 1988. Heavy spring-tine cultivated, rotary harrowed, potatoes planted: 8 Apr. Rotary ridged: 25 Apr. Weedkiller applied: 5 May. Mancozeb with pirimicarb applied: 15 June, 30 June. Manganese zinc ethylene bisdithiocarbamate applied: 8 July. Mancozeb applied: 18 July, 1 Aug, 15 Aug. Fentin hydroxide applied: 30 Aug. Haulm mechanically destroyed: 5 Sept. Lifted: 15 Sept.

Fallow: Heavy spring-tine cultivated: 29 Apr, 1988. Cultivated with rotary grubber: 13 May, 13 June. Ploughed: 15 July. Disced and rolled: 29 July. Ploughed: 1 Aug.

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88/R/BK/1 W. WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	3/W1B	3/W1S	5/WB2	4/W3B	6/W11B	6/W11S	1/W22B	9W30B	9W30S	0/W37B
01DN4PK	9.25	*	8.16	7.59	6.52	*	*	*	*	*
21DN2	9.52	*	7.90	7.41	7.07	*	8.01	7.51	*	6.84
22D	6.49	*	3.91	3.43	2.46	*	4.10	5.19	*	3.61
030	2.87	1.98	0.85	0.87	0.73	0.73	0.68	0.35	0.80	0.73
05F	2.90	2.27	0.92	0.99	0.99	0.56	0.86	0.28	0.65	0.46
06N1F	5.58	4.62	3.42	4.33	3.51	1.97	2.88	3.35	2.71	4.48
07N2F	7.95	5.84	6.02	6.41	4.79	2.68	4.10	4.26	3.91	5.32
08N3F	8.49	5.26	5.29	6.67	5.19	3.06	5.60	5.92	4.43	5.77
09N4F	8.46	6.06	6.29	7.08	4.86	3.06	6.53	5.30	4.28	5.98
10N2	7.36	4.88	3.56	4.92	2.78	2.23	2.46	1.63	1.55	1.77
11N2P	6.27	5.10	4.29	5.05	3.09	2.14	2.62	1.29	0.74	1.57
12N2PNA	6.83	5.45	3.81	4.70	3.70	2.67	3.55	1.36	1.76	3.65
13N2PK	7.30	5.65	3.82	5.07	3.74	2.93	4.87	4.76	3.12	5.03
14N2PKMG	7.96	5.84	5.26	5.46	4.97	2.97	5.90	3.85	3.07	5.33
15N5F	8.23	5.75	7.13	6.73	4.29	3.38	6.60	5.58	4.29	6.41
16N6F	7.98	4.98	7.10	6.66	5.00	3.11	6.71	6.90	4.35	3.65
17N1+3FN	8.94	6.44	6.80	6.92	5.75	3.25	7.03	6.66	4.36	6.58
18N0+3FN	8.86	5.72	7.12	6.72	5.70	3.23	6.63	6.08	4.08	6.50
19C	5.21	4.11	1.30	2.93	0.69	1.39	2.18	0.55	1.49	1.74
20NKMG	*	*	*	*	*	*	1.32	*	*	1.59

GRAIN MEAN DM% 82.3

STRAW TONNES/HECTARE

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

SECTION PLOT	3/WIB	3/WIS	1/W22B
01DN4PK	7.88	*	*
21DN2	7.96	*	5.84
22D	3.06	*	3.56
030	0.95	1.49	0.40
05F	0.93	1.87	0.48
06N1F	2.86	5.02	2.73
07N2F	5.26	7.93	3.43
08N3F	6.17	9.10	3.48
09N4F	6.55	7.53	5.05
10N2	3.31	5.50	1.85
11N2P	3.26	4.85	2.13
12N2PNA	4.00	5.50	1.68
13N2PK	4.88	7.90	3.09
14N2PKMG	4.84	7.25	3.20
15N5F	6.44	9.23	4.67
16N6F	6.88	9.20	5.06
17N1+3FN	6.54	8.34	4.11
18N0+3FN	6.45	8.92	4.11
19C	2.20	3.95	2.24
20NKMG	*	*	1.09

STRAW MEAN DM% 84.7

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88/R/BK/1 POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	52.0	92.0
21DN2	48.6	90.0
22D	37.0	90.3
030	11.4	80.5
05F	17.8	86.1
06N1F	33.6	84.2
07N2F	40.4	87.9
08N3F	54.9	95.9
09N4F	49.2	93.9
10N2	8.4	66.3
11N2P	8.5	45.6
12N2PNA	12.3	62.4
13N2PK	27.0	79.8
14N2PKMG	43.5	89.2
15N5F	51.1	96.4
16N6F	51.6	96.1
17N1+3FH	27.1	92.7
18N1+3FH	36.7	94.5
19C	16.8	87.7

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88/R/HB/2

HOOS BARLEY

Object: To study the effects of organic and inorganic manures on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised. The rotation was discontinued in 1979 and the experiment reverted to continuous s. barley.

The 137th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-87/R/HB/2.

Treatments: All combinations of:-

1. **MANURE** Fertilizers and organic manures:

	Form of N 1852-1966	Additional treatments 1852-1979	Changes since 1980
---	None	-	-
-P-	None	P	-
--K	None	K(Na)Mg	-
-PK	None	PK(Na)Mg	-
A--	A	-	-
AP-	A	P	-
A-K	A	K(Na)Mg	-
APK	A	PK(Na)Mg	-
N----	N	-	-
NP---	N	P	-
N-K--	N	K(Na)Mg	-
NPK--	N	PK(Na)Mg	-
N--S-	N	Si	Si omitted
NP-S-	N	P Si	"
N-KS-	N	K(Na)MgSi	"
NPKS-	N	PK(Na)MgSi	"
N---S	N	-	Si added
NP--S	N	P	"
N-K-S	N	K(Na)Mg	"
NPK-S	N	PK(Na)Mg	"
N--SS	N	Si	-
NP-SS	N	P Si	-
N-KSS	N	K(Na)MgSi	-
NPKSS	N	PK(Na)MgSi	-
C(--)	C	-	PKMg omitted
C(P-)	C	P	"
C(-K)	C	K(Na)Mg	"
C(PK)	C	PK(Na)Mg	"
D	None	D	-
(D)	(D)	-	-
(A)	(Ashes)	-	-
-	None	-	-

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88/R/HB/2

Form of N: A, sulphate of ammonia: N, nitrate of soda - each to supply 48 kg N: C, castor meal to supply 96 kg N
P: 35 kg P as single superphosphate (triple superphosphate in 1974 and 1988)
K: 90 kg K as sulphate of potash
(Na): 16 kg Na as sulphate of soda until 1973
Mg: 35 kg Mg, as kieserite every third year since 1974 (sulphate of magnesia annually until 1973)
Si: Silicate of soda at 450 kg
D: Farmyard manure at 35 tonnes. (D): until 1871 only
(Ashes): Weed ash 1852-1916, furnace ash 1917-1932, none since

2. **N** Nitrogen fertilizer (kg N), as 'Nitro-Chalk', since 1968 (cumulative N applications until 1973, on a cyclic system since 1974):

0
48
96
144

Plus extra plots testing all combinations of:-

1. **MANURE** Fertilizers other than magnesium:

551AN2PK	Plot 551 AN2PK
561--PK	Plot 561 --PK
571NN2--	Plot 571 NN2
581NN2--	Plot 581 NN2

N2: 96 kg N as 'Nitro-Chalk' since 1968. Other symbols as above.

2. **MGNESIUM** Magnesium fertilizer (kg Mg) as kieserite every third year since 1974:

0
35

NOTE: For a fuller record see 'Details' etc.

Basal applications: Weedkillers: Mecoprop at 2.4 kg with clopyralid at 0.05 kg and bromoxynil at 0.24 kg in 200 l. Fungicides: Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 200 l on two occasions.

Seed: Triumph, seed dressed triadimenol and fuberidazole, sown at 160 kg.

Cultivations, etc.:- Silicate of soda, P and K applied: 11 Jan, 1988. FYM applied, ploughed: 15 Jan. Spring-tine cultivated, rotary harrowed, seed sown: 22 Feb. N applied: 12 Apr. Weedkillers applied: 10 May. Fungicides applied: 20 May, 17 June. Combine harvested: 15 Aug.

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88/R/HB/2

MAIN PLOTS

GRAIN TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.40	1.24	1.57	1.45	1.16
-P-	1.05	3.05	4.10	3.39	2.90
--K	1.18	2.40	1.82	3.47	2.22
-PK	1.11	3.92	5.00	6.59	4.16
A--	0.57	1.43	1.89	2.07	1.49
AP-	2.21	2.65	2.82	2.42	2.52
A-K	0.73	1.74	2.17	2.04	1.67
APK	1.45	2.89	5.06	6.39	3.95
N----	1.20	1.64	2.79	2.31	1.99
NP---	2.02	2.71	3.89	3.54	3.04
N-K--	0.84	1.77	1.99	3.18	1.95
NPK--	1.84	4.18	5.51	6.98	4.63
N--S-	1.17	1.99	2.21	3.22	2.15
NP-S-	1.34	4.28	4.43	4.91	3.74
N-KS-	1.33	3.23	4.63	3.56	3.19
NPKS-	1.68	3.78	5.49	6.89	4.46
N---S	1.00	2.07	2.23	2.87	2.04
NP--S	1.84	4.23	4.07	4.47	3.65
N-K-S	1.28	2.51	2.52	3.13	2.36
NPK-S	1.38	4.06	5.74	6.14	4.33
N--SS	1.44	1.87	2.33	1.84	1.87
NP-SS	1.41	3.74	4.00	3.97	3.28
N-KSS	1.64	3.78	2.90	3.15	2.87
NPKSS	1.45	3.90	5.29	5.72	4.09
C(--)	1.49	3.35	3.75	4.30	3.22
C(P-)	1.16	3.44	4.57	5.19	3.59
C(-K)	1.92	2.49	4.49	5.20	3.52
C(PK)	1.74	3.41	5.26	6.52	4.23
D	5.33	6.62	7.19	7.11	6.56
(D)	1.82	3.01	2.80	3.62	2.81
(A)	1.24	2.12	3.14	4.53	2.76
-	0.68	1.95	1.47	2.50	1.65
Mean	1.47	2.98	3.66	4.15	3.06

GRAIN MEAN DM% 80.4

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88/R/HB/2

MAIN PLOTS

STRAW TONNES/HECTARE

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

N	0	48	96	144	Mean	
MANURE						
---	0.29	0.93	1.25	1.58	1.01	1.16
-P-	0.53	1.26	1.63	2.04	1.36	2.90
--K	0.44	1.66	1.12	2.23	1.36	2.22
-PK	0.32	1.65	2.96	3.21	2.04	4.16
A--	0.31	1.13	0.87	1.08	0.85	1.49
AP-	1.06	1.23	1.46	1.31	1.26	2.52
A-K	0.29	1.57	1.56	2.16	1.39	1.67
APK	0.68	1.19	2.32	3.61	1.95	3.95
D	2.37	3.70	4.93	4.92	3.98	6.56
(D)	0.85	1.57	2.18	2.33	1.73	2.81
(A)	0.59	1.13	1.61	2.36	1.42	2.76
-	0.36	1.13	1.69	2.16	1.34	1.65
Mean	0.67	1.51	1.97	2.42	1.64	
	1.48	2.75	3.25	3.80	2.82	

STRAW MEAN DM% 73.9

PLOT AREA HARVESTED 0.00154

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	Mean
MGNESIUM					
0	4.95	0.54	3.65	1.35	2.62
35	5.28	0.61	3.25	1.96	2.78
Mean	5.11	0.58	3.45	1.66	2.70

GRAIN MEAN DM% 79.1

PLOT AREA HARVESTED 0.00329

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88/R/WF/3

WHEAT AND FALLOW

Object: To study the effects of fallowing on unmanured w. wheat - Hoosfield.

The 133rd year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-87/R/WF/3.

Whole plot dimensions: 9.60 x 211.

Treatments:
Each year there are two plots, one is sown to w. wheat, one is fallow; they alternate in successive years.

Seed: Brimstone, dressed fonofos, sown at 180 kg.

Cultivations, etc.:-
Wheat plot: Rotary harrowed, seed sown: 6 Nov, 1987. Combine harvested: 6 Sept, 1988.
Fallow plot: Ploughed: 14 Dec, 1987. Heavy spring-tine cultivated: 29 Apr, 1988. Cultivated by rotary grubber: 16 May, 13 June.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.00	0.60
MEAN DM%	83.0	84.9

~~PLOT AREA HARVESTED 0.02321~~

AREA HARVESTED 0.04309

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88/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1876-1901, and of additional phosphate applied since 1986, on the yield of continuous s. barley - Hoosfield.

The 133rd year, s. barley.

For previous years see 'Details' 1967, 1973 and 74-87/R/EX/4.

Treatments: All combinations of:-

Whole plots

1. **OLD RES** — Residues of manures applied annually 1876-1901:

O	None
D	Farmyard manure at 35 tonnes
N	96 kg N as ammonium salts
P	34 kg P as superphosphate
NPKNAMG	N and P as above plus 137 kg K as sulphate of potash, 16 kg Na as sulphate of soda, 11 kg Mg as sulphate of magnesia

2. **P** — Phosphate applied annually from 1986 as superphosphate until 1987, triple superphosphate since:

O	None
P1	44 kg
P2	87 kg
P3	131 kg

plus all combinations of:-

1. **OLD RES** — Residues of manures applied annually 1876-1901:

O	None
D	Farmyard manure at 35 tonnes
N*	96 kg N as nitrate of soda
PK	34 kg P as superphosphate, 137 kg K as sulphate of potash
N*PK	N, P and K as above

2. **N88** — Nitrogen fertilizer (kg N) as 'Nitro-Chalk' until 1985, as 'Nitram' since 1986 (basal until 1975, on a cyclic system since 1976):

0
48
96
144

NOTE: All plots of the combination OLD RES, P were given N at 144 kg as 'Nitram' and K at 83 kg as muriate of potash.

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88/R/EX/4

Basal applications: Weedkillers: Glyphosate at 1.4 kg in 200 l. Mecoprop at 2.4 kg with clopyralid at 0.05 kg and bromoxynil at 0.24 kg in 200 l. Fungicides: Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 200 l on two occasions.

Seed: Triumph, seed dressed triadimenol and fuberidazole, sown at 160 kg.

Cultivations, etc.:- Glyphosate applied: 17 Nov, 1987. P and K applied: 11 Dec. Ploughed: 14 Dec. Heavy spring-tine cultivated twice: 22 Feb, 1988, 23 Feb. Rotary harrowed, seed sown: 7 Mar. N applied: 13 Apr. Remaining weedkillers applied: 11 May. Fungicides applied: 17 May, 17 June. Combine harvested: 15 Aug.

PHOSPHATE PLOTS

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
OLD RES					
0	3.04	6.01	6.68	6.77	5.63
D	5.48	6.99	7.16	7.17	6.70
N	2.34	6.33	6.93	7.15	5.69
P	5.05	6.93	7.12	7.16	6.57
NPKNAMG	4.69	6.79	7.22	7.21	6.48
Mean	4.12	6.61	7.02	7.09	6.21

GRAIN MEAN DM% 84.2

STRAW TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
OLD RES					
0	1.47	3.23	3.04	3.56	2.83
D	2.68	3.74	3.75	3.26	3.36
N	1.27	3.34	3.94	3.25	2.95
P	2.78	4.00	4.45	3.91	3.78
NPKNAMG	2.23	3.28	3.19	3.50	3.05
Mean	2.09	3.52	3.67	3.50	3.19

STRAW MEAN DM% 87.4

PLOT AREA HARVESTED 0.00728

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88/R/EX/4

NITROGEN PLOTS

GRAIN TONNES/HECTARE

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

N88 / OLD RES	0	48	96	144	Mean
O	1.06	1.41	2.03	1.71	1.55
D	2.09	3.71	4.83	4.96	3.90
N*	1.13	1.35	1.80	2.33	1.65
PK	1.48	2.95	4.30	4.55	3.32
N*PK	1.80	2.36	3.64	4.43	3.06
Mean	1.51	2.36	3.32	3.59	2.70

GRAIN MEAN DM% 81.8

NITROGEN PLOTS

STRAW TONNES/HECTARE

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

N88 / OLD RES	0	48	96	144	Mean
O	0.29	0.58	0.72	0.71	0.58
D	0.63	1.61	2.19	2.04	1.62
N*	0.36	0.56	0.72	1.07	0.68
PK	0.64	1.48	2.04	2.41	1.64
N*PK	0.65	0.85	1.35	2.07	1.23
Mean	0.52	1.02	1.40	1.66	1.15

STRAW MEAN DM% 88.0

PLOT AREA HARVESTED 0.00728

https://doi.org/10.23637/ERADOC-1-43

88/R/PG/5

PARK GRASS

Object: To study the effects of organic and inorganic manures and lime on old grass (for hay).

The 133rd year, hay.

For previous years see 'Details' 1967 and 1973 and 74-87/R/PG/5.

Treatments: Combinations of:-

Whole plots

1. **MANURE** Fertilizers and organic manures:

N1	Plot 1	N1
O(D)	Plot 2	None (D until 1863)
O/PLOT3	Plot 3	None
P	Plot 4-1	P
N2P	Plot 4-2	N2 P
N1MIN	Plot 6	N1 P K Na Mg
MIN	Plot 7	P K Na Mg
PNAMG	Plot 8	P Na Mg
N2MIN	Plot 9	N2 P K Na Mg
N2PNAMG	Plot 10	N2 P Na Mg
N3MIN	Plot 11-1	N3 P K Na Mg
N3MINSI	Plot 11-2	N3 P K Na Mg Si
O/PLOT12	Plot 12	None
D/F	Plot 13	D/F
N2*MIN	Plot 14	N2* P K Na Mg
MIN(N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*MIN	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNAMG	Plot 18	N2 K Na Mg
D	Plot 19	D
D/N*PK	Plot 20	D/N*P K

N1, N2, N3:	48, 96, 144 kg N as sulphate of ammonia
N1*, N2*:	48, 96 kg N as nitrate of soda (30 kg N to Plot 20, only in years with no farmyard manure)
P:	35 kg P (15 kg P to Plot 20, only in years with no farmyard manure) as single superphosphate (triple superphosphate in 1974, 1987 and 1988)
K:	225 kg K (45 kg K to Plot 20, only in years with no farmyard manure) as sulphate of potash
Na:	15 kg Na as sulphate of soda
Mg:	10 kg Mg as sulphate of magnesia
Si:	Silicate of soda at 450 kg
D:	Farmyard manure at 35 tonnes every fourth year
F:	Fish meal every fourth year to supply 63 kg N
MIN:	P K Na Mg

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88/R/PG/5

Sub plots

2. **LIME** Liming:

A	a Ground chalk applied as necessary to achieve pH7
B	b Ground chalk applied as necessary to achieve pH6
C	c Ground chalk applied as necessary to achieve pH5
D	d None

NOTE: Lime was applied regularly, and at the same rate, to all a and b sub plots of Plots 1 to 17 (except 12) from 1924. Differential liming started in 1965 on certain b and c sub plots (except on Plot 12) and in 1976 on certain a sub plots (including Plot 12) and 12b.

Additional sub plots (Plots 18, 19 and 20 only) (tonnes $CaCO_3$ applied every fourth year 1920-1964):

N2KNAMG0	18-1	None
N2KNAMG2	18-2	13.5
N2KNAMG1	18-3	7.9
DO	19-1	None
D2	19-2	6.3
D1	19-3	1.1
D/N*PK0	20-1	None
D/N*PK2	20-2	5.6
D/N*PK1	20-3	1.1

Since 1965 Plot 18-1 has been split into two for treatments 'c' and 'd' above and Plot 18-3 split into two for treatments 'a' and 'b'. The remaining sub plots of Plots 18, 19 and 20 are treated as 'a'.

NOTE: For a fuller record of treatments see ' Details' etc.

Cultivations, etc.:- P applied: 11 Jan, 1988. Remaining mineral fertilizers applied: 17 Feb. N applied: 25 Apr. Cut: 14 June, 17 Nov.

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88/R/PG/5

1ST CUT (14/6/88) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	3.54	2.54	1.99	1.47	2.38
O(D)	2.72	3.43	1.58	1.58	2.32
O/PLOT3	2.49	3.30	1.33	1.40	2.13
P	3.42	3.81	2.73	2.37	3.08
N2P	3.67	3.29	3.41	2.23	3.15
N1MIN	4.78	4.64			4.71
MIN	5.03	5.16	5.16	4.37	4.93
PNAMG	2.82	3.47	3.44	3.32	3.26
N2MIN	5.73	5.51	5.48	2.64	4.84
N2PNAMG	4.09	4.09	4.08	2.25	3.63
N3MIN	6.26	6.20	5.49	4.46	5.60
N3MINSI	6.07	5.87	5.90	4.71	5.64
O/PLOT12	2.33	1.93	1.37	1.38	1.75
D/F	4.72	4.70	4.79	4.41	4.66
N2*MIN	5.38	5.77	5.37	4.98	5.37
MIN(N2*)	5.01	4.97	3.75	3.46	4.30
N1*MIN	5.50	5.61	4.30	3.53	4.73
N1*	3.45	3.45	2.89	2.62	3.10
N2KNAMG0			2.16	2.72	2.44
N2KNAMG2	2.74				2.74
N2KNAMG1	1.93	2.27			2.10
D0	4.05				4.05
D2	3.94				3.94
D1	3.94				3.94
D/N*PK0	5.41				5.41
D/N*PK2	5.02				5.02
D/N*PK1	4.55				4.55

1ST CUT MEAN DM% 22.2

https://doi.org/10.23637/ERADOC-1-43

88/R/PG/5

2ND CUT (17/11/88) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	2.32	1.85	1.49	0.64	1.57
O(D)	2.02	2.15	1.31	1.37	1.71
O/PLOT3	1.47	1.82	1.06	1.49	1.46
P	2.00	2.25	1.77	1.69	1.93
N2P	1.29	1.26	1.55	0.50	1.15
N1MIN	2.22	2.18			2.20
MIN	2.65	2.16	2.72	2.56	2.52
PNAMG	2.08	2.68	2.44	2.48	2.42
N2MIN	2.47	3.01	1.62	1.29	2.10
N2PNAMG	1.65	1.87	1.57	0.87	1.49
N3MIN	2.87	2.49	2.05	3.02	2.61
N3MINSI	2.62	2.31	2.05	2.94	2.48
O/PLOT12	1.39	1.46	1.86	1.64	1.59
D/F	3.60	5.42	2.47	2.41	3.47
N2*MIN	2.56	2.85	1.89	1.81	2.28
MIN(N2*)	2.37	2.23	2.40	2.19	2.30
N1*MIN	2.09	2.32	2.16	1.90	2.12
N1*	1.86	1.98	1.53	2.08	1.87
N2KNAMG0			1.09	1.04	1.07
N2KNAMG2	3.39				3.39
N2KNAMG1	2.82	2.85			2.84
D0	2.96				2.96
D2	3.44				3.44
D1	2.92				2.92
D/N*PK0	3.20				3.20
D/N*PK2	4.65				4.65
D/N*PK1	3.05				3.05

2ND CUT MEAN DM% 21.8

https://doi.org/10.23637/ERADOC-1-43

88/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	5.86	4.39	3.48	2.11	3.96
O(D)	4.73	5.58	2.88	2.95	4.04
O/PLOT3	3.95	5.12	2.39	2.89	3.59
P	5.42	6.05	4.50	4.06	5.01
N2P	4.96	4.55	4.97	2.73	4.30
N1MIN	7.00	6.82			6.91
MIN	7.68	7.32	7.88	6.93	7.45
PNAMG	4.90	6.14	5.88	5.80	5.68
N2MIN	8.20	8.53	7.11	3.94	6.94
N2PNAMG	5.74	5.95	5.65	3.12	5.11
N3MIN	9.14	8.68	7.54	7.48	8.21
N3MINSI	8.70	8.19	7.95	7.65	8.12
O/PLOT12	3.71	3.38	3.23	3.02	3.34
D/F	8.32	10.13	7.26	6.82	8.13
N2*MIN	7.93	8.62	7.26	6.79	7.65
MIN(N2*)	7.38	7.20	6.15	5.65	6.59
N1*MIN	7.59	7.92	6.46	5.43	6.85
N1*	5.31	5.44	4.42	4.70	4.97
N2KNAMG0			3.25	3.76	3.51
N2KNAMG2	6.13				6.13
N2KNAMG1	4.76	5.13			4.94
D0	7.01				7.01
D2	7.38				7.38
D1	6.86				6.86
D/N*PK0	8.61				8.61
D/N*PK2	9.67				9.67
D/N*PK1	7.60				7.60

TOTAL OF 2 CUTS MEAN DM% 22.0

PLOT AREA HARVESTED 0.00002

https://doi.org/10.23637/ERADOC-1-43

88/R/AG/6

AGDELL

Object: To study, the residual values of phosphate and potash applied in the period 1848-1951 and further dressings since 1964.

The 19th year of revised scheme, ley.

For previous years see 'Details' 1967 and 1973, and 74-87/R/AG/6.

NOTE: Yields were not taken and no new treatments were applied.

Basal applications: Manures: 'Nitram' at 380 kg and later at 180 kg.

Cultivations, etc.:- First N applied: 18 Apr, 1988. Cut: 2 June.
Second N applied: 6 June. Cut: 21 Nov.

https://doi.org/10.23637/ERADOC-1-43

88/R/BN/7

BARNFIELD

Object: The experiment was designed to study the effects of organic and inorganic manures on continuous root crops. It has been progressively modified to study effects on other crops.

Sections 1 and 2 the fifth year of grass/clover. The 14th year of grass on the rest of the experiment.

For previous years see 'Details' 1967 and 1973 and 74-87/R/BN/7.

Plot dimensions: 10.7 x 55.9.

Treatments to grass: All combinations of:-

Whole plots

1. **MANURE** Fertilizers and organic manures:

D	D
DPK	D P K
PKMG	P K (Na) Mg
P	P
PK	P K
PMG	P (Na) Mg
O	O

P: 35 kg P as single superphosphate until 1987, triple superphosphate since and in 1974
K: 225 kg K as sulphate of potash
(Na): 90 kg Na as sodium chloride until 1973
Mg: 90 kg Mg as kieserite every fourth year since 1974 (sulphate of magnesia until 1973)
D: Farmyard manure at 35 tonnes (until 1975).

Quarter plots

2. **N PERCUT** Nitrogen fertilizer in 1988 (kg N per cut) as 'Nitram' and residues of forms of N previously each supplying 96 kg N per annum:

75	75, previously nitrate of soda, section 3
100	100, previously sulphate of ammonia, section 4
125	125, previously sulphate of ammonia + castor meal, section 5
150	150, previously castor meal, section 6

Castor meal last applied 1961, nitrate of soda and sulphate of ammonia until 1959.

plus one plot **MANURE** KMG 100

Treatments to grass/clover, sections 1 and 2 (not given nitrogen fertilizer):

MANURE Fertilizers and organic manures as for grass above, excluding KMG.

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88/R/BN/7

NOTES: (1) P K and D treatments were applied to Sections 1 and 2 until 1980. None were applied subsequently until the resumption of P and K treatments, only, from 1985.
(2) Yields were not taken from section 2.

Cultivations, etc.:-
All sections: P applied: 12 Jan, 1988. K applied: 14 Jan. Cut: 24 May, 21 Nov.
Grass (Sections 3, 4, 5 and 6) only: N applied: 5 Apr, 1988, 26 May.

GRASS

1ST CUT (24/5/88) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
D	5.48	5.02	5.28	5.35	5.28
DPK	5.78	5.02	5.46	5.70	5.49
PKMG	5.50	5.21	5.03	5.25	5.25
P	4.54	2.80	2.83	3.20	3.34
PK	5.71	5.06	5.18	5.15	5.28
PMG	4.28	2.73	2.81	2.69	3.13
0	4.04	3.22	2.84	2.82	3.23
Mean	5.05	4.15	4.20	4.31	4.43

MANURE KMG 100 5.20

Grand mean 4.45

1ST CUT MEAN DM% 21.2

2ND CUT (21/11/88) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
D	5.30	6.59	6.45	6.73	6.27
DPK	4.73	5.97	6.44	5.94	5.77
PKMG	3.56	4.90	5.19	5.18	4.71
P	2.32	1.52	1.83	2.02	1.92
PK	2.90	5.31	5.02	5.05	4.57
PMG	2.00	1.58	1.23	1.77	1.65
0	2.26	1.34	1.26	1.86	1.68
Mean	3.29	3.89	3.92	4.08	3.79

MANURE KMG 100 4.18

Grand mean 3.81

2ND CUT MEAN DM% 22.3

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88/R/BN/7

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
D	10.77	11.62	11.73	12.08	11.55
DPK	10.51	10.99	11.89	11.64	11.26
PKMG	9.06	10.11	10.22	10.44	9.96
P	6.86	4.32	4.66	5.22	5.26
PK	8.61	10.36	10.20	10.20	9.84
PMG	6.28	4.32	4.04	4.46	4.78
0	6.30	4.56	4.10	4.68	4.91
Mean	8.34	8.04	8.12	8.39	8.22

MANURE KMG 100 9.39

Grand mean 8.26

TOTAL OF 2 CUTS MEAN DM% 21.8

PLOT AREA HARVESTED 0.00568

GRASS/CLOVER

1ST CUT (24/5/88) DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	3.09	3.29	2.67	1.78	2.48	1.80	1.20	2.33

1ST CUT MEAN DM% 21.1

2ND CUT (21/11/88) DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	4.47	3.70	2.58	2.48	2.26	2.12	1.43	2.72

2ND CUT MEAN DM% 22.3

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	7.56	6.99	5.25	4.26	4.74	3.92	2.63	5.05

TOTAL OF 2 CUTS MEAN DM% 21.7

PLOT AREA HARVESTED 0.00568

https://doi.org/10.23637/ERADOC-1-43

88/R/GC/8

GARDEN CLOVER

Object: To study yields and pathogens of red clover grown continuously - Manor Garden.

Sponsor: J. McEwen.

The 135th year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-87/R/GC/8.

Design: 2 blocks of 2 plots.

Whole plot dimensions: 1.02 x 1.42.

Treatments:

FUNGCIDE	Fungicide, to control Sclerotinia trifoliorum:
NONE	None
BENOMYL	Benomyl at 0.6 kg in 800 l on 30 Sept, 1987, 26 Oct, 27 Nov, 22 Dec and 5 Feb, 1988

Basal applications: Manures: Chalk at 1.25 t. (0:18:36) at 420 kg. Mg at 50 kg, as Epsom Salts. Nematicide: Aldicarb at 10 kg.

NOTE: Additional K was applied to replace that removed by the crop in 1987. **FUNGCIDE** NONE required 316 and 252 kg K2O to the first and second blocks respectively, **FUNGCIDE** BENOMYL 284 and 273 kg K2O. This was applied as muriate of potash, one third in spring 1988 and one third after the first and second cuts.

Seed: Hungaropoly, sown at 34 kg in 1987.

Cultivations, etc.:- PK and Mg applied: 28 Sept, 1987. Chalk applied: 30 Oct. K applied: 18 Feb, 1988. Aldicarb applied: 21 Apr. Cut and K applied: 1 June, 7 July. Cut: 18 Aug, 29 Sept.

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88/R/GC/8

1ST CUT (1/6/88) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	7.31	7.27	7.29

1ST CUT MEAN DM% 13.8

2ND CUT (7/7/88) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	3.62	3.28	3.45

2ND CUT MEAN DM% 13.2

3RD CUT (18/8/88) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	2.99	2.88	2.93

3RD CUT MEAN DM% 15.9

4TH CUT (29/9/88) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	1.33	1.31	1.32

4TH CUT MEAN DM% 15.1

TOTAL OF 4 CUTS DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	15.25	14.74	14.99

TOTAL OF 4 CUTS MEAN DM% 14.5

PLOT AREA HARVESTED 0.00010

https://doi.org/10.23637/ERADOC-1-43