ROTHAMSTED RESEARCH

Yields of the Field Experiments 2012

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Results of the Classical and Other Long-term Experiments 2012

Rothamsted Research

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Results of the

Classical and other

Long-term Experiments

2012

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List of Experiments in the 2012 Yield Book

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R/CS/477 & W/CS/478	Continuous Maize
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 DM%: 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, 50.0 g / l cyproconazole and 62.5 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
Statis	h	glyphosate
Comet	f	200g/l pyraclostrobin
Acanto Prima	f	Cyprodinil+picoxystrobin 30.8% w/w
Chimera	h	Metsulfuron-methyl+thifensulfuron methyl 2.9:42.9% w/w
Tracker	f	Boscalid+epoxiconazole 233:67g/l
Justice	f	200g/l Proquinazid
CCC	gr	720g/l Chlormequat
Hoedown	h	glyphosate
Gallup 360	h	360 g/l glyphosate
Barbarian	h	360 g/l glyphosate
Thor	i/n	10% w/w fosthiazate

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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12/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 169th 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 74-11/R/BK/1.

Areas harvested[a]:

	Section	
Wheat:	0	0.00320
	1	0.00589
	5,4,6 and 7	0.00487
	8,9	0.00512
Oats:	2	0.00487
Maize:	3	0.00162

[a] Harvest areas in the 2007-2010 yield books were incorrectly assigned, but yields were correct.

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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(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 2015/16.
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 2015/16
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 Year	1	9	0*	8+	6**	5	3	7	4	2
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
1989	W	W	W	W	W	W	W	P	F	W

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Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
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
2011	W	W	W	W	W	M	O	W	W	W
2012	W	W	W	W	W	W	M	W	W	O

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*.

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12/R/BK/1

Experimental Diary:

All Sections

Date		Application	Rate	Units
31-Aug-11	p	Sprayed Weedazol - water volume = 200 lt/ha (Sprayed to control equestum prior to primary cultivations)	20	l/ha
27-Sep-11	f	Applied Muriate of PotashPlots 140-149	181	kg/ha
27-Sep-11	f	Applied Triple Super Phosphate - plots 170-189 + 130-149 + 110-119	171	kg/ha
28-Sep-11	a	Applied FYM - to strip 2.1 +2.2 (not section 2 oats)	35	t/ha
01-Oct-11	a	Ploughed – soil thrown Northward	-	
03-Oct-11	a	Cutlipressed	-	
13-Oct-11	p	Sprayed Liberator - sections 0, 1, 4, 5, 6, 7 and 9 only. Plots 012 and 2.12 sprayed by accident. 200 lt/ha water volume.	0.6	l/ha
23-Nov-11	p	Sprayed Seal Z - all sections apart from section 3 sprayed. 200 lt/ha water volume.	50	ml/ha
01-Dec-11	p	Sprayed Lexus class - section 2 only. 200 lt/ha water volume.	60	g/ha
05-Dec-11	a	Cut Hedges - road side only	-	
10-Apr-12	a	Rotovated fallow areas	-	
20-Apr-12	p	Sprayed Platform - all sections except section 3 sv 200lt/ha	1	kg/ha
17-May-12	a	Cut Paths	-	
18-May-12	a	Cut Paths	-	
28-May-12	a	Topped Paths	-	
14-Jun-12	a	Cut paths	-	
14-Jun-12	a	Rotavated paths - to wet to finish		
20-Jun-12	a	Cut Paths	-	
20-Jun-12	a	Rotavated Paths	-	
02-Jul-12	a	Rotavated Fallows	-	
02-Jul-12	a	Replaced marker posts	-	
05-Jul-12	a	Paths Cut	-	
30-Jul-12	a	Paths Cut	-	
06-Aug-12	p	Sprayed Samurai and Mixture B	Sa@3 MB@4	l/ha
28-Aug-12	a	Rolled with Discs	-	
31-Aug-12	p	Sprayed Weedazol. TL EW 296 sv SECTIONS 0 1 2 4 5 6 7 9 only	20	l/ha
28-Sep-12	f	Spread Fert TSP as on sheet - sections spread on to: 110 - 119 130 - 139 140 - 149 170 - 179 180 - 189	171	kg/ha
28-Sep-12	f	Spread Fertilizer Muriate of Potash as on sheet onto Plots: 140 - 149	181	kg/ha

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03-Oct-12	a	Applied FYM to Strip 2.1 and 2.2 but not section 7, as per plan	-	
03-Oct-12	a	Ploughed – soil thrown Southward	-	
Winter Wheat				
11-Oct-11	s	Drilled Hereward trt Redigo Deter	350	seeds/m^2
15-Mar-12	f	Applied Nitram on plots 12, 17, 18 and 19. wheat only	139	kg/ha
21-Mar-12	p	Sprayed Cherokee SE and Justice SV 200lt/ha Sections 0, 1, 9 - 4 - 5 - 7 and 8.	CH@1.0 JU@0.125	l/ha
02-Apr-12	f	Applied Kieserite on plots:- 5,6,7,8,9,11,12,15,116,17,18,19 and 20	80	kg/ha
02-Apr-12	f	Applied Sulphate of Potash on plots:- 5,6,7,8,9,12,13,15,116,17,18,19 and 20	217	kg/ha
17-Apr-12	f	Applied Nitram Feriliser onto plots 6,7,8,9,10,11,12,13,14,15,16,17,18,19 and 20	-	
17-Apr-12	f	Applied Nitram Feriliser onto plot - 2.1 ONLY	417	kg/ha
13-May-12	p	Sprayed Bravo 500, Tracker and CCC ONLY ON SECTIONS: 0, 1, 9, 4, 5, 7 & 8	Br@1.0 Tr@1.0 CCC@2.25	l/ha
13-May-12	p	Sprayed Ally Max, Starane, Topik and Wetter. ONLY SPRAYED SECTIONS 0, 1, 9, 4, 5 ,6 & 7	Al@42* St@0.5 To@0.125	*g/ha, l/ha
22-May-12	f	Applied 3rd N Treatment on sections 12, 17, 18 and 19 wheat only	139	kg/ha
28-May-12	p	Sprayed Comet, Bravo 500 and Opus Sections 0, 1, 9, 4, 5, 7 and 8	Co@0.6 Br@1.0 Op@0.8	l/ha
12-Jun-12	p	Sprayed w/ Amistar and Prosaro 100 sv Sections 0, 1, 9, 2, 4, 5, 7 and 8 ONLY	Am@0.3 Pr@0.7	l/ha
21-Aug-12	a	Harvested	-	
22-Aug-12	a	Harvested	-	
23-Aug-12	a	Sampled, Baled and Weighed Straw	-	
Winter Oats				
11-Oct-11	s	Drilled Gerald trt Beret Multi Section 2 only	350	seeds/m^2
16-May-12	p	Sprayed Amistar, Agriguard, Corbel, Ally Max and Starane 2 Section 2 only	Am@0.5, Ag@2.5, Co@0.25, Al@42*, St@0.5	l/ha, *g/ha

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02-Jul-12	a	Wild Oat Pulling 0.12 - 1 2.28 - 1 0.38 - 1 0.58 - 1 0.98 - 3 118 + 103 158 - 1 168 - 1 178 - 1 113 Total	See Notes	
20-Aug-12	a	Harvested - Cut and Chopped	-	
23-Aug-12	a	Sampled, Baled and Weighed Straw	-	
Maize				
29-Mar-12	p	Sprayed Section 3 - Samurai SL PRE MAIZE 200lt/ha	3	l/ha
13-May-12	s	Drilled Maize Section 3 (Maize)	10.2	seeds/m^2
13-May-12	a	Powerharrowed Section 3 (Maize) only	-	
14-Jun-12	f	Nitram Applied by hand; plots 193, 183, 173 and 123	193 @ 139 183 @ 287 173 @ 278 123 @ 417	kg/ha
20-Jun-12	p	Sprayed Section 3 ONLY w/ Samson Extra and Callisto 200 sv	Sa@0.75and Ca@1.0	l/ha
27-Sep-12		Harvested Maize for Yield	-	
27-Sep-12	a	Harvested and Chopped odds and ends	-	
28-Sep-12	a	Harvested and Chopped odds and ends	-	
Wilderness				
28-May-12	a	Topped wilderness	-	
18-Jun-12	a	Mowed Wilderness with Topper	-	

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

https://doi.org/10.23637/ERADOC-1-222

12/R/BK/1

WHEAT

GRAIN TONNES/HECTARE

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

SECTION / PLOT	5/W1	4/W2	7/W3	6/W35	0/W8	1/W46	9/W54	8/W4	Mean
01(FYM)N4	8.00	7.85	7.50	4.93	*	*	*	*	7.07
21FYMN3	7.45	8.14	7.59	5.34	6.41	6.52	6.93	1.12	6.19
22FYM	7.51	5.91	6.07	5.55	4.96	5.09	5.98	1.10	5.27
03Nil	2.42	1.11	1.25	1.17	1.19	0.53	0.52	0.84	1.13
05(P)KMg	2.01	1.47	1.42	1.36	1.46	1.21	1.56	1.63	1.51
06N1(P)KMg	4.08	3.63	3.51	3.24	3.63	3.32	3.46	1.33	3.28
07N2(P)KMg	6.03	5.20	4.53	4.26	5.28	5.19	4.67	1.51	4.59
08N3(P)KMg	7.30	5.58	5.77	5.38	6.53	6.37	5.87	2.11	5.61
09N4(P)KMg	7.29	5.87	6.76	5.64	6.10	6.36	6.68	1.98	5.84
10N4	6.34	3.57	1.43	1.56	1.11	1.48	1.13	0.76	2.17
11N4PMg	5.24	2.84	3.00	3.15	5.47	3.29	2.39	0.89	3.28
12N1+3+1(P)KMg	7.08	7.52	7.57	5.52	6.53	6.49	7.28	1.44	6.18
13N4PK	7.21	6.30	6.52	5.98	6.55	6.12	6.49	1.97	5.89
14N4PK*(Mg*)	7.55	6.09	6.53	6.20	6.45	6.14	6.56	1.46	5.87
15N5(P)KMg	7.34	6.63	7.30	5.76	6.94	7.12	7.17	1.25	6.19
16N6(P)KMg	6.59	7.56	7.34	5.09	6.50	7.06	6.99	0.64	5.97
17N1+4+1PKMg	6.35	6.95	7.20	5.08	6.22	6.76	6.75	0.87	5.77
18N1+2+1PKMg	7.28	7.33	7.18	5.43	6.99	6.62	7.19	1.30	6.17
19N1+1+1KMg	7.79	5.77	6.47	4.58	5.91	5.66	6.73	1.52	5.55
20N4KMg	*	*	*	*	1.12	0.14	*	*	0.63
Mean	6.36	5.54	5.52	4.49	5.02	4.82	5.24	1.32	4.81

GRAIN MEAN DM% 85.1

STRAW TONNES/HECTARE

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

SECTION / PLOT	5/W1	4/W2	7/W3	6/W35	0/W8	1/W46	9/W54	8/W4	Mean
01(FYM)N4	8.79	*	*	*	*	*	*	*	8.79
21FYMN3	8.07	*	*	*	*	4.30	*	7.13	6.50
22FYM	5.82	*	*	*	*	4.30	*	4.59	4.90
03Nil	0.95	*	*	*	*	0.14	*	0.75	0.61
05(P)KMg	0.62	*	*	*	*	0.17	*	3.68	1.49
06N1(P)KMg	2.59	*	*	*	*	1.44	*	3.98	2.67
07N2(P)KMg	3.96	*	*	*	*	2.31	*	3.43	3.23
08N3(P)KMg	5.37	*	*	*	*	3.67	*	5.44	4.83
09N4(P)KMg	6.57	*	*	*	*	3.52	*	5.85	5.31
10N4	3.48	*	*	*	*	0.75	*	2.61	2.28
11N4PMg	3.22	*	*	*	*	1.28	*	4.06	2.86
12N1+3+1(P)KMg	8.40	*	*	*	*	4.02	*	6.05	6.16
13N4PK	6.07	*	*	*	*	3.03	*	5.42	4.84
14N4PK*(Mg*)	5.31	*	*	*	*	3.18	*	5.13	4.54
15N5(P)KMg	7.16	*	*	*	*	4.56	*	6.14	5.96
16N6(P)KMg	8.79	*	*	*	*	4.41	*	6.15	6.45
17N1+4+1PKMg	9.04	*	*	*	*	4.62	*	6.37	6.68
18N1+2+1PKMg	7.48	*	*	*	*	4.00	*	8.35	6.61
19N1+1+1KMg	5.90	*	*	*	*	3.23	*	6.47	5.20
20N4KMg	*	*	*	*	*	0.14	*	*	0.14
Mean	5.66	*	*	*	*	2.79	*	5.09	4.51

STRAW MEAN DM% 86.9

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12/R/BK/1

OATS

TONNES/HECTARE (85% DM)

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

Units	PLOT	GRAIN	STRAW
12	01(FYM)N4]	5.66[a]	2.99
212	21[FYMN2]	6.21	3.28[a]
222	22[FYM]	6.45	3.41
32	03Nil	1.74	0.40
52	05(P)KMg	1.97	0.48
62	06[N1](P)KMg	2.37	0.66
72	08[N2](P)KMg	2.88	0.81
82	08[N3](P)KMg	4.37	1.59
92	09[N4](P)KMg	3.61	0.97
102	10[N4]	4.76	2.06
112	11[N4]PMg	5.85	3.26
122	12[N1+3+1](P)KMg	4.29	1.54
132	13[N4]PK	3.43	0.91
142	14[N4]PK*(Mg*)	3.29	0.86
152	15[N5](P)KMg	5.33	2.83
162	16[N6](P)KMg	6.24	4.37
172	17[N1+4+1]PKMg	5.11	2.70
182	18[N1+2+1]PKMg	3.35	1.09
192	19[N1+1+1]KMg	2.94	0.73
	MEAN DM%	87.0	77.9

[a]Values estimated from the grain/straw ratio of plot 22.2 due to combine blockage

MAIZE

TONNES/HECTARE (100% DM)

ERRATUM
see 2016 page16 (supplied)

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

PLOT	WHOLE CROP
01(FYM)N4	16.71
21FYMN3	21.28
22FYM	13.08
03Nil	1.93
05(P)KMg	4.15
06N1(P)KMg	6.71
07N2(P)KMg	10.33
08N3(P)KMg	12.66
09N4(P)KMg	11.85
10N4	1.12
11N4PMg	6.35
12N2+3(P)KMg	10.88
13N4PK	12.51
14N4PK*(Mg*)	11.45
15N5(P)KMg	11.60
16N6(P)KMg	10.65
17N2+4PKMg	10.65
18N2+2PKMg	13.37
19N2+1KMg	6.33
MEAN	10.19

MEAN DM% 25.9

PLOT AREA HARVESTED 0.00162

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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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SECTION 8: CLEAN GRAIN, TONNES/HA, AFTER REMOVING WEED SEEDS.

YEAR	2010	2011
SECTION	8/W2	8/W3
PLOT		
01 (FYM)N4	–	–
2.1 FYMN2	1.69	3.03
2.2 FYM	3.20	3.67
03 Nil	0.67	1.53
05 (P)KMg	1.52	2.51
06 N1(P)KMg	2.16	2.31
07 N2(P)KMg	3.11	2.38
08 N3(P)KMg	3.99	2.91
09 N4(P)KMg	4.38	3.58
10 N4	1.14	1.12
11 N4PMg	4.49	3.33
12 N1+3+1(P)K2Mg2	3.58	4.56
13 N4PK	3.06	3.39
14 N4PK*(Mg*)	3.68	2.96
15 N5(P)KMg	2.55	1.34
16 N6(P)KMg	2.23	2.43
17 N1+4+1PKMg	2.69	2.42
18 N1+2+1PKMg	2.59	3.42
19 N1+1+1KMg	2.31	2.18
20 N4KMg	*	*

Note: Section 8 fallow in 2008

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12/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 161st year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-10/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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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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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 2013.

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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Experimental Diary

Date		Application	Rate	Unit
14-Sep-11	p	Sprayed Weedazol in water @ 250 l/ha	20	l/ha
24-Nov-11	f	Applied Kieserite to plots 634,633,632,631	233	kg/ha
24-Nov-11	f	Applied Triple Superphosphate to plots 634,633,632,631.	215	kg/ha
24-Nov-11	f	Applied Sulphate of Potash as per plan.	217	kg/ha
28-Nov-11	f	Applied silicate of soda to plots 433,432,333,332,233,232,133 and 132.	450	kg/ha
29-Nov-11	a	Ploughed, soil thrown south.	-	
29-Dec-11	a	Applied FYM to plots 734,733,732,731,724,723,722, and 721	35	t/ha
27-Feb-12	s	Drilled Tipple Sp. Barley tr Beret Multi	164	kg/ha
27-Feb-12	a	Flexi Tined	-	
01-Mar-12	a	Rolled – Finished	-	
01-Mar-12	p	Sprayed Kula and Stomp 400 in 200l/ha.	K@3.3 S@2.0	l/ha
12-Apr-12	a	Rotovated paths	-	
23-Apr-12	f	Nitrochalk Applied by hand, to Plots 11,12, 21, 22,31,32,41,42,61,62,63,71,72,73 (Main Plots).	0, 48,96, 144	kg N /ha
10-May-12	f	Nitram Applied by hand to Plots 13, 23, 33, 43, 44, 34, 24, 14, 55, 56, 57 and 58 (Silicate & P Test Plots).	144	kg N/ha
16-May-12	f	Nitram Applied to surrounding areas.	417	kg/ha
22-May-12	p	Sprayed Spring Barley w/ Amistar, Corbel and Duplosan	Am@1.0 Co@0.25 Du@2.0	l/ha
10-Jun-12	p	Sprayed Jenton in 200 l/ha	1.5	l/ha
14-Jun-12	a	Pull up Wild Oats - discards only	-	
04-Jul-12	a	Picking Wild Oats - 24 plants picked from plots	-	
06-Aug-12	a	Cut Paths	-	
24-Aug-12	a	Harvested O+E's	-	
31-Aug-12	a	Harvested	-	
03-Sep-12	a	Sampled, Weighed and Baled.	-	
19-Sep-12	a	Stubble Rolled	-	
20-Sep-12	p	Sprayed Whole field w/ Weedazol EW	20	l/ha
28-Sep-12	f	Spread Sulphate of Potash as on sheet to plots 631-634 411-444 311-344 241-244 141-144 + Strip 5	217	kg/ha
28-Sep-12	f	Spread Fert TSP and Kieserite as on sheet sections 631-634	Tsp@215 Kie@233	kg/ha
01-Oct-12	a	Spread Soda Silicate onto plots 432-132, 433-133	450kg/ha	kg/ha
03-Oct-12	a	Applied FYM to 734 to 731 and 724 to 721	35t/ha	t/ha
08-Oct-12	A	Ploughed	-	

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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MAIN PLOTS

Grain tonnes/hectare

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

N	0	48	96	144	Mean
MANURE					
---	1.40	2.00	1.70	1.82	1.73
-P-	1.82	2.63	3.34	3.13	2.73
--K	0.43	0.91	0.93	0.99	0.82
-PK	1.89	3.49	4.53	5.73	3.91
A--	0.93	1.51	2.07	1.67	1.54
AP-	2.57	2.82	2.12	2.51	2.50
A-K	0.62	0.89	0.85	1.24	0.90
APK	1.75	3.80	4.65	5.16	3.84
FYM1852onwards	7.05	7.87	7.80	8.02	7.68
FYM1852-1871	2.92	2.15	2.33	2.27	2.42
(A)	1.82	2.54	3.05	4.07	2.87
-	0.91	2.13	2.28	1.74	1.77
FYM2001onwards	5.57	7.00	7.63	7.98	7.04
P2K	3.11	4.97	6.27	6.66	5.25
Mean	2.34	3.19	3.54	3.78	3.21

Grain Mean DM% 96.7

Straw tonnes/hectare

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

N	0	48	96	144	Mean
MANURE					
---	0.28	0.60	0.36	0.56	0.45
-P-	0.54	0.91	1.47	1.49	1.10
--K	0.14	0.22	0.14	0.16	0.16
-PK	0.40	1.19	1.50	2.27	1.34
A--	0.16	0.30	0.56	0.39	0.35
AP-	0.69	1.21	0.95	1.35	1.05
A-K	0.20	0.14	0.17	0.19	0.18
APK	0.36	1.41	1.46	2.03	1.32
FYM1852onwards	2.71	3.15	3.26	3.78	3.22
FYM1852-1871	0.85	0.45	0.78	0.97	0.76
(A)	0.58	0.88	1.08	1.74	1.07
-	0.23	0.68	0.29	0.44	0.41
FYM2001onwards	1.73	2.94	3.43	3.49	2.90
P2K	0.83	1.74	2.30	2.84	1.93
Mean	0.69	1.13	1.27	1.55	1.16

Straw Mean DM% 84.1

Plot area harvested
0.00256 or 0.00192

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PHOSPHATE PLOTS

Grain tonnes/hectare

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

PLOTS	
142	3.41
143	3.35
144	3.12
242	6.52
243	6.76
244	5.92
341	4.65
342	5.23
343	4.07
344	3.96
441	5.74
442	6.21
443	6.10
444	5.72
551	5.30
552	4.95
561	5.24
562	4.44
571	3.51
572	3.24
581	1.29
582	0.98
Mean	4.53

Grain Mean DM% 84.0

Plot area harvested 0.00256

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12/R/HB/2

SILICATE PLOTS

Grain tonnes/hectare

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

PK / **Silicat**e	N3--	N3P-	N3-K	N3PK	Means
(-)-	2.43	3.40	1.86	5.89	3.40
(Si)-	3.39	4.19	3.71	6.56	4.46
(-)Si	3.10	3.88	2.61	6.00	3.90
(Si)Si	3.39	3.64	3.90	5.88	4.20

Grain Mean DM% 84.0

Plot area harvested 0.00256

https://doi.org/10.23637/ERADOC-1-222 *pp 25*

12/R/WF/3

WHEAT AND FALLOW

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

The 157th year, w. wheat.
For previous years see 'Details' 1967, 1973 and Yield Books for 74-11/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

Date		Application	Rate	Units
03-Oct-11	a	Ploughed	-	
04-Oct-11	a	Culitpressed	-	
12-Oct-11	a	Rolled	-	
14-Oct-11	p	Sprayed Liberator in 200l/ha of water	0.6	l/ha
22-Feb-12	a	Drilled Crusoe trt Redigo Deter	450	Sm^2
22-Mar-12	p	Sprayed Cherokee SE and Justice in 200l/ha of water	Ch@1.0 Ju@0.125	l/ha
10-Apr-12	a	Rotovated fallow areas	-	
05-May-12	p	Sprayed AllyMax, Bravo 500, Tracker, Agriguard and Starane 2 in 200l/ha of water	Al@ 42* Br@1.0 Tr@1.0 Ag@2.25St@0.5	*g/ha, l/ha
05-May-12	p	Sprayed AllyMax, Bravo 500, Tracker, Agriguard and Starane 2 in 200l/ha of water	Al@42* Br@1.0 Tr@1.0 Ag@2.25St@0.5	*g/ha, l/ha
23-May-12	p	Sprayed Comet, Bravo 500 and Opus	Co@0.6Br@1.0 Op@0.8	l/ha
13-Jun-12	p	Sprayed w/ Amistar and Prosaro	Am@0.3Pro@0.7	l/ha
14-Jun-12	a	Cut paths	-	
01-Aug-12	a	Marking out Experiment	-	
07-Aug-12	a	Paths Cut and Cultivated	-	
23-Aug-12	a	Harvested.	-	
24-Aug-12	a	Harvested O+E's	-	
24-Aug-12	a	Sampled Baled and Weighed	-	
14-Sep-12	a	Rotovated Fallows	-	
20-Sep-12	p	Sprayed Whole field w/ Weedazol EW	20	l/ha
04-Oct-12	a	Ploughed	-	

Grain and straw tonnes/hectare

	Grain	Straw
Yield	1.613	0.8691
DM%	83.11	89.59

Plot area harvested 0.04431

Note: Unground grain and straw was archived.

https://doi.org/10.23637/ERADOC-1-222 *pp 26*

12/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1856 - 1901, and of additional phosphate applied since 1986 (P test) and of additional potassium since 2007 (K test); on the yield of continuous s. barley up to 1991, w. wheat since – Hoosfield.

The 157th year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-11/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:

	2000-12	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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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

Date		Application	Rate	Units
15-Aug-11	a	Combined for yields	-	
15-Aug-11	a	Straw weights	-	
29-Sep-11	f	Applied Triple Super Phosphate, as per plan.	-	
29-Sep-11	f	Applied Muriate of Potash, as per plan	-	
30-Sep-11	a	Applied Chalk, as per plan Plots 022,024,074. Plots 011,023,044,061,062,063,064, 071, 082,083,084,103. Plots 021, 041,042,043, 051,054,081,101,102,104.	 2 4 6	 t/ha t/ha t/ha
03-Oct-11	a	Ploughed	-	
04-Oct-11	a	Cultipressed	-	
12-Oct-11	a	Rolled	-	
14-Oct-11	p	Sprayed Liberator in 200l/ha of water	0.6	l/ha
16-Mar-12	f	Applied Ammonium Sulphate Fertiliser	238	kg/ha
22-Mar-12	p	Sprayed Cherokee SE and Justice in 200l/ha	Ch1.0 Ju 0.125	l/ha
11-Apr-12	f	Applied Nitram Feriliser	580	kg/ha
05-May-12	p	Sprayed AllyMax, Bravo 500, Tracker, Agriguard and Starane in 200l/ha of water	Al@ 42* Br@ 1.0 Tr@ 1.0 Ag@ 2.25 St@0.5	*g/ha l/ha
05-May-12	p	Sprayed AllyMax, Bravo 500, Tracker, Agriguard and Starane 2 in 200 l/ha of water	Al@ 42*, Br@ 1.0, Tr@ 1.0, Ag@ 2.25, St@0.5	*g/ha l/ha
17-May-12	a	Cut Paths	-	
17-May-12	f	Applied Nitram	145	kg/ha
23-May-12	p	Sprayed Comet, Bravo 500 and Opus	Co@0.6 Br@1.0 Op@0.8	l/ha
13-Jun-12	p	Sprayed w/ Amistar and Prosaro in 100l/ha of water	Am@0.3 P@0.7	l/ha
14-Jun-12	a	Cut paths	-	
20-Jun-12	a	Cut Paths	-	

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06-Aug-12	a	Cut Paths	-	
07-Aug-12	p	Sprayed w/ Samurai	3	l/ha
23-Aug-12	a	Harvested.	-	
24-Aug-12	a	Harvested O+E's	-	
24-Aug-12	a	Sampled Baled and Weighed	-	
20-Sep-12	p	Sprayed Whole field w/ Weedazol EW	20	l/ha
28-Sep-12	f	Spread Muriate of Potash - plots 103,83,63,43,23	125	kg/ha
28-Sep-12	f	Spread Muriate of Potash - plots 104-94,87-73,64-54,44-34,24-14	250	kg/ha
28-Sep-12	f	Spread TSP as on sheet on plots 101-93,81-73,61-53,41-33,21-13	75	kg/ha

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

P TEST

Grain tonnes/hectare

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

P_RES / OLD_RES	O	P1	P2	P3	Mean
O	2.43	7.22	8.36	8.72	6.68
D	4.94	8.66	8.66	8.64	7.72
N	1.43	7.78	8.21	8.45	6.47
P	3.64	8.23	8.42	8.77	7.26
NPKNAMG	3.45	8.02	8.60	8.52	7.15
Mean	3.18	7.98	8.45	8.62	7.06

Grain mean DM% 86.5

Plot area harvested 0.00538

Straw tonnes/hectare

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

P_RES / OLD_RES	O	P1	P2	P3	Mean
O	1.61	4.01	5.18	5.73	4.13
D	2.89	5.21	6.49	6.41	5.25
N	0.97	4.51	4.95	5.43	3.96
P	2.09	4.79	5.21	5.87	4.49
NPKNAMG	2.22	4.19	5.08	6.03	4.38
Mean	1.96	4.54	5.38	5.89	4.44

Straw mean DM% 86.3

Plot area harvested 0.00538

https://doi.org/10.23637/ERADOC-1-222

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K TEST

Grain tonnes/hectare

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

K_Test / **OLD_RES**	K0	K1	K2	Mean
O	6.23	8.03	8.51	7.25
D	6.43	7.91	8.35	7.28
N*	6.53	8.27	8.36	7.42
PK	7.48	8.53	8.65	8.03
N*PK	6.86	8.35	8.49	7.64
Mean	6.70	8.22	8.47	7.53

Standard errors of differences of means

Table	OLD_RES	K_Test	OLD_RES K_Test	
s.e.d.		0.316	0.707	min.rep
	0.354	0.274	0.612	max-min

Grain mean DM% 86.6

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12/R/EX/4

K TEST

Straw tonnes/hectare

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

K_Test / OLD_RES	K0	K1	K2	Mean
O	4.00	5.74	5.71	4.86
D	5.15	6.51	6.66	5.87
N*	4.79	5.63	5.94	5.29
PK	5.69	6.32	6.37	6.02
N*PK	4.58	5.65	6.13	5.24
Mean	4.84	5.97	6.16	5.45

Standard errors of differences of means

Table	OLD_RES	K_Test	OLD_RES K_Test	
s.e.d.		0.217	0.486	min.rep
	0.243	0.188	0.421	max-min
		0.154X	0.344	max.rep

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	5	0.344	6.3

Straw mean DM% 88.6

Plot area harvested 0.005

https://doi.org/10.23637/ERADOC-1-222

12/R/PG/5

PARK GRASS

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

The 157th year, hay.

For previous years see 'Details' 1977 and 1973 and Yield Books for 74-11/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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12/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 2011-2012; the seventh 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 Lime was applied at rates shown below.

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.]

Experimental diary

Date		Application	Rate	Unit
22-Nov-11	a	Cut and baled	-	
23-Nov-11	a	Cut and baled - finished, bales removed.	-	
28-Nov-11	f	Applied Triple Superphosphate to plots 11/2, 11/1, 10, 9/2, 9/1, 8, 7, 6, 4/2, 4/1, 14/2, 14/1, 15 and 16.	171	kg/ha
28-Nov-11	f	Applied Triple Superphosphate applied to plot 20	73	kg/ha
11-Jan-12	a	Repair fence	-	
17-Jan-12	f	Applied Sulphate of Potash to plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	542	kg/ha
17-Jan-12	f	Applied Sulphate of Soda to plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	43	kg/ha
17-Jan-12	f	Applied Magnesium Sulphate to plots 6,7,9-1,9-2,11-1,14-1,14-2,15,16 and 18	111	kg/ha

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17-Jan-12	a	Applied Chalk to plots 6 - 13/2	See rates	
19-Jan-12	a	Applied Chalk to plots 17a, 16a, 15a	below	
23-Jan-12	a	Applied Chalk to plots 15b - 4/2a and plot 18		
24-Jan-12	a	Chalk applications completed		
23-Jan-12	f	Applied Sulphate of Potash, 11/2 only	542	kg/ha
23-Jan-12	f	Applied Sulphate of Soda	43	kg/ha
23-Jan-12	f	Applied Sulphate Magnesia	111	kg/ha
23-Jan-12	f	Applied silicate of soda, plot 11/2 only	450	kg/ha
25-Jan-12	f	Applied Sulphate of Potash, plot 2/1	542	kg/ha
25-Jan-12	f	Applied Sulphate of Potash, plot 20	108	kg/ha
05-Apr-12	a	Cutting Paths	-	
10-Apr-12	a	Cutting Paths	-	-
16-Apr-12		Applied Sodium Nitrate to plots:		
	f	20	188	kg/ha
	f	16 17	300	
	f	14/2	600	
	f	Applied Ammonium Sulphate Fertiliser to plots: 1, 6, 4/2, 9/2, 10, 18, 11/11, 11/2, as per plan	-	
18-May-12	a	Cut Paths	-	
20-Jun-12	a	Cut Paths	-	
25-Jun-12	a	Started Cutting Plots For Yield	-	
26-Jun-12	a	Cut for Yield	-	
26-Jun-12	a	Mowed Discards	-	
26-Jun-12	a	Grass turned for Hay	-	
27-Jun-12	a	Hay Rowed up	-	
02-Jul-12	a	Topped Tracks/Paths	-	
04-Jul-12	a	Put out corner posts	-	
01-Aug-12	a	Marking out Experiment	-	
06-Aug-12	a	Measured and Cut Paths	-	
07-Aug-12	a	Topped O+E's	-	
17-Oct-12	a	Paths Cut	-	
30-Oct-12	a	Harvest Cut for Samples- see sheet	-	
31-Oct-12	a	Harvested/Cut for Samples	-	
06-Nov-12	a	O+E's cut and bales removed from field	-	
07-Nov-12	a	Baled cut grass, bales removed from field	-	
18-Dec-12	f	Applied TSP to finish	171	kg/ha
19-Dec-12	f	Applied TSP, 200kg	171	kg/ha

NOTE: Samples of herbage (1st and 2nd Cut) were taken for chemical analysis. Unground herbage samples from all plots were archived.

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12/R/PG/5

Chalk applications (t/ha) to Park Grass in 20011/2012 are given below (to include internal paths).

Plot	a	b	c
1	1.75	0.50	0.75
2/1	1.50	0.75	0.30
2/2	0.30	0.30	0.00
3	0.50	0.00	0.00
4/1	1.50	0.30	0.00
4/2	4.00	0.75	0.75
6	3.00	2.50	-
7	2.50	0.75	0.30
8	2.50	0.50	0.30
9/1	1.50	0.50	0.50
9/2	2.50	1.50	1.50
10	3.00	1.00	0.50
11/1	4.00	1.00	1.50
11/2	2.50	1.50	1.00
12	1.50	0.75	0.30
13/1	1.50	0.75	0.30
13/2	2.00	0.30	0.00
14/1	2.00	0.50	0.00
14/2	2.00	0.00	0.00
15	3.00	0.75	0.30
16	3.00	0.00	0.00
17	1.50	0.00	0.00
18	4.00	1.50	0.50

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12/R/PG/5

1ST CUT (23-24/6/12) DRY MATTER TONNES/HECTARE

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

Grand mean 3.79

Manure	Lime	a	b	c	d	Mean
N1	1	3.19	3.07	2.40	1.60	2.56
K	2/1	2.64	2.98	1.96	1.57	2.29
None(FYM)	2/2	2.69	2.72	1.82	2.06	2.32
None	3	2.75	2.83	1.40	1.93	2.23
P	4/1	3.90	4.09	3.49	3.39	3.72
N2P	4/2	3.04	3.30	3.47	2.51	3.08
N1PKNaMg	6	5.32	5.02			5.17
PKNaMg	7	5.15	5.08	5.01	3.94	4.80
PNaMg	8	3.27	3.33	3.52	3.29	3.36
PKNaMg(N2)	9/1	4.95	5.09	4.44	1.49	3.99
N2PKNaMg	9/2	4.47	4.68	4.58	3.79	4.38
N2PNaMg	10	4.01	3.88	3.73	2.69	3.58
N3PKNaMg	11/1	6.67	5.11	5.26	3.10	5.03
N3PKNaMgSi	11/2	5.85	5.06	5.16	3.86	4.98
None	12	2.46	2.38	1.45	1.32	1.90
(FYM/F)	13/1	3.54	3.78	3.28	2.80	3.35
FYM/PM	13/2	3.45	3.63	3.40	2.91	3.35
PKNaMg(N2*)	14/1	4.99	5.20	5.07	4.87	5.03
N2*PKNaMg	14/2	5.31	6.40	5.96	5.48	5.78
PKNaMg(N2*)	15	5.33	5.20	4.45	4.55	4.88
N1*PKNaMg	16	5.22	5.05	4.84	4.13	4.81
N1*	17	3.35	3.50	2.75	3.17	3.19
N2KNaMg	18	2.80	3.26	2.50	2.55	2.78
N2KNaMg	18/2					3.52
FYM	19/1					4.49
FYM	19/2					4.54
FYM	19/3					4.44
FYM/N*PK	20/1					5.50
FYM/N*PK	20/2					4.64
FYM/N*PK	20/3					4.68

1ST CUT MEAN DM% 23.50

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12/R/PG/5

2ND CUT (2/11/12) DRY MATTER TONNES/HECTARE

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

Grand mean 2.08

Manure	Lime	a	b	c	d	Mean
N1	1	1.41	1.23	0.72	0.79	1.04
K	2/1	1.49	1.53	0.74	0.66	1.10
None(FYM)	2/2	1.57	1.57	1.09	1.16	1.35
None	3	1.41	1.61	0.54	0.75	1.08
P	4/1	2.08	2.20	1.67	1.63	1.89
N2P	4/2	0.84	0.98	1.20	0.75	0.94
N1PKNaMg	6	2.70	2.88			2.79
PKNaMg	7	2.73	2.77	2.94	2.77	2.80
PNaMg	8	1.88	2.28	1.99	2.24	2.10
PKNaMg(N2)	9/1	2.73	3.23	2.37	0.88	2.30
N2PKNaMg	9/2	2.66	2.62	1.99	1.45	2.18
N2PNaMg	10	1.20	1.27	1.62	1.07	1.29
N3PKNaMg	11/1	2.72	2.70	2.24	2.87	2.63
N3PKNaMgSi	11/2	3.02	3.27	2.79	3.39	3.12
None	12	1.86	1.81	1.44	1.51	1.65
(FYM/F)	13/1	2.30	2.84	2.63	2.67	2.61
FYM/PM	13/2	2.18	3.11	3.01	2.73	2.76
PKNaMg(N2*)	14/1	2.28	2.66	2.88	3.01	2.71
N2*PKNaMg	14/2	1.86	2.44	2.57	2.55	2.35
PKNaMg(N2*)	15	2.28	2.85	3.05	2.89	2.77
N1*PKNaMg	16	2.15	2.53	2.94	2.20	2.45
N1*	17	1.10	1.36	0.91	0.98	1.09
N2KNaMg	18	3.12	1.47	1.46	2.50	2.14
N2KNaMg	18/2					1.64
FYM	19/1					3.53
FYM	19/2					2.86
FYM	19/3					2.55
FYM/N*PK	20/1					2.86
FYM/N*PK	20/2					3.23
FYM/N*PK	20/3					2.83

2ND CUT MEAN DM% 21.43

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12/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

Grand mean 5.87

Manure	Lime	a	b	c	d	Mean
N1	1	4.60	4.30	3.12	2.40	3.60
K	2/1	4.13	4.52	2.70	2.23	3.39
None(FYM)	2/2	4.26	4.29	2.92	3.22	3.67
None	3	4.16	4.44	1.94	2.69	3.31
P	4/1	5.98	6.29	5.16	5.02	5.61
N2P	4/2	3.88	4.29	4.66	3.25	4.02
N1PKNaMg	6	8.01	7.91			7.96
PKNaMg	7	7.88	7.86	7.95	6.71	7.60
PNaMg	8	5.16	5.61	5.51	5.54	5.45
PKNaMg(N2)	9/1	7.68	8.32	6.81	2.37	6.30
N2PKNaMg	9/2	7.12	7.31	6.57	5.24	6.56
N2PNaMg	10	5.21	5.14	5.35	3.75	4.86
N3PKNaMg	11/1	9.39	7.81	7.49	5.96	7.66
N3PKNaMgSi	11/2	8.88	8.33	7.95	7.25	8.10
None	12	4.32	4.19	2.89	2.83	3.56
(FYM/F)	13/1	5.84	6.62	5.91	5.47	5.96
FYM/PM	13/2	5.63	6.74	6.41	5.64	6.10
PKNaMg(N2*)	14/1	7.27	7.87	7.95	7.88	7.74
N2*PKNaMg	14/2	7.17	8.84	8.52	8.03	8.14
PKNaMg(N2*)	15	7.61	8.05	7.49	7.44	7.65
N1*PKNaMg	16	7.37	7.58	7.77	6.33	7.26
N1*	17	4.45	4.86	3.66	4.14	4.28
N2KNaMg	18	5.92	4.73	3.96	5.05	4.92
N2KNaMg	18/2					5.15
FYM	19/1					8.02
FYM	19/2					7.40
FYM	19/3					6.99
FYM/N*PK	20/1					8.36
FYM/N*PK	20/2					7.86
FYM/N*PK	20/3					7.51

TOTAL OF 2 CUTS MEAN DM% 22.48

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12/R/GC/8

GARDEN CLOVER

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

The 159th year, red clover.

For previous years see `Details' 1967 and 1973, and Yield books for 74-11/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:

Date		Application	Rate	Units
19-Jan-12	f	Applied Magnesium Sulphate	520	kg/ha
19-Jan-12	f	Applied TSP	158	kg/ha
19-Jan-12	f	Applied Potassium Sulphate	300	kg/ha
19-Jan-12	a	Applied Chalk	1.25	t/ha
01-Jun-12	a	First cut	-	
11-Jul-12	a	Second cut	-	
05-Sep-12	a	Third cut	-	
08-Oct-12	p	Sprayed w/ Rosate 36	6	l/ha

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

https://doi.org/10.23637/ERADOC-1-222 *pp 39*

12/R/GC/8

1ST CUT (01/6/12) DRY MATTER TONNES/HECTARE

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

Grand mean 3.88

FUNG_RES	NONE	BENOMYL
	3.99	3.78

1ST CUT MEAN DM% 20.3

SECOND CUT (11/7/12) DRY MATTER TONNES/HECTARE

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

Grand mean 3.84

FUNG_RES	NONE	BENOMYL
	3.77	3.92

2ND CUT MEAN DM% 15.3

THIRD CUT (05/9/12) DRY MATTER TONNES/HECTARE

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

Grand mean 3.27

FUNG_RES	NONE	BENOMYL
	3.35	3.19

3RD CUT MEAN DM% 22.2

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

Grand mean 10.99

FUNG_RES	NONE	BENOMYL
	11.10	10.88

TOTAL OF 3 CUTS MEAN DM% 19.3

PLOT AREA HARVESTED CUT 1, 2 & 3 - 0.00014

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12/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 75th year, leys, w. beans, w. wheat, w. rye

For previous years see 'Details' 1967 & 1973 and Yield Books for 74-11/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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12/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).

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.

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 were 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.

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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12/W/RN/3

3. **N** Nitrogen fertilizer as split dressings in spring 2012 (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 2011 (actual date not recorded).

Continuous rotations	No FYM	FYM Res
Before wheat	Half plots	Half plots
Abe/Be	270	340
AO/O	200	270
LLn/AO	0	30
Ln/Ln	90	70

None to other plots.

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12/W/RN/3

Experimental Diary

Date		Application	Rate	Units
All				
18-Oct-11	a	Plough all plots at 14" except those remaining in grass.	-	
18-Oct-11	a	Ploughed - thrown east on 14" furrows. Grass plots not ploughed.	-	
01-Nov-11	a	Cambridge Rolled - block 1 only.	-	
23-Apr-12	a	Cut Paths	-	
22-May-12	a	Cut paths	-	
16-Jul-12	a	Cut paths	-	
Grass ley and clover/grass leys (first year leys)				
21-Oct-11	f	Applied Nitram - applied to plots 11,12 and 13,14 only - new grass plots.	50	kg N/ha
21-Oct-11	f	Applied Nitram - applied to plots 3,4 and 7,8 only - new grass plots	25	kg N/ha
21-Oct-11	f	Applied Triple Super Phosphate - applied to 1st year leys plots 3,4,7,8,11,12,13,14	213	kg/ha
21-Oct-11	f	Applied Potassium Sulphate - applied to first year leys plots 3,4,7,8,11,12,13,14	140	kg/ha
01-Nov-11	s	Drilled Grass plots - Ln1 plots only, plots 11, 12, 13 and 14.	30	kg/ha
01-Nov-11	s	Drilled Grass plots - Lc1 plots only; plots 3, 4, 7 and 8.	30	kg/ha
24-Nov-11	a	Cut and weighed grass for yield (Yield cut 2 in 2011)	-	
30-Nov-11	a	Cut and removed grass (yield cut 2 in 2011)	-	
01-Dec-11	a	Topped a second time to tidy up.	-	
17-Jul-12	a	First cut - cut and weighed grass plots for yield	-	
24-Jul-12	a	Grass areas topped	-	
25-Jul-12	a	Turned hay	-	
28-Jul-12	a	Rowed up hay	-	
28-Jul-12	a	Baled and Removed	-	
18-Aug-12	a	Sprayed Samurai - Ln3 & Lc3 plots	4	l/ha
05-Nov-12	a	Second cut - cut and weighed grass plots for yield	-	
Grass ley and clover/grass leys (second and third year leys)				
21-Oct-11	f	Applied Triple Super Phosphate to 2nd and 3rd year leys plots 23,24,25,26,29,30,31,32	213	kg/ha
21-Oct-11	f	Applied Potassium Sulphate to 2nd and 3rd year leys plots 23,24,25,26,29,30,31,32,55,59,57,58,56,60,51,62	140	kg/ha

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24-Nov-11	a	Cut and weighed grass for yield (yield cut 2 in 2011)	-	
30-Nov-11	a	Cut and removed grass (yield cut 2 in 2011)	-	
01-Dec-11	a	Topped a second time to tidy up.	-	
17-Jul-12	a	First cut - cut and weighed grass plots for yield	-	
24-Jul-12	a	Grass areas topped	-	
25-Jul-12	a	Turned hay	-	
28-Jul-12	a	Rowed up hay	-	
28-Jul-12	a	Baled and Removed	-	
18-Aug-12	p	Sprayed Samurai - Ln3, Lc3 plots only	4	l/ha
05-Nov-12	a	Second cut - cut and weighed grass plots for yield	-	
W Beans				
21-Oct-11	f	Applied Triple Super Phosphate in accordance with plan	127	kg/ha
26-Oct-11	s	Drill W Bean - Wizzard	25	seed/m^2
28-Nov-11	p	Sprayed Crawler	3.5	kg/ha
18-Aug-12	p	Sprayed Samurai	4	l/ha
03-Sep-12	a	Combined for yields	-	
11-Sep-12	a	Baled and Removed	-	
W Wheat				
21-Oct-11	f	Applied Muriate of Potash to plots 65, 66, 67, 68, 72, 73 and 74, as per plan	-	
21-Oct-11	f	Applied Triple Super Phosphate in accordance with plan	127	kg/ha
22-Oct-11	a	Cultivate using pigtail cultivator to 13cm to incorporate fertilisers	-	
26-Oct-11	s	Drill Wheat - Solstice @ 400 seeds/m2 (Solstice substituted the Glasgow, ok'd with AM)	-	
30-Dec-11	p	Sprayed Lexus class @ 200 lt/ha water volume.	60	g/ha
23-Apr-12	f	Applied 1st Nitrochalk 27%N according to plan	148	kg/ha
3-May-12	f	Applied remaining Nitrochalk 27%N by hand to blocks 5 according to plan.	-	
		N1 plots	148	kg/ha
		N2 plots	444	kg/ha
		N3 plots	740	kg/ha
17-May-12	p	spray fungicide T1 + herbicide; Thor @20g/ha + Ignite @1l/ha in 200l water	ha	g/ha
24-May-12	p	spray fungicides T2; Rubric @0.8l + Comet @0.5l + Rover @1l/ha in 200l water RN3 - wheat only	ha	l/ha
03-Sep-12	a	Combined for yields	-	
11-Sep-12	a	Baled and Removed	-	
W Rye				
21-Oct-11	a	Applied Chalk to plots 33 - 48.	174	
21-Oct-11	f	Applied Triple Super Phosphate	127	kg/ha

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26-Oct-11	s	Drill W.Rye - Humbolt	400	seed/m^2
01-Nov-11	s	Drilled Rye - Humbolt - Block 1 - plots 1, 2, 5, 6, 9, 10, 15 and 16.	400	seed/m^2
30-Dec-11	p	Sprayed Lexus class in 200 l/ha of water	60	g/ha
23-May-12	a	Nitrochalk 27%N applied by hand to block 3	-	
		N1 plots	180	kg/ha
		N2 plots	364	kg/ha
		N3 plots	545	kg/ha
03-Sep-12	a	Combined for yields	-	
11-Sep-12	a	Baled and Removed	-	
W Oats				
21-Oct-11	f	Applied Triple Super Phosphate in accordance with plan	127	kg/ha
28-Oct-11	s	Drilled oat plots with Mascani @400seeds/m2	400	seed/m^2
30-Dec-11	p	Sprayed Lexus class in 200 l/ha of water	60	g/ha
03-Sep-12	a	Combined for yields	-	
11-Sep-12	a	Baled and Removed	-	

NOTE: Herbage and grain samples taken for chemical analyses

LEYS

1ST CUT (17 /6/12) DRY MATTER TONNES/HECTARE

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

FYM_RES	NONE	FYM	Mean
LEY			
LC1	4.89	4.67	4.78
LC2	3.25	3.68	3.46
LC3	5.89	6.80	6.35
LN1	3.17	3.48	3.32
LN2	3.96	3.80	3.88
LN3	4.04	4.06	4.05
(LLC/LC)LC1	5.57	4.30	4.93
(LLC/LC)LC2	4.73	4.23	4.48
(LLC/LC)LC3	5.73	5.05	5.39
(LLN/LN)LN1	4.96	6.25	5.60
(LLN/LN)LN2	4.39	3.29	3.84
(LLN/LN)LN3	3.86	4.78	4.32
Mean	4.54	4.53	4.53

1ST CUT MEAN DM% 31.2

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12/W/RN/3

LEYS 2ND CUT (05/11/12) DRY MATTER TONNES/HECTARE

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

FYM_RES / LEY	NONE	FYM	Mean
LC1	0.22	0.40	0.31
LC2	0.42	0.68	0.55
LC3	0.00	0.00	0.00
LN1	0.55	0.61	0.58
LN2	0.36	0.28	0.32
LN3	0.00	0.00	0.00
(LLC/LC)LC1	0.25	0.20	0.22
(LLC/LC)LC2	1.05	1.01	1.03
(LLC/LC)LC3	0.00	0.00	0.00
(LLN/LN)LN1	1.10	1.56	1.33
(LLN/LN)LN2	0.60	0.19	0.40
(LLN/LN)LN3	0.00	0.00	0.00
Mean	0.38	0.41	0.40

2ND CUT MEAN DM% 33.4

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FYM_RES / LEY	NONE	FYM	Mean
LC1	5.11	5.07	5.09
LC2	3.67	4.35	4.01
LC3	5.89	6.80	6.35
LN1	3.72	4.08	3.90
LN2	4.32	4.09	4.20
LN3	4.04	4.06	4.05
(LLC/LC)LC1	5.82	4.49	5.15
(LLC/LC)LC2	5.78	5.24	5.51
(LLC/LC)LC3	5.73	5.05	5.39
(LLN/LN)LN1	6.05	7.81	6.93
(LLN/LN)LN2	5.00	3.49	4.24
(LLN/LN)LN3	3.86	4.78	4.32
Mean	4.92	4.94	4.93

TOTAL OF 2 CUTS MEAN DM% 32.2

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12/W/RN/3

W. WHEAT (1ST TEST CROP)

Grain tonnes/hectare

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

FYMRES	none	FYM	Mean
ROTATION			
(AO)W	5.73	6.88	6.31
(ABe)W	7.02	7.31	7.16
(LLn/AO)W	6.92	7.03	6.97
(LLc/ABe)W	8.28	8.91	8.60
(Ln)W	7.16	7.05	7.10
(LLN/Ln)W	7.13	7.24	7.19
(Lc)W	8.18	8.04	8.11
(LLc/Lc)W	8.46	8.37	8.42
Mean	7.36	7.60	7.48

N	0	80	160	240	Mean
ROTATION					
(AO)W	4.40	6.04	7.52	7.27	6.31
(ABe)W	3.92	6.57	8.73	9.44	7.16
(LLn/AO)W	3.45	7.45	8.20	8.79	6.97
(LLc/ABe)W	5.28	9.18	10.13	9.80	8.60
(Ln)W	4.39	7.52	8.38	8.13	7.10
(LLN/Ln)W	4.20	7.75	8.46	8.33	7.19
(LC)W	7.28	7.72	8.08	9.37	8.11
(LLc/Lc)W	6.61	9.17	8.91	8.98	8.42
Mean	4.94	7.68	8.55	8.76	7.48

N	0	80	160	240	Mean
FYMRES					
none	4.52	7.79	8.50	8.62	7.36
FYM	5.36	7.56	8.60	8.90	7.60
Mean	4.94	7.68	8.55	8.76	7.48

	N	0	80	160	240
ROTATION	**FYMRES**				
(AO)W	none	2.27	6.63	7.07	6.97
	FYM	6.53	5.46	7.97	7.57
(ABe)W	none	3.82	6.07	8.27	9.90
	FYM	4.01	7.07	9.19	8.97
(LLn/AO)W	none	3.19	7.10	8.40	8.98
	FYM	3.70	7.81	8.00	8.61
(LLc/ABe)W	none	4.72	8.99	10.03	9.38
	FYM	5.83	9.38	10.23	10.21
(Ln)W	none	4.66	7.41	8.57	8.00
	FYM	4.12	7.62	8.19	8.25
(LLN/Ln)W	none	4.17	7.87	7.95	8.52
	FYM	4.22	7.64	8.97	8.15
(Lc)W	none	7.29	8.93	7.93	8.56
	FYM	7.27	6.51	8.22	10.18
(LLc/Lc)W	none	6.01	9.36	9.78	8.70
	FYM	7.21	8.98	8.03	9.25

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12/W/RN/3

W.WHEAT - GRAIN MEAN DM% 85.3

PLOT AREA HARVESTED 0.00192

RYE EXTRA

GRAIN (85% DRY MATTER) TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
(ABe)R	1.99	1.65	1.82
(AO)R	1.49	1.24	1.36
(LLn/AO)R	2.31	2.65	2.48
(LLc/ABe)R	2.99	2.55	2.77
Mean	2.19	2.02	2.11

GRAIN MEAN DM% 81.8

PLOT AREA HARVESTED 0.00413

W. RYE (2ND TEST CROP)

12/W/RN/3 W. RYE

Grain tonnes/hectare

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

FYMRES ROTATION	none	FYM	Mean
(AO)R	2.37	2.74	2.55
(ABe)R	2.37	2.91	2.64
(LLn/AO)R	2.83	2.96	2.89
(LLc/ABe)R	3.07	2.67	2.87
(Ln)R	3.38	2.97	3.17
(LLn/Ln)R	3.27	3.44	3.36
(Lc)R	3.33	3.45	3.39
(LLc/Lc)R	3.17	3.07	3.12
Mean	2.98	3.03	3.00

N ROTATION	0	50	100	150	Mean
(AO)R	2.03	2.55	2.76	2.88	2.55
(ABe)R	2.02	2.65	3.01	2.89	2.64
(LLn/AO)R	2.19	3.12	2.93	3.33	2.89
(LLc/ABe)R	2.37	3.06	3.00	3.06	2.87
(Ln)R	3.36	3.07	3.31	2.96	3.17
(LLn/Ln)R	3.21	3.63	3.18	3.41	3.36
(Lc)R	3.52	3.16	3.76	3.12	3.39
(LLc/Lc)R	3.13	3.06	3.18	3.11	3.12
Mean	2.73	3.04	3.14	3.09	3.00

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12/W/RN/3

N	0	50	100	150	Mean
FYMRES					
none	2.59	3.08	3.16	3.07	2.98
FYM	2.87	2.99	3.12	3.12	3.03
Mean	2.73	3.04	3.14	3.09	3.00

	N	0	50	100	150
ROTATION	**FYMRES**				
(AO)R	none	1.71	2.35	2.58	2.85
	FYM	2.35	2.74	2.95	2.90
(ABe)R	none	1.73	2.31	2.73	2.73
	FYM	2.32	2.99	3.29	3.04
(LLn/AO)R	none	1.98	3.00	2.99	3.34
	FYM	2.40	3.24	2.87	3.32
(LLc/ABe)R	none	2.35	2.95	3.45	3.53
	FYM	2.39	3.16	2.54	2.59
(Ln)R	none	3.42	3.62	3.39	3.10
	FYM	3.30	2.51	3.23	2.82
(LLn/Ln)R	none	2.87	3.87	3.15	3.21
	FYM	3.55	3.40	3.22	3.61
(Lc)R	none	3.56	3.27	3.82	2.68
	FYM	3.48	3.05	3.69	3.56
(LLc/Lc)R	none	3.12	3.25	3.22	3.08
	FYM	3.15	2.86	3.15	3.13

GRAIN MEAN DM% 83.9 PLOT AREA HARVESTED 0.00192

BEANS

GRAIN (85% DRY MATTER) TONNES/HECTARE

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

FYMRES	NONE	FYM	Mean
ROTATION			
(AO)Be	*	*	*
(LLn/AO)Be	*	*	*
(LLc/ABe)Be	0.12	0.36	0.24
(ABe)Be	0.40	1.62	1.01
Mean	0.26	0.99	0.63

GRAIN MEAN DM% 80.2

PLOT AREA HARVESTED 0.00413

Note: Due to wet weather and severe weed infestation no yields were obtained for (AO)Be and (LLn/AO)Be treatment plots.

https://doi.org/10.23637/ERADOC-1-222

12/W/RN/3

OATS

GRAIN (85% DRY MATTER) TONNES/HECTARE

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

FYMRES / **ROTATION**	NONE	FYM	Mean
ABe	1.28	1.42	1.35
AO	2.36	2.07	2.21
LLc/ABe	1.71	1.73	1.72
LLn/AO	3.30	3.18	3.24
Mean	2.16	2.10	2.13

GRAIN MEAN DM% 82.9

PLOT AREA HARVESTED 0.00413

https://doi.org/10.23637/ERADOC-1-222 *pp 51*

12/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 47th year, forage maize

For previous years see 'Details' 1973 and Yield Books for 74-12/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

https://doi.org/10.23637/ERADOC-1-222 *pp 52*

12/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

For 2011 W. wheat nitrogen rates (kg N/ha) were:
0, 50, 100, 150, 200, 250 as nitro-chalk (27% N).

For 2012 Forage Maize nitrogen rates were 0, 50, 100, 150, 200, 250 & 250 kg N/ha as Nitro-chalk (27% N)

Experimental Diary

Date		Application	Rate	Units
01-Sep-11	a	Combined Plots	-	
30-Sep-11	s	Spread mustard by hand, as per plan	-	
30-Sep-11	a	Shallow power harrow to incorporate mustard seeds as per plan	-	
24-Nov-11	a	Cut and weighed grass plots for yield (yield cut 2 in 2011).	-	
30-Nov-11	a	Cut and removed grass - grass plot only	-	
01-Dec-11	a	Topped grass a second time to tidy up	-	
29-Mar-12	f	Spread Fert TSP with Kuhn, as per plan	97.5	kg/ha
29-Mar-12	f	Spread Fert SOP with Kuhn, as per plan	200	kg/ha
29-Mar-12	f	Applied basal fertilisers as plans, TSP @97.5kg/ha except plots 5,11,23,26. Sulphate of Potash applied @200kg/ha except plots 5,11,23,26. TH	-	kg/ha
19-Apr-12	a	Spread FYM, straw, compost by hand	-	kg/ha
20-Apr-12	a	Spread FYM, straw, compost by hand to finish	-	kg/ha
20-Apr-12	a	chopped straw with orsi	-	
18-May-12	a	Ploughed soil to the south	-	
23-May-12	a	Powerharrowed maize areas	-	
24-May-12	f	Applied N treatments, as per plan	-	kg/ha
25-May-12	s	Drilled Maize, Hudson Maize trt Mesurol, rolled plots after drilling	10.1	seeds/m^2
26-Jun-12	p	Spray Samson Extra herbicide + Callisto in 200l of water on maize areas only	Sa 0.75 Ca 1.0	l/ha
12-Jul-12	f	Applied Nitro-chalk as per plan	See above	
17-Jul-12	a	Cut and weighed grass plots for yield - cut 1	-	
17-Jul-12	a	Cut paths	-	
24-Jul-12	a	Grass areas topped	-	

https://doi.org/10.23637/ERADOC-1-222 *pp 53*

25-Jul-12	a	Turned hay	-
28-Jul-12	a	Rowed up hay	-
28-Jul-12	a	Baled and Removed	-
15-Aug-12	a	Cut paths	-
02-Oct-12	a	Cut Maize for yields	-
03-Oct-12	a	Cut Maize for yields	-
10-Oct-12	a	Mowed, Baled and removed maize	-
05-Nov-12	a	Cut and weighed grass plots for yield cut 2	-
05-Nov-12	a	Applied FYM as per plan	see plan

NOTE: Whole crop samples taken for chemical analyses

FORAGE MAIZE

WHOLE CROP TONNES/HECTARE (100%DM)

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

Nitrogen / **Treatment**	0kg	50kg	100kg	150kg	200kg	250kg	Mean
F(Fd)	1.96	3.31	2.95	3.30	3.65	3.25	3.07
F(Ln,Lc6)	3.26	5.40	5.20	5.38	6.73	6.55	5.42
St(St)	3.03	4.12	6.53	5.73	6.71	5.55	5.28
CC(Gm,Lc8)	3.18	4.35	5.25	5.81	6.09	6.46	5.19
Co(Pt,Lc8)	5.22	5.79	8.26	9.17	7.43	8.45	7.39
Dg10(Fs)	3.60	5.59	6.94	5.69	7.31	6.28	5.90
Dg25(Dg)	5.75	6.65	7.47	8.80	6.80	7.28	7.13
Mean	3.71	5.03	6.09	6.27	6.39	6.26	5.62

Standard errors of differences of means

Table	**Treatment**	**Nitrogen**	**Treatment Nitrogen**
s.e.d.	1.311	0.449	1.702
Except when comparing means with the same level(s) of Treatment			1.188

Grain Mean %DM 24.3

Plot area harvested (ha) 0.000560

NOTE: Due to wet weather and severe weed infestation maize yields were much smaller than would normally be expected.

https://doi.org/10.23637/ERADOC-1-222 *pp 54*

12/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
2011	1.46	0.39	1.85
2012	4.11	0.64	4.75

Cut dry matter t/ha (17/7/12 & 5/11/12)

Note: See previous Yield Books (2004-11) for cutting dates

https://doi.org/10.23637/ERADOC-1-222 *pp 55*

12/R/CS/326 and 12/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 26th year, w. wheat

For previous years see Yield Books for 87-11/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	2.67	1.56
2 NORMAL	Twice normal	5.34	3.12
4 NORMAL	Four times normal	10.68	6.24

Experimental Diary

Great Knott III (R)

Date		Application	Rate	Units
17-Aug-11	a	Straw applied to treatments, as per plan	-	-
30-Aug-11	p	Sprayed Statis 360 water volume = 200 lt/ha (Sprayed stubble prior to primary cultivations)	1.5 lt/ha	l/ha
15-Sep-11	p	Sprayed Symbol water volume = 200 lt/ha (Stubble glyphosate prior to primary cultivations)	1.5 lt/ha	l/ha
17-Sep-11	a	Ploughed - started	-	
19-Sep-11	a	Ploughed - finished	-	
20-Sep-11	a	Cultipressed	-	
07-Oct-11	s	Drilled Hereward trt Beret Gold	350	seeds/m^2
13-Oct-11	p	Sprayed Liberator + Cinder in 200l/ha of water	Li@0.6 Ci@2.0	l/ha
28-Nov-11	p	Sprayed Hallmark with Zeon Technology in 200l/ha of water	50	ml/ha
29-Feb-12	p	Sprayed Pacifica and Bio-Power in 150 l/ha of water	P@0.4* B@1.0	*kg/ha l/ha
15-Mar-12	p	Sprayed Cherokee SE and Justice in 200 l/ha of water	Ch@1.0 Ju@0.125	l/ha
12-Apr-12	f	Applied Nitram Fertiliser	262	kg/ha

https://doi.org/10.23637/ERADOC-1-222 *pp 56*

16-Apr-12	a	Mowed Paths	-	
23-Apr-12	p	Sprayed Bravo 500, Tracker, Agriguard and Starane2 in 200l/ha of water	Br@1.0 Tr@0.8 Ag2.25 St@0.50	l/ha
06-May-12	p	Sprayed Ally Max in 200l/ha of water	42	g/ha
16-May-12	a	Cut paths	-	
17-May-12	f	Applied Nitram	262	kg/ha
22-May-12	p	Sprayed Topik and Adigor	To@0.125 Ad@1.0	l/ha
23-May-12	p	Sprayed Comet, Bravo 500 and Opus	Co@0.6 Br@1.0 Op@0.8	l/ha
13-Jun-12	p	Sprayed w/ Amistar and Prosaro in 100l/ha of water	Am@0.3 Pro@0.7	l/ha
15-Jun-12	a	Cut paths	-	
09-Jul-12	a	Topped/Cut Paths	-	
30-Jul-12	a	Paths Cut	-	
23-Aug-12	a	Plots harvested, straw weighed and baled.	-	
19-Sep-12	a	Sub Soiled	-	
20-Sep-12	a	Ploughed	-	
13-Oct-12	f	Spread MOP onto Stubble	227	kg/ha

Far Field I (W)

Date		Application	Rate	Units
08-Sep-11	a	Straw applied to treatments, as per plan	-	-
15-Sep-11	p	Sprayed Symbol (glyphosate) on 326 area, ex rye area and 12m headland around whole field	3.0	l/ha
23-Sep-11	a	Ploughed, soil thrown west		
10-Oct-11	s	Drilled Hereward trt Redigo Deter	350	seeds/m^2
11-Oct-11	a	Cambridge Rolled.	-	
11-Oct-11	a	Rolled	-	
11-Oct-11	a	Errected rabbit netting	-	
17-Nov-11	p	Sprayed Sherman, Tawny and Seal Z in 200l/ha of water	Sh@2.5 Ta@2.0 Se@50*	l/ha *ml/ha
28-Mar-12	f	Double Top applied @ 148 kg/ha= 40 kg/ha N	148	kg/ha
29-Mar-12	p	Spray Cherokee	1.25	l/ha
29-Mar-12	p	Spray Pacifica + biopower - headland only and 4 tramlines from beans and triangle E of ww1250.	Sp@0.4 Bi@* 1.0	l/ha *kg/ha
10-May-12	f	Nitram	203	kg/ha
13-May-12	p	Spray fungicide T1 - Ignite + Bravo 500+ Chlormequat + Mn in 200 l/ha of water	Ig@1.0 Br@1.0 Ch@2.0 Mn@2.0	l/ha
24-May-12	f	Nitram applied as per plan	203	kg/ha
06-Sep-12	a	Combined Plots	-	
07-Sep-12	a	Straw weights	-	

NOTE: Samples of grain and straw were taken for chemical analyses for both experiments.

https://doi.org/10.23637/ERADOC-1-222

12/R/CS/326

GRAIN TONNES/HECTARE

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

Straw_	
-	7.12
1	7.39
2	7.88
4	7.86
Mean	7.56

Standard errors of differences of means

Table	Straw_
s.e.d.	0.274

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	9	0.387	5.1

Grain mean DM% 86.2

STRAW TONNES/HECTARE

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

Straw_	
-	5.56
1	6.23
2	6.14
4	6.50
Mean	6.11

Standard errors of differences of means

Table	Straw_
s.e.d.	0.395

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	9	0.558	9.1

Straw mean DM% 83.1

Plot area harvested 0.00284

https://doi.org/10.23637/ERADOC-1-222 *pp 58*

12/W/CS/326

GRAIN TONNES/HECTARE

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

Straw_	
-	6.13
1	6.46
2	6.54
4	6.46
Mean	6.39

Standard errors of differences of means

Table	Straw_
s.e.d.	0.116

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.142	2.2

Grain mean DM% 86.9

STRAW TONNES/HECTARE

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

Straw_	
-	4.94
1	4.76
2	5.23
4	5.25
Mean	5.05

Standard errors of differences of means

Table	Straw_
s.e.d.	0.303

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	6	0.371	7.4

Straw mean DM% 95.1

Plot area harvested 0.00305

https://doi.org/10.23637/ERADOC-1-222 *pp 59*

12/R/CS/477

CONTINUOUS MAIZE

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

Sponsors: A. J. Macdonald

The 16th year, forage maize and s. barley

For previous years see Yield Books for 97-11/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

Date		Application	Rate	Units
29-Sep-11	f	Applied Triple Super Phosphate, as per plan	-	
29-Sep-11	f	Applied Muriate of Potash, as per plan	-	
01-Oct-11	a	Spread Maize Tops, as per plan	10	t/ha
01-Oct-11	a	Ploughed	-	
27-Mar-12	s	Flexi tined before drilling	-	-
27-Mar-12	a	Drilled Tipple Sp. Barley tr Beret Multi	350	Seeds/m^2
28-Mar-12	a	Rolled - Finished	-	
13-May-12	s	Drilled Hudson (Maize - dressed with Mesural)	10.2	Seed/m^2
13-May-12	a	Powerharrowed	-	
22-May-12	P	Sprayed Spring Barley w/ Amistar, Corbel and Duplosan	Am@1.0 Co@0.25 Du@2.0	l/ha
23-May-12	f	Broadcast Double Top; 27% N, 30% SO_3 - Maize and Barley	356	kg/ha
10-Jun-12	p	Sprayed w/ Seguris, Harmony and Inka used to top up in 200l/ha of water	Se@0.7, Ha@100* In@60*	l/ha, *g/ha
20-Jun-12	p	Sprayed Samson Extra and Callisto in 200l/ha of water	Sa@0.75 Ca@1.5	l/ha
12-Jul-12	p	Sprayed Dow Shield in 200l/ha of water	0.5	l/ha
01-Aug-12	a	Marking out Experiment	-	

https://doi.org/10.23637/ERADOC-1-222 *pp 60*

07-Aug-12	a	Paths Cut and Cultivated	-	
24-Aug-12	a	Harvested Barley	-	
24-Aug-12	a	Sampled Baled and Weighed	-	
31-Aug-12	a	Harvested odds and ends	-	
20-Sep-12	p	Sprayed Whole field w/ Weedazol EW	20	l/ha
27-Sep-12	a	Harvested Maize for Yield	-	
27-Sep-12	a	Harvested and Chopped Maize odds and ends	-	
28-Sep-12	f	Spread MOP and TSP	MOP181 TSP171	kg/ha
05-Oct-12	a	Applied Maize tops to plots 3,6,9,12,16,18 @300kg/plot	10	t/ha

NOTE: Samples of barley grain and maize (whole crop) were taken for chemical analyses.

https://doi.org/10.23637/ERADOC-1-222 *pp 61*

12/R/CS/477

MAIZE

WHOLE CROP TONNES/HECTARE (100% DM)

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

Treatment	
M	7.13
MT	8.01
M(B)	8.90
Mean	8.02

Standard errors of differences of means

Table	Treatment
s.e.d.	1.549

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	4	1.897	23.7

GRAIN MEAN DM% 24.7

Plot area harvested 0.00108

SPRING BARLEY

GRAIN TONNES/HECTARE

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

Treatment	
BT	5.92
B	5.23
B(M)	5.74
Mean	5.63

Standard errors of differences of means

Table	Treatment
s.e.d.	0.280

Grain mean DM% 83.7

Plot area harvested 0.00525

https://doi.org/10.23637/ERADOC-1-222 *pp 62*

12/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 16th year, forage maize and s. barley

For previous years see Yield Books for 97-11/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

Date		Application	Rate	Units
23-Nov-10	a	Spread chopped maize as per plan.	-	
23-Nov-10	a	Ploughed, dowdeswell 4 furrow at 14".	-	
25-Mar-11	a	Flexi Tined.	-	
25-Mar-11	a	Combination Drilled Optic on spring barley plots only. Cambridge rolled.	350	seeds/m^2
25-Apr-11	f	Broadcast Double Top; 27% N, 30% SO_3 - Maize and Barley	356	kg/ha
05-May-11	a	Rotary Harrowed. Drilled Hudson (Maize) dressed Mesurol.	10.2	seeds/m^2
20-May-11	p	Sprayed Thor in 200 l/ha of water on spring barley plots only	20	g/ha
07-Jun-11	p	Sprayed Callisto with Samson in 200l/ha of water on Maize plots only	Ca@1.0 Sa@0.75	l/ha
01-Sep-11	a	Combined Barley plots	-	
02-Sep-11	a	Combined O+Es	-	
07-Sep-11	a	Baled and removed straw	-	
26-Sep-11	a	Cut Maize for yields	-	
06-Oct-11	a	Cut remainder of maize including discards, bale and clear bales	-	

NOTE: Samples of barley grain and maize (whole crop) were taken for chemical analyses.

12/W/CS/478

https://doi.org/10.23637/ERADOC-1-222 *pp 63*

MAIZE

WHOLE CROP TONNES/HECTARE (100% DM)

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

Treatment	
M	6.72
MT	6.76
M(B)	5.68
Mean	6.39

Standard errors of differences of means

Table	Treatment
s.e.d.	1.367

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	4	1.674	26.2

MEAN DM% 24.5

PLOT AREA HARVESTED 0.00108

SPRING BARLEY

GRAIN TONNES/HECTARE

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

Treatment	
BT	5.04
B	4.55
B(M)	5.08
Mean	4.89

Standard errors of differences of means

Table	Treatment
s.e.d.	0.095

Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
Blocks.Plots	4	0.116	2.4

GRAIN MEAN DM% 84.3

PLOT AREA HARVESTED 0.00525

https://doi.org/10.23637/ERADOC-1-222 *pp 64*

Rothamsted Research

The Weather : Monthly Summary : 2012

(Departure from the 30 year means (1981 - 2010) in brackets)

			Mean temperatures ℃								Rain			Drainage	
	Sunshine		Maximum		Minimum		Dew point	Ground	In ground under grass		5" turf wall		Rain	20"	Wind
	Hours	()	℃	()	℃	()	℃	frosts*	30 cm	100 cm	Total mm	()	days**	mm	km/hr***
January	82.2	(+20.18)	8.5	(+1.75)	2.5	(+1.26)	2.6	13	6.1	7.7	58.0	(-11.97)	20	26.3	11.3
February	109.3	(+29.03)	6.4	(-0.50)	0.1	(-0.85)	1.0	15	4.1	5.8	24.7	(-25.44)	8	12.4	9.2
March	193.5	(+78.61)	12.8	(+2.94)	3.1	(+0.40)	4.6	22	7.6	7.4	34.7	(-16.13)	16	8.8	8.1
April	150.1	(-11.14)	11.5	(-1.11)	3.3	(-0.69)	3.9	14	8.9	8.8	168.6	(+113.57)	25	109.1	10.4
May	175.6	(-19.06)	16.1	(+0.05)	7.9	(+1.02)	7.7	4	11.9	10.2	52.6	(-2.08)	14	27.8	9.5
June	144.9	(-53.31)	17.6	(-1.51)	10.0	(+0.27)	10.0	3	14.6	12.9	166.5	(+113.21)	22	78.0	10.3
July	172.3	(-32.86)	19.8	(-1.96)	11.6	(-0.25)	11.5	0	16.8	14.7	128.4	(+78.57)	23	53.6	7.7
August	176.5	(-19.77)	21.7	(+0.18)	12.8	(+0.91)	13.2	0	17.4	15.9	54.9	(-8.82)	16	8.4	7.7
September	179.6	(+36.20)	18.3	(+0.01)	8.4	(-1.53)	8.8	1	14.9	15.0	40.4	(-17.27)	15	7.3	8.8
October	86.0	(-25.71)	12.7	(-1.36)	6.7	(-0.47)	7.3	8	12.0	12.9	115.8	(+34.13)	26	58.6	8.8
November	76.9	(+6.13)	9.4	(-0.32)	3.6	(-0.23)	4.3	13	8.6	10.4	100.4	(+23.79)	22	132.2	8.8
December	68.2	(+14.40)	7.5	(+0.64)	1.4	(-0.24)	2.6	15	5.3	7.6	114.2	(+44.67)	26	200.1	11.0
Year	1615.0	(+22.68)	13.5	(-0.10)	5.9	(-0.03)	6.5	108	10.7	10.8	1059.2	(+326.23)	233	722.4	9.3

* Number of nights grass minimum was below 0.0 °C

30 year Mean Rainfall = 733mm

** Number of days rain was 0.2 mm or more

*** At 2 metres above the ground

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Woburn Experimental Farm

The Weather : Monthly Summary : 2012

(Departure from 30-year means (1981 - 2010) in brackets)

			Mean temperatures °C								Rain			
	Sunshine		Maximum		Minimum		Dew	Ground	In ground under grass		Total mm		Rain	Wind
	Hours	( )		( )		( )	point	frosts *	30 cm	100 cm	Tipping bucket		days **	km/hr***
												( )		
January	73.1	(+13.03)	9.0	(+1.95)	2.1	(+0.82)	4.6	13	5.9	8.1	35.0	(-19.53)	19	10.0
February	90.8	(+15.91)	6.9	(-0.49)	-0.4	(-1.30)	3.0	17	3.9	6.2	18.6	(-23.56)	14	7.7
March	168.6	(+55.17)	13.3	(+2.90)	2.2	(-0.51)	7.0	20	7.6	7.4	27.0	(-18.91)	12	6.2
April	142.0	(-8.94)	12.2	(-0.82)	3.1	(-0.67)	7.3	12	9.0	8.5	132.0	(+79.79)	25	8.2
May	177.8	(-9.46)	16.7	(+0.17)	7.3	(+0.75)	12.0	4	12.7	10.1	68.8	(+15.54)	15	6.9
June	151.7	(-36.26)	18.2	(-1.37)	9.8	(+0.40)	13.7	1	15.7	13.0	149.0	(+98.93)	23	9.3
July	174.4	(-22.73)	20.7	(-1.44)	11.5	(-0.08)	15.1	0	18.0	15.0	76.0	(+26.11)	21	7.1
August	170.6	(-18.23)	23.2	(+1.26)	13.0	(+1.38)	14.1	1	19.1	16.9	56.6	(-1.20)	14	7.3
September	169.4	(+32.33)	18.8	(+0.09)	8.4	(-1.19)	9.3	2	15.2	15.6	41.2	(-15.91)	10	8.7
October	95.0	(-16.79)	13.2	(-1.20)	6.3	(-0.59)	7.7	7	12.0	13.5	112.0	(+41.17)	24	7.2
November	66.5	(+0.24)	9.8	(-0.21)	3.5	(-0.28)	4.8	11	8.5	11.0	90.2	(+27.73)	21	7.3
December	66.4	(+20.79)	8.0	(+0.80)	1.6	(+0.08)	3.1	14	5.4	8.2	98.8	(+43.05)	26	10.2
Year	1546.1	(+25.06)	14.2	(+0.19)	5.7	(-0.06)	8.5	102.0	11.1	11.1	905.2	(+253.20)	224.0	8.0

* Number of nights grass minimum was below 0.0 °C

30 year Mean Rainfall = 652mm

** Number of days rain was 0.2 mm or more

*** At 2 metres above ground

https://doi.org/10.23637/ERADOC-1-222