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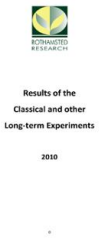
Yields of the Field Experiments 2010



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Results of the Classical and Other Long-term Experiments 2010

Rothamsted Research

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ROTHAMSTED RESEARCH

Results of the Classical and other Long-term Experiments

2010

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List of Experiments in the 2010 Yield Book

R/BK/1	Broadbalk
R/HB/2	Hoos Barley
R/WF/3	Wheat and Fallow
R/EX/4	Exhaustion Land
R/PG/5	Park Grass
R/GC/8	Garden Clover
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W/RN/3	Ley Arable
W/RN/12	Organic Manuring

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CONVENTIONS

For each experiment current treatments are shown with the factor and level names which are used in the tables.

For each experiment references are given to previous years. These refer to the '(Numerical) (Results)' previous editions of 'Yields of the Field Experiments'.

For the classical and some long-term experiments reference is made to 'Details' – separate publications, giving full descriptions of treatments until 1977 & 1973, with full titles 'Details of the Classical and Long Term Experiments up to 1977' and 'Details of the Classical and Long Term Experiments up to 1973'.

The following conventions are observed unless otherwise stated.

All areas are in hectares. All plot dimensions are in metres.

All rates of application of fertilizers, sprays etc. are per hectare.

All yields are per hectare.

For any other crop, details of abbreviations are given as necessary

Fertilizers

27%N or 34.5% N means nitrogen as calcium ammonium nitrate or ammonium nitrate.

Anhydrous Sulphate of Soda	
Chalk	
Compost	
Double Top	27% nitrogen and 30% SO_3
FYM	Farmyard manure (from bullocks)
Headland Manganese 500	500 g/l 27.5% w/w manganese carbonate
Kieserite	$MgSO_4H_2O$ 17.7% magnesium and 23.3% sulphur
Maize Tops	
Manganese sulphate	$Mn_2 (SO_4)_3$ 27% manganese and 24% sulphur
Magnesium sulphate	$MgSO_4$ H_2O 17.7% magnesium and 23.3% sulphur
Muriate of potash	60% K_2O
Nitram	34.5% N
Nitraprill	34.5% N
Nitrate of soda	$NaNO_3$ 16% nitrogen and 27% sodium

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Nitro-Chalk	Calcium Ammonium Nitrate 27% N
Potassium sulphate	50% K_2O and 18.4% sulphur
Silicate of soda	Na_2SiO_3 37% sodium and 23% silica
Sodium Sulphate	99.9% SO_4
Sulphate of ammonia	$(NH_4)_2SO_4$ 21% nitrogen 24% sulphur
Sulphate of potash	K_2SO_4 50% K_2O and 18.4% sulphur
Triple superphosphate (TSP)	47% P_2O_5

Cereal straw is removed unless otherwise stated.

GS: Growth Stage.

tm): Tank mix; two or more products applied together.
tr: means seed dressing

Machinery definitions as used in the diary.

Accord	Pneumatic drill with Suffolk coulters 12.5cm apart
Combine drilled	Drill mounted behind a rotary harrow.
Dutch harrow	Rigid tine harrow
Flexitine	Heavy spring-tine cultivator
Nodet Gougis	Pneumatic precision drill with variable spacing
Nordsten	Drill with Suffolk coulters 12 cm apart
Oyjord	Drill with Suffolk coulters 14.2 cm apart
Plough/N	Furrow slice turned to the North (-/S = South, -/E = East, -/W = West)
Shakerator	Deep tine cultivator with vibrating tines 60cm apart and 45 cm deep
Subsoiler	Deep tine cultivator with vibrating tines 60cm apart and 45 cm deep

Application code: This is used to identify the kind of application
a = application (cultivations, harvest, etc.), p = pesticide, f = fertilizer and s = seed.

Tables of means

The following abbreviations are used in variate headings:

Wheat, barley, oats, beans, lupins etc.
Grain: Grain (at 85% dry matter)
Straw: Straw (at 85% dry matter)

All crops
Mean D.M. %: Mean dry matter % as harvested

Standard errors

NOTES:
(1) This report gives standard errors of differences, not of means.
(2) Annotations (e.g. * min rep, max-min, max rep) to S.E.Ds are only explained the first time they occur in any experiment.

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PESTICIDES USED

The following list of pesticides is based on The UK Pesticides Guide, CAB International and The British Crop Protection Council. CABI Publishing

KEY TO ABBREVIATIONS

ad	Adjuvant	d	Desiccant	f	Fungicide
gr	Growth regulator	h	Herbicide	i	Insecticide
m	Molluscicide	n	Nematicide	tr	Trace elements

Trade Name	Function	Active ingredient
Agriguard Chlormequat 720	gr	720 g/l chlormequat
Agriguard Fluroxypyr	h	200g/l fluroxypyr
Allure	m	1.5% w/w metaldehyde
Ally Max SX	h	143 g/l & 143 g/l metsulfuron-methyl + tribenuron-methyl
Alpha Pendimethalin 330 EC	h	330 g/l pendimethalin
Amistar	f	250 g/l azoxystrobin
Amistar Opti	f	100 g/l & 500 g/l azoxystrobin and chlorothalonil
Anchor	f	600 ml/100 kg of seed (rate recommended for legumes)
Arelon 500	h	500 g/l isoproturon
Avadex Excel 15G	h	15% w/w tri-allate
Azural	h	360 g/l glyphosate
BASF 3C Chlormequat 720	gr	720 g/l chlormequat
Beret Gold	f	200 ml/100 kg of seed
Biopower	ad	20.2 + 6.7% w/w 3,6-dioaeicosylsulphate sodium salt + 3,6-dioxaoctadecylsuphate sodium salt
Bravo 500	f	500 g/l chlorothalonil
Brutus	f	37.5 g/l & 27.5 g/l epoxiconazole and metconazole
Callisto	h	100 g/l mesotrione
Cherokee	f	chlorothalonil, 50.000 g / l cyproconazole and 62.500 g / l propiconazole
Clipper	h	360 g/l glyphosate
Cycocel	gr	460 g/l chlormequat chloride
Decoy Wetex	m	20 g/kg methiocarb
Dow Agrosciences Glyphosate 360	h	360 g/l glyphosate
Duplosan KV	h	600 g/l mecoprop-P
Fandango	f	100 g/l and 100 g/l fluoxastrobin and prothioconazole
Flexity	f	300 g/l metrafenone
Hallmark with Zeon Technology	i	100 g/l lambda cyhalothrin
Harmony M SX	h	40 g/kg + 400 g/kg metsulfuron-methyl + thifensufuron-methyl
Headland Charge	h	600 g/l mecoprop-P
Hurler	h	200 g/l fluroxypyr
Karan	i	3.000 % w/w methiocarb
Lexus Class	h	33.3 + 16.7 % carfentrazone-ethyl + Flupyrsulfuron-methyl
Landgold Lambda-Z	i	100 g/l lambda-cyhalothrin
Langold Propyzamide 400 SC	h	400 g/l propyzamide
Liberator	h	400 + 100 g/l diflufenican + flufenacet
Mesurol	m	100 g/100l
Opus	f	125 g/l epoxyconazole
Pacifica	h	10 g/kg + 30 g/kg idosulfuron-methyl-sodium + mesosulfuron-methyl
Proline	f	250.000 g/l prothioconazole
Raxil Pro	f	150 ml/100 kg of seed
Redigo Deter	f	200 ml/100 kg of seed
Roundup Metro	h	360 g/l glyphosate

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Samson	h	40 g/l nicosulfuron
Slingshot	h	360 g/l glyphosate
Splice	f	233 g/l and 67 g/l boscalid and epoxiconazole
Stomp 400 SC	h	400 g/l pendimethalin
Talius	f	200 g/l proquinazid
Weedazol-TL	h	225 g/l amitrol

Note: Seed dressing rates indicated for Anchor, Beret Gold, Mesurol, Redigo Deter and Raxil Pro are those recommended by the manufacturer and may differ from the actual rate used.

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10/R/BK/1

BROADBALK

Object: To study the effects of organic manures and inorganic fertilisers on continuous w. wheat and wheat in rotation. 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 was added to the first to extend the rotation to fallow, potatoes, w. wheat, w. wheat, w. wheat. In 1996 the fallow was replaced by w. oats and potatoes replaced by maize in 1997.
The 166th year, w. wheat, w. oats and forage maize.
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 Yield Books for 74-O9R//BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00320
	1	0.00589
	2,3,6 and 7	0.00487
	5	0.00162
	8,9	0.00512
Oats:	4	0.00487 (*see note 4, below)
Maize:	7	0.00487

Treatments:
In 2001 a number of the treatments were changed. The treatments are now:-

Whole plots

PLOT	Fertilizers and organic manures Treatments	
	Plot	From 2001
01 (FYM)N4	01	N4
21FYMN3	2.1	FYM N2 (1)
22FYM	2.2	FYM
03Nil	03	None
05(P)KMg	05	(P) K Mg
06N1 (P) KMg	06	N1 (P) K Mg
07N2(P)KMg	07	N2 (P) K Mg
08N3(P)KMg	08	N3 (P) K Mg
09N4(P)KMg	09	N4 (P) K Mg
10N4	10	N4
11N4PMg	11	N4 P Mg
12N1+3+1(P)K2Mg2	12	N1+3+1 (P) K2 Mg2 (2)
13N4PK	13	N4 P K
14N4PK*(Mg*)	14	N4 P K* (Mg*)
15N5(P)KMg	15	N5 (P) K Mg
16N6(P)KMg	16	N6 (P) K Mg
17N1+4+1PKMg	17	N1+4+1 P K Mg
18N1+2+1PKMg	18	N1+2+1 P K Mg
19N1+1+1KMg	19	N1+1+1 K Mg
20N4KMg	20	N4 K Mg

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10/R/BK/1

(1) FYM N3 since 2005
(2) N1+3+1 (P) KMg since 2006

W. oats; Nitrogen and farmyard manure were not applied.

N1, N2, N3, N4, N5, N6:	48, 96, 144, 192, 240, 288 kg N as 33.5% N; to be applied at the same time as the second dressings in the split nitrogen plots for wheat and to the seedbed for forage maize.

Split N to wheat

N1+1+1, 1+2+1 etc:	Rates as above. Timings: first two weeks of March, GS31 or mid-April (whichever comes first) and GS37/mid-May.

Split N to forage maize

N2+1, 2+2, 2+3,2+4:	Rates as above. Timings: to the seedbed and post-emergence.
P:	35 kg P as triple superphosphate
(P):	(none), to be reviewed in 2010/11.
K:	90 kg K as potassium sulphate.
K2:	180 kg K as potassium sulphate (plus 450 kg K autumn 2000 only)
K*:	90 kg K as potassium chloride
Mg:	12 kg Mg as kieserite.
Mg2:	24 kg Mg as kieserite.(plus 60kg Mg, autumn 2000 only).
(Mg*):	(none), to be reviewed in 2010/11
FYM:	Farmyard manure at 35 t

Previous treatment:-

Whole plots

PLOT		Fertilizers and organic manures:-		
	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985 – 2000
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 ½[P K (Na) Mg]	N1+3 ½[P K Mg] (A)+
18N0+3FH	18	P K Na Mg (A)	N2 ½[P K (Na) Mg]	N0+3 ½[P K Mg] (A)+
19(C)	19	C	C	(C) (since 1989)
20N2KMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating each year

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+ This change since 1980. Treatments shown are those to w. wheat; autumn N alternates. Maize received N3 ½[PK Mg] on both plots 17 and 18. These treatments shown incorrectly in 1999-2002 Yield books.
W. oats; Nitrogen and dung were not applied.

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:	30kg Mg annually to Plot 14 (applied at 26 kg 1990 to 2000), 35 kg Mg every third year to other plots since 1974 (applied at 30 kg in 1991, 1994, 1997 and 2000 and at 15 kg on half rate treatments). All as kieserite since 1974, previously as sulphate of magnesia annually.
D:	Farmyard manure at 35 t
(C):	Castor meal to supply 96 kg N until 1988, none since
F:	Full rate P K (Na) Mg as above
H:	Half rate of above.

Strips of sub-plots: Until 1967 wheat alone was grown on the experiment, with some bare fallowing. From 1968, the experiment was divided into 10 sections with the following cropping:-

SECTION

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	F	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

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Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1989	W	W	W	W	W	W	W	P	F	W
1990	W	W	W	W	W	F	W	W	P	W
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
1995	W	W	W	W	W	F	W	W	P	W
1996	W	W	W	W	W	P	O	W	W	W
1997	W	W	W	W	W	W	M	W	W	O
1998	W	W	W	W	W	W	W	O	W	M
1999	W	W	W	W	W	W	W	M	O	W
2000	W	W	W	W	W	O	W	W	M	W
2001	W	W	W	F	W	M	O	W	W	W
2002	W	W	W	W	W	W	M	W	W	O
2003	W	W	F	W	W	W	W	O	W	M
2004	W	W	F	W	W	W	W	M	O	W
2005	W	W	W	W	W	O	W	W	M	W
2006	W	W	W	W	W	M	O	W	W	W
2007	W	W	W	W	W	W	M	W	W	O
2008	W	W	W	F	W	W	W	O	W	M
2009	W	W	W	W	W	W	W	M	O	W
2010	W	W	W	W	W	O	W	W	M	W

W = w. wheat, O = w. oats (spring oats 2001), P = potatoes, BE = s. beans, F = fallow, M = forage maize
* 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 2.9t 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 (omitted). No chalk was applied after autumn 1991 until autumn 2007 when differential amounts were applied to selected plots (see "Results 2008").

(3) In 2003 and 2004 section 0 was used for an experiment (CS/595) investigating different herbicides to control *Equisetum arvense*.

(4) In 2006 part of plots 2.2, 06, 09 and 14 on Section 4 used for a nutrition trial with the application of urea. 5m was cut off the end of these plots before the yield measurement was taken.

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10/R/BK/1

Experimental Diary:

All Sections

			Rate	Unit
14-Sep-09	f	TSP - Plots 110-119, 130-149, 170-180	171.00	kg/ha
	a	Spread fertiliser		
	f	TSP - Plots 140-149	181.00	kg/ha
17-Sep-09	a	Applied FYM		
	a	Topped - Edges of maize plots		
	a	Subsoiled - Headlands only		
	f	FYM - Plots 2.10-2.20 (not oats in section 5 plots 2.15 and 2.25)	35.00	t/ha
18-Sep-09	a	Plough		
19-Sep-09	a	Flexitined		
21-Sep-09	a	Flexitined		
	a	Cultipressed		
09-Oct-09	a	Topped - Topped drain		
11-Oct-09	a	Cultipressed - Second time		
19-Nov-09	a	Erect rabbit fence - Started (Posts only)		
23-Nov-09	a	Cut Hedges - Road side		
24-Nov-09	a	Cut Hedges		
	a	Erect rabbit fence		
25-Nov-09	a	Erect rabbit fence		
11-Dec-09	a	Cut Hedges		
05-Jan-10	a	Repair electric fence around trial - Fence had broken in several places due to snow and frost over xmas period		
06-Apr-10	f	Potassium Sulphate - strip 5,6,7,8,9,12,13,15,16,17,18,19 and 20 on all sections	217.00	kg/ha
06-May-10	a	Remove rabbit fence		
07-May-10	a	Mow / Rotavate paths		
12-May-10	a	Mow / Rotavate paths		
	a	Rotavate		
13-May-10	a	Flexitined - Headlands only		
	a	Rotavate - down paths		
14-May-10	a	Mow / Rotavate paths		
25-May-10	a	Mow / Rotavate paths		
14-Jun-10	a	Rotavated down paths - To finish		
16-Jun-10	a	Rotavated down paths - To finish		
17-Jun-10	a	Cut paths		
	a	Rotavated down paths - Finished		
09-Jul-10	a	Other operation, see note - pulled wild oats 103 in total		
14-Jul-10	a	Mow / Rotavate paths		
09-Sep-10	a	Topped - grass headlands and drain		

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10/R/BK/1

Cropped Sections

Winter Wheat

			Rate	Unit
13-Oct-09	a	Combination Drilled		
	s	Hereward - At 350 seeds per m^2	141.00	kg/ha
14-Oct-09	a	Rolled		
15-Oct-09	p	Liberator - 200 lt water (Wheat only and not section 8)	0.60	l/ha
10-Dec-09	p	Lexus Class	60.00	g/ha
	p	Hallmark with Zeon Technology	50.00	ml/ha
19-Mar-10	f	Nitram - strips 12 and 17-19	139.00	kg/ha
20-Apr-10	f	Nitram - strips 1, 2.1 and 16-20		
05-May-10	p	Bravo 500 - sections 0,1,2,3,7,8 & 9	1.00	l/ha
	p	Tracker - sections 0,1,2,3,7,8 & 9	1.00	l/ha
	p	Talius - sections 0,1,2,3,7,8 & 9	0.13	l/ha
	p	Chlormequat 3C - sections 0,1,2,3,7,8 & 9	2.25	l/ha
17-May-10	f	Nitram - Strip 12,17,18,19 ww only	139.00	kg/ha
20-May-10	p	Ally Max SX - sections 0,1,2,3,6,7 and 9	42.00	g/ha
20-May-10	p	Starane 2 - sections 0,1,2,3,6,7 and 9	1.00	l/ha
02-Jun-10	p	Comet - 200 lt water (sections 0, 1, 2, 3, 7, 8, 9)	0.60	l/ha
	p	Opus - 200 lt water (sections 0, 1, 2, 3, 7, 8, 9)	0.60	l/ha
31-Aug-10	a	Combine harvest, plots for yield - Sections 0 and 1		
01-Sep-10	a	Combine harvest remaining wheat - sections 2,3,6,7,8 & 9		
	a	Sample, bale and weigh straw - sections 2,3,6,7,8 & 9		
03-Sep-10	a	Combine harvest discards		
04-Sep-10	a	Baled		
08-Sep-10	a	Other operation, see note - removed bales		

Winter Oats

13-Oct-09	a	Combination drilled		
	s	Gerald - At 350 seeds per m^2	125.00	kg/ha
20-May-10	p	Ally Max 5s - Section 5		
	p	Starane 2 - Section 5		
03-Aug-10	a	Combine harvest, plots for yield - Section 5 only		
	a	Baled - Section 5 only		
	a	Cut harvest strips, weighed and sampled - Section 5 only		
16-Aug-10	a	Combine harvest discards - combined headlands		

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10/R/BK/1

Forage Maize

			Rate	Unit
09-Apr-10	p	Rosate 36 - Maize section only (200 lt water)	4.00	l/ha
26-Apr-10	a	Nodet Drilled		
	s	Hudson - Maize section only	10.20	seeds/m^2
	a	Flexi Tined - Maize area		
	a	Power harrowed - Maize area		
27-Apr-10	f	Nitram - Strips 12 and 17-19		
28-Apr-10	a	Rolled - Maize plots		
04-Jun-10	p	Callisto - 200 lt water maize section only	0.75	l/ha
	p	Samson Extra - 200 lt water maize section only	0.75	l/ha
07-Jun-10	f	Nitram - plot 194	139.00	kg/ha
	f	Nitram - plot184	278.00	kg/ha
	f	Nitram - plot 124	417.00	kg/ha
	f	Nitram - plot 174	556.00	kg/ha
27-Sep-10	a	Harvest Maize Plots		
	a	Other operation, - cut maize discards		
28-Sep-10	a	Other operation, - cut maize discards		

Wilderness

26-Nov-09	a	Topped - Grass area
	a	Topped - Stubbed area
23-Apr-10	a	Cut grass area

NOTE: Samples of wheat and oat grain and straw and forage maize were taken for chemical analysis. Unground wheat grain and straw from Section 1 and maize samples from Section 4 were archived

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10/R/BK/1

WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	7/W1	2/W2	3/W3	6/W33	0/W6	1/W44	9/W52	8/W2	Mean
01(FYM)N4	8.86	7.24	7.26	5.97	*	*	*	*	7.33
21FYMN3	9.18	8.42	8.11	7.35	5.93	5.89	5.47	2.26	6.58
22FYM	5.75	5.17	4.86	4.52	3.95	3.79	4.45	3.54	4.51
03Nil	2.14	1.02	0.89	0.95	1.03	1.02	0.66	0.72	1.05
05(P)KMg	1.95	1.27	1.27	1.17	1.33	1.25	1.12	1.74	1.39
06N1(P)KMg	3.84	3.48	3.62	2.86	3.72	3.74	3.07	2.34	3.33
07N2(P)KMg	5.46	4.90	5.04	4.36	5.23	5.85	4.04	3.36	4.78
08N3(P)KMg	6.79	5.85	5.99	5.32	6.04	6.09	4.51	4.27	5.61
09N4(P)KMg	8.19	6.80	6.86	6.67	6.21	6.47	5.57	4.77	6.44
10N4	5.29	4.25	3.68	2.94	1.87	1.67	1.40	1.27	2.80
11N4PMg	6.87	5.76	4.90	6.08	5.32	4.98	5.39	5.01	5.54
12N1+3+1(P)KMg	8.75	8.15	7.72	7.22	6.86	7.12	6.49	4.08	7.05
13N4PK	7.66	7.39	6.67	6.31	6.42	6.23	5.47	3.45	6.20
14N4PK*(Mg*)	7.64	6.72	6.18	5.86	6.34	6.60	4.95	4.14	6.05
15N5(P)KMg	8.16	6.52	6.55	6.69	6.88	6.55	6.08	3.04	6.31
16N6(P)KMg	8.80	8.07	7.74	7.84	6.87	6.86	5.94	2.88	6.87
17N1+4+1PKMg	9.03	8.70	8.27	7.84	6.98	6.60	5.42	2.93	6.97
18N1+2+1PKMg	8.34	7.93	7.59	4.95	6.85	6.15	5.07	2.85	6.22
19N1+1+1KMg	7.32	5.62	5.40	3.59	5.64	4.57	5.22	2.46	4.98
20N4KMg	*	*	*	*	1.12	0.66	*	*	0.89
GRAIN MEAN DM%	86.1								

STRAW TONNES/HECTARE

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

SECTION PLOT	7/W1	2/W2	3/W3	6/W33	0/W6	1/W44	9/W52	8/W2	Mean
01(FYM)N4	4.83	*	*	*	*	*	*	*	4.83
21FYMN3	4.92	*	*	*	*	3.40	*	4.47	3.31
22FYM	3.38	*	*	*	*	2.15	*	4.39	3.31
03Nil	0.53	*	*	*	*	0.33	*	0.31	0.39
05(P)KMg	0.40	*	*	*	*	0.34	*	1.69	0.81
06N1(P)KMg	1.39	*	*	*	*	1.47	*	1.98	1.62
07N2(P)KMg	2.43	*	*	*	*	2.30	*	2.47	2.40
08N3(P)KMg	2.99	*	*	*	*	2.54	*	2.84	2.79
09N4(P)KMg	3.90	*	*	*	*	2.82	*	3.54	3.42
10N4	2.45	*	*	*	*	0.89	*	1.12	1.49
11N4PMg	2.78	*	*	*	*	1.94	*	2.73	2.48
12N1+3+1(P)KMg	4.48	*	*	*	*	3.60	*	4.53	4.21
13N4PK	3.66	*	*	*	*	2.75	*	3.27	3.22
14N4PK*(Mg*)	3.12	*	*	*	*	3.06	*	3.23	3.13
15N5(P)KMg	3.57	*	*	*	*	3.06	*	3.69	3.44
16N6(P)KMg	4.41	*	*	*	*	3.29	*	4.00	3.90
17N1+4+1PKMg	4.97	*	*	*	*	3.56	*	4.17	4.23
18N1+2+1PKMg	3.98	*	*	*	*	3.28	*	4.23	3.83
19N1+1+1KMg	3.58	*	*	*	*	2.49	*	3.63	3.23
20N4KMg	*	*	*	*	*	0.22	*	*	0.22
STRAW MEAN DM%	89.3								

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10/R/BK/1

W. OATS
TONNES/HECTARE

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

PLOT	GRAIN	STRAW
01(FYM)[N4]	6.22	3.29
21[FYMN2]	7.30	4.52
22[FYM]	6.88	3.84
03Nil	2.17	0.73
05 (P) KMg	1.76	0.35
06[N1](P)KMg	2.11	0.70
08[N2](P)KMg	2.62	0.96
08[N3](P)KMg	3.58	1.58
09[N4](P)KMg	4.78	1.96
10[N4]	5.79	2.69
11[N4]PMg	6.10	2.63
12[N1+3+1](P)KMg	5.13	2.47
13[N4]PK	4.20	1.85
14[N4]PK*(Mg*)	4.47	2.04
15[N5](P)KMg	6.25	3.25
16[N6](P)KMg	7.34	4.03
17[N1+4+1]PKMg	7.11	3.80
18[N1+2+1]PKMg	3.32	1.53
MEAN DM%	86.7	71.6

FORAGE MAIZE
WHOLE CROP (100% DM) TONNES/HECTARE

ERRATUM
see 2016 page16 (supplied)

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

PLOT	WHOLE CROP
01(FYM)N4	16.77
21FYMN3	17.87
22FYM	14.91
03Nil	2.02
05(P)KMg	4.46
06N1(P)KMg	7.95
07N2(P)KMg	11.28
08N3(P)KMg	11.85
09N4(P)KMg	11.79
10N4	2.50
11N4PMg	8.13
12N2+3(P)KMg	14.49
13N4PK	13.08
14N4PK*(Mg*)	13.64
15N5(P)KMg	14.22
16N6(P)KMg	12.75
17N2+4PKMg	12.27
18N2+2PKMg	11.49
19N2+1KMg	5.00
MEAN DM%	29.5

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Maize Yields (100% DM) shown in previous yield books (2009-2015) were found to be in error because an increase in the crop row spacing from 0.6m to 0.7m was not accounted for.
The corrected yields are given below:

Year	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***	***2015***
Treatment/ Section	***7***	***4***	***5***	***3***	***2***	***7***	***4***
01(FYM)N4	11.81	14.37	8.67	14.32	3.51	13.30	14.31
21FYMN3	13.84	15.32	9.26	18.24	6.65	15.46	16.61
22FYM	12.37	12.78	11.95	11.21	8.75	15.87	12.12
03Nil	0.58	1.73	1.49	1.65	1.34	1.45	2.63
05(P)KMg	5.20	3.82	2.86	3.56	3.32	4.25	4.05
06N1(P)KMg	7.12	6.82	5.05	5.75	5.90	7.77	7.13
07N2(P)KMg	8.51	9.67	7.90	8.85	4.48	9.87	8.88
08N3(P)KMg	8.25	10.15	5.27	10.85	6.14	8.57	10.85
09N4(P)KMg	8.34	10.10	5.83	10.16	4.52	8.96	10.12
10N4	0.94	2.15	1.09	0.96	2.07	2.79	2.83
11N4PMg	5.19	6.97	3.88	5.44	4.36	4.36	7.71
12N2+3(P)KMg	8.55	12.42	7.32	9.33	6.52	11.11	14.64
13N4PK	8.89	11.21	7.20	10.72	8.80	9.58	15.00
14N4PK*(Mg*)	8.76	11.69	7.01	9.82	9.52	11.33	14.47
15N5(P)KMg	7.82	12.19	5.63	9.94	7.03	10.06	13.15
16N6(P)KMg	7.40	10.93	4.33	9.13	6.57	8.59	14.18
17N2+4PKMg	8.18	10.52	5.19	9.13	3.46	8.99	12.35
18N2+2PKMg	8.45	9.85	5.88	11.46	5.95	8.98	11.94
19N2+1KMg	3.49	4.28	2.56	5.43	3.10	4.53	5.10
Mean	7.56	9.31	5.70	8.73	5.37	8.73	10.42
Mean DM%	20.90	29.50	18.80	25.90	25.10	29.80	23.20
Plot Area Harvested	0.00189						

Note: In 2013 herbicide was applied accidentally to maize. Consequently, the maize yields given above for 2013 are unreliable.

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10/R/HB/2

HOOS BARLEY

Object: To study the effects of organic manures and inorganic fertilizers on continuous s. barley. From 1968 to 1978 a rotation of potatoes, beans and s. barley was practised on parts of the experiment. The rotation was discontinued in 1979 and the whole experiment reverted to continuous s. barley. The experiment was modified for 2003. The main plots continue as previously. The Silicate Test plots continue but are not split to test rates of N (basal N is applied). The remaining plots are to be used to study the effect on yield of P residues, (basal N applied).

The 159th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-09/R/HB/2.

Main plots

Treatments:

Whole plots

1. MANURE	Plot	Fertilizers and Organic Manures		
		Form of N 1852-1966	Additional treatments 1852-2002	Treatments since 2003
---	11	None	-	-
-P-	21	None	P	(P)
--K	31	None	K (Na) Mg	K(Mg)
-PK	41	None	PK (Na) Mg	(P) K (Mg)
A--	12	A	-	-
AP-	22	A	P	(P)
A-K	32	A	K (Na) Mg	K(Mg)
APK	42	A	PK (Na) Mg	(P) K (Mg)
D1852	72	None	D	D
(D)	71	None	(D)	(D)
(A)	62	None	(Ashes)	(Ashes)
-	61	None	-	-
D2001 [(a)]	73[(a)]	-	D	D
P2KMg [(a)]	63 [(a)]	-	P2KMg	P2KMg

[(a)] Plots 63 and 73 started in 2001

Form of N: A, sulphate of ammonia to supply 48kg N
P: 35 kg P as triple superphosphate in 1974 and from 1988 to 2002, single superphosphate in other years
(P): (none), P application to be reviewed for 2013
P2: 44kg P as triple superphosphate
K: 90 kg K as sulphate of potash
(Na): (none), 16 kg Na as sulphate of soda until 1973
Mg: 35kg Mg as kieserite every third year since 1974 (applied at 30 kg in 1992, 1995 and 1998) (sulphate of magnesia annually until 1973). Annually to new plot 63.
(Mg): (none), Mg application to be reviewed for 2013

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10/R/HB/2

D1852: Farmyard manure at 35t since 1852
D2001: Farmyard manure at 35t since 2001
(D): Farmyard manure 1852 – 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

Silicate Test plots

Treatments:

Whole plots

MANURE	Plot	Fertilizers: Additional treatment 1852-1979	Changes since 1980	Treatments since 2003
N----	131	-	-	N3
NP---	231	P	-	N3 (P)
N-K--	331	K(Na)Mg	-	N3 K(Mg)
NPK--	431	PK(Na)Mg	-	N3(P)K(Mg)
N—S-	134	Si	Si omitted	N3 (Si)
NP-S-	234	P Si	Si omitted	N3(P) (Si)
N-KS-	334	K(Na)MgSi	Si omitted	N3 K(Mg)(Si)
NPKS-	434	PK(Na)MgSi	Si omitted	N3(P)K(Mg)(Si)
N---S	132	-	Si added	N3 Si
NP--S	232	P	Si added	N3(P) Si
N-K-S	332	K(Na)Mg	Si added	N3 K(Mg) Si
NPK-S	432	PK(Na)Mg	Si added	N3(P)K(Mg) Si
N--SS	133	Si	-	N3 Si
NP-SS	233	P Si	-	N3(P) Si
N-KSS	333	K(Na)MgSi	-	N3 K(Mg) Si
NPKSS	433	PK(Na)MgSi	-	N3(P)K(Mg) Si

N: From 1852-1966 whole plots received 48kg N as nitrate of soda. Between 1968-2002 whole plots were split to test 4 rates of N as "Nitro-chalk" (cumulative applications until 1973, on a cyclic system from 1974).
N3: Basal N, 144kg as "Nitro-chalk" since 2003
Si: Silicate of soda at 450kg (Note: S also refers to silicate of soda)
(Si): Silicate of soda omitted since 1980
P, (P), K, Mg, (Mg), (Na): as above

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10/R/HB/2

P Test plots

Treatments:

Since 2003 the remaining plots [ex-Castor meal (plots 14, 24, 34 & 44) and those testing combinations of NPK with and without Mg (plots 55, 56, 57 & 58)] have been used to study the effect of P residues on yield. Previous treatments have resulted in different levels of available P in the soil. Large dressing of K were applied to some plots to increase levels of exchangeable K in the soil such that K should not limit yield; plots 141 and 241 were sacrificed and used as discard areas so that the K application did not encroach on adjacent no K plots on the Silicate Test. Other plots received the normal rate of K. The level of exchangeable Mg in the soil is such that Mg should not limit yield; the need to apply Mg will be reviewed for 2011.

Whole plots
Manure

Plot	Treatment since 2003
142	N3K*
143	N3K*
144	N3K*
242	N3K*
243	N3K*
244	N3K*
341	N3K
342	N3K
343	N3K
344	N3K
441	N3K
442	N3K
443	N3K
444	N3K
551	N3K
552	N3K
561	N3K
562	N3K
571	N3K*
572	N3K*
581	N3K*
582	N3K*

N3: Basal N, 144kg as “Nitro-chalk”
K: 90kg K as sulphate of potash
K*: 450kg K as sulphate of potash

In 2005 the extra dressings of K (i.e. K*) was stopped and the whole experiment reverted to K dressings of 90 kg K/ha/year.

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10/R/HB/2

Experimental Diary

			Rate	Unit
10-Dec-09	f	Triple Superphosphate	215.00	kg/ha
	f	Kieserite	233.00	kg/ha
	f	Potassium Sulphate	217.00	kg/ha
16-Dec-09	f	FYM	35.00	t/ha
17-Dec-09	a	Plough		
09-Mar-10	a	Spring tined		
11-Mar-10	s	Tipple - 350 seeds per m2	170.00	kg/ha
	a	Rolled		
	a	Combination Drilled		
15-Apr-10	a	Rotavated paths		
20-Apr-10	f	Nitrachalk to the main plots as indicated on the plan		
23-Apr-10	f	Nitram – Silicate Test, P Test, headlands & O+E's	420.00	kg/ha
12-May-10	a	Rotavate		
24-May-10	p	Kestral - Started	0.50	l/ha
	p	Jenton - Started	0.50	l/ha
	p	Bravo 500 - Started	1.00	l/ha
25-May-10	p	Kestral	0.50	l/ha
	p	Jenton	0.50	l/ha
	p	Bravo 500	1.00	l/ha
26-May-10	p	Harmony M SX - 200 lt water	100.00	g/ha
28-May-10	p	Dow Shield - 200 lt water	0.35	l/ha
04-Jun-10	p	Axial - 200 lt water	0.40	l/ha
	p	Axial - 200 lt water	0.40	l/ha
	p	Adigor - 200 lt water	1.00	l/ha
	p	Adigor - 200 lt water	1.00	l/ha
16-Jun-10	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Mobius - 200 lt water	0.43	l/ha
	p	Standon Fenpropimorph 750 - 200 lt water	0.50	l/ha
	p	Corbel - 200 lt water	0.50	l/ha
18-Jun-10	a	Rotavated paths		
09-Jul-10	a	Other operation - pulled wild oats, none found		
31-Aug-10	a	Combine harvest, plots for yield		
	a	Sample, bale and weigh straw		
05-Sep-10	a	Combine harvest		
09-Sep-10	a	Baled		
22-Sep-10	a	Other operation - removed bales		

NOTE: Samples of grain and straw were taken for chemical analysis. Unground grain and straw samples from selected treatments were archived.

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10/R/HB/2

MAIN PLOTS

GRAIN TONNES/HECTARE

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

MANURE	N	O	48	96	144	MEAN
---		1.07	1.52	1.54	1.92	1.51
-P-		1.78	2.87	3.59	3.77	3.00
--K		0.69	1.52	1.90	2.29	1.60
-PK		1.43	2.92	3.51	4.59	3.11
A--		0.96	1.31	1.53	1.71	1.38
AP-		1.90	2.90	3.68	4.00	3.12
A-K		0.85	1.32	1.46	2.12	1.44
APK		1.35	2.71	3.65	4.03	2.93
FYM1852onwards		5.04	6.69	7.02	6.97	6.43
FYM1852-1871		1.10	1.78	4.31	3.36	2.64
(A)		1.11	2.44	2.31	2.83	2.17
-		0.95	1.25	1.27	1.82	1.32
FYM2001onwards		3.42	5.95	5.92	5.60	5.22
P2K		2.19	2.78	4.74	5.07	3.69
MEAN		1.70	2.71	3.32	3.58	2.83

Grain Mean DM% 91.0

STRAW TONNES/HECTARE

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

MANURE	N	0	48	96	144	MEAN
---		0.17	0.50	0.41	0.71	0.45
-P-		0.46	0.90	1.17	1.27	0.95
--K		0.00	0.46	0.75	0.82	0.51
-PK		0.30	1.18	1.37	1.85	1.17
A--		0.19	0.37	0.47	0.58	0.40
AP-		0.34	0.88	1.45	1.39	1.02
A-K		0.16	0.26	0.50	0.80	0.43
APK		0.33	1.01	1.55	1.57	1.11
FYM1852onwards		1.73	2.65	3.03	2.97	2.59
FYM1852-1871		0.14	0.72	1.57	1.13	0.89
(A)		0.25	0.91	0.74	0.93	0.71
-		0.22[a]	0.29[b]	0.44	0.64	0.26
FYM2011onwards		1.02	2.18	2.28	2.47	1.99
P2K		0.48	0.85	1.66	1.95	1.24
MEAN		0.37	0.94	1.24	1.36	0.98

Straw Mean DM% 83.7

[a] Straw Yield estimated from Grain/Straw ratio on N48[b]

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10/R/HB/2

SILICATE PLOTS

GRAIN TONNES/HECTARE

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

Silicate	PK	N3--	N3P-	N3-K	N3PK	MEAN
(-)-		1.91	4.36	1.49	5.03	3.20
(Si)-		2.38	4.79	2.81	5.41	3.85
(-)Si		2.69	4.10	2.48	5.40	3.97
(Si)Si		2.86	4.01	3.11	5.49	3.87
MEAN		2.46	4.31	2.47	5.33	3.64

Grain Mean DM% 84.9

PHOSPHATE PLOTS

GRAIN TONNES/HECTARE

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

PLOTS	
142	2.35
143	2.42
144	2.36
242	5.08
243	4.95
244	4.94
341	3.02
342	3.35
343	3.12
344	3.53
441	4.54
442	5.12
443	4.85
444	5.03
551	5.23
552	5.06
561	4.41
562	4.55
571	1.98
572	2.74
581	1.09
582	0.84
MEAN	3.66

Grain Mean DM% 85.0

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10/R/WF/3

WHEAT AND FALLOW

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

The 155th year, w. wheat.

For previous years see 'Details' 1967, 1973 and Yield Books for 74-09/R/WF/3.

Whole plot dimensions: 9 x 211

Treatments:
Two plots, one sown to w. wheat, one fallow; alternating in successive years.

Experimental Diary

			Rate	Unit
30-Sep-09	a	Plough		
01-Oct-09	a	Cultipressed		
05-Oct-09	s	Hereward - At 350 seeds per m2	145.00	kg/ha
	p	Liberator - 200 lt water	0.60	l/ha
	a	Combination Drilled		
10-Apr-10	p	Cherokee - 146 l water	1.00	l/ha
18-Apr-10	p	Attribut - 146 lt water	100.00	g/ha
	p	Amber - 146 lt water	1.00	l/ha
	p	Oxytril CM - 146 lt water	1.00	l/ha
27-Apr-10	a	Flexi tined - Fallow plots		
	a	Powerharrowed - Fallow plots		
06-May-10	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Tracker - 200 lt water	1.00	l/ha
	p	Chlormequat 3C - 200 lt water	2.25	l/ha
18-May-10	p	Tomahawk	1.00	l/ha
	p	Cleancrop Gallifrey	1.00	l/ha
20-May-10	a	Rotavate - fallow areas		
02-Jun-10	p	Comet - 200 lt water	0.60	l/ha
	p	Opus - 200 lt water	0.60	l/ha
21-Jul-10	a	Rotavate - fallows		
31-Aug-10	a	Combine harvest, plots for yield		
	a	Sample, bale and weigh straw		
03-Sep-10	a	Combine harvest discards		
04-Sep-10	a	Baled		
22-Sep-10	a	Other operation - removed bales		

Note: Unground grain and straw was archived.

GRAIN AND STRAW YIELDS TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.58	0.71
MEAN DM%	84.94	86.62
PLOT AREA HARVESTED	0.04431	

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10/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1856 - 1901, and of additional phosphate applied since 1986, on the yield of continuous s. barley up to 1991, w. wheat since – Hoosfield.

The 155th year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-09/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 t
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** Maintenance P (20 kg P) applied annually from 2000 to maintain existing levels of available P In the soil. (P1) (P2) and (P3) are residues of P applied annually 1986–1992:

	2000-10	1986-92
O	None	None
P (P1)	20 kg P	44 kg P
P (P2)	20 kg P	87 kg P
P (P3)	20 kg P	131 kg P

NOTE: P treatments were applied at 61.5 kg P in error in 2000.

Plus

Whole plots (K test, previously N test until 1991

1. OLD RES Residues of manures applied annually 1876 – 1901:

O	None
D	Farmyard manure at 35 t
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

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10/R/EX/4

2. K Potassium applied annually from 2007 as muriate of potash

O	None
K1	75 kg K_2O (62.2 kg K)
K2	150 kg K_2O (124.5 kg K)

Whole plots
Nitrogen: 50 kg N as ammonium sulphate (to supply sufficient S) during first two weeks in March, 200 kg N as ammonium nitrate at GS31/mid-April (whichever comes first) and 50 kg N as ammonium nitrate at GS37 (not later than mid-May)

Experimental diary

K Test			Rate	Unit
29-Sep-09	f	Basal P (triple superphosphate) – plots 02, 04, 06, 08 and 10	75.00	kg/ha
	f	Muriate of Potash, plots 23, 43, 63, 83 & 103	125.00	kg/ha
	f	Muriate of Potash, plots 24, 44, 64, 84, 104	250.00	kg/ha

P Test			Rate	Unit
29-Sep-09	f	Triple Superphosphate – plots 011 – 013, 031 – 033, 051 – 053, 071 – 073 and 091- 093	75.00	kg/ha
	f	Muriate of Potash, plots 01,03, 05, 07 & 09	250.00	kg/ha

All Plots			Rate	Unit
29-Sep-09	a	Spread fertiliser		
30-Sep-09	a	Plough		
01-Oct-09	a	Cultipressed		
02-Oct-09	a	Cultipressed - Second time		
05-Oct-09	a	Combination Drilled		
	s	Drilled Xi19 – at 350 seeds per m^2	166.00	kg/ha
	p	Liberator -200 lt water	0.60	l/ha
19-Mar-10	f	Sulphate of Ammonia - As indicated on plan	238.00	kg/ha
06-Apr-10	f	Kieserite	80.00	kg/ha
10-Apr-10	p	Cherokee - 146 l water	1.00	l/ha
15-Apr-10	f	Nitram	580.00	kg/ha
18-Apr-10	p	Attribut - 146 lt water	100.00	g/ha
	p	Amber - 146 lt water	1.00	l/ha
	p	Oxytril CM - 146 lt water	1.00	l/ha
06-May-10	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Tracker - 200 lt water	1.00	l/ha
	p	Chlormequat 3C - 200 lt water	2.25	l/ha
12-May-10	a	Mow / Rotavate paths		
18-May-10	p	Tomahawk	1.00	l/ha
	p	Cleancrop Gallifrey	1.00	l/ha
19-May-10	f	Nitram	145.00	kg/ha

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10/R/EX/4

			Rate	Unit
02-Jun-10	p	Comet - 200 lt water	0.60	l/ha
	p	Opus - 200 lt water	0.60	l/ha
03-Jun-10	a	Rotavated paths		
17-Jun-10	a	Cut paths		
14-Jul-10	a	Mow / Rotavate paths		
31-Aug-10	a	Combine harvest, plots for yield		
	a	Sample, bale and weigh straw		
03-Sep-10	a	Combine harvest discards		
04-Sep-10	a	Baled		

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

P TEST

GRAIN TONNES/HECTARE

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

P_RES OLD_RES	O	P(P1)	P(P2)	P(P3)	Mean
O	2.27	5.74	6.48	7.14	5.41
D	4.14	7.26	7.80	7.59	6.70
N	1.61	6.71	7.73	7.94	6.00
P	4.45	7.38	8.15	7.57	6.89
NPKNAMG	3.80	6.95	7.68	8.49	6.73
MEAN	3.25	6.81	7.57	7.75	6.34

GRAIN MEAN DM% 85.9%

STRAW TONNES/HECTARE

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

P_RES OLD_RES	O	P1	P2	P3	MEAN
O	0.82	2.54	3.37	3.52	2.56
D	2.12	3.81	4.31	3.97	3.55
N	0.84	3.25	3.87	3.80	2.94
P	1.93	3.71	4.19	4.33	3.54
NPKNAMG	2.17	3.67	3.93	4.18	3.49
MEAN	1.58	3.40	3.93	3.96	3.22

STRAW MEAN DM% 93.5%

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10/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

K_TEST OLD_RES	KO	K1	K2	Mean
O	7.43	7.93	7.85	7.66
D	7.62	8.02	8.01	7.82
N*	7.88	7.87	8.36	8.00
PK	7.83	7.62	8.00	7.82
N*PK	7.59	7.88	8.59	7.91
MEAN	7.67	7.86	8.16	7.84

Standard errors of difference of means

Table	OLD_RES	K_TEST	OLD_RES K_Test	
rep.	4	unequal	unequal	
d.f.	5	5	5	
s.e.d.		0.145	0.323	min.rep
	0.162	0.125	0.280	max-min
		0.102X	0.229	max.rep

(No comparisons in categories where s.e.d. marked with an X
Grain mean dm% 86.3

STRAW TONNES/HECTARE

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

K_TEST OLD_RES	K0	K1	K2	Mean
O	3.85	4.54	4.15	4.10
D	3.96	4.36	4.30	4.14
N*	4.18	4.21	4.31	4.22
PK	4.41	3.94	4.36	4.28
N*PK	4.01	4.15	4.23	4.10
MEAN	4.08	4.24	4.27	4.17
REP	10	5	5	

Standard errors of difference of means

Table	OLD_RES	K_TEST	OLD_RES K_Test	
rep.	4	unequal	unequal	
d.f.	5	5	5	
s.e.d.		0.206	0.460	min.rep
	0.230	0.178	0.398	max-min
		0.146X	0.325	max.rep

(No comparisons in categories where s.e.d. marked with an X
Straw mean dm% 93.4

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10/R/PG/5

PARK GRASS

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

The 155th year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-09/R/PG/5.

Treatments: Combinations of:-

Whole plots

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

N1	Plot 1	N1
K	Plot 2/1	K since 1996 (as 2/2 before)
None (FYM)	Plot 2/2	None (FYM until 1863)
None	Plot 3	None
P	Plot 4/1	P
N2P	Plot 4/2	N2 P
N1PKNaMg	Plot 6	N1 P K Na Mg
PKNaMg	Plot 7	P K Na Mg
PNaMg	Plot 8	P Na Mg
PKNaMg(N2)	Plot 9/1	P K Na Mg (+ N2 until 1989)
N2PKNaMg	Plot 9/2	N2 P K Na Mg
N2PNaMg	Plot 10	N2 P Na Mg
N3PKNaMg	Plot 11/1	N3 P K Na Mg
N3PKNaMgSi	Plot 11/2	N3 P K Na Mg Si
None	Plot 12	None
(FYM/F)	Plot 13/1	None (FYM/F until 1993/1995)
FYM/PM	Plot 13/2	FYM/PM (FYM/F until 1999)
PKNaMg (N2*)	Plot 14/1	P K Na Mg (+ N2* until 1989)
N2*PKNaMg	Plot 14/2	N2* P K Na Mg
PKNaMg (N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*PKNaMg	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNaMg	Plot 18	N2 K Na Mg
FYM	Plot 19	FYM
FYM/N*PK	Plot 20	FYM/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 in years with no farmyard manure)
P:	35 kg P (15 kg P to plot 20 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 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
FYM:	Farmyard manure at 35 t every fourth year

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10/R/PG/5

1. Manure, fertilisers and organic manures (cont'd)

F:	Fishmeal every fourth year to supply 63 kg N (stopped 1999; replaced by PM)
PM	Pelleted poultry manure at 2 t, every fourth year to supply 63 kg N (started 2003)

Sub-plots

2. **Lime** Liming plots 1-18 (excluding 18/2):

a	Ground chalk applied as necessary to achieve pH7
b	Ground chalk applied as necessary to achieve pH6
c	Ground chalk applied as necessary to achieve pH5
d	None

NOTE: Lime was applied regularly 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 was applied in 2008-2009; the sixth application in a triennial scheme of soil pH analysis and remedial chalk applications.

[This note was incorrect in 97-01/R/PG/5 Yield book entries.]

Lime Liming plots 18-20

NOTE: Differential rates of lime were applied to sub-plots 2 and 3 regularly 1920-1964. Since 1975 plot 18-1 has been split into two for treatments 'c' and 'd' as 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.

[This note was incorrect in 97-01/R/PG/5 Yield book entries.]

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10/R/PG/5

Experimental diary

			Rate	Unit
04-Jan-10	a	Cut back scrub and trees along North headland		
01-Feb-10	f	TSP - Plots 4-1, 4-2, 6, 7, 8, 9-1, 9-2, 10, 11-1, 11-2, 14-1, 14-2, 15, 16	171.00	kg/ha
	f	TSP - Plots 20-1, 20-2, 20-3	73.00	kg/ha
15-Feb-10	f	Potassium Sulphate - Plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16,18 and 20	542.00	kg/ha
	f	Sodium Sulphate - Plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	43.00	kg/ha
	f	Magnesium Sulphate - Plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	111.00	kg/ha
	a	Spread fertiliser - Plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16,18 and 20		
16-Feb-10	f	Potassium Sulphate - Plot 11-2	542.00	kg/ha
	f	Sodium Sulphate - Plot 11-2	43.00	kg/ha
	f	Magnesium Sulphate - Plot 11-2	111.00	kg/ha
	f	Silicate of soda - Plot 11-2	450.00	kg/ha
	a	Spread fertiliser		
18-Feb-10	f	Sodium Sulphate - Plot 10	43.00	kg/ha
	f	Magnesium Sulphate - Plot 10	111.00	kg/ha
	a	Spread fertiliser		
19-Feb-10	f	Potassium Sulphate - plot 11-2	542.00	kg/ha
	a	Spread fertiliser		
20-Feb-10	f	Sodium Sulphate - plot 11-2	43.00	kg/ha
	f	Magnesium Sulphate	111.00	kg/ha
	a	Spread fertiliser		
22-Mar-10	f	Sulphate of Ammonia - Treatments indicated on plan		
	a	Cleared branches		
24-Mar-10	f	Nitrate of Soda - Treatments indicated on plan		
16-Apr-10	a	Cut paths - Started		
20-Apr-10	a	Cut paths		
05-May-10	a	Cut surrounds		
06-May-10	a	Mow / Rotavate paths		
13-May-10	a	Mow / Rotavate paths		
14-May-10	a	Mow / Rotavate paths		
07-Jun-10	a	Cut paths		
09-Jun-10	a	Cut paths - Finished		
21-Jun-10	a	Cut harvest strips, weighed and sampled		
21-Jun-10	a	Cut o+es - Started		
22-Jun-10	a	Cut harvest strips, weighed and sampled, finished		
22-Jun-10	a	Cut o+es - Finished		
	a	Turned grass		
23-Jun-10	a	Turned grass		

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10/R/PG/5

23-Jun-10	a	Contractor baled grass
24-Jun-10	a	Rowed up grass - Second time to tidy up bits left by contractor
25-Jun-10	a	Baled left over grass
12-Aug-10	a	Mow paths
28-Oct- 10	a	Mown - internal paths
29-Oct-10	a	Mown - internal paths
01-Nov-10	a	Mown - internal paths
02-Nov-10	a	Cut harvest strips, weighed and sampled
03-Nov-10	a	Mown
	a	Baled - removed bales

1ST CUT (21-22/6/10) DRY MATTER TONNES/HECTARE

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

Grand mean 3.50

	Manure	Lime	a	b	c	d	Mean
N1	1		2.23	1.98	1.40	0.50	1.53
K	2/1		1.93	2.37	0.75	0.66	1.42
None (FYM)	2/2		1.72	2.06	1.12	0.90	1.45
None	3		1.85	2.41	0.85	1.07	1.55
P	4/1		3.21	3.31	2.33	2.33	2.79
N2P	4/2		2.83	2.92	3.23	1.78	2.69
N1PKNaMg	6		5.59	6.44			6.02
PKNaMg	7		5.12	5.32	5.20	2.64	4.57
PNaMg	8		2.76	3.22	2.65	2.58	2.80
PKNaMg (N2)	9/1		4.66	5.29	3.99	0.84	3.69
N2PKNaMg	9/2		5.63	5.63	4.54	2.92	4.69
N2PNaMg	10		2.95	3.04	3.53	1.89	2.85
N3PKNaMg	11/1		7.22	5.92	5.85	3.98	5.74
N3PKNaMgSi	11/2		6.45	6.49	6.11	4.25	5.82
None	12		1.94	1.87	0.84	0.94	1.40
(FYM/F)	13/1		3.03	3.39	2.33	1.65	2.60
FYM/PM	13/2		4.00	4.82	3.75	2.79	3.84
PKNaMg (N2*)	14/1		5.40	5.87	5.97	5.18	5.60
N2*PKNaMg	14/2		4.99	5.08	4.95	4.30	4.83
PKNaMg (N2*)	15		5.22	5.39	5.59	1.90	4.53
N1*PKNaMg	16		5.56	6.22	4.75	3.30	4.96
N1*	17		1.97	2.09	1.90	2.06	2.00
N2KNaMg	18		2.22	2.52	2.75	0.35	1.96
N2KNaMg	18/2						3.11
FYM	19/1						4.26
FYM	19/2						5.78
FYM	19/3						5.33
FYM/N*PK	20/1						6.05
FYM/N*PK	20/2						5.12
FYM/N*PK	20/3						6.02

1ST CUT MEAN DM% 29.5

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10/R/PG/5

2ND CUT (02/11/10) DRY MATTER TONNES/HECTARE

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

Grand Mean 1.29

	Manure	Lime	a	b	c	d	Mean
N1	1		0.72	1.01	0.83	0.23	0.70
K	2/1		0.53	0.76	0.06	0.27	0.40
None (FYM)	2/2		0.45	0.74	0.34	0.34	0.47
None	3		0.42	0.71	0.22	0.50	0.46
P	4/1		0.86	0.94	0.90	1.05	0.94
N2P	4/2		0.95	1.31	1.01	0.80	1.02
N1PKNaMg	6		1.22	1.95			1.59
PKNaMg	7		1.64	1.84	1.97	0.97	1.60
PNaMg	8		1.04	1.27	1.17	1.47	1.24
PKNaMg (N2)	9/1		1.80	1.62	1.18	0.32	1.23
N2PKNaMg	9/2		1.67	1.70	1.11	1.36	1.46
N2PNaMg	10		0.67	0.98	1.04	0.76	0.86
N3PKNaMg	11/1		2.03	1.63	1.35	2.07	1.77
N3PKNaMgSi	11/2		1.81	2.04	1.75	2.76	2.09
None	12		1.04	0.80	0.46	0.55	0.71
(FYM/F)	13/1		1.79	1.97	1.24	0.64	1.41
FYM/PM	13/2		1.72	3.46	1.82	1.37	2.09
PKNaMg (N2*)	14/1		1.82	1.92	2.27	2.16	2.04
N2*PKNaMg	14/2		1.63	1.62	1.91	1.86	1.75
PKNaMg (N2*)	15		1.45	1.83	2.02	0.91	1.55
N1*PKNaMg	16		1.76	2.24	1.82	1.35	1.79
N1*	17		0.99	1.01	0.79	1.10	0.97
N2KNaMg	18		0.84	0.85	0.95	0.23	0.72
N2KNaMg	18/2						1.19
FYM	19/1						1.73
FYM	19/2						2.31
FYM	19/3						2.05
FYM/N*PK	20/1						2.71
FYM/N*PK	20/2						2.13
FYM/N*PK	20/3						1.99

2ND CUT MEAN DM% 21.07

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10/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

Grand Mean 4.80

	Manure	Lime	a	b	c	d	Mean
N1	1		2.95	2.99	2.23	0.73	2.23
K	2/1		2.46	3.12	0.81	0.92	1.83
None (FYM)	2/2		2.17	2.79	1.46	1.24	1.91
None	3		2.27	3.12	1.08	1.52	2.01
P	4/1		4.07	4.25	3.23	3.38	3.73
N2P	4/2		3.79	4.23	4.24	2.58	3.71
N1PKNaMg	6		6.82	8.40			7.61
PKNaMg	7		6.75	7.16	7.17	3.61	6.17
PNaMg	8		3.80	4.49	3.82	4.05	4.04
PKNaMg (N2)	9/1		6.46	6.91	5.16	1.17	4.92
N2PKNaMg	9/2		7.30	7.33	5.65	4.28	6.14
N2PNaMg	10		3.62	4.02	4.57	2.65	3.71
N3PKNaMg	11/1		9.25	7.55	7.20	6.05	7.51
N3PKNaMgSi	11/2		8.25	8.52	7.86	7.01	7.91
None	12		2.98	2.67	1.30	1.49	2.11
(FYM/F)	13/1		4.81	5.37	3.57	2.30	4.01
FYM/PM	13/2		5.72	8.28	5.57	4.16	5.93
PKNaMg (N2*)	14/1		7.23	7.79	8.23	7.34	7.65
N2*PKNaMg	14/2		6.62	6.70	6.86	6.16	6.59
PKNaMg (N2*)	15		6.68	7.21	7.61	2.81	6.08
N1*PKNaMg	16		7.31	8.46	6.57	4.65	6.75
N1*	17		2.95	3.09	2.69	3.16	2.98
N2KNaMg	18		3.06	3.38	3.70	0.58	2.68
N2KNaMg	18/2						4.30
FYM	19/1						5.99
FYM	19/2						8.09
FYM	19/3						7.38
FYM/N*PK	20/1						8.77
FYM/N*PK	20/2						7.25
FYM/N*PK	20/3						8.01

TOTAL OF 2 CUTS MEAN DM% 25.27

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10/R/GC/8

GARDEN CLOVER

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

The 157th year, red clover.

For previous years see `Details' 1967 and 1973, and Yield books for 74-09/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.

Experimental diary:

			Rate	Unit
02/12/2009	f	Potassium Sulphate	300.00	kg/ha
	f	Chalk	1000.00	kg/ha
	f	Triple Superphosphate	158.00	kg/ha
	f	Magnesium Sulphate	520.00	kg/ha
17-May-10	a	First Cut		
26-Jun-10	a	Second Cut		
24-Aug-10	a	Third Cut		

NOTE: Samples of clover taken from each cut for chemical analysis

1ST CUT (17/05/10) DRY MATTER TONNES/HECTARE

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

Grand mean 4.71

FUNG_RES	NONE	BENOMYL
	4.95	4.46

1ST CUT MEAN DM% 17.2

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10/R/GC/8

SECOND CUT (26/06/10) DRY MATTER TONNES/HECTARE

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

Grand mean 4.59

FUNG_RES	NONE	BENOMYL
	4.53	4.65

2ND CUT MEAN DM% 20.8

THIRD CUT (24/08/10) DRY MATTER TONNES/HECTARE

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

Grand mean 3.83

FUNG_RES	NONE	BENOMYL
	4.38	3.29

3RD CUT MEAN DM% 26.9

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

Grand mean 13.13

FUNG_RES	NONE	BENOMYL
	13.86	12.41

TOTAL OF 3 CUTS MEAN DM% 21.6

PLOT AREA HARVESTED CUT 1, 2 & 3 0.00014

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10/W/RN/3

LEY/ARABLE

Object: To compare the effects on soil fertility of rotations with or without leys – Woburn, Stackyard D.

Sponsors: A. J. Macdonald

The 73rd year, leys, w. beans, w. wheat, w. rye

For previous years see 'Details' 1967 & 1973 and Yield Books for 74-09/W/RN/3.

Design: 5 series of 8 plots, split for treatments other than rotations.

Whole plot dimensions: 8.53 x 40.7

Treatments: All phases of four five-course rotations were originally present:

ROTATION

LEY	Clover/grass ley:	L, L, L, P, W
CLO	All legume ley:	SA, SA,SA, P, W until 1971 then CL, CL, CL, P, W.
A	Arable with roots:	P, R, C, P, W until 1971 then P, B, B, P, W.
A H	Arable with hay:	P, R, H, P, W until 1971 then P, B, H, P, W.

P = potatoes, R = w. rye, C = carrots, W= w. wheat, B = s. barley, H = hay, L = clover/grass ley, SA = sainfoin ley, CL = red clover ley.

Rotations themselves followed different cycles:

On four plots in each block the rotations were repeated.
On four plots in each block arable rotations alternated each five years with ley rotations.
From 1976 all the rotations were changed on all phases except for the first and second test crops in 1976:

LN 3	(Previous LEY) LN1, LN2, LN3, W, R
LC 3	(Previous CLO) LC1, LC2, LC3, W, R
AF	(Previous A) F, F, BE, W, R
AB	(Previous A H) B, B, BE, W, R

From 1988 rotations AF and AB are replaced by AM and ABe respectively. Phased in at the beginning of each treatment crop sequence.

AM	R, BE, M, W, R
ABe	R, M, BE, W, R

LN1 to LN3 = three year grass ley with N, 1st year to 3rd year,
LC= clover/grass ley, no N, BE = beans (s. oats until 1980), F = fallow,
M = forage maize

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10/W/RN/3

Plots hitherto in alternating rotations were changed to test eight-year leys and two test crops:

LLN LLN1, LLN2, LLN3, LLN4, LLN5, LLN6, LLN7, LLN8, W, R
LLC LLC1, LLC2, LLC3, LLC4, LLC5, LLC6, LLC7, LLC8, W, R
LLN1 to LLN8 = eight year grass ley with nitrogen, first year to eighth year, similarly for LLC – clover/grass ley, no nitrogen

The new scheme started by sowing these new leys in spring 1976 on four phases and in spring 1977 on the fifth phase (2nd test crop in 1976).

From 2007 plots previously in the 1st cycle of testing eight-year leys followed by two arable test crops (i.e. those plots which were changed to eight-year ley treatments in 1976 or 1977) changed to a three-year arable rotation followed by two arable test crops. Plots were "phased in" but joined the relevant point in the rotation. From 2008 the second cycle 8-yr grass and grass/clover leys changed to 3-yr grass or grass/clover leys respectively. They will be phased in between 2008 and 2012.
LLN/AO (Previously 1st cycle, 8-yr grass ley) R, BE, O, W, R
LLC/ABe (Previously 1st cycle, 8-yr grass/clover ley) R, O, BE, W, R
LLC/LC3 (Previously 2nd cycle, 8-yr grass ley) Lc 1, Lc 2, Lc 3, W, R
LLN/LN3 (Previously 2nd cycle, 8-yr grass/clover ley) Ln 1, Ln 2, Ln 3, W, R

From 2009 W oats (O) replaced forage maize (M) in the AM and ABe rotations on block III and were phased in on blocks V, IV, II and I in subsequent years. The AM treatment was re-named AM/AO.
In 1992 w. rye (R) replaced s. barley (B) as the second test crop.
Yields are taken from the leys, arable treatment crops and the test crops.

Treatments to first test crop w. wheat, all combinations of:

Whole plots:

1. **ROTATION** Rotations before wheat:

   LLN 8
   LN 3
   LLC 8
   LC 3
   LLC/LC3 not yet in phase
   LLN/LN3 not yet in phase
   LLN/AO not yet in phase
   LLC/ABe not yet in phase
   AM/AO
   ABe

1/ 2 plots:

2. **NSPLIT(FYM res)** Farmyard manure residues, last applied 1960s:
   Split N v single N dressing to wheat, tested 2001-5

   Nsplit (noFYM)
   Nsingle(FYM)

1/8 plots:

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10/W/RN/3

3. **N** Nitrogen fertilizer as split dressings in spring 2009 (kg N) as 34.5% N:

0	0	
80	40 + 40	) to be applied
160	40 + 120	) late-February/early-March
240	40+ 200	) and mid-April

Treatments to second test crop w.rye, all combinations of:

Whole plots:

1. **ROTATION** Rotations before first test crop:
   LLN8
   LN 3
   LLC 8
   LC 3
   LLC/LC3 not yet in phase
   LLN/LN3 not yet in phase
   LLN/AO not yet in phase
   LLC/ABe not yet in phase
   AM/AO
   ABe

1/ 2 plots:

2. **NSPLIT(FYM res)** Farmyard manure residues, last applied 1960s:
   Nsplit to wheat (no FYM)
   Nsingle to wheat (FYM)

   1/8 plots:

3. **N** Nitrogen fertilizer in spring 2009 (kg N) as 34.5%:
   0
   50
   100
   150

Treatments to leys:

FYM RES Farmyard manure residues:

NONE
FYM 38 t on each occasion, last applied 1960s.

NOTE: Corrective K dressings (kg K_2O ha^{-1}) as muriate of potash, applied where necessary to first test crop w. wheat and long-term leys in the wheat block, applied 23 September 2009

Continuous rotations	No FYM	FYM Res
Before wheat	Half plots	Half plots
ABe	400	380
AM/AO	340	360
LLn/AO	140	90
None to other plots.		

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10/W/RN/3

Experimental Diary

Grass Ley and clover/grass ley (**ROTATION** LN1, LLN, LN1, LLC, LC1)

			Rate	Unit
23-Sep-09	f	Potassium Sulphate - 1st year leys in 2010	140.00	kg/ha
	f	TSP - 1st year leys in 2010	213.00	kg/ha
13-Oct-09	a	Plough - wheat, rye, oats and new ley plots		
14-Oct-09	a	Rotavate - Block 4		
20-Oct-09	s	Laura, fescue, promess timothy	30.00	kg/ha
15-Apr- 10	f	Nitram - Grass only, 200 lt water	217.00	kg/ha
23-Jun-10	a	Topped - paths		
24-Jun-10	a	Cut harvest strips, weighed and sampled - Ley plots		
26-Jun-10	a	Baled –Ley plots		
28-Jun-10	f	Nitram - Blocks 4&5 grass leys only	217.00	kg/ha
20-Jul-10	f	MOP - Ley plots on blocks 4 and 5	83.00	kg/ha

Grass leys and clover/grass leys (ROTATION LLN, Ln2-3, LLc, Lc2-3**)**

			Rate	Unit
19-Oct-09	a	Rotavate - blocks 2, 3, 5		
10-Apr-10	p	Duplosan KV - Grass only, 200 lt water	2.00	l/ha
15-Apr-10	f	Nitram - Grass only, 200 lt water	217.00	kg/ha
15-May-10	a	Harrowed - 2nd and 3rd year leys		
23-Jun-10	a	Topped - paths		
24-Jun-10	a	Cut harvest strips, weighed and sampled - Ley plots		
26-Jun-10	a	Baled – Ley-plots		
28-Jun-10	f	Nitram - Blocks 4&5 grass leys only	217.00	kg/ha
20-Jul-10	f	MOP - Ley plots on blocks 4 and 5	83.00	kg/ha
09-Aug-10	p	Glyphogan 360 - Leys on block 3, 200 lt water	4.00	l/ha

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10/W/RN/3

W. Beans (ROTATION)

			Rate	Unit
23-Sep-09	a	Broadcast		
19-Oct-09	a	Rotavate - blocks 2, 3, 5		
10-Dec-09	p	Stomp 400 SC - 200 l/ha water	3.00	l/ha
27-Jan-10	s	Wizzard	40.00	s/m2
	a	Plough - Beans		
17-Mar-10	p	Skirmish - 200 lt water on Beans	1.00	l/ha
23-Jun-10	a	Topped - paths		

W. Wheat (1st TEST CROP)

			Rate	Unit
21-Sep-09	p	Nufosate Ace - 200 lt water Pre wheat leys desiccated - plots 03, 04, 07, 08, 11,12 ,13, 14	4.00	l/ha
	p	Nufosate Ace - 200 lt water	4.00	l/ha
23-Sep-09	f	MOP - Plots 1,2,5,6,9,10 (as plan indicates)		
	f	TSP - Arable areas	127.00	kg/ha
13-Oct-09	a	Plough - wheat, rye, oats and new ley plots		
14-Oct-09	s	Drilled Glasgow - At 350 seeds per m2		
	a	Rotavate - Block 1		
10-Apr-10	p	Ally Max SX - Winter wheat, 200 lt water	42.00	g/ha
18-Apr-10	f	Nitrochalk - N1 plots	145.00	kg/ha
	f	Nitrochalk - N2 plots	436.00	kg/ha
	f	Nitrochalk - N3 plots	727.00	kg/ha
02-Jun-10	p	Opus - 200 lt water	0.60	l/ha
23-Jun-10	a	Topped - paths		
09-Aug-10	p	Glyphogan 360 - wheat on block 1, 200 lt water	4.00	l/ha
05-Sep-10	a	Combine harvest, plots for yield		
	a	Cut harvest strips, weighed and sampled		
	a	Swath straw		

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10/W/RN/3

W. Rye (2ND TEST CROP AND ROTATION)

			Rate	Unit
23-Sep-09	f	TSP - Arable areas	127.00	kg/ha
12-Oct-09	f	Limestone - block 2	5.00	t/ha
13-Oct-09	a	Plough - wheat, rye, oats and new ley plots		
14-Oct-09	a	Rotavate - Block 4		
19-Oct-09	a	Rotavate - blocks 2, 3, 5		
20-Oct-09	s	Drilled Protector - at 325 seeds per m2		
15-Apr-10	f	Nitram - Rye and Oats	290.00	kg/ha
26-Apr-10	f	Nitrochalk - Rye, N1 plots	182.00	kg/ha
	f	Nitrochalk - Rye, N2 plots	364.00	kg/ha
	f	Nitrochalk - Rye, N3 plots	545.00	kg/ha
02-Jun-10	p	Opus - 200 lt water	0.60	l/ha
23-Jun-10	a	Topped - paths		
06-Sep-10	a	Swath straw - rye and oats		
	a	Cut harvest strips, weighed and sampled - rye and oats		
09-Sep-10	a	Combine harvest, plots for yield		
21-Sep-10	a	Baled - and removed		

W. Oats (ROTATION)

			Rate	Unit
23-Sep-09	f	TSP - Arable areas	127.00	kg/ha
13-Oct-09	a	Plough - wheat, rye, oats and new ley plots		
19-Oct-09	a	Rotavate - blocks 2, 3, 5		
20-Oct-09	s	Drilled Gerald - at 325 seeds per m2		
11-Dec-09	p	Lexus Class on oats - 200 lt water	60.00	g/ha
15-Apr-10	f	Nitram - Grass only, 200 lt water	217.00	kg/ha
	f	Nitram - Rye and Oats	290.00	kg/ha
23-Jun-10	a	Topped - paths		
24-Jun-10	a	Cut harvest strips, weighed and sampled - Ley plots		
28-Jun-10	f	Nitram - Blocks 4&5 grass leys only	217.00	kg/ha
20-Jul-10	f	MOP - Ley plots on blocks 4 and 5	83.00	kg/ha
06-Sep-10	a	Cut harvest strips, weighed and sampled - rye and oats		
	a	Swath straw - rye and oats		
09-Sep-10	a	Combine harvest, plots for yield		
21-Sep-10	a	Baled - and removed		

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10/W/RN/3

LEYS

1st AND ONLY CUT (24/06/10) DRY MATTER TONNES/HECTARE

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

FYM_RES	NONE	FYM	Mean
LEY			
LC1	3.10	2.98	3.04
LC2	5.32	3.85	4.58
LC3	6.39	5.48	5.94
LN1	4.78	3.90	4.34
LN2	4.27	4.47	4.37
LN3	4.77	4.08	4.42
(LLC/LC) LC1	2.65	2.93	2.79
(LLC/LC) LC2	5.33	5.17	5.25
(LLC/LC) LC3	4.02	4.82	4.42
(LLC/LC) LN1	5.20	5.73	5.47
(LLC/LC) LN2	5.27	4.67	4.97
(LLC/LC) LN3	4.93	5.56	5.25
MEAN	4.67	4.47	

1ST CUT MEAN DM%	30.8	
1ST CUT Units AREA HARVESTED		0.00200

10/W/RN/3

ARABLE TREATMENT CROPS
10/W/RN/3

BEANS

GRAIN TONNES/HECTARE

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

FYMRES	NONE	FYM	Mean
ROTATION			
AO (Be)	2.29	3.23	2.76
(LLn/AO) Be	4.07	3.65	3.86
(LLc/ABe) Be	2.50	1.67	2.09
(ABe) Be	1.45	2.58	2.02
MEAN	2.58	2.78	

Grain mean DM%	81.7
Plot area harvested	0.00393

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OATS

GRAIN TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
ABe	6.86	5.74	6.30
AO	2.77	2.96	2.87
LLc/ABe	7.01	7.19	7.10
LLn/AO	4.38	4.14	4.26
Mean	5.25	5.01	5.13

Grain mean DM%	86.7
Plot area harvested	0.00393

RYE

GRAIN TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
ABe	5.04	4.64	4.84
AO	4.99	5.26	5.12
LLn/AO	5.34	6.03	5.69
LLc/ABe	4.61	4.41	4.51
MEAN	4.99	5.08	5.04

Grain mean DM%	86.8
Plot area harvested	0.00393

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10/W/RN/3

W.WHEAT (1st TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES	None	FYM	Mean
ROTATION			
LLn/Ln	2.93	3.71	3.32
Ln	3.86	3.90	3.88
LLc/ABe	6.15	5.51	5.83
Lc	4.92	4.68	4.80
AM/AO	4.12	3.56	3.84
ABe	4.46	3.73	4.10
LLn/AO	4.05	4.42	4.23
LLc/Lc	5.24	4.49	4.86
MEAN	4.47	4.25	4.36

N	0	80	160	240
ROTATION				
LLn/Ln	2.58	3.35	4.54	2.81
Ln	2.85	3.74	4.75	4.18
LLc/ABe	3.22	5.67	6.77	7.68
Lc	3.90	4.89	5.20	5.21
AM/AO	1.52	4.18	4.74	4.90
ABe	1.98	4.17	4.70	5.55
LLn/AO	2.60	4.32	4.91	5.09
LLc/Lc	3.58	4.95	5.85	5.07
MEAN	2.78	4.41	5.18	5.06

N	0	80	160	240
FYMRES				
None	2.92	4.52	5.17	5.26
FYM	2.63	4.30	5.20	4.87

N		0	80	160	240
FYMRES					
ROTATION					
LLn/Ln	none	2.38	3.18	2.91	3.25
	FYM	2.77	3.52	6.18	2.38
Ln	none	2.93	3.62	4.88	4.03
	FYM	2.77	3.87	4.63	4.34
LLc/ABe	none	3.16	6.23	7.05	8.17
	FYM	3.27	5.11	6.48	7.19
Lc	none	3.73	5.18	5.39	5.38
	FYM	4.07	4.59	5.01	5.03
AM/AO	none	1.79	4.55	5.00	5.13
	FYM	1.26	3.82	4.49	4.68
ABe	none	2.52	4.48	4.93	5.90
	FYM	1.43	3.85	4.46	5.19
LLn/AO	none	2.59	3.94	4.88	4.77
	FYM	2.61	4.70	4.94	5.41
LLc/Lc	none	4.26	4.95	6.33	5.44
	FYM	2.90	4.96	5.38	4.70

Plot area harvested	0.00192
Grain mean DM%	87.6

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10/W/RN/3

RYE (2nd TEST CROP)

GRAIN TONNES/HECTARE

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

FYMRES	none	FYM	MEAN
ROTATION			
LLn	3.57	3.60	3.58
Ln	3.74	3.55	3.65
LLc	4.03	4.00	4.02
Lc	3.67	3.60	3.63
AM/AO	3.31	3.62	3.46
ABe	3.18	2.95	3.07
LLn/AO	4.41	4.78	4.59
LLc/ABe	3.82	3.71	3.77

N	0	50	100	150
ROTATION				
LLn	2.54	3.57	4.14	4.09
Ln	2.13	3.65	4.18	4.63
LLc	2.77	3.64	4.70	4.96
Lc	2.40	3.34	4.24	4.55
AM/AO	1.51	3.33	4.35	4.66
ABe	1.70	2.87	3.79	3.91
LLn/AO	2.81	4.20	5.69	5.67
LLc/ABe	2.43	3.44	4.57	4.62
MEAN	2.29	3.51	4.46	4.64

N	0	50	100	150	Mean
FYMRES					
none	2.29	3.50	4.44	4.63	3.72
FYM	2.28	3.51	4.47	4.64	3.73

N		0	50	100	150
ROTATION					
FYMRES					
LLn	none	2.63	3.47	3.98	4.20
	FYM	2.44	3.67	4.31	3.97
Ln	none	2.19	3.99	4.16	4.63
	FYM	2.07	3.31	4.20	4.63
LLc	none	2.87	3.47	4.56	5.23
	FYM	2.67	3.81	4.83	4.69
Lc	none	2.49	3.34	4.12	4.72
	FYM	2.32	3.35	4.36	4.38
AM/AO	none	1.41	3.11	4.32	4.33
	FYM	1.61	3.54	4.33	4.99
ABe	none	1.62	2.91	4.11	4.09
	FYM	1.78	2.82	3.47	3.73
LLn/AO	none	2.72	4.27	5.50	5.14
	FYM	2.90	4.13	5.88	6.21
LLc/ABe	none	2.40	3.46	4.74	4.70
	FYM	2.46	3.42	4.40	4.55

Plot area harvested	0.00183
Grain mean DM%	87.2

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10/W/RN/12

ORGANIC MANURING

Object: To study, from crop yields and soil analyses, the effects of a range of types of organic matter – Woburn, Stackyard B.

Sponsors: A. J. Macdonald

The 46th year winter beans

For previous years see 'Details' 1973 and Yield Books for 74-09/W/RN/12.

Design: 4 blocks of 8 plots

Whole plot dimensions: 8.0 x 29.5 (8.0 x 26.5 on Block III).

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter from different sources. An arable rotation was started on two blocks on 1972 and the remaining two blocks in 1973. After a period of testing the residues, a further period of accumulation was started; on two blocks (which included ley sown in 1979) in 1981 and on the other two (which included ley sown in 1980) in 1982. A second test phase began when leys on the first pair of blocks were ploughed for the 1st test crop in 1987 and on the second pair for the 1st test crop in 1988. From 1988 two blocks, and 1989 the other two, to 1994, plots were split into 6 sub-plots to test five levels of nitrogen and nil. From 1995 to 1997 residual effects of that nitrogen were measured. In 1998 to 2000 yields were taken from whole plots only. In 2001 plots were split into half-plots to test two rates of N.
For 2003 the experiment was modified to test further inputs of organic matter. An arable rotation (w. rye, s. barley, w. beans, w. wheat, forage maize) was started on seven plots within each block; the eighth was sown to a grass/clover ley.

Whole plots

1. **Treatment** (Not necessarily applied each year):

1966-1971/2	1979/82-1986/7	Since 2003
Fd	Fd	F
Ln	Lc6	F
St	St	St
Gm	Lc8	CC
Pt	Lc8	Co
Fs	Fs	Dg10
Dg	Dg	Dg25
Lc	Lc6	Lc

F: no organic amendment. St: chopped straw at 7.5t/ha. CC: cover crop prior to spring sown crops. Co: compost at 40t/ha. Dg10: FYM at 10t/ha. Dg25: FYM at 25t/ha. Dg: FYM at 50t/ha. Fd: fertilizers equivalent to FYM. Fs: fertilizers equivalent to straw (+P). Lc/Lc6/Lc8: grass/clover leys. Ln: grass ley + N. Gm: green manure. Pt: peat.

Since 2003, all treatments, except Dg25, have also received PKS fertilizers:
20 kg P/ha, 83 kg K/ha, 36 kg S/ha

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10/W/RN/12

In addition in 2003 F and CC treatments received 120 kg N/ha, St received 90 kg N/ha. Dg10 received 60 kg N/ha. No N was applied to Dg25, Co or Lc treatments.

Nitrogen
In 2008 all plots, except Lc (permanent grass/clover), split into 6 to test rates of N. For crops receiving nitrogen rates rotate as follows:
N0 > N1 > N2 > N3 > N4 > N5 > N0 etc.

For 2009 s. barley crop nitrogen rates (kg N/ha) were:
0, 35, 70, 105, 140, 175 as nitro-chalk (27% N).
No N was applied to the beans in 2010

Experimental Diary

			Rate	Unit
11-Sep-09	a	Load straw	7.50	t/ha
21-Sep-09	p	Nufosate Ace - 200 lt water	4.00	l/ha
09-Nov-09	f	Chalk	5.00	t/ha
	a	Spread straw		
11-Nov-09	f	Chalk - Finished	5.00	t/ha
	a	Spread straw		
28-Jan-10	a	Compost - Co plots	40.00	t/ha
02-Feb-10	a	FYM - Dg, 10 plot	10.00	t/ha
03-Feb-10	a	FYM - DG, 25 plot	25.00	t/ha
08-Mar-10	a	Plough - Bean plots		
09-Mar-10	s	Fuego	42.00	s/m2
	a	Combination Drilled		
17-Mar-10	p	Skirmish - 200 lt water on Beans	1.00	l/ha
23-Apr-10	a	Harrowed		
24-Apr-10	s	Fuego	32.00	seeds/m2
	a	Combination Drilled		
26-May-10	a	Baled - Ley plots		
24-Jun-10	a	Cut harvest strips, weighed and sampled - Ley plots		
09-Sep-10	a	Combine harvest, plots for yield		
22-Sep-10	a	Baled - removed		
10-Oct-10	a	Other operation - straw treatments applied as scheduled, chopped and spread		
11-Oct-10	f	compost - as scheduled		
	f	FYM - as scheduled		

Note: Beans re-drilled due to severe damage by crows

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10/W/RN/12

BEAN GRAIN TONNES/HECTARE

***** Table of means *****

Treatment	
F(Fd)	0.70
F(Ln, Lc6)	1.01
st(st)	0.76
CC(Gm, Lc8)	0.86
Co(Pt, Lc8)	1.21
Dg 10 (Fs)	0.87
Dg 25 (Dg)	1.35
Mean	0.96

GRAIN TONNES/HECTARE

Standard errors of differences of means

Table	Treatment
rep	4
d.f.	18
s.e.d.	0.192

Stratum standard errors and coefficients of variations

Stratum	d.f	se	cv%
Block plots	18	0.272	28.2

Grain mean dm% 81.3

Plot area harvested 0.00619

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10/W/RN/12

GRASS/CLOVER

DRY MATTER TONNES/HECTARE

***** Table of means *****

Year	1st Cut	2nd Cut	Total
2003	-	-	-
2004	1.82	-	1.82
2005	1.86	0.13	1.99
2006	4.07	-	4.07
2007	3.12	1.36	4.48
2008	5.72	1.65	7.37
2009	4.77	-	4.77
2010	4.41	-	4.41

Cut dry matter t/ha (24/6/10)

Note: See previous Yield Books (2004-09) for cutting dates

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10/R/CS/326 and 10/W/CS/326

AMOUNTS OF STRAW

Object: To study the effects of different amounts of straw, incorporated into the soil, on w. wheat – Rothamsted (R) Great Knott III, Woburn (W) Far Field I

Sponsors: A Macdonald and M. J. Glendining,

The 24th year, w. wheat

For previous years see Yield Books for 87-09/R & W/CS/326

Design: 4 randomised blocks of 4 plots (R)
3 randomised blocks of 4 plots (W)

Whole plot dimensions: 3.0 x 13.5 (R). 0.004 ha
3.0 x 14.5 (W).

Treatments:

STRAW Amounts of straw incorporated into the seedbed (t/ha), cumulative to previous annual dressings:

		R	W
NONE	None	-	-
NORMAL	Normal	4.30	3.20
2 NORMAL	Twice normal	8.60	6.40
4 NORMAL	Four times normal	17.20	12.80

Experimental Diary

Great Knott III (R)

			Rate	Unit
19-Aug-09	a	Load straw		
11-Sep-09	p	Nufosate Ace - on stubble	1.50	l/ha
05-Oct-09	a	Combination Drilled		
	s	Hereward - At 350 seeds per m2	145.00	kg/ha
	p	Liberator - 200 lt water	0.60	l/ha
12-Mar-10	f	Double top	185.00	kg/ha
08-Apr-10	p	Unix - 146 lt water	1.00	l/ha
	p	Unix - 146 lt water	1.00	l/ha
	p	Cherokee - 146 lt water	1.00	l/ha
	p	Cherokee - 146 lt water	1.00	l/ha
15-Apr-10	f	Nitram	232.00	kg/ha
17-Apr-10	p	Pacifica - Winter wheat only (146 lt water)	0.50	kg/ha
	p	Biopower - Started (146 lt water)	1.00	l/ha
04-May-10	a	Mow / Rotavate paths		

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10/R/CS/326 and 10/W/CS/326

			Rate	Unit
05-May-10	p	Bravo 500	1.00	l/ha
	p	Splice	1.00	l/ha
	p	Tracker	1.00	l/ha
	p	Talius	0.13	l/ha
	p	Talius	0.13	l/ha
	p	Agriguard Chlormequat 720	2.25	l/ha
	p	Chlormequat 3C	2.25	l/ha
10-May-10	a	Mow / Rotavate paths		
18-May-10	f	Nitram	174.00	kg/ha
19-May-10	p	Ally Max SX	42.00	g/ha
	p	Tomahawk	1.00	l/ha
31-May-10	p	Comet 200 - 200 lt water	0.60	l/ha
	p	Opus - 200 lt water	0.60	l/ha
07-Jun-10	a	Cut paths		
17-Jun-10	a	Cut paths		
14-Jul-10	a	Mow / Rotavate paths		
31-Aug-10	a	Combine harvest, plots for yield		
	a	Sample, bale and weigh straw		
01-Sep-10	a	Sample, bale and weigh straw		
04-Sep-10	a	Baled		

Far Field I (W)

			Rate	Unit
01-Oct-09	a	Combination Drilled		
	a	Rolled		
	s	Hereward - At 350 seeds per m2		
10-Dec-09	p	Atlantis - 200 l/ha water	400.00	g/ha
	p	Stomp 400 SC - 200 l/ha water	3.00	lt/ha
	p	Biopower - 200 l/ha water	1.00	lt/ha
18-Mar-10	f	Double Top	185.00	kg/ha
10-Apr-10	p	Atlantis WG - 200 lt water	0.40	lt/ha
	p	Biopower - 200 lt water	1.00	lt/ha
15-Apr-10	f	Nitram - Winter wheat	232.00	kg/ha
17-May-10	f	Nitram 34.5%	115.00	kg/ha
02-Jun-10	p	Opus - 200 lt water	0.60	l/ha
	p	Comet - 200 lt water	0.6	l/ha
06-Sep-10	a	Cut harvest strips, weighed and sampled		
	a	Swath straw		
13-Sep-10	a	Sample, bale and weigh straw		
10-Oct-10	a	Other operation - straw treatments applied, chopped and spread (1=15.3kg)		

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10/R/CS/326

GRAIN TONNES/HECTARE

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

Treatment	
-	7.35
1	7.47
2	7.34
4	7.63
Mean	7.45

Standard errors of differences of means

Table	Treatment
s.e.d.	0.219

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	9	0.310	4.2

Grain mean dm% 85.6

STRAW TONNES/HECTARE

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

Treatment	
-	3.53
1	3.50
2	3.65
4	3.87
Mean	3.64

Standard errors of differences of means

Table	Treatment
s.e.d.	0.212

Stratum standard errors and coefficients of variation

Straw (at 85% dry matter) tonnes/hectare

Stratum	d.f.	s.e.	cv%
Blocks.Plots	9	0.300	8.2

Straw mean dm% 89.4

Plot area harvested 0.00270

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10/W/CS/326

GRAIN TONNES/HECTARE

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

Treatment	
-	6.43
1	6.36
2	6.20
4	6.24
Mean	6.31

Standard errors of differences of means

Table	Treatment
s.e.d.	0.2.78

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.341	5.4

GRAIN MEAN DM% 88.3

STRAW TONNES/HECTARE

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

Treatment	
-	3.12
1	3.09
2	3.13
4	3.14
Mean	3.12

Standard errors of differences of means

Table	Treatment
s.e.d.	0.321

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.393	12.6

STRAW MEAN DM% 86.8

Plot area harvested 0.00290

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10/R/CS/477

CONTINUOUS MAIZE

Object: To monitor the fate of organic carbon in the soil organic matter – Hoosfield

Sponsors: A. J. Macdonald

The 14th year, forage maize and s. barley

For previous years see Yield Books for 97-09/R/CS/477

Design: 3 randomised blocks of 6 plots.

Plot dimensions: 12.0 x 25.0

Treatments:-

CROP	Crop and straw treatments:
M	Continuous maize, stubble incorporated
(M)B	S. barley after five years maize, stubble incorporated
MT	Maize, stubble plus 10 t maize tops incorporated
B(M)	S. barley, after ten years of Maize, straw removed
BT	Continuous spring barley, straw removed plus 10 t maize tops incorporated
B	Continuous spring barley, straw removed

Note: Cropping was changed from Maize to S. barley on the BM treatment in 2010

Experimental diary

			Rate	Unit
14-Sep-09	a	Spread maize on plots - 300 kg on each plot	10.00	t/ha
29-Sep-09	f	MOP	181.00	kg/ha
	f	TSP	171.00	kg/ha
	a	Spread fertiliser		
	a	Spread fertiliser		
06-Oct-09	a	Subsoiled - Headlands only		
09-Oct-09	a	Plough		
11-Mar-10	p	Rosate 36 - 200 lt water	6.00	l/ha
06-Apr-10	a	Springtined		
	a	Flexitined - tramlines only		
07-Apr-10	a	Flexitined - Headlands only		
08-Apr-10	s	Optic - Spring barley plots	350.00	seeds/m2
	a	Flexitined		
	a	Combination Drilled		
09-Apr-10	a	Rolled		
26-Apr-10	f	Double Top	356.00	kg/ha
	a	Power harrowed - Maize area		
	a	Flexi Tined - Maize area		
27-Apr-10	s	Hudson	10.20	seeds/msq
	a	Nodet Drilled		
28-Apr-10	a	Rolled - Maize plots		

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10/R/CS/477

24-May-10	p	Kestral - started	0.50	l/ha
	p	Jenton - started	0.50	l/ha
	p	Bravo 500 - started	1.00	l/ha
25-May-10	p	Kestral	0.50	l/ha
	p	Jenton	0.50	l/ha
	p	Bravo 500	1.00	l/ha
26-May-10	p	Headland Charge - 200 lt water	1.50	l/ha
	p	Harmony M SX - 200 lt water	100.00	g/ha
31-May-10	p	Pirlid- 200 lt water	0.35	l/ha
04-Jun-10	p	Axial - 200 lt water	0.40	l/ha
	p	Axial - 200 lt water	0.40	l/ha
	p	Adigor - 200 lt water	1.00	l/ha
	p	Adigor - 200 lt water	1.00	l/ha
	p	Callisto - 200 lt water	0.75	l/ha
	p	Samson Extra - 200 lt water	0.50	l/ha
18-Jun-10	a	Cut paths		
23-Jun-10	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Bravo 500 - 200 lt water	1.00	l/ha
	p	Mobius - 200 lt water	0.43	l/ha
	p	Standon Fenpropimorph 750 - 200 lt water	0.50	l/ha
	p	Corbel - 200 lt water	0.50	l/ha
14-Jul-10	a	Mow / Rotavate paths		
21-Aug-10	a	Combine harvest barley plots for yield		
	a	Baled		
27-Sep-10	a	Harvest Maize Plots		
	a	Other operation, - cut maize discards		
28-Sep-10	a	Other operation, - cut maize discards		

MAIZE

WHOLE CROP (AT 100% DRY MATTER) TONNES/HECTARE

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

Treatment	
M	11.02
MT	10.32
Mean	10.67

Standard errors of differences of means

Table	Treatment
s.e.d.	1.684

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Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	2	2.062	19.3

MEAN DM% 31.4

PLOT AREA HARVESTED 0.00108

SPRING BARLEY

GRAIN TONNES/HECTARE

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

Treatment	
(M)B	3.25
BT	3.87
B	2.88
B(M)	4.21
Mean	3.55

Standard errors of differences of means

Table	Treatment
s.e.d.	0.319

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.390	11.0

Grain mean dm% 83.0

Plot area harvested 0.00525

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10/W/CS/478

CONTINUOUS MAIZE

Object: To monitor the fate of organic carbon in the soil organic matter – Woburn, Stackyard AI

Sponsors: A. J. Macdonald

The 14th year, forage maize and s. barley

For previous years see Yield Books for 97-09/W/CS/478

Design: 3 randomised blocks of 6 plots.

Plot dimensions: 9.0 x 25.00

Treatments:-

CROP Crop and straw treatments:

M	Continuous maize, stubble incorporated
(M)B	S. barley after five years maize, stubble incorporated
MT	Maize, stubble plus 10 t maize tops incorporated
B(M)	S. barley, after ten years of maize, straw removed
BT	Continuous spring barley, straw removed plus 10 t maize tops incorporated
B	Continuous spring barley, straw removed

Note: Cropping was changed from Maize to S. barley on the BM treatment in 2010

Experimental diary

			Rate	Unit
16-Sep-09	a	Spread maize on plots - BT and MT plots	10.00	t/ha
21-Sep-09	p	Nufosate Ace - 200 lt water	4.00	l/ha
23-Sep-09	f	MOP	181.00	kg/ha
	a	Broadcast		
	f	TSP	171.00	kg/ha
14-Oct-09	a	Plough		
11-Apr-10	a	Harrowed		
19-Apr-10	s	Optic tr Raxil Pro	350.00	seeds/m2
19/04/2010	a	Combination Drilled		
	a	Rolled		
28-Apr-10	s	Hudson tr Mesurol	10.20	seeds/m2
	a	Nodet Drilled		
17-May-10	f	Double top	356.00	kg/ha
02-Jun-10	p	Opus - 200 lt water	0.60	l/ha
	p	Corbel - 200 lt water	0.50	l/ha
22-Jun-10	p	Callisto - 220 lt water	1.00	l/ha
	p	Samson - 220 lt water	0.75	l/ha
09-Sep-10	a	Combine harvest, plots for yield - barley		
	a	Swath straw		
21-Sep-10	a	Baled and removed		
30-Sep-10	a	Harvest Maize Plots - weighed and sampled		
09-Oct-10	a	Mown - maize plots		

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10/W/CS/478

MAIZE

WHOLE CROP (AT 100% DRY MATTER) TONNES/HECTARE

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

Treatment	
M	7.06
MT	5.53
Mean	6.29

Standard errors of differences of means

Table	Treatment
s.e.d.	0.484

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	2	0.593	9.4

MEAN DM% 39.7

PLOT AREA HARVESTED 0.00108

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10/W/CS/478

SPRING BARLEY

GRAIN TONNES/HECTARE

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

Treatment	
(M)B	2.21
BT	2.25
B	1.94
B(M)	3.26
Mean	2.41

Standard errors of differences of means

Table	Treatment
s.e.d.	0.124

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.151	6.3

Grain mean dm% 84.4

Plot area harvested 0.00525

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Rothamsted Experimental Station

The Weather : Monthly Summary : 2010

(Departure from 30-year means (1971 - 2000) in brackets)

	Sunshine		Mean temperatures °C								Rain			Drainage	Wind
			Maximum		Minimum		Dew	Ground	In ground under grass		Total mm		Rain	20 inch	***
	Hours	( )	°C	( )	°C	( )	point	frosts [a]	30 cm	100 cm	12cm(5") turf wall		Days**	mm	km/hr
January	65.8	(+10.76)	3.2	(-3.10)	-0.9	(-1.74)	-0.4	19	3.1	5.7	47.3	(-22.32)	13	48.4	8.9
February	55.6	(-15.08)	5.4	(-1.27)	0.3	(-0.47)	1.2	18	3.4	5.1	77.2	(+28.44)	23	72.9	9.6
March	145.7	(+38.52)	9.8	(+0.34)	2.5	(+0.19)	2.9	20	5.6	5.7	45.2	(-8.72)	13	17.2	10.6
April	222.5	(+75.68)	14.1	(+2.17)	3.8	(+0.15)	3.8	14	8.9	8.1	18.7	(-34.83)	8	4.0	9.0
May	205.4	(+10.49)	15.4	(-0.37)	5.7	(-0.62)	5.9	11	11.5	10.1	38.4	(-11.33)	8	14.0	8.3
June	240.8	(+50.48)	20.8	(+2.22)	10.3	(+1.09)	10.1	0	15.3	12.9	23.5	(-36.71)	9	0.2	8.0
July	179.4	(-23.95)	22.8	(+1.35)	13.2	(+1.86)	11.7	0	17.6	15.4	31.6	(-10.41)	12	0.2	8.1
August	140.3	(-56.48)	19.8	(-1.63)	11.7	(+0.39)	11.4	0	16.5	15.5	127.6	(+73.87)	20	39.2	8.8
September	133.2	(-9.16)	17.7	(-0.31)	10.0	(+0.51)	10.8	0	14.7	14.7	59.7	(-1.31)	16	12.5	8.7
October	99.6	(-12.59)	13.7	(-0.04)	7.2	(+0.60)	8.1	7	12.2	13.1	84.9	(+10.25)	16	50.9	8.9
November	60.5	(-9.62)	7.5	(-1.84)	2.7	(-0.60)	3.0	13	8.5	10.5	54.8	(-11.40)	21	29.1	10.3
December	38.4	(-9.70)	2.0	(-5.15)	-2.7	(-4.61)	-1.2	24	3.6	6.5	35.3	(-34.80)	16	28.1	8.6
Year	1587.0	(+49.3)	12.7	(-0.6)	5.3	(-0.3)	5.6	126.0	10.1	10.3	644.2	(-59.4)	175.0	316.5	9.0

[a] Number of nights grass minimum was below 0.0 °C

** Number of days rain was 0.2 mm or more

*** At 2 metres above ground

30 year Mean Rainfall = 704mm

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Woburn Experimental Farm

The Weather : Monthly Summary : 2010

(Departure from 30-year means (1971 - 2000) in brackets)

	Sunshine		Mean temperatures °C								Rain			Wind[c]
			Maximum		Minimum		Dew	Ground	In ground under grass		Total mm		Rain	***
	Hours	( )		( )		( )	point	frosts [a]	30 cm	100 cm	Tipping bucket		days **	km/hr
												( )		
January	60.4	(+12.09)	3.6	(-3.11)	-1.2	(-2.21)	-0.3	17	3.3	6.1	44.8	(-10.68)	16	6.6
February	54.8	(-9.19)	5.8	(-1.32)	0.1	(-0.73)	1.4	16	3.6	5.4	79.6	(+38.80)	26	6.9
March	141.0	(+39.73)	10.4	(+0.48)	2.5	(+0.10)	3.4	14	5.8	5.6	35.2	(-14.37)	16	8.6
April	213.7	(+77.91)	14.8	(+2.54)	3.4	(+0.04)	4.9	9	9.2	7.8	19.8	(-32.80)	10	7.1
May	205.3	(+22.05)	16.3	(+0.29)	5.4	(-0.67)	7.2	3	11.8	9.6	55.8	(+3.07)	9	6.0
June	248.9	(+71.97)	21.5	(+2.56)	9.3	(+0.26)	11.2	0	15.8	12.1	38.0	(-20.79)	10	5.7
July	173.6	(-19.87)	23.2	(+1.46	13.3	(+2.10)	12.3	0	18.1	14.8	16.8	(-28.84)	11	8.2
August	127.6	(-56.76)	20.2	(-1.36)	11.9	(+0.81)	11.7	0	16.9	15.4	151.8	(+97.30)	20	7.6
September	133.1	(+1.88)	18.3	(+0.06)	9.6	(+0.29)	11.4	0	15.0	14.9	51.0	(-7.44)	17	7.9
October	101.6	(-2.21)	14.2	(+0.19)	7.3	(+0.85)	9.3	6	12.5	13.6	46.4	(-18.27)	18	7.1
November	59.6	(-3.83)	7.9	(-1.72)	2.0	(-1.40)	4.0	18	8.8	11.2	34.0	(-23.37)	18	7.5
December	29.2	(-12.16)	2.4	(-5.14)	-3.8	(-5.75)	-1.1	22	3.7	7.4	18.0	(-41.67)	14	5.3
Year	1519.7	(+133.8)	14.2	(+0.0)	5.8	(-0.05)	6.9	83	11.0	10.6	573.2	(-17.37)	171.0	7.2

[a] Number of nights grass minimum was below 0.0 °C

** Number of days rain was 0.2 mm or more

*** At 2 metres above ground

30 year Mean Rainfall = 649mm

https://doi.org/10.23637/ERADOC-1-220