

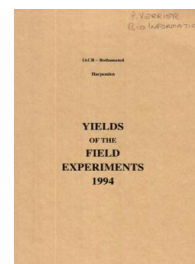
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Yields of the Field Experiments 1994

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Experiments - Classics

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:

Wheat:	Section	
	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 m².
- 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.

94/R/BK/1 W. WHEAT

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

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

94/R/BK/1 POTATOES

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

PLOT	TOTAL TUBERS	% WARE	
	TONNES/ HECTARE	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

94/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 143rd year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-93/R/HB/2.

Treatments: All combinations of:-

Whole plots

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

		Form of N 1852-1966	Additional treatments 1852-1979	Changes since 1980
---	11	None	-	-
-P-	21	None	P	-
--K	31	None	K(Na)Mg	-
-PK	41	None	PK(Na)Mg	-
A--	12	A	-	-
AP-	22	A	P	-
A-K	32	A	K(Na)Mg	-
APK	42	A	PK(Na)Mg	-
N----	131	N	-	-
NP---	231	N	P	-
N-K--	331	N	K(Na)Mg	-
NPK--	431	N	PK(Na)Mg	-
N--S-	134	N	Si	Si omitted
NP-S-	234	N	P Si	"
N-KS-	334	N	K(Na)MgSi	"
NPKS-	434	N	PK(Na)MgSi	"
N---S	132	N	-	Si added
NP--S	232	N	P	"
N-K-S	332	N	K(Na)Mg	"
NPK-S	432	N	PK(Na)Mg	"
N--SS	133	N	Si	-
NP-SS	233	N	P Si	-
N-KSS	333	N	K(Na)MgSi	-
NPKSS	433	N	PK(Na)MgSi	-
C(--)	14	C	-	PKMg omitted
C(P-)	24	C	P	"
C(-K)	34	C	K(Na)Mg	"
C(PK)	44	C	PK(Na)Mg	"
D	72	None	D	-
(D)	71	(D)	-	-
(A)	62	(Ashes)	-	-
-	61	None	-	-

94/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 triple superphosphate in 1974 and since 1988, single superphosphate in other years
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

Sub plots

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:-

Whole plots

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

55AN2PK	Plot 55 AN2PK
56--PK	Plot 56 --PK
57NN2--	Plot 57 NN2
58NN2--	Plot 58 NN2

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

Sub plots

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

0
35

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

Experimental diary:

19-Nov-93 : **T** : P applied.
22-Nov-93 : **T** : Si and K applied.
15-Dec-93 : **T** : FYM applied.
16-Dec-93 : **B** : Ploughed.
14-Mar-94 : **B** : Spring-tine cultivated twice, rotary harrowed, Alexis, dressed Baytan, drilled at 350 seeds per m², rolled.

94/R/HB/2

Experimental diary:

27-Apr-94 : T : N applied.
 27-May-94 : B : Duplosan New System CMPP at 2.0 l with Vindex at 1.4 l
 in 200 l.
 23-Jun-94 : B : Derosal WDG at 312 g with Dorin at 1.0 l in 260 l.
 09-Aug-94 : B : Combine harvested.

NOTE: Samples of grain and straw were taken from selected plots for chemical analysis.

MAIN PLOTS

GRAIN TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.25	0.28	0.92	0.75	0.55
-P-	1.90	3.29	3.75	2.98	2.98
--K	0.07	1.01	0.75	2.05	0.97
-PK	0.57	3.08	5.10	6.10	3.71
A--	0.57	0.79	1.18	1.08	0.91
AP-	2.04	3.02	3.81	3.62	3.12
A-K	0.43	1.11	0.95	1.53	1.01
APK	0.75	2.94	3.96	5.14	3.20
N----	0.20	1.04	1.89	1.62	1.19
NP---	1.64	3.61	4.09	3.75	3.28
N-K--	0.50	1.56	1.66	1.75	1.37
NPK--	1.12	3.04	4.83	5.49	3.62
N--S-	0.85	1.11	2.77	1.39	1.53
NP-S-	0.86	4.04	3.85	3.66	3.10
N-KS-	1.70	1.82	1.91	3.05	2.12
NPKS-	0.60	3.59	5.60	5.22	3.75
N---S	1.04	1.71	1.76	2.23	1.68
NP--S	2.15	3.62	4.76	4.21	3.68
N-K-S	0.70	1.70	2.05	2.51	1.74
NPK-S	0.79	3.50	4.36	5.11	3.44
N--SS	1.12	1.44	1.83	1.99	1.59
NP-SS	2.02	3.35	4.20	4.78	3.59
N-KSS	0.26	1.77	2.24	2.79	1.77
NPKSS	0.59	3.78	4.39	6.40	3.79
C(--)	1.08	2.54	3.08	3.37	2.52
C(P-)	1.33	3.23	3.66	4.03	3.06
C(-K)	0.99	1.96	3.50	3.84	2.57
C(PK)	0.96	2.34	4.24	4.82	3.09
D	3.75	5.52	5.42	5.52	5.05
(D)	0.52	1.97	3.71	2.19	2.10
(A)	0.48	1.97	1.63	1.59	1.42
-	0.61	0.95	0.33	1.54	0.86
Mean	1.01	2.40	3.07	3.32	2.45

GRAIN MEAN DM% 86.0

94/R/HB/2 MAIN PLOTS

STRAW TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.07	0.19	0.24	0.24	0.18
-P-	0.50	1.24	1.45	1.45	1.16
--K	0.04	0.29	0.20	0.59	0.28
-PK	0.21	1.00	1.89	2.46	1.39
A--	0.17	0.23	0.29	0.23	0.23
AP-	0.49	1.07	1.78	1.40	1.19
A-K	0.17	0.26	0.27	0.40	0.27
APK	0.21	1.04	1.88	2.89	1.50
D	1.26	3.00	3.06	3.70	2.76
(D)	0.26	0.69	1.20	0.66	0.70
(A)	0.13	0.38	0.43	0.37	0.33
-	0.23	0.27	0.21	0.47	0.30
Mean	0.31	0.80	1.07	1.24	0.86

STRAW MEAN DM% 77.8

PLOT AREA HARVESTED 0.00154

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

MANURE	55AN2PK	56--PK	57NN2--	58NN2--	Mean
MAGNESIUM					
0	3.77	0.15	2.58	0.53	1.76
35	4.65	0.19	2.54	0.98	2.09
Mean	4.21	0.17	2.56	0.75	1.92

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00329

94/R/WF/3

WHEAT AND FALLOW

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

The 139th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-93/R/WF/3.

Whole plot dimensions: 9.0 x 211.

Treatments:

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

Experimental diary:

Wheat plot:

20-Oct-93 : T : Ploughed.
28-Oct-93 : T : Spring-tine cultivated, rotary harrowed, Apollo, dressed
Fonofos Seed Treatment, drilled at 380 seeds per m².
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 : Halo at 2.0 l with New 5C Cycocel at 2.5 l in 200 l.
13-Jun-94 : T : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 200 l.
17-Jun-94 : T : Hostathion at 840 ml in 200 l.
22-Aug-94 : T : Combine harvested.

Fallow plot:

20-Oct-93 : T : Ploughed.
16-Jun-94 : T : Cultivated by rotary grubber.
08-Jul-94 : T : Cultivated by rotary grubber.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.12	0.39
MEAN DM%	84.1	76.9
PLOT AREA HARVESTED	0.023232	

94/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 up to 1991, w. wheat since - Hoosfield.

The 139th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-93/R/EX/4.

Treatments: All combinations of:-

Whole plots (P test)

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 RES** Residues of phosphate (kg P) applied annually from 1986, as single superphosphate in 1986 and 1987, triple superphosphate from 1988 until 1992, none since:

O	None
P1	44
P2	87
P3	131

plus

Whole plots (K test, previously N test until 1991)

- | | |
|----------------|--|
| 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 |

Experimental diary:

P test:

15-Oct-93 : **T** : Muriate of potash at 167 kg.

K test:

15-Oct-93 : **T** : Triple superphosphate at 319 kg.

94/R/EX/4

Experimental diary:

All plots:

- 20-Oct-93 : B : Ploughed.
- 22-Oct-93 : B : Spring-tine cultivated twice, rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m².
- 12-Apr-94 : B : 34.5% N at 568 kg.
- 09-May-94 : B : Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
: B : Halo at 2.0 l with New 5C Cycocel at 2.5 l in 200 l.
- 13-Jun-94 : B : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 200 l.
- 17-Jun-94 : B : Hostathion at 840 ml in 200 l.
- 16-Aug-94 : B : Combine harvested..

NOTE: Samples of grain and straw were taken for chemical analysis.

P TEST

GRAIN TONNES/HECTARE

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

P RES	O	P1	P2	P3	Mean
OLD RES					
O	2.42	7.29	7.62	7.88	6.30
D	6.45	8.07	8.07	7.53	7.53
N	2.32	7.41	7.75	7.54	6.26
P	6.34	8.09	8.69	8.07	7.80
NPKNAMG	5.75	7.60	7.87	7.87	7.27
Mean	4.66	7.69	8.00	7.78	7.03

GRAIN MEAN DM% 86.0

STRAW TONNES/HECTARE

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

P RES	O	P1	P2	P3	Mean
OLD RES					
O	1.35	4.44	4.58	4.74	3.78
D	3.59	4.80	4.68	4.50	4.39
N	1.08	4.42	4.45	4.18	3.53
P	3.79	4.97	5.35	4.86	4.74
NPKNAMG	3.22	4.74	4.54	4.36	4.22
Mean	2.61	4.68	4.72	4.53	4.13

STRAW MEAN DM% 91.1

PLOT AREA HARVESTED 0.00589

94/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

OLD RES

O	7.08
D	6.84
N*	6.90
PK	6.86
N*PK	6.54
Mean	6.84

GRAIN MEAN DM% 86.0

STRAW TONNES/HECTARE

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

OLD RES

O	3.65
D	3.36
N*	3.09
PK	3.32
N*PK	3.03
Mean	3.29

STRAW MEAN DM% 90.4

PLOT AREA HARVESTED 0.00589

94/R/PG/5

PARK GRASS

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

The 139th year, hay.

For previous years see 'Details' 1967 and 1973 and 74-93/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	Plot 3	None
P	Plot 4/1	P
N2P	Plot 4/2	N2 P
N1MN	Plot 6	N1 P K Na Mg
MN	Plot 7	P K Na Mg
PNAMG	Plot 8	P Na Mg
MN(N2)	Plot 9/1	P K Na Mg (N2 until 1989)
N2MN	Plot 9/2	N2 P K Na Mg
N2PNAMG	Plot 10	N2 P Na Mg
N3MN	Plot 11/1	N3 P K Na Mg
N3MNSI	Plot 11/2	N3 P K Na Mg Si
O	Plot 12	None
D/F	Plot 13	D/F
MN(N2*)	Plot 14/1	P K Na Mg (N2* until 1989)
N2*MN	Plot 14/2	N2* P K Na Mg
MN(N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*MN	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 triple superphosphate in 1974 and since 1987, single superphosphate in other years
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
MN:	P K Na Mg

94/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. Lime last applied in 1994.

Chalk applied 1994 (tonnes CaCO₃):

Plot	a	b	c
1	7.0	1.5	0.8
2	7.0	-	0.3
3	7.0	-	0.3
4/1	7.0	-	0.3
4/2	12.1	8.6	3.6
6	7.0	1.5	-
7	7.0	-	0.3
8	7.0	-	0.3
9/1	21.0	11.5	8.8
9/2	15.1	8.6	5.1
10	12.1	8.6	5.1
11/1	22.0	10.5	9.0
11/2	14.0	10.5	9.0
12	3.0	0.8	0.3
13	5.0	-	0.3
14/1	7.0	-	-
14/2	2.2	-	-
15	3.0	0.8	1.3
16	2.2	-	-
17	2.2	-	-
18	12.1	6.6	8.1

None applied to plots 18/2, 19 and 20. This application was the first in a triennial scheme of soil pH analyses and chalk applications.

94/R/PG/5

Additional sub-plots (Plots 18, 19 and 20 only) (tonnes CaCO₃ 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'. Plots 19 and 20 received no further chalk after 1968; plot 18/2 no further chalk after 1972.

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

Experimental diary:

19-Nov-93 : T : P applied.
24-Nov-93 : T : K, Na, Mg and Si applied.
21-Jan-94 : T : Chalk application started.
08-Feb-94 : T : Chalk application finished.
21-Apr-94 : T : N applied.
27-Jun-94 : B : First sample cut. Remaining area cut for hay (started).
28-Jun-94 : B : Remaining area cut for hay (finished). Hay turned.
29-Jun-94 : B : Hay turned.
30-Jun-94 : B : Hay turned and rowed up.
01-Jul-94 : B : Hay baled.
29-Nov-94 : B : Second sample cut, herbage removed (started).
30-Nov-94 : B : Second sample cut, herbage removed (finished).
Remaining area cut, herbage removed.

NOTES: (1) Herbage samples from selected plots were taken for chemical analysis.
(2) A comparison of hay and silage yields was made on selected plots.
(3) Number and biomass of individual plant species were measured on all plots.

94/R/PG/5

1ST CUT (27/6/94) DRY MATTER TONNES/HECTARE

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

	LIME	A	B	C	D	MEAN
	MANURE					
N1	1	3.23	3.26	3.57	2.22	3.07
O(D)	2	2.82	3.84	2.44	2.22	2.83
O	3	2.90	3.39	1.95	2.17	2.60
P	4/1	3.88	4.74	3.28	3.22	3.78
N2P	4/2	4.33	3.68	4.00	2.48	3.62
N1MN	6	5.92	5.74			5.83
MN	7	5.39	5.62	5.80	4.56	5.34
PNAMG	8	3.93	4.76	3.80	3.55	4.01
MN(N2)	9/1	5.12	3.67	1.87	2.70	3.34
N2MN	9/2	6.45	6.50	5.70	6.19	6.21
N2PNAMG	10	4.92	4.24	4.15	3.13	4.11
N3MN	11/1	6.52	7.53	6.33	4.83	6.30
N3MNSI	11/2	6.57	6.56	6.60	5.73	6.36
O	12	3.09	3.04	1.88	1.95	2.49
D/F	13	4.58	5.53	5.19	5.13	5.11
MN(N2*)	14/1	5.02	4.57	4.00	3.37	4.24
N2*MN	14/2	2.82	6.66	5.31	4.88	4.92
MN(N2*)	15	4.47	5.44	5.29	4.71	4.98
N1*MN	16	5.12	5.61	4.85	4.82	5.10
N1*	17	3.85	3.56	3.19	3.04	3.41
N2KNAMG0	18/1			4.94	2.77	3.86
N2KNAMG2	18/2					4.32
N2KNAMG1	18/3	4.54	3.82			4.18
D0	19/1					5.76
D2	19/2					5.56
D1	19/3					5.99
D/N*PK0	20/1					5.63
D/N*PK2	20/2					5.82
D/N*PK1	20/3					5.48

1ST CUT MEAN DM% 28.1

94/R/PG/5

2ND CUT (30/11/94) DRY MATTER TONNES/HECTARE

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

	LIME	A	B	C	D	MEAN
	MANURE					
N1	1	2.36	1.17	0.86	0.20	1.15
O(D)	2	0.80	0.98	0.88	0.80	0.87
O	3	0.67	0.87	0.81	0.91	0.82
P	4/1	0.91	0.72	0.92	0.73	0.82
N2P	4/2	1.18	1.25	0.55	0.26	0.81
N1MN	6	0.80	0.84			0.82
MN	7	0.77	1.06	1.13	0.58	0.88
PNAMG	8	0.62	0.72	0.84	0.91	0.77
MN(N2)	9/1	0.56	0.55	0.19	0.02	0.33
N2MN	9/2	0.83	0.99	0.44	0.42	0.67
N2PNAMG	10	0.75	0.97	0.74	0.77	0.81
N3MN	11/1	1.17	0.86	0.82	0.55	0.85
N3MNSI	11/2	1.48	1.30	0.78	0.76	1.08
O	12	0.33	0.53	0.68	0.51	0.51
D/F	13	1.39	1.31	0.88	1.09	1.17
MN(N2*)	14/1	1.67	1.11	0.83	0.74	1.09
N2*MN	14/2	1.97	2.07	1.25	1.09	1.60
MN(N2*)	15	1.00	1.37	0.97	0.75	1.02
N1*MN	16	1.40	1.52	0.92	0.86	1.17
N1*	17	0.57	0.54	0.78	1.09	0.75
N2KNAMG0	18/1			0.67	0.18	0.42
N2KNAMG2	18/2					1.07
N2KNAMG1	18/3	0.79	0.79			0.79
D0	19/1					1.43
D2	19/2					3.29
D1	19/3					1.38
D/N*PK0	20/1					1.64
D/N*PK2	20/2					1.93
D/N*PK1	20/3					2.16

2ND CUT MEAN DM% 32.8

94/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME		A	B	C	D	MEAN
MANURE						
N1	1	5.59	4.43	4.43	2.42	4.22
O(D)	2	3.62	4.83	3.32	3.02	3.70
O	3	3.57	4.26	2.76	3.08	3.42
P	4/1	4.79	5.46	4.20	3.94	4.60
N2P	4/2	5.50	4.93	4.55	2.74	4.43
N1MN	6	6.72	6.58			6.65
MN	7	6.16	6.68	6.93	5.14	6.23
PNAMG	8	4.55	5.47	4.65	4.46	4.78
MN(N2)	9/1	5.68	4.21	2.06	2.72	3.67
N2MN	9/2	7.28	7.49	6.15	6.61	6.88
N2PNAMG	10	5.68	5.21	4.89	3.91	4.92
N3MN	11/1	7.69	8.38	7.15	5.37	7.15
N3MNSI	11/2	8.04	7.86	7.38	6.49	7.44
O	12	3.41	3.58	2.56	2.46	3.00
D/F	13	5.98	6.84	6.07	6.22	6.28
MN(N2*)	14/1	6.69	5.68	4.83	4.12	5.33
N2*MN	14/2	4.79	8.73	6.56	5.97	6.51
MN(N2*)	15	5.47	6.81	6.25	5.46	6.00
N1*MN	16	6.52	7.13	5.77	5.67	6.27
N1*	17	4.42	4.09	3.97	4.14	4.15
N2KNAMG0	18/1			5.62	2.95	4.28
N2KNAMG2	18/2					5.39
N2KNAMG1	18/3	5.33	4.61			4.97
D0	19/1					7.18
D2	19/2					8.85
D1	19/3					7.38
D/N*PK0	20/1					7.28
D/N*PK2	20/2					7.75
D/N*PK1	20/3					7.64

TOTAL OF 2 CUTS MEAN DM% 30.4

PLOT AREA HARVESTED 0.00002

94/R/BN/7

BARNFIELD

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

Sections 1 and 2 the 11th year of grass/clover. The 20th year of grass on the rest of the experiment.

For previous years see 'Details' 1967 and 1973 and 74-93/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)
(D)PK	(D) P K
PKMG	P K (Na) Mg
P	P
PK	P K
PMG	P (Na) Mg
0	0

P: 35 kg P as triple superphosphate in 1974 and since 1987, single superphosphate in other years

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 1994 (kg N per cut) as 34.5% N, cumulative to previous dressings, 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

94/R/BN/7

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

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

- 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.
(3) Only one cut was taken for yield as there was insufficient growth to justify a second cut.

Experimental diary:

19-Nov-93 : T : P applied.
23-Nov-93 : T : K applied.
25-Nov-93 : T : Mg applied.
18-Mar-94 : T : N applied to sections 3, 4, 5 and 6.
30-Mar-94 : B : Flat rolled.
10-Jun-94 : B : Cut.
11-Jun-94 : B : Herbage cut on remainder of plot. Herbage removed.
14-Jun-94 : T : N applied to sections 3, 4, 5 and 6.
19-Oct-94 : B : Topped. No yields taken.

NOTE: Herbage samples were taken for chemical analysis.

94/R/BN/7

GRASS

1ST CUT (10/6/94) DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
(D)	7.35	8.72	6.59	7.06	7.43
(D)PK	7.04	6.63	7.32	7.29	7.07
PKMG	6.66	7.64	7.61	7.68	7.40
P	3.85	3.84	3.95	5.27	4.23
PK	6.44	7.51	7.61	5.71	6.81
PMG	3.61	3.66	4.01	2.61	3.47
0	3.22	3.40	2.70	2.07	2.85
Mean	5.45	5.91	5.68	5.38	5.61

MANURE KMG 100 6.66

Grand mean 5.64

1ST CUT MEAN DM% 23.3

PLOT AREA HARVESTED 0.00568

GRASS/CLOVER

1ST CUT (10/6/94) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D)PK	PKMG	P	PK	PMG	0	Mean
	5.70	5.79	4.21	3.83	4.11	5.11	4.21	4.71

1ST CUT MEAN DM% 20.0

PLOT AREA HARVESTED 0.00155

94/R/GC/8

GARDEN CLOVER

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

The 141st year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-93/R/GC/8.

Design: 2 blocks of 2 plots.

Whole plot dimensions: 1.00 x 1.40.

Treatments:

FUNG RES Residual effects of fungicide to control *Sclerotinia trifoliorum*:

NONE None

BENOMYL Benomyl sprays during previous winters, last applied November 1989.

NOTE: Hungaropoly, sown at 30 kg in 1990.

Experimental diary:

03-Nov-93 : B : Chalk at 1.25 t, PK as (0:18:36) at 420 kg and Epsom salts at 530 kg.

07-Jun-94 : B : First cut, hand weeded.

02-Aug-94 : B : Second cut, hand weeded.

18-Aug-94 : T : **FUNG RES** NONE: Muriate of potash at 3970 and 2740 kg to first and second blocks respectively.

: T : **FUNG RES** BENOMYL: Muriate of potash at 2830 and 3010 kg.

02-Nov-94 : B : Third cut.

NOTE: Crop samples were taken for chemical analysis.

94/R/GC/8

1ST CUT (7/6/94) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	5.26	5.10	5.18

1ST CUT MEAN DM% 15.4

2ND CUT (2/8/94) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	6.52	6.01	6.27

2ND CUT MEAN DM% 25.3

3RD CUT (2/11/94) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	1.14	1.10	1.12

3RD CUT MEAN DM% 19.1

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	12.92	12.21	12.57

TOTAL OF 3 CUTS MEAN DM% 19.9

PLOT AREA HARVESTED 0.00010