ROTHAMSTED RESEARCH

Yields of the Field Experiments

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Results of the Classical and Other Long-term Experiments

Rothamsted Research

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ROTHAMSTED
RESEARCH

Results of the

Classical and other

Long-term Experiments

2016

List of Experiments in the 2016 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
W/RN/3	Ley Arable
W/RN/12	Organic Manuring
R/CS/326 & W/CS/326	Amounts of Straw
R/CS/477 & W/CS/478	Continuous Maize (Revision to Yields 2009-2015)

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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 (MOP)	60% K_2O as Potassium Chloride (KCl)
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
Silicate of soda	Na_2SiO_3 37% sodium and 23% silica
Sodium Sulphate	35% Sodium
Sulphate of ammonia	$(NH_4)_2SO_4$ 21% nitrogen 24% sulphur
Sulphate of potash (SOP)	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 Referred to in the Diary Notes

Cultivations			
	Manufacturer	**Width**	**Description**
Plough	Kverneland	1.5 m	5 Furrow, 25 cm Furrows.
Cultipress	Simba	3.3 m	Used after Ploughing.
Flexitine	Bunford	3.3 m	Used for lifting Worked ground.
Powerharrow	Kverneland	3.0 m	Used for creating seed bed.
Rotavator	Howard	1.3 m	Mainly used for BK/1 Paths.
Rotavator	Concept	1.2 m	Mainly Used for HB/2 Paths.
Drills			
	Manufacturer	**Width**	**Description**
Accord Combination Drill	Kverneland	3.0 m	Power-harrow Mounted Pneumatic drill with Suffolk coulters 12.5 cm apart.
Maize Drill	Nodet Pneumasem 2	5 Rows	Rows spaced at 70 cm.
Chemical Applications			
	Manufacturer	**Width**	**Description**
Aero-spreader	Kuhn	12 m	Tractor Mounted - General Fert Applications.

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Muck Spreader	International	1.5 m	Trailed - FYM Applications.
Exacto-matic	Ransome, Nordsten	3.8 m	Tractor Mounted - Fert Applications.
Sprayer	Knight	24 m	Tractor Mounted - Chemical Application.
Quickpass	Yr-Crop	1.5 m	Trailed - Fert Applications.
Lowspread	Lowspread	2.76 m	Tractor Mounted - Fert Applications.
Harvesters			
	Manufacturer	**Width**	**Description**
Rosenlew SR2010	Sampo	(Cut) 2m	Cereal Combine Harvester with a Continuous Weighing System.
3760	John Deere	2 Row	Maize Harvester, Cut and Mulch. Trailed Machine used after plot yields.
Tucano	Claas	6 m	Commercial Combine used for harvesting discards after plot yields.
Box Mower	Wilder	1.1 m	Box Mower Mainly used for yields on PG/5.
Mower	Unifarm	1.83 m	Commercial Mower used to mow discards on PG/5.
Other			
	Manufacturer	**Width**	**Description**
Ring Rolls	Cousins	3.3 m	Ring rolls for covering seed post drilling.
Topper 9	McConnell	2.72 m	Topper used for topping stubbles and grass areas.
Small Topper	Kilworth	1.1 m	Topper used with Iseki Tractor - Used for cutting Paths.
945 Conventional Baler	New Holland	-	Traditional Baler Used for baling straw samples.
Round Baler	Claas	-	Used for clearing unwanted leftover straw/grass from experiments.
Tractors			
	Manufacturer	**Weight**	**Description**
T7210	New Holland	8.1 t	Main cultivations tractor.
TL6030 Elite	New Holland	5.5 t	Sprayer tractor.
6830	John Deere	5.6 t	Drill and fertiliser application tractor.
TH4335	Iseki	1.1 t	Paths cutting tractor.

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T503	Tym	2.0 t	Fertiliser applications and Rotovating.

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.

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
Ally Max SX	h	metsulfuron-methyl + tribenuron-methyl (14.3:14.3 % w/w)
Atlantis	h	iodosulfuron-methyl-sodium + mesosulfuron-methyl (0.6:3.0 % w/w)
Balear 720	f	chlorothalonil (720 g/l)
BASF 3C	gr	chlormequat (750 g/l)
Bassoon EC	f	epoxiconazole (83 g/l)
BioPower	adj	6.7% w/w 3,6-dioxaeicosylsulphate sodium salt and 20.2% w/w 3,6-dioxaoctadecylsulphate sodium salt
Bravo 500	f	chlorothalonil (500 g/l)
Cello	f	prothioconazole + spiroxamine + tebuconazole (100:250:100 g/l)
Chex	water conditioner	A soluble liquid concentrate containing water conditioning and acidifying agents, humectant, pH buffer and an anti-foam.
Clayton Spigot	f	fenpropimorph (750 g/l)
Compitox plus	h	mecoprop-P (600 g/l)

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Corbel	f	fenpropimorph (750 g/l)
Cortez	f	epoxiconazole (125 g/l)
Cyflamid	f	cyflufenamid (50 g/l)
Excalibur	h	diflufenican + flupyrsulfuron-methyl (44.4:5.6 % w/w)
Firebrand	adj	ammonium sulphate (500 g/l)
Folicur	f	tebuconazole (250g/l)
Hallmark with zeon tech	i	lambda-cyhalothrin (100 g/l)
Hatchet xtra	h	fluroxypyr (200 g/l)
Hunter	h	florasulam + fluroxypyr (2.5:100 g/l)
Hurler	h	fluroxypyr (200 g/l)
Keystone	f	epoxiconazole + isopyrazam (99:125 g/l)
Kingdom	f	boscalid + epoxiconazole (140:50 g/l)
Kinto	f	prochloraz + triticonazole (60:20 g/l)
Laser	h	cycloxydim (200 g/l)
Liberator	h	diflуenican + flufenacet (100:400 g/l)
Mesurol	i	methiocarb (500g/l)
Mirage 40 EC	f	prochloraz (400 g/l)
Moddus	gr	trinexapac-ethyl (250 g/l)
Odin	f	tebuconazole (250g/l)
Pacifica	h	iodosulfuron-methyl-sodium + mesosulfuron-methyl (1.0:3.0% w/w)
Proline	f	prothioconazole (275 g/l)
Raxil star	f	fluopyram + prothioconazole + tebuconazole (20.8:103.1:63.2 g/l)
Redigo	f	prothioconazole (100 g/l)
Redigo Deter	f	prothioconazole + clothiandin (50:250 g/l)
Redigo Pro	f	prothioconazole + tebuconazole (15:20 g/l)
Refine Max	h	metsulfuron-methyl + thifensulfuron-methyl (6.7:33.3 w/w)
Samurai	h	glyphosate (360 g/l)
San 703	f	chlorothalonil + cyproconazole (375:40 g/l)
Simba SX	h	metsulfuron-methyl (20 % w/w)
Sprinter-K	foliar feed	K_20, 30% w/w (44,4% w/v)
Stomp Aqua	h	pendimethalin (455 g/l)
Supasect	i	cypermethrin
TDS Major	m	metaldehyde (4% w/w)
Toledo	f	tebuconazole (430 g/l)
Troy 480	h	bentazone (480 g/l)
Vortex	f	epoxiconazole + fluxapyroxad + pyraclostrobin (41.6:41.6:61 g/l)
Zarado	adj	70% w/w oil (rapeseed oil fatty acid esters) as emulsifiable concentrate

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16/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 173rd 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 74-15/R/BK/1.

Areas harvested[a]:

Wheat:	Section	
	0	0.00320
	1	0.00589
	2,4,7 and 6	0.00487
	9	0.00512
Oats:	3	0.00487
Maize:	5	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 since 2001), 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 since 2001), 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	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
1989	W	W	W	W	W	W	W	P	F	W
1990	W	W	W	W	W	F	W	W	P	W

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Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1991	W	W	W	W	W	P	F	W	W	W
1992	W	W	W	W	W	W	P	W	W	F
1993	W	W	W	W	W	W	W	F	W	P
1994	W	W	W	F	W	W	W	P	F	W
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
2013	W	W	W	W	W	W	W	O	W	M
2014	W	W	W	W	W	W	W	M	O	W
2015++	W	W	W	F	W	O	W	W	M	W
2016	W	W	W	F	W	M	O	W	W	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.

++ Spring Wheat in 2015

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 2013 the wheat variety changed from Hereward to Crusoe, but it was sown very late (22nd February 2013) because of the very wet autumn and winter of 2012-13.

(5) Spring wheat (var Mulika) and winter oats (var Gerald) were sown in March 2015, instead of in autumn/winter 2014, because the very wet soil conditions in autumn 2014 prevented sowing of a winter crop. The whole site was spring-tine cultivated in March 2015 instead of being ploughed. Section 8 was left in bare fallow and had two in-season cultivations (inversion ploughing) to control weeds.

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16/R/BK/1

Experimental Diary:

Date		Application	Rate	Units
All Sections				
01/10/2015	f	Applied MOP Fertiliser - Strip 14; All Sections	181	kg/ha
01/10/2015	f	Applied FYM - Strips 2.2 and 2.1; All Sections except Section 3	35	t/ha
01/10/2015	a	Ploughed (Thrown Southwards)	-	-
01/10/2015	f	Applied TSP - To strips 11, 13, 14, 17 + 18; All Sections	171	kg/ha
02/10/2015	a	Started Ploughing all field (Thrown Northwards)	-	-
04/10/2015	a	Cultipressed	-	-
12/10/2015	a	Powerharrowed	-	-
15/10/2015	a	Ring Rolled	-	-
11/11/2015	a	Hedge Cutting	-	-
12/11/2015	a	Hedge Cutting	-	-
07/01/2016	a	Erected Electric Fence (West end to stop rabbits)	-	-
11/04/2016	f	Applied SOP - Strips 5, 6, 7, 8, 9, 12, 13, 15, 16, 17, 18, 19 + 20; All Sections	217	kg/ha
13/04/2016	f	Applied Kieserite Fertiliser - Strips 5, 6, 7, 8, 9, 11, 12, 15, 16, 17, 18, 19 + 20; All Sections	80	kg/ha
20/04/2016	a	Marked out and Mowed all paths	-	-
24/05/2016	a	Mowed All Paths	-	-
06/06/2016	a	Cut Cross Paths	-	-
25/07/2016	a	Cut Cross Paths	-	-
09/08/2016	a	Combined the immediate surrounds of trials	-	-
12/08/2016	a	Completed Straw Weights	-	-
19/08/2016	a	Started to mop up leftover wheat with Claas	-	-
19/08/2016	a	Baled and removed all swaths from Claas	-	-
23/08/2016	a	Mopped Up remaining crop	-	-
27/08/2016	a	Removed Bales	-	-
W Wheat				
14/10/2015	s	Drilled Crusoe trt Redigo Deter - Sections 0, 1, 2, 4, 6, 7 + 9	350	seed/m^2
19/10/2015	p	Sprayed WW - Liberator - Sections 0, 1, 2, 4, 6, 7 + 9	0.6	lt/ha
19/10/2015	p	Sprayed WW -Stomp Aqua - Sections 0, 1, 2, 4, 6, 7 + 9	1.75	lt/ha
12/11/2015	p	Applied TDS Major - Sections 0, 1, 2, 4, 6, 7 + 9	5	kg/ha
21/03/2016	f	Applied Nitram @34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strips 12, 17, 18 + 19	139	kg/ha
07/04/2016	f	Applied Nitram @34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strips 6, 19	139	kg/ha

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07/04/2016	f	Applied Nitram @34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strips 7, 18	278	kg/ha
07/04/2016	f	Applied Nitram @34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strips 2.1, 8, 12	417	kg/ha
07/04/2016	f	Applied Nitram @34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strips 1, 9, 10, 11, 13, 14, 17	556	kg/ha
07/04/2016	f	Applied Nitram @34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strip 15	696	kg/ha
07/04/2016	f	Applied Nitram @34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strip 16	835	kg/ha
13/04/2016	p	Sprayed Moddus - Sections 0, 1, 2, 4, 7, + 9	150	ml/ha
13/04/2016	p	Sprayed 3C Chlormequat750 - Sections 0, 1, 2, 4, 7 + 9	1.25	lt/ha
13/04/2016	p	Sprayed Odin - Sections 0, 1, 2, 4, 7 + 9	500	ml/ha
13/04/2016	p	Sprayed Mirage 40ec - Sections 0, 1, 2, 4, 7 + 9	500	ml/ha
13/04/2016	p	Sprayed Bravo500 - Sections 0, 1, 2, 4, 7 + 9	1	lt/ha
13/04/2016	p	Sprayed Moddus - Section 6 only	150	ml/ha
13/04/2016	p	Sprayed 3C Chlormequat750 - Section 6 only	1.25	lt/ha
30/04/2016	p	Sprayed Chex - Sections 0, 1, 2, 4, 6, 7 + 9	250	ml/ha
30/04/2016	p	Sprayed Pacifica - Sections 0, 1, 2, 4, 6, 7 + 9	500	ml/ha
30/04/2016	p	Sprayed Bio Power - Sections 0, 1, 2, 4, 6, 7 + 9	1	lt/ha
05/05/2016	f	Applied Nitram @ 34.5%N - Sections 0, 1, 2, 4, 6, 7 + 9; Strips 12, 17, 18 + 19	139	kg/ha
12/05/2016	p	Sprayed Keystone - Sections 0, 1, 2, 4, 7 + 9	800	ml/ha
12/05/2016	p	Sprayed Balear720 - Sections 0, 1, 2, 4, 7 + 9	700	ml/ha
03/06/2016	p	Sprayed Vortex - Sections 0, 1, 2, 4, 7 + 9	909	ml/ha
03/06/2016	p	Sprayed Bassoon - Sections 0, 1, 2, 4, 7 + 9	600	ml/ha
10/07/2016	p	Sprayed Cello - Sections 0, 1, 2, 4, 7 + 9	550	ml/ha
10/08/2016	a	Combined All Plots for yield - Sections 0, 1, 2, 4, 6, 7 + 9	-	-

W Oats

14/10/2015	s	Drilled Mascani Oats, trt Kinto - Section 3 only	350	seed/m^2
12/11/2015	p	Applied TDS Major - Sections 3	5	kg/ha
21/12/2015	p	Sprayed Oats with Excalibur and Hallmark	180	g/ha
21/12/2015	p	Sprayed Oats with Excalibur and Hallmark	40	ml/ha
27/04/2016	p	Sprayed Ally Max	30	g/ha
27/04/2016	p	Sprayed BASF 3C Chlormequat750	2	lt/ha
27/04/2016	p	Sprayed Cello	800	ml/ha
27/04/2016	p	Sprayed Hurler	1	lt/ha
06/06/2016	p	Sprayed Folicur - Sections 3 only	750	ml/ha
08/08/2016	a	Combined all Plots on Section 3	-	-
08/08/2016	a	Completed Straw Weights on Section 3	-	-
09/08/2016	a	Completed Straw weight on section 3	-	-
14/10/2015	s	Drilled Mascani, trt Kinto - Section 3 only	350	seeds/m^2
12/11/2015	p	Applied TDS Major - Sections 3	5	kg/ha

Maize

19/04/2016	p	Sprayed Firebrand - Section 5 only	1	lt/ha
19/04/2016	p	Sprayed Samurai - Section 5 only	3	lt/ha

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22/04/2016	a	Springtined - Section 5	-	-
03/05/2016	a	Flexitined - Section 5 only	-	-
05/05/2016	s	Drilled Severus Maize - trt Mesurol - Section 5 only	10.2	seed/m^2
05/05/2016	a	Powerharrow - Section 5 only - Prior to Drilling	-	-
17/05/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 065	139	kg/ha
17/05/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 075, 125, 175, 185, 195	278	kg/ha
17/05/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 085, 215 (plot 215 applied by hand)	417	kg/ha
17/05/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 095, 105, 115, 135, 145	556	kg/ha
17/05/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 155	696	kg/ha
17/05/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 165	835	kg/ha
07/06/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 195	139	kg/ha
07/06/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 185	278	kg/ha
07/06/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 175	556	kg/ha
07/06/2016	f	Applied Nitram @34.5%N - Section 5 only - Plot 125	417	kg/ha
19/07/2016	a	Hand Rotavated inter-row - Section 5 only	-	-
21/09/2016	a	Harvested Maize plots for yield - Section 5 only	-	-

Fallows

27/10/2015	a	Flexitined bare fallow - Section 8 only
23/03/2016	a	Powerharrowed - Section 8 only
17/05/2016	a	Topped Weeds - Section 8 only
19/05/2016	a	Ploughed - Section 8
06/06/2016	a	Powerharrowed - Section 8 only
19/07/2016	a	Power harrowed all fallows
20/07/2016	a	Power Harrow - Section 8 only
25/07/2016	a	Flexitined Section 8
05/08/2016	a	Ploughed (thrown Northwards) - Section 8 only
05/08/2016	a	Ring Rolled - Section 8

Wilderness

04/01/2016	a	Cleared fallen tree
27/10/2016	a	Topped Grass

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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WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	4/W1	7/W2	2/W3	6/W39	0/W12	1/W50	9/W58	Mean
01(FYM)N4	11.58	9.38	6.73	4.87	*	*	*	8.14
21FYMN3	12.15	10.61	9.83	6.30	7.01	8.91	9.84	9.23
22FYM	6.45	4.97	5.01	4.48	3.42	3.89	5.65	4.84
03Nil	1.75	0.42	0.43	0.40	0.63	0.90	0.74	0.75
05(P)KMg	2.06	0.34	0.35	0.51	0.78	0.97	0.80	0.83
06N1(P)KMg	4.94	2.54	2.90	2.24	2.63	2.85	2.59	2.95
07N2(P)KMg	7.71	3.50	3.83	3.20	4.20	4.55	4.48	4.50
08N3(P)KMg	9.31	5.54	6.71	3.81	6.09	5.66	6.70	6.26
09N4(P)KMg	10.20	6.30	9.05	4.92	6.52	7.10	7.16	7.32
10N4	7.45	1.00	3.71	1.36	0.75	1.43	0.99	2.38
11N4PMg	6.69	7.69	6.57	3.77	6.11	5.71	6.36	6.13
12N1+3+1(P)KMg	11.48	8.85	10.36	4.73	7.53	8.79	9.81	8.79
13N4PK	10.09	6.62	8.28	4.21	6.37	7.73	8.21	7.36
14N4PK*(Mg*)	9.36	6.31	5.65	3.83	4.22	4.90	7.62	5.98
15N5(P)KMg	11.09	5.65	7.54	3.84	6.02	7.79	9.67	7.37
16N6(P)KMg	11.66	7.74	8.73	4.45	7.00	7.55	9.63	8.11
17N1+4+1PKMg	12.62	9.86	10.95	4.82	8.67	8.25	9.90	9.30
18N1+2+1PKMg	10.33	8.97	9.20	5.33	7.66	7.48	8.99	8.28
19N1+1+1KMg	8.81	3.46	6.76	4.05	6.54	6.07	6.97	6.10
20N4KMg	*	*	*	*	1.55	0.74	*	1.15
Mean	8.72	5.78	6.45	3.74	4.93	5.33	6.45	5.91

GRAIN MEAN DM% 87.5

STRAW TONNES/HECTARE

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

SECTION PLOT	4/W1	7/W2	2/W3	6/W39	0/W12	1/W50	9/W58	Mean
01(FYM)N4	4.82	*	*	*	*	*	*	4.82
21FYMN3	5.95	*	*	*	*	4.75	*	5.35
22FYM	2.30	*	*	*	*	2.25	*	2.27
03Nil	0.13	*	*	*	*	0.18	*	0.16
05(P)KMg	0.19	*	*	*	*	0.17	*	0.18
06N1(P)KMg	1.91	*	*	*	*	1.33	*	1.62
07N2(P)KMg	2.93	*	*	*	*	2.29	*	2.61
08N3(P)KMg	3.60	*	*	*	*	2.52	*	3.06
09N4(P)KMg	4.16	*	*	*	*	3.40	*	3.78
10N4	2.00	*	*	*	*	0.68	*	1.34
11N4PMg	2.21	*	*	*	*	2.56	*	2.38
12N1+3+1(P)KMg	4.58	*	*	*	*	4.30	*	4.44
13N4PK	3.78	*	*	*	*	3.50	*	3.64
14N4PK*(Mg*)	2.85	*	*	*	*	2.27	*	2.56
15N5(P)KMg	4.33	*	*	*	*	3.51	*	3.92
16N6(P)KMg	5.07	*	*	*	*	3.36	*	4.22
17N1+4+1PKMg	6.24	*	*	*	*	3.81	*	5.03
18N1+2+1PKMg	4.35	*	*	*	*	3.10	*	3.72
19N1+1+1KMg	3.97	*	*	*	*	2.94	*	3.46
20N4KMg	*	*	*	*	*	0.35	*	0.35
Mean	3.44	*	*	*	*	2.49	*	2.96

STRAW MEAN DM% 84.5

Note: No yields are reported on section 8 in 2015 and 2016 because it was left in bare fallow to control weeds.

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OATS

TONNES/HECTARE (85% DM)

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

Plot	Treatment	GRAIN	STRAW
13	01(FYM)[N4]	4.12	2.42
213	21[FYMN3]	5.82	4.53
223	22[FYM]	5.23	3.42
33	03Nil	1.17	0.54
53	05(P)KMg	1.62	0.67
63	06[N1](P)KMg	1.90	0.92
73	07[N2](P)KMg	2.30	1.10
83	08[N3](P)KMg	2.34	1.11
93	09[N4](P)KMg	2.72	1.34
103	10[N4]	3.84	2.03
113	11[N4]PMg	3.81	2.02
123	12[N1+3+1](P)KMg	2.49	1.10
133	13[N4]PK	2.50	1.15
143	14[N4]PK*(Mg*)	1.85	0.81
153	15[N5](P)KMg	2.90	1.40
163	16[N6](P)KMg	3.24	1.67
173	17[N1+4+1]PKMg	3.58	2.13
183	18[N1+2+1]PKMg	2.42	1.26
193	19[N1+1+1]KMg	2.45	1.18
	MEAN	2.96	1.62

PLOT AREA HARVESTED 0.00487

MAIZE

TONNES/HECTARE (100% DM)

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

Plot	Treatment	Whole Crop
15	01(FYM)N4	12.57
215	21FYMN3	9.43
225	22FYM	8.66
35	03Nil	0.80
55	05(P)KMg	2.33
65	06N1(P)KMg	4.36
75	07N2(P)KMg	4.95
85	08N3(P)KMg	5.47
95	09N4(P)KMg	5.40
105	10N4	3.80
115	11N4PMg	3.15
125	12N2+3(P)KMg	5.74
135	13N4PK	6.82
145	14N4PK*(Mg*)	7.29
155	15N5(P)KMg	5.77
165	16N6(P)KMg	6.02
175	17N2+4PKMg	4.92
185	18N2+2PKMg	7.89
195	19N2+1KMg	4.68
	MEAN	5.79

PLOT AREA HARVESTED 0.00189

Mean DM% 29.7

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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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16/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 165th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and Yield Books for 74-15/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 2017
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 2017

D1852: Farmyard manure at 35t since 1852

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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 was reviewed for 2015.

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 all of the P test plots reverted to K dressings of 90 kg K/ha/year.

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Experimental Diary

Date		Application	Rate	Units
28/10/2015	f	Applied TSP onto plots 634 - 631	215	kg/ha
28/10/2015	f	Applied Kieserite onto plots 634 - 631	233	kg/ha
29/10/2015	f	Applied SOP onto plots 634-631, 561-311, 551-411, 571-241 and 581-141	217	kg/ha
23/11/2015	p	Sprayed Firebrand	1	lt/ha
23/11/2015	p	Sprayed Samurai	3	lt/ha
26/11/2015	f	Applied FYM onto plots 721-724 & 731-734	35	t/ha
26/11/2015	f	Applied Silicate of Soda onto plots 433, 432, 333, 332, 233, 232, 133 + 132	450	kg/ha
03/12/2015	a	Ploughed; thrown south	-	-
17/02/2016	a	Combination Harrowed all Site and surrounds	-	-
29/02/2016	s	Drilled KWS Irina - trt Raxial Star	350	seed/m^2
19/04/2016	p	Sprayed Hallmark with Zeon Technology	50	ml/ha
21/04/2016	a	Marked out and rotavated all paths	-	-
05/05/2016	f	Applied Nitram @ 34.5%N to Old Series 5, Series C and Series AA (except plots 6 and 7)	417	kg/ha
09/05/2016	f	Applied Nitrochalk to plots 114, 122, 213, 224, 312, 323, 411, 424, 612, 622, 632, 714, 723, 733	0	kg/ha
09/05/2016	f	Applied Nitrochalk to plots 111, 121, 214, 221, 311, 322, 413, 423, 614, 623, 633, 713, 724, 734	48	kg/ha
09/05/2016	f	Applied Nitrochalk to plots 113, 124, 211,222, 313, 321, 412, 421, 611, 621, 631, 712, 721, 732	96	kg/ha
09/05/2016	f	Applied Nitrochalk to plots 112, 123, 212, 223, 314, 324, 414, 422, 613, 624, 634, 711, 722, 731	144	kg/ha
23/05/2016	p	Sprayed Refine Max	75	g/ha
23/05/2016	p	Sprayed Hatchet Xtra	750	ml/ha
23/05/2016	p	Sprayed Kingdom	1.25	lt/ha
24/05/2016	a	Rotavated Paths	-	-
26/07/2016	a	pulled wild oats from plots (36) and surrounds	-	-
23/08/2016	a	Mopped Up remaining crop	-	-
24/08/2016	a	Sampo Harvested All Plots	-	-
25/08/2016	a	Combined with Tucano Harvester all leftover crop	-	-

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MAIN PLOTS

Grain tonnes/hectare

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

N	0	48	96	144	Mean
MANURE					
---	0.78	1.92	1.20	0.77	1.17
-P-	1.57	2.71	4.70	4.93	3.48
--K	0.39	1.54	1.65	1.88	1.36
-PK	1.92	3.76	5.07	5.55	4.08
A--	0.62	0.79	1.10	0.76	0.82
AP-	2.17	3.25	3.55	3.70	3.17
A-K	0.43	0.78	1.34	1.14	0.92
APK	1.72	3.62	4.80	5.61	3.94
FYM1852onwards	5.98	7.03	7.38	7.84	7.06
FYM1852-1871	1.87	2.21	2.59	2.75	2.35
(A)	0.61	0.97	1.73	2.84	1.54
-	0.55	0.54	1.14	0.82	0.76
FYM2001onwards	4.02	5.94	6.16	7.51	5.91
P2K	1.98	3.42	4.71	5.30	3.85
Mean	1.76	2.75	3.37	3.67	2.89

Grain Mean DM% 87.4

Straw tonnes/hectare

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

N	0	48	96	144	Mean
MANURE					
---	0.08	0.50	0.37	0.09	0.26
-P-	0.39	0.78	1.59	1.81	1.14
--K	0.11	0.34	0.47	0.45	0.34
-PK	0.53	1.30	1.75	2.57	1.54
A--	0.03	0.19	0.24	0.22	0.17
AP-	0.46	1.10	1.42	1.18	1.04
A-K	0.10	0.09	0.29	0.17	0.16
APK	0.36	1.38	1.74	2.68	1.54
FYM1852onwards	2.04	3.23	3.09	3.80	3.04
FYM1852-1871	0.35	0.46	0.70	0.90	0.60
(A)	0.09	0.19	0.46	0.97	0.43
-	0.15	0.11	0.41	0.12	0.20
FYM2001onwards	0.94	2.39	2.33	3.24	2.22
P2K	0.65	1.22	1.57	2.59	1.51
Mean	0.45	0.95	1.17	1.49	1.01

Straw Mean DM% 89.1

Plot area harvested 0.0192, 0.00256

https://doi.org/10.23637/ERADOC-1-249

16/R/HB/2

PHOSPHATE PLOTS

Grain tonnes/hectare

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

PLOTS

142	2.42
143	2.03
144	1.76
242	6.51
243	6.55
244	6.27
341	2.21
342	2.58
343	4.15
344	5.62
441	6.05
442	6.10
443	6.13
444	6.72
551	6.44
552	6.41
561	6.35
562	6.19
571	3.25
572	4.74
581	0.52
582	1.00
Mean	4.54

Grain Mean DM% 88.9

Plot area harvested 0.00256

SILICATE PLOTS

Grain tonnes/hectare

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

PK	N3--	N3P-	N3-K	N3PK	Mean
Silicate					
(-)-	1.08	5.04	1.08	5.89	3.27
(Si)-	1.23	4.88	1.80	6.60	3.63
(-)Si	1.92	4.74	2.09	6.67	3.86
(Si)Si	2.17	4.63	2.59	6.56	3.99
Mean	1.60	4.82	1.89	6.43	3.69

Grain Mean DM% 89.4

Plot area harvested 0.00256

https://doi.org/10.23637/ERADOC-1-249

16/R/WF/3

WHEAT AND FALLOW

Object: To maintain a low plant available P site – Hoosfield.

Whole plot dimensions: 9 x 211

Treatments:
Two plots, one sown to w. wheat, one fallow; alternating in successive years. From 2016 this experiment was converted to continuous wheat on both plots, with no yields or samples taken at harvest. For previous years see 'Details' 1967, 1973 and Yield Books for 74-14/R/WF/3.

Experimental Diary

Date		Application	Rate	Units
09/10/2015	a	Ploughed - thrown south	-	-
09/10/2015	a	Topped all field and experiment - Batwing	-	-
15/10/2015	a	Powerharrowed - seed bed preparation	-	-
15/10/2015	s	Drilled Winter Wheat var. Crusoe trt Redigo	350	seed/m^2
18/10/2015	a	Ring Rolled all new drilling	-	-
19/10/2015	p	Sprayed Liberater - wheat only	0.6	lt/ha
19/10/2015	p	Sprayed Stomp Aqua - wheat only	1.75	lt/ha
12/11/2015	p	Sprayed Hallmark	40	ml/ha
03/12/2015	p	Applied TDS Major	5	kg/ha
12/12/2015	p	Sprayed Hallmark	40	ml/ha
08/04/2016	p	Sprayed Moddus	150	ml/ha
08/04/2016	p	Sprayed BASF 3C Chlormequat750	1.25	lt/ha
08/04/2016	p	Sprayed Odin	500	ml/ha
08/04/2016	p	Sprayed Mirage 40ec	500	ml/ha
09/04/2016	p	Sprayed Bravo500	1	lt/ha
05/05/2016	p	Sprayed Keystone - wheat only	800	ml/ha
05/05/2016	p	Sprayed Balear720 - wheat only	700	ml/ha
25/05/2016	p	Sprayed Simba SX - wheat only	20	gms/ha
25/05/2016	p	Sprayed Vortex - wheat only	1.5	lt/ha
25/05/2016	p	Sprayed Spiggot - wheat only	250	ml/ha
09/07/2016	p	Sprayed Cello	550	ml/ha
09/07/2016	p	Sprayed Hallmark	50	ml/ha
23/08/2016	a	Mopped Up remaining crop (Harvest)	-	-
26/08/2016	a	Round Baled and removed straw	-	-

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16/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 161st year, w. wheat.

For previous years see 'Details' 1977, 1973 and Yield Books for 74-14/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. In 2009 maintenance P applications were changed from 20 kg P/ha to 15 kg P/ha. This was not recorded in the yield books for 2009-13. (P1) (P2) and (P3) are residues of P applied annually 1986–1992:

	2009-Present	2000-08	1986-92
O	None	None	None
P (P1)	15 kg P	20 kg P	44 kg P
P (P2)	15 kg P	20 kg P	87 kg P
P (P3)	15 kg P	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

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

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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
25/08/2015	p	Sprayed Firebrand	1	lt/ha
25/08/2015	p	Sprayed Samurai	4	lt/ha
01/10/2015	f	Applied MOP - Plots 103, 83, 63, 43 + 23	125	kg/ha
01/10/2015	f	Applied MOP - Plots 094-014, 092-012, 104-024, 093-013, 091-011	250	kg/ha
01/10/2015	f	Applied TSP - plots 101-021, 102-022, 103-023, 104-024, 091-011 + 092-012	75	kg/ha
09/10/2015	a	Ploughed; thrown south	-	-
09/10/2015	a	Topped all field and exp - Batwing	-	-
15/10/2015	a	Power harrowed - Seed bed preparation	-	-
15/10/2015	s	Drilled Crusoe trt Redigo	350	seed/m^2
18/10/2015	a	Ring Rolled all new drilling	-	-
19/10/2015	p	Sprayed WW - Liberater	0.6	lt/ha
19/10/2015	p	Sprayed WW - Stomp Aqua	1.75	lt/ha
12/11/2015	p	Sprayed Hallmark	40	ml/ha
03/12/2015	p	Applied TDS Major	5	kg/ha
12/12/2015	p	Sprayed Hallmark	40	ml/ha
21/03/2016	f	Applied Sulphate of Ammonia	238	kg/ha
04/04/2016	f	Applied Nitram @ 34.5%N	840	kg/ha
08/04/2016	p	Sprayed Moddus	150	ml/ha
08/04/2016	p	Sprayed BASF 3C Chlormequat750	1.25	lt/ha
08/04/2016	p	Sprayed Odin	500	ml/ha
08/04/2016	p	Sprayed Mirage 40ec	500	ml/ha
08/04/2016	p	Sprayed Bravo500	1	lt/ha
13/04/2016	f	Applied Kieserite - all plots	80	kg/ha
05/05/2016	p	Sprayed Keystone - wheat only	800	ml/ha
05/05/2016	p	Sprayed Keystone - wheat only	700	ml/ha
24/05/2016	p	Sprayed Vortex	1.5	lt/ha
24/05/2016	p	Sprayed VortexCorbel	250	ml/ha
09/07/2016	p	Sprayed Cello	550	ml/ha
09/07/2016	p	Sprayed Hallmark	50	ml/ha
22/08/2016	a	Cut Paths using Iseki and Mower	-	-
23/08/2016	a	Mopped Up remaining crop	-	-
25/08/2016	a	Harvested All Plots	-	-

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26/08/2016	a	Combined all crop using Tucano	-	-
25/08/2015	p	Sprayed Firebrand	1	lt/ha

Note: Samples of grain and straw were taken for chemical analysis. The yield strips on plots 031-034, 071- 074, 091- 094 (12 plots in total) were made smaller this year to avoid areas where the crop had already been sampled by S. McGrath et al.

16/R/EX/4

P TEST

Grain tonnes/hectare

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

P_RES	O	P1	P2	P3	Mean
OLD_RES					
O	2.48	7.72	8.51	9.12	6.96
D	5.66	10.35	10.85	11.49	9.59
N	2.33	8.07	9.90	9.59	7.47
P	4.23	9.89	10.93	11.27	9.08
NPKNAMG	3.96	7.98	11.11	11.83	8.72
Mean	3.73	8.80	10.26	10.66	8.36

Grain mean DM% 85.2

Straw tonnes/hectare

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

P_RES	O	P1	P2	P3	Mean
OLD_RES					
O	2.49	6.84	7.76	7.49	6.14
D	5.33	9.5	9.49	8.94	8.32
N	1.90	7.56	8.45	7.68	6.40
P	3.59	7.56	8.47	8.05	6.92
NPKNAMG	3.92	7.22	9.13	8.80	7.27
Mean	3.45	7.74	8.66	8.19	7.01

Straw mean DM% 92.1

Plot area harvested 0.00538, 0.00252.

K TEST

Grain tonnes/hectare

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

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K_Test	K0	K1	K2	Mean
OLD_RES				
O	9.14	10.50	10.48	9.82
D	8.76	10.92	10.86	9.83
N*	9.44	10.52	9.84	9.81
PK	10.54	10.51	10.18	10.44
N*PK	9.56	10.75	11.14	10.25
Mean	9.49	10.64	10.50	10.03

Grain mean DM% 85.5

Straw tonnes/hectare

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

K_Test	K0	K1	K2	Mean
OLD_RES				
O	6.70	8.34	8.40	7.53
D	6.55	8.05	8.12	7.32
N*	6.08	7.53	7.64	6.83
PK	7.22	7.08	7.19	7.18
N*PK	6.31	7.10	7.40	6.78
Mean	6.57	7.62	7.75	7.13

Straw mean DM% 96.6 Plot area harvested 0.00538

https://doi.org/10.23637/ERADOC-1-249

16/R/PG/5

PARK GRASS

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

The 161st year, hay.
For previous years see 'Details' 1977 and 1973 and Yield Books for 74-15/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
(P)KNaMg	Plot 7/1	K Na Mg (+P until 2012)
PKNaMg	Plot 7/2	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
N3*PKNaMg (N2*)	Plot 15	N3*P K Na Mg (N2* until 1875; P K Na Mg 1876-2012)
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*, N3*:	48, 96, 144 kg N as nitrate of soda (30 kg N to plot 20 in years with no farmyard manure). In 2013 plot 15 started to receive 144 kg N/ha as nitrate of soda to provide a comparison with plot 11/1, which receives 144 kg N/ha as sulphate of ammonia.
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
(P):	other years In 2013 plot 7 was split into 7/1 & 7/2. P was withheld from plot 7/1 to evaluate the effect of withholding P on plant biodiversity in 2013-2015. 7/2 continues to receive P as above.

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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
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 2014-2015; the eighth 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.]

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	Units
23/10/2015	a	Mowed all discards and leftover grass.	-	-
23/10/2015	a	Rowed up all mowing across field	-	-
23/10/2015	a	Baled and removed all grass on field	-	-
02/12/2015	f	Applied TSP Fertilizer - plots 11/2, 11/1, 10, 9/2, 9/1, 8, 7/2, 6, 4/2, 4/1, 14/2, 14/1, 15 + 16	171	kg/ha
02/12/2015	f	Applied TSP Fertilizer - plot 20	73	kg/ha
20/01/2016	f	Started to apply Fertilizer Powders to designated plots	-	-
21/01/2016	f	Completed applying Fertilizer Powders - Sulphate of Potash - plots 2-1, 6, 7-1, 7-2, 9-1, 9-2, 11-1, 11-2, 14-1, 14-2, 15, 16, 18, 20…	542	kg/ha
21/01/2016	f	Completed applying Fertilizer Powders - Sulphate of Magnesia - plots 6, 7-1, 7-2, 8, 9-1, 9-2, 10, 11-1, 11-2, 14-1, 14-2, 15, 16, 18	111	kg/ha
21/01/2016	f	Completed applying Fertilizer Powders - Sulphate of Soda - plots 6, 7-1, 7-2, 8, 9-1, 9-2, 10, 11-1, 11-2, 14-1, 14-2, 15, 16, 18	43	kg/ha

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21/01/2016	f	Completed applying Fertilizer Powders - Silicate of Soda - plot 11-2	450	kg/ha
9/04/2016	f	Applied Ammonium Sulphate 21%N - plot 1, 6a, 6b	229	kg/ha
19/04/2016	f	Applied Ammonium Sulphate 21%N - plots 4-2, 9-2, 10, 18	457	kg/ha
19/04/2016	f	Applied Ammonium Sulphate 21%N - plots 11-1, 11-2	686	kg/ha
19/04/2016	f	Applied Sodium Nitrate 16%N - plots 16, 17	300	kg/ha
19/04/2016	f	Applied Sodium Nitrate 16%N - plot 14/2	600	kg/ha
19/04/2016	f	Applied Sodium Nitrate 16%N - plot 15	900	kg/ha
20/04/2016	f	Applied Sodium Nitrate 16%N - plot 20	188	kg/ha
10/05/2016	a	Cut paths in and around experiment using Iseki and mower	-	-
03/06/2016	a	Cut Paths within Trial	-	-
16/06/2016	a	Cut Paths.	-	-
04/07/2016	a	Started Harvest Yields to be completed (1st Cut)	-	-
04/07/2016	a	Cut Paths Before starting yields Iseki and Mower	-	-
05/07/2016	a	Completed plots yields (1st Cut).	-	-
05/07/2016	a	Cut discards and surrounds.	-	-
06/07/2016	a	Teddered all mowed grass on field	-	-
07/07/2016	a	Rowed up all grass on field	-	-
19/10/2016	a	Started cutting plots for Yield (2nd Cut)	-	-
20/10/2016	a	Completed grass yields (2nd Cut).	-	-

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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16/R/PG/5

***** TABLES OF MEANS

1ST CUT (04-05/07/2016) DRY MATTER TONNES/HECTARE

Grand mean 4.44

Manure	Lime	a	b	c	d	Mean
N1	1	3.48	2.88	2.23	1.74	2.58
K	2/1	3.24	3.88	3.02	2.50	3.16
None(FYM)	2/2	3.88	3.69	2.53	3.09	3.30
None	3	3.22	3.35	2.10	3.02	2.92
P	4/1	4.12	4.71	4.09	3.53	4.11
N2P	4/2	3.21	3.62	3.85	2.16	3.21
N1PKNaMg	6	5.43	5.40			5.42
(P)KNaMg	7/1	5.59	6.34	5.57	4.21	5.43
PKNaMg	7/2	5.67	5.57	5.68	4.75	5.42
PNaMg	8	4.37	4.45	4.06	3.92	4.20
PKNaMg(N2)	9/1	5.19	5.82	5.19	2.50	4.68
N2PKNaMg	9/2	6.00	6.22	5.66	4.60	5.62
N2PNaMg	10	4.95	5.20	5.17	3.39	4.68
N3PKNaMg	11/1	5.79	5.90	5.93	4.99	5.65
N3PKNaMgSi	11/2	6.22	6.09	6.26	5.38	5.99
None	12	3.41	3.03	2.55	2.66	2.91
(FYM/F)	13/1	4.43	4.61	4.44	4.24	4.43
FYM/PM	13/2	4.05	4.31	5.04	5.13	4.63
PKNaMg(N2*)	14/1	5.55	5.19	5.13	5.31	5.30
N2*PKNaMg	14/2	4.90	4.53	4.48	4.49	4.60
N3*PKNaMg(N2*)	15	5.79	5.70	5.95	5.35	5.70
N1*PKNaMg	16	5.52	4.80	4.93	4.57	4.96
N1*	17	3.51	3.42	2.52	2.89	3.08
N2KNaMg	18	3.48	4.01	4.09	3.62	3.80
N2KNaMg	18/2					4.73
FYM	19/1					5.27
FYM	19/2					5.47
FYM	19/3					4.73
FYM/N*PK	20/1					5.40
FYM/N*PK	20/2					5.50
FYM/N*PK	20/3					5.47

1ST CUT MEAN DM% 26.5

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***** Tables of means

2ND CUT (19-20/10/2016) DRY MATTER TONNES/HECTARE

Grand mean 1.34

Manure	Lime	a	b	c	d	Mean
N1	1	0.97	0.73	0.50	0.52	0.68
K	2/1	0.83	1.09	0.63	0.55	0.77
None(FYM)	2/2	1.27	1.21	0.87	0.69	1.01
None	3	0.77	0.93	0.56	0.56	0.71
P	4/1	1.29	1.67	1.25	0.87	1.27
N2P	4/2	0.75	0.86	0.63	0.48	0.68
N1PKNaMg	6	1.92	1.53			1.73
(P)KNaMg	7/1	1.87	2.05	1.41	0.74	1.52
PKNaMg	7/2	1.76	1.87	1.57	0.75	1.49
PNaMg	8	1.20	1.29	0.96	0.94	1.10
PKNaMg(N2)	9/1	1.69	1.79	1.38	0.26	1.28
N2PKNaMg	9/2	1.66	1.86	1.15	0.71	1.34
N2PNaMg	10	0.80	0.97	1.05	0.62	0.86
N3PKNaMg	11/1	1.63	1.67	1.35	1.45	1.53
N3PKNaMgSi	11/2	2.55	2.10	1.72	1.55	1.98
None	12	1.21	0.88	0.73	0.52	0.84
(FYM/F)	13/1	1.58	1.46	1.26	0.92	1.31
FYM/PM	13/2	1.64	2.40	2.27	1.75	2.02
PKNaMg(N2*)	14/1	2.28	3.12	2.71	2.62	2.68
N2*PKNaMg	14/2	1.62	1.89	1.85	2.17	1.88
N3*PKNaMg(N2*)	15	1.70	1.98	1.88	1.55	1.78
N1*PKNaMg	16	1.81	2.12	1.52	1.30	1.69
N1*	17	0.99	1.03	0.75	1.01	0.95
N2KNaMg	18	0.78	0.91	0.87	0.33	0.72
N2KNaMg	18/2					1.22
FYM	19/1					1.44
FYM	19/2					2.53
FYM	19/3					1.86
FYM/N*PK	20/1					1.85
FYM/N*PK	20/2					2.07
FYM/N*PK	20/3					1.57

2ND CUT MEAN DM% 28.97

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16/R/PG/5

***** Tables of means

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

Grand mean 5.78

Manure		Lime	a	b	c	d	Mean
N1	1		4.45	3.61	2.73	2.26	3.26
K	2/1		4.07	4.96	3.65	3.05	3.93
None(FYM)	2/2		5.15	4.90	3.40	3.78	4.31
None	3		3.99	4.28	2.66	3.58	3.63
P	4/1		5.41	6.39	5.34	4.40	5.39
N2P	4/2		3.96	4.48	4.47	2.64	3.89
N1PKNaMg	6		7.35	6.93			7.14
(P)KNaMg	7/1		7.46	8.39	6.98	4.95	6.94
PKNaMg	7/2		7.43	7.43	7.25	5.50	6.90
PNaMg	8		5.57	5.75	5.02	4.87	5.30
PKNaMg(N2)	9/1		6.88	7.61	6.57	2.76	5.95
N2PKNaMg	9/2		7.66	8.08	6.82	5.31	6.97
N2PNaMg	10		5.76	6.18	6.22	4.00	5.54
N3PKNaMg	11/1		7.42	7.57	7.28	6.45	7.18
N3PKNaMgSi	11/2		8.77	8.19	7.98	6.93	7.97
None	12		4.62	3.91	3.27	3.18	3.75
(FYM/F)	13/1		6.02	6.07	5.70	5.16	5.74
FYM/PM	13/2		5.69	6.71	7.31	6.88	6.65
PKNaMg(N2*)	14/1		7.84	8.31	7.84	7.93	7.98
N2*PKNaMg	14/2		6.51	6.42	6.33	6.66	6.48
N3*PKNaMg(N2*)	15		7.50	7.68	7.83	6.90	7.48
N1*PKNaMg	16		7.33	6.92	6.44	5.87	6.64
N1*	17		4.50	4.45	3.27	3.91	4.03
N2KNaMg	18		4.26	4.92	4.95	3.95	4.52
N2KNaMg	18/2						5.95
FYM	19/1						6.71
FYM	19/2						8.00
FYM	19/3						6.60
FYM/N*PK	20/1						7.25
FYM/N*PK	20/2						7.58
FYM/N*PK	20/3						7.05

TOTAL OF 2 CUTS MEAN DM% 27.73

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16/R/GC/8

GARDEN CLOVER

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

The 163rd year, red clover.

For previous years see `Details' 1967 and 1973, and Yield books for 74-15/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
10/12/2015	f	Applied Sulphate of Soda	50	kg/ha
10/12/2015	f	Applied TSP	75	kg/ha
10/12/2015	f	Applied Potassium Sulphate	150	kg/ha
10/12/2015	f	Applied Chalk	1.25	t/ha
06/06/2016	a	First cut	-	-
20/07/2016	a	Second cut	-	-
19/09/2016	a	Third cut	-	-

```
1ST CUT (06/06/2016) DRY MATTER TONNES/HECTARE

***** Tables of means

Grand mean 2.03

FUNG_RES     NONE   BENOMYL
              2.11     1.94

1st CUT MEAN DM% 19.1


2nd CUT (20/07/2016) DRY MATTER TONNES/HECTARE

***** Tables of means

Grand mean 3.23

FUNG_RES     NONE   BENOMYL
              3.23     3.23

2ND CUT MEAN DM% 20.9
```


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16/R/GC/8

```
3rd CUT (19/09/2016) DRY MATTER TONNES/HECTARE

***** Tables of means

Grand mean 1.80

FUNG_RES     NONE   BENOMYL
              1.77     1.83

3RD CUT MEAN DM% 25.4


TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

***** Tables of means

Grand mean 7.06

 FUNG_RES     NONE   BENOMYL
              7.12      7.00


 TOTAL OF 3 CUTS MEAN DM% 21.8
```


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16/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 79th year, leys, w. beans, w. wheat, w. rye

For previous years see 'Details' 1967 & 1973 and Yield Books for 74-15/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 every 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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16/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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16/W/RN/3

3. **N** Nitrogen fertilizer as split dressings in spring 2015 (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:
   N split to wheat (no FYM)
   N single to wheat (FYM)

   1/8 plots:

3. **N** Nitrogen fertilizer in spring 2013 (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 2015 (see date below).

Continuous rotations Before wheat	No FYM Half plots	FYM Res Half plots
ABe/Be	380	310
AO/O	370	350
LLn/AO	130	230
LLn/ABe	120	150
LLn/Ln3	20	50
Ln3	50	-

None to other plots.

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16/W/RN/3

Experimental Diary

Date		Application	Rate	Units
ALL				
11/11/2015	a	Ploughed; Thrown South-East	-	-
12/11/2015	a	Power harrowed	-	-
26/05/2016	a	Cut paths	-	-
11/07/2016	a	Cut paths	-	-
12/07/2016	a	Cut paths	-	-
15/08/2016	a	Combined; Commercial combine swathed rest of the plots	-	-
19/08/2016	a	Removed all bales	-	-
08/09/2016	a	Baled Straw	-	-
12/09/2016	a	Removed bales	-	-
Grass ley and clover/grass leys (first year leys)				
27/10/2015	f	Applied Nitro Chalk; Plots 23,24,29,30. (Grass/clover leys)	92	kg/ha
27/10/2015	f	Applied Nitro Chalk; Plots 25,26,31,32. (Grass Leys)	185	kg/ha
27/10/2015	f	Applied Sulphate of Potash; All ley plots	140	kg/ha
27/10/2015	f	Applied TSP Fertilizer; All ley plots	213	kg/ha
19/11/2015	s	Drilled Grass and Clover plots	30	kg/ha
19/11/2015	s	Drilled Grass only plots	30	kg/ha
02/03/2016	f	Applied MOP Fertiliser; All ley plots	167	kg/ha
14/04/2016	f	Applied Nitram (34.5% N) Fertiliser; Plots 25,26,31,32 (Grass leys only)	217	kg/ha
13/07/2016	a	Cut grass plots for yield	-	-
14/07/2016	a	Mowed all grass plots	-	-
14/07/2016	a	Turned grass	-	-
18/07/2016	a	Turned hay	-	-
18/07/2016	a	Rowed up and baled hay; Grass plots only	-	-
21/07/2016	f	Applied MOP Fertiliser; All ley plots	83	kg/ha
10/11/2016	a	Cut grass plots for yield (2nd Cut)	-	-
Grass ley and clover/grass leys (2nd and 3rd year leys)				
27/10/2015	f	Applied Sulphate of Potash; All ley plots	140	kg/ha
27/10/2015	f	Applied TSP Fertilizer; All ley plots	213	kg/ha
19/11/2015	a	Drilled Grass and Clover plots	30	kg/ha
19/11/2015	a	Drilled Grass only plots	30	kg/ha
02/03/2016	f	Applied MOP Fertiliser; All ley plots	167	kg/ha
14/04/2016	f	Applied Nitram (34.5% N) Fertiliser; Plots 57,58,61,62,65,66,69 and 70 (Grass Ley only)	217	kg/ha
13/07/2016	a	Cut grass plots for yield	-	-
14/07/2016	a	Mowed all grass plots	-	-
14/07/2016	a	Turned grass	-	-
18/07/2016	a	Turned hay	-	-
18/07/2016	a	Rowed up and baled hay; Grass plots only	-	-

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21/07/2016	a	Applied MOP Fertiliser; All ley plots	83	kg/ha
10/11/2016	a	Cut grass plots for yield (2nd Cut)	-	-
W Beans				
27/10/2015	f	Applied TSP Fertilizer	127	kg/ha
19/11/2015	s	Drilled Wizzard Winter beans	42	seeds/m^2
23/02/2016	p	Sprayed Chex (in 200 lt/ha water volume)	0.25	lt/ha
23/02/2016	p	Sprayed Laser (in 200 lt/ha water volume)	1.25	lt/ha
23/02/2016	p	Sprayed Zarado (in 200 lt/ha water volume)	1	lt/ha
29/02/2016	f	Applied SOP	150	kg/ha
05/04/2016	p	Sprayed Troy 480 (in 241 lt/ha water volume)	3	lt/ha
23/05/2016	p	Sprayed Sprinter (in 200 lt/ha water volume)	2	lt/ha
23/05/2016	p	Sprayed San 703 (in 200 lt/ha water volume)	2	lt/ha
23/05/2016	p	Sprayed Hallmark (in 200 lt/ha water volume)	75	ml/ha
10/06/2016	p	Sprayed SAN 703 (in 200 lt/ha water volume)	2	lt/ha
30/06/2016	p	Sprayed Toledo (in 200 lt/ha water volume)	0.6	lt/ha
13/08/2016	a	Combined plots for yield	-	-
W Wheat				
27/10/2015	f	Applied TSP Fertilizer	127	kg/ha
10/11/2015	f	Applied corrective K; Plot 37	0.6	kg/ha
10/11/2015	f	Applied corrective K; Plots 38 and 43	1.5	kg/ha
10/11/2015	f	Applied corrective K; Plot 47	3.6	kg/ha
10/11/2015	f	Applied corrective K; Plot 36	3.9	kg/ha
10/11/2015	f	Applied corrective K; Plot 48	4.5	kg/ha
10/11/2015	f	Applied corrective K; Plot 35	6.9	kg/ha
10/11/2015	f	Applied corrective K; Plot 45	9.2	kg/ha
10/11/2015	f	Applied corrective K; Plot 39	10.4	kg/ha
10/11/2015	f	Applied corrective K; Plot 40	11.0	kg/ha
10/11/2015	f	Applied corrective K; Plot 46	11.3	kg/ha
19/11/2015	s	Drilled Solstice tr Redigo Deter	400	seeds/m^2
29/02/2016	f	Applied SOP	150	kg/ha
31/03/2016	p	Sprayed Atlantis (in 150 lt/ha water volume)	0.4	kg/ha
31/03/2016	p	Sprayed Compitox Plus (in 150 lt/ha water volume)	1.0	lt/ha
31/03/2016	p	Sprayed Biopower (in 150 lt/ha water volume)	1.0	lt/ha
05/04/2016	p	Sprayed Sprinter (in 150 lt/ha water volume)	2.0	lt/ha
05/04/2016	p	Sprayed Toledo (in 150 lt/ha water volume)	0.3	lt/ha
11/04/2016	f	Applied 1st Nitro-chalk 27%N by hand (first of 2 doses); All Wheat Plots	148	kg/ha
27/04/2016	f	Applied 2nd Nitro-chalk 27%N by hand; Plots 332, 342, 353, 363, 372, 383, 392, 403, 412, 424, 441, 434, 452, 461, 472, 483	148	kg/ha
27/04/2016	f	Applied 2nd Nitro-chalk 27%N by hand; Plots 331, 351, 361, 343, 384, 373, 394, 401, 414, 422, 432, 444, 453, 462, 471, 484	444	kg/ha
27/04/2016	f	Applied 2nd Nitro-chalk 27%N by hand; Plots 334, 341, 354, 364, 374, 381, 393, 404, 411, 423, 431, 443, 454, 463, 474, 482	741	kg/ha
30/04/2016	p	Sprayed Sprinter (in 150 lt/ha water volume)	2	lt/ha

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30/04/2016	p	Sprayed Simba (in 150 lt/ha water volume)	20	g/ha
30/04/2016	p	Sprayed Cortez (in 150 lt/ha water volume)	0.75	lt/ha
30/04/2016	p	Sprayed Bravo 500 (in 150 lt/ha water volume)	1	lt/ha
23/05/2016	p	Sprayed Sprinter (in 150 lt/ha water volume)	2	lt/ha
23/05/2016	p	Sprayed Vortex (in 150 lt/ha water volume)	1.5	lt/ha
23/05/2016	p	Sprayed Hunter (in 150 lt/ha water volume)	1.5	lt/ha
09/06/2016	p	Sprayed Cello (in 150 lt/ha water volume)	0.6	lt/ha
09/06/2016	p	Sprayed Cyflamid (in 150 lt/ha water volume)	0.15	lt/ha
09/06/2016	p	Sprayed Hallmark (in 150 lt/ha water volume)	50	lt/ha
12/08/2016	a	Combined plots for yield; Block 3 only with Sampo	-	-

W Rye

10/11/2015	f	Applied Chalk; Block 1 only (originally noted against W/RN/12, but considered to be in error).	5.00	t/ha
27/10/2015	f	Applied TSP Fertilizer	127	kg/ha
19/11/2015	s	Drilled Phoenix tr Kinto	300	seeds/m^2
29/02/2016	f	Applied SOP	150	kg/ha
14/04/2016	f	Applied Nitram (34.5% N) Fertiliser; Plots 17,18,19,20,21,22,27 and 28.	290	kg/ha
27/04/2016	f	Applied Nitram (34.5% N) Fertiliser by hand; Plots 012, 022, 032, 041, 052, 064, 071, 082, 092, 104, 112, 122, 131, 141, 154, 161	145	kg/ha
27/04/2016	f	Applied Nitram (34.5% N) Fertiliser by hand; Plots 014, 024, 034, 043, 054, 061, 074, 084, 094, 102, 113, 123, 134, 143, 152, 163	290	kg/ha
27/04/2016	f	Applied Nitram (34.5% N) Fertiliser by hand; Plots 011, 021, 031, 042, 051, 063, 072, 081, 091, 103, 111, 121, 132, 142, 153, 162	435	kg/ha
28/04/2016	p	Sprayed Sprinter (in 200 lt/ha water volume)	2	lt/ha
28/04/2016	p	Sprayed Ally Max (in 200 lt/ha water volume)	30	g/ha
28/04/2016	p	Sprayed Chlormequat (in 200 lt/ha water volume)	2	lt/ha
28/04/2016	p	Sprayed Cello (in 200 lt/ha water volume)	0.8	lt/ha
23/05/2016	p	Sprayed Sprinter (in 200 lt/ha water volume)	2	lt/ha
23/05/2016	p	Sprayed Keystone (in 200 lt/ha water volume)	1	lt/ha
13/08/2016	a	Combined plots for yield	-	-

W Oats

27/10/2015	f	Applied TSP Fertilizer	127	kg/ha
19/11/2015	s	Drilled Mascani tr Kinto	400	seeds/m^2
29/02/2016	f	Applied SOP	150	kg/ha
14/04/2016	f	Applied Nitram (34.5% N) Fertiliser; Plots 49,50,53,54,71,72,73 and 74.	290	kg/ha
28/04/2016	p	Sprayed Sprinter (in 150 lt/ha water volume)	2	lt/ha
28/04/2016	p	Sprayed Simba (in 150 lt/ha water volume)	30	g/ha
28/04/2016	p	Sprayed Chlormequat (in 150lt/ha water volume)	2	lt/ha
28/04/2016	p	Sprayed Cello (in 150 lt/ha water volume)	0.8	lt/ha
28/04/2016	p	Sprayed Hatchet Extra (in 150lt/ha water volume)	0.75	lt/ha.
09/06/2016	p	Sprayed Cello (in 150 lt/ha water volume)	0.6	lt/ha
09/06/2016	p	Sprayed Cyflamid (in 150 lt/ha water volume)	0.15	lt/ha
13/08/2016	a	Combined plots for yield	-	-

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NOTE: Herbage and grain samples were taken for chemical analyses.

LEYS

1ST CUT (09-Dec-15) DRY MATTER TONNES/HECTARE

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

FYM_RES			
LEY	NONE	FYM	MEAN
LC1	3.73	2.20	2.96
LC2	5.24	4.87	5.06
LC3	7.04	6.34	6.69
LN1	3.02	4.02	3.52
LN2	5.34	6.05	5.70
LN3	5.48	5.52	5.50
(LLC/LC)LC1	1.84	2.21	2.03
(LLC/LC)LC2	4.97	5.05	5.01
(LLC/LC)LC3	5.52	5.53	5.52
(LLN/LN)LN1	3.99	3.69	3.84
(LLN/LN)LN2	6.51	6.42	6.46
(LLN/LN)LN3	5.70	5.38	5.54
MEAN	4.87	4.77	4.82

1ST CUT MEAN DM% 32.5

2ND CUT (09-Dec-15) DRY MATTER TONNES/HECTARE

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

FYM_RES			
LEY	NONE	FYM	MEAN
LC1	0.28	0.35	0.32
LC2	0.12	0.10	0.11
LC3	0.00	0.00	0.00
LN1	0.89	2.22	1.56
LN2	0.11	0.26	0.19
LN3	0.00	0.00	0.00
(LLC/LC)LC1	0.09	0.24	0.17
(LLC/LC)LC2	2.49	1.71	2.10
(LLC/LC)LC3	0.00	0.00	0.00
(LLN/LN)LN1	0.09	0.15	0.12
(LLN/LN)LN2	0.52	0.62	0.57
(LLN/LN)LN3	0.00	0.00	0.00
MEAN	0.38	0.47	0.43

2ND CUT MEAN DM% 39.7

Note: For several years the LN1-3 plots do not appear to have been receiving N after the first cut (as stipulated in the plan. This is being discussed with the farm.

https://doi.org/10.23637/ERADOC-1-249

16/W/RN/3

ARABLE TREATMENT CROPS

WINTER BEANS

GRAIN (85% DRY MATTER) TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
(AO)Be	1.73	1.58	1.66
(LLn/AO)Be	1.17	1.28	1.22
(LLc/ABe)Be	2.02	2.32	2.17
(ABe)Be	2.17	2.04	2.11
Mean	1.77	1.81	1.79

GRAIN MEAN DM% 83.1

PLOT AREA HARVESTED 0.00413

OATS

GRAIN (85% DRY MATTER) TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
ABe	6.61	6.71	6.66
AO	7.01	6.95	6.98
LLc/ABe	6.50	6.45	6.48
LLn/AO	7.39	7.62	7.50
Mean	6.88	6.93	6.91

GRAIN MEAN DM% 84.8

PLOT AREA HARVESTED 0.00413

RYE (Extra)

GRAIN (85% DRY MATTER) TONNES/HECTARE

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

FYMRES ROTATION	NONE	FYM	Mean
(ABe)R	5.41	5.85	5.63
(AO)R	6.21	5.64	5.93
(LLn/AO)R	6.73	7.09	6.91
(LLc/ABe)R	6.35	6.50	6.43
Mean	6.17	6.27	6.22

GRAIN MEAN DM% 85.5

https://doi.org/10.23637/ERADOC-1-249

PLOT AREA HARVESTED 0.00413

16/W/RN/3

W. WHEAT

Grain tonnes/hectare

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

FYMRES	none	FYM	Mean
ROTATION			
(AO)W	4.72	5.69	5.20
(ABe)W	5.84	6.06	5.95
(LLn/AO)W	4.04	5.15	4.59
(LLc/ABe)W	5.75	4.54	5.14
(LN)W	6.43	3.81	5.12
(LLN/Ln)W	6.56	7.16	6.86
(LC)W	6.58	5.60	6.09
(LLc/Lc)W	6.39	7.11	6.75
Mean	5.79	5.64	5.71

N	0	80	160	240	Mean
ROTATION					
(AO)W	0.63	5.60	7.51	7.08	5.20
(ABe)W	1.52	7.07	6.36	8.85	5.95
(LLn/AO)W	0.35	6.14	5.82	6.06	4.59
(LLc/ABe)W	1.15	6.85	7.16	5.42	5.14
(LN)W	1.99	6.12	5.59	6.77	5.12
(LLN/Ln)W	3.32	7.50	8.07	8.54	6.86
(LC)W	4.79	6.94	6.58	6.05	6.09
(LLc/Lc)W	5.26	7.36	6.89	7.49	6.75
Mean	2.38	6.70	6.75	7.03	5.71

N	0	80	160	240	Mean
FYMRES					
none	2.49	6.67	6.50	7.49	5.79
FYM	2.26	6.73	6.99	6.57	5.64
Mean	2.38	6.70	6.75	7.03	5.71

N		0	80	160	240
ROTATION	FYMRES				
(AO)W	none	0.49	5.06	7.14	6.19
	FYM	0.78	6.15	7.88	7.97
(ABe)W	none	1.74	6.61	4.65	10.36
	FYM	1.30	7.53	8.08	7.34
(LLn/AO)W	none	0.28	5.72	4.06	6.08
	FYM	0.42	6.56	7.57	6.03
(LLc/ABe)W	none	0.72	7.00	8.04	7.23
	FYM	1.57	6.71	6.27	3.60
(LN)W	none	3.23	6.57	7.93	8.01
	FYM	0.76	5.68	3.25	5.54
(LLN/Ln)W	none	3.45	7.13	7.37	8.27
	FYM	3.19	7.86	8.77	8.82
(LC)W	none	4.81	7.41	7.88	6.23
	FYM	4.77	6.46	5.29	5.88
(LLc/Lc)W	none	5.22	7.84	4.92	7.58
	FYM	5.31	6.89	8.85	7.39

Grain mean DM% 86.2

Plot area harvested 0.00192

https://doi.org/10.23637/ERADOC-1-249 *pp 46*

16/W/RN/3

W. RYE

Grain tonnes/hectare

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

FYMRES	none	FYM	Mean
ROTATION			
(AO)R	5.24	5.09	5.16
(ABe)R	6.09	5.56	5.83
(LLn/AO)R	5.53	6.09	5.81
(LLc/ABe)R	6.97	5.81	6.39
(Ln)R	6.31	6.55	6.43
(LLn/Ln)R	6.42	7.77	7.10
(Lc)R	6.89	5.94	6.41
(LLc/Lc)R	7.61	6.92	7.26
Mean	6.38	6.22	6.30

N	0	50	100	150	Mean
ROTATION					
(AO)R	1.84	5.11	6.70	7.00	5.16
(ABe)R	1.95	5.46	8.53	7.35	5.83
(LLn/AO)R	2.44	5.93	6.86	7.99	5.81
(LLc/ABe)R	2.87	6.48	7.89	8.33	6.39
(Ln)R	3.37	6.13	7.51	8.72	6.43
(LLn/Ln)R	4.22	6.92	8.66	8.60	7.10
(Lc)R	3.38	6.71	8.08	7.48	6.41
(LLc/Lc)R	4.74	6.53	9.14	8.65	7.26
Mean	3.10	6.16	7.92	8.01	6.30

N	0	50	100	150	Mean
FYMRES					
none	3.16	6.15	7.79	8.42	6.38
FYM	3.04	6.17	8.05	7.60	6.22
Mean	3.10	6.16	7.92	8.01	6.30

N		0	50	100	150
ROTATION	FYMRES				
(AO)R	none	1.89	5.02	6.41	7.63
	FYM	1.79	5.21	6.99	6.37
(ABe)R	none	2.30	6.04	8.43	7.60
	FYM	1.61	4.89	8.64	7.11
(LLn/AO)R	none	2.16	5.89	5.81	8.26
	FYM	2.73	5.98	7.92	7.72
(LLc/ABe)R	none	3.61	6.62	8.48	9.17
	FYM	2.13	6.34	7.30	7.48
(Ln)R	none	3.54	5.83	7.03	8.86
	FYM	3.21	6.43	7.98	8.58
(LLn/Ln)R	none	3.54	5.91	7.97	8.27
	FYM	4.89	7.92	9.35	8.93
(Lc)R	none	3.64	6.72	8.48	8.72
	FYM	3.12	6.70	7.69	6.25
(LLc/Lc)R	none	4.64	7.19	9.72	8.89
	FYM	4.84	5.87	8.56	8.40

Grain mean DM% 82.5

Plot area harvested 0.00192

https://doi.org/10.23637/ERADOC-1-249

16/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 51st year, Winter Wheat

For previous years see 'Details' 1973 and Yield Books for 74-15/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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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)

For 2013 Winter rye nitrogen rates were 0,30,60,90,120,150 kg N/ha as Nitro-chalk (27% N)

For 2014 S Barley nitrogen rates were 0, 35, 70,105,140,175 kg N/ha as Nitro-chalk (27% N)

For 2015 Winter beans – No Nitrogen Applied

Experimental Diary

Date		Application	Rate	Units
29/10/2015	f	Applied FYM; Plots 5,11,23,26	25.00	t/ha
29/10/2015	f	Applied FYM; Plots 8,14,18,28	10.00	t/ha
30/10/2015	f	Applied compost; Plots 7 and 21	40.00	t/ha
02/11/2015	f	Applied compost; Plots 12 and 27	40.00	t/ha
02/11/2015	f	Applied straw; Plots 3,15,17,31	7.50	t/ha
09/11/2015	f	Topped straw plots; Plots 3,15,17,31.	-	-
10/11/2015	a	Ploughed; Thrown west	-	-
12/11/2015	a	Power harrowed	-	-
16/11/2015	s	Drilled Gallant, tr Redigo Pro; 4m tine drill	400.00	seeds/m^2
29/02/2016	f	Applied SOP; all plots except plots 5,11,23 and 26 (Dg25)	200.00	kg/ha
04/03/2016	f	Applied TSP Fertilizer; all plots including grass except plots 5,11,23 and 26 (Dg25)	97.50	kg/ha
31/03/2016	p	Sprayed Atlantis (in 150 lt/ha water volume); wheat only	0.40	kg/ha
31/03/2016	p	Sprayed Compitox Plus (in 150 lt/ha water volume); wheat only	1.00	lt/ha
31/03/2016	p	Sprayed Biopower (in 150 lt/ha water volume); wheat only	1.00	lt/ha
11/04/2016	f	Applied Nitro-chalk (27% N); 1st nitrogen treatment; by hand to wheat only	185.00	kg/ha
27/04/2016	f	Applied Nitro-chalk (27% N); 2nd nitrogen treatment; by hand to wheat only	185.00	kg/ha

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27/04/2016	f	Applied Nitro-chalk (27% N); 2nd nitrogen treatment; by hand to wheat only	370.00	kg/ha
27/04/2016	f	Applied Nitro-chalk (27% N); 2nd nitrogen treatment; by hand to wheat only	556.00	kg/ha
27/04/2016	f	Applied Nitro-chalk (27% N); 2nd nitrogen treatment; by hand to wheat only	741.00	kg/ha
30/04/2016	p	Sprayed Sprinter (in 150 lt/ha water volume); wheat only	2.00	lt/ha
30/04/2016	p	Sprayed Simba (in 150 lt/ha water volume); wheat only	20.00	g/ha
30/04/2016	p	Sprayed Cortez (in 150 lt/ha water volume); wheat only	0.75	lt/ha
30/04/2016	p	Sprayed Bravo 500 (in 150 lt/ha water volume); wheat only	1.00	lt/ha
23/05/2016	p	Sprayed Sprinter (in 150 lt/ha water volume); wheat only	2.00	lt/ha
23/05/2016	p	Sprayed Vortex (in 150 lt/ha water volume); wheat only	1.50	lt/ha
23/05/2016	p	Sprayed Hunter (in 150 lt/ha water volume); wheat only	1.50	lt/ha
26/05/2016	a	Cut paths		
09/06/2016	p	Sprayed Cello (in 150 lt/ha water volume); wheat only	0.60	lt/ha
09/06/2016	p	Sprayed Cyflamid (in 150 lt/ha water volume); wheat only	0.15	lt/ha
09/06/2016	p	Sprayed Hallmark (in 150 lt/ha water volume); wheat only	50.00	ml/ha
11/07/2016	a	Cut paths	-	-
12/07/2016	a	Cut paths	-	-
13/07/2016	a	Cut grass plots for yield	-	-
14/07/2016	a	Mowed all grass plots	-	-
14/07/2016	a	Turned grass	-	-
18/07/2016	a	Turned hay	-	-
18/07/2016	a	Rowed up and baled hay; Grass plots only	-	-
13/08/2016	a	Combined plots for yield; All wheat plots	-	-
15/08/2016	a	Combined; Commercial combine swathed rest of the plots	-	-
19/08/2016	a	Removed all bales	-	-
08/09/2016	a	Baled Straw	-	-
12/09/2016	a	Removed bales	-	-
10/11/2016	a	Cut grass plots for yield (2nd Cut)	-	-

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16/W/RN/12

WINTER WHEAT

GRAIN TONNES/HECTARE (85%DM)

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

Nitrogen	0	50	100	150	200	250	Mean
Treatment							
F(Fd)	0.91	3.69	6.13	6.83	7.93	7.91	5.57
F(Ln,Lc6)	2.38	3.64	5.95	7.13	7.31	6.94	5.56
St(St)	1.17	3.85	5.63	6.98	6.92	7.70	5.37
CC(Gm,Lc8)	0.84	3.92	5.65	6.76	7.52	7.72	5.40
Co(Pt,Lc8)	1.92	3.67	7.19	7.09	6.82	7.23	5.65
Dg10(Fs)	1.15	4.31	6.28	7.37	8.5	8.39	6.00
Dg25(Dg)	2.33	4.93	7.4	8.16	7.83	9.15	6.63
Mean	1.53	4	6.32	7.19	7.55	7.86	5.74

Standard errors of differences of means

Table	Treatment	Nitrogen	Treatment Nitrogen
rep.	24	28	4
s.e.d.	0.518	0.246	0.788
d.f.	18	105	74.46
Except when comparing means with the same level(s) of Treatment			0.651
d.f.			105

Grain Mean Dm (%) 86.8

Plot area harvested (ha)
0.001566 0.001766

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
2013	4.65	0.60	5.24
2014	4.09	0.91	5.01
2015	*	0.36	-
2016	3.97	0.56	4.53

Cut dry matter t/ha (13-Jul-2016 & 10-Nov-2016)

*Note: Herbage and grain samples were taken for chemical analysis.

https://doi.org/10.23637/ERADOC-1-249

16/R/CS/326 and 16/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 30th year, w. wheat (no yields taken).

Notes: Both experiments will finish in autumn 2017. No yields were taken in 2016. Only farm diary details are shown below. For previous years see Yield Books for 87-15/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	4.70	3.39
2 NORMAL	Twice normal	9.40	6.78
4 NORMAL	Four times normal	18.80	13.56

Experimental Diary

Great Knott III (R)

Date		Application	Rate	Units
05/08/2015	a	Loaded Straw onto plots 4, 7, 11, 14	17.87	kg/ha
05/08/2015	a	Loaded Straw onto plots 2, 6, 10, 13	35.74	kg/ha
05/08/2015	a	Loaded Straw onto plots 3, 5, 9, 16	71.4	kg/ha
05/08/2015	a	Topped all plots with topper 9 to condition straw for ploughing	-	-
06/09/2015	p	Sprayed Samurai	1.00	lt/ha
06/09/2015	p	Sprayed Firebrand	2.00	lt/ha
15/09/2015	a	Ploughed; Thrown West		
28/09/2015	a	Cultipressed		
05/10/2015	s	Drilled Crusoe dr Redigo	350.00	seeds/m^2
05/10/2015	a	Ring Rolled		
09/10/2015	p	Sprayed Liberator	600.00	ml/ha
12/11/2015	p	Sprayed Hallmark	40.00	ml/ha
08/03/2016	f	Applied Double Top Fertilizer (27% N); Applied with Kuhn Aerospreader	148.00	kg/ha
01/04/2016	f	Applied Nitram (34.5% N)	260.00	kg/ha
05/04/2016	p	Sprayed 3C Chlormequat 750	1.25	lt/ha
05/04/2016	p	Sprayed Moddus	200.00	ml/ha
05/04/2016	p	SprayedSavannah	500.00	ml/ha
05/04/2016	p	Sprayed Mirage40ec	500.00	ml/ha

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05/04/2016	p	Sprayed Bravo 500	1.00	lt/ha
08/04/2016	p	Sprayed Moddus	150.00	ml/ha
08/04/2016	p	Sprayed 3C Chlormequat750,	1.25	lt/ha
08/04/2016	p	Sprayed Odin	500.00	ml/ha
08/04/2016	p	Sprayed Mirage 40ec	500.00	ml/ha
08/04/2016	p	Sprayed Bravo500	1.00	lt/ha
14/04/2016	f	Applied MOP; Applied to wheat only	250.00	kg/ha
14/04/2016	f	Applied TSP	298.00	kg/ha
25/04/2016	f	Applied Nitram (34.5% N)	260.00	kg/ha
04/05/2016	p	Sprayed Ally Max	20.00	g/ha
04/05/2016	p	Sprayed Keystone	800.00	ml/ha
04/05/2016	p	Sprayed Balear 720	700.00	ml/ha
25/05/2016	p	Sprayed Vortex	1.50	lt/ha
25/05/2016	p	Sprayed Spiggot	250.00	ml/ha
25/05/2016	p	Sprayed Hatchet Xtra	750.00	ml/ha
08/07/2016	p	Sprayed Cello	550.00	ml/ha
08/07/2016	p	Sprayed Hallmark	50.00	ml/ha

Far Field I (W)

Date		Application	Rate	Unit
05/10/2015	a	Topped straw		
07/10/2015	a	Ploughed; Thrown north west		
08/10/2015	a	Springtyne		
16/10/2015	s	Drilled Crusoe dr Redigo Deter	375.00	Seeds/m2
17/10/2015	a	Rolled		
31/10/2015	p	Sprayed Liberator (in 200 lt/ha water volume.)	0.60	lt/ha
03/11/2015	p	Sprayed Sprinter (in 200 lt/ha water volume.)	2.00	lt/ha
03/11/2015	p	Sprayed Hallmark (in 200 lt/ha water volume.)	40.00	ml/ha
26/02/2016	f	Applied Double Top Fertilizer	148.00	kg/ha
31/03/2016	p	Sprayed Chex (in 150 lt/ha water volume.)	0.25	lt/ha
31/03/2016	p	Sprayed Pacifica (in 150 lt/ha water volume.)	0.50	kg/ha
31/03/2016	p	Sprayed Bio Power (in 150 lt/ha water volume.)	1.00	lt/ha
04/04/2016	f	Applied Nitram (34.5% N) Fertiliser	203.00	kg/ha
05/04/2016	p	Sprayed Sprinter (in 150 lt/ha water volume.)	2.00	lt/ha
05/04/2016	p	Sprayed Toledo (in 150 lt/ha water volume.)	0.30	lt/ha
05/04/2016	p	Sprayed Bravo 500 (in 150 lt/ha water volume.)	1.00	lt/ha
05/04/2016	p	Sprayed Moddu (in 150 lt/ha water volume.)	0.10	lt/ha
05/04/2016	p	Sprayed Chlormequat (in 150 lt/ha water volume.)	1.25	lt/ha
29/04/2016	f	Applied Nitram (34.5% N) Fertiliser	203.00	kg/ha
04/05/2016	p	Sprayed Sprinter (in 150 lt/ha water volume.)	2.00	lt/ha
04/05/2016	p	Sprayed Keystone (in 150 lt/ha water volume.)	0.80	lt/ha
04/05/2016	p	Sprayed Balear 720 (in 150 lt/ha water volume.)	0.70	lt/ha
24/05/2016	p	Sprayed Sprinter (in 150 lt/ha water volume.)	2.00	lt/ha
24/05/2016	p	Sprayed Vortex (in 150 lt/ha water volume.)	1.50	lt/ha
09/06/2016	p	Sprayed Cello (in 150 lt/ha water volume.)	0.60	lt/ha
09/06/2016	p	Sprayed Cyflamid (in 150 lt/ha water volume.)	0.15	lt/ha
09/06/2016	p	Sprayed Hallmark (in 150 lt/ha water volume.)	50.00	ml/ha
13/08/2016	a	Combined		
18/08/2016	a	Baled Straw		

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R/CS/477 and W/CS/478
CONTINUOUS MAIZE

Experimental details are given on page 56 of the 2015 yield book. 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 experiments ceased after harvest 2015. No yields were taken for 2016 onwards

The corrected yields for 2009-2015 are given below:

WHOLE CROP TONNES/HECTARE (100% DM)

Table of Means

R/CS/477

Year	2009	2010	2011	2012	2013	2014	2015
Treatment							
M	8.87	9.44	6.12	6.11	2.00	9.18	1.48
MT	8.63	8.84	5.66	6.87	2.33	9.64	2.14
(B)M	9.45			7.63	1.60	12.71	3.30
M(B)					2.52	12.03	2.25
Mean	8.98	9.14	5.89	6.87	2.11	10.89	2.29
Plot Area Harvested	0.00126						
Mean DM%	21.4	31.4	18.4	24.7	23.7	30.8	25.1

W/CS/478

Year	2009	2010	2011	2012	2013	2014	2015
Treatment							
M	9.80	6.05	8.5	5.76	2.39	2.30	-
MT	9.64	4.74	9.19	5.79	3.62	4.73	-
(B)M	9.57				2.86	4.86	-
M(B)				4.87	2.67	3.03	-
Mean	9.67	5.39	8.84	5.47	2.88	3.73	-
Plot Area Harvested	0.00126						
Mean DM%	23.8	39.7	32.7	24.5	26.5	34.6	-

In 2015 no yields for were taken on W/CS/478 because of crop failure

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Rothamsted Research

The Weather : Monthly Summary : 2016

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

	Sunshine		Mean temperatures °C								Rain		Rain	Drainage	Wind
			Maximum		Minimum		Dew point	Ground	In ground under grass		Tipping Bucket			20"	
	Hours	( )	°C	( )	°C	( )	°C	frosts*	30 cm	100 cm	Total mm	( )	days**	mm	km/hr***
January	64.5	(+2.46)	8.1	(+1.36)	1.8	(+0.63)	3.17	16	6.5	8.6	92.3	(+22.34)	25	153.1	9.7
February	111.5	(+31.19)	8.0	(+1.09)	1.6	(+0.67)	2.29	18	5.9	7.5	46.9	(-3.27)	18	22.9	11.2
March	133.4	(+18.45)	9.2	(-0.65)	1.8	(-0.92)	3.03	18	6.2	7.0	84.3	(+33.52)	16	82.5	9.3
April	167.6	(+6.37)	11.9	(-0.73)	3.5	(-0.52)	4.09	12	8.8	8.5	62.0	(+6.96)	24	26.1	8.4
May	197.0	(+2.40)	17.4	(+1.34)	7.9	(+0.99)	8.51	7	12.4	10.5	39.4	(-15.30)	11	0.6	8.6
June	141.0	(-57.17)	19.0	(-0.11)	11.2	(+1.45)	12.07	0	15.5	13.2	84.8	(+31.58)	22	22.8	5.9
July	210.3	(+5.09)	22.2	(+0.43)	12.8	(+0.89)	12.82	0	17.3	15.1	27.1	(-22.80)	16	1.8	6.8
August	217.6	(+21.38)	22.7	(+1.17)	12.9	(+1.02)	13.0	0	17.1	15.9	30.1	(-33.58)	12	0.1	7.7
September	128.0	(-15.44)	20.4	(+2.10)	12.2	(+2.29)	14.0	0	16.5	16.0	70.3	(+12.68)	16	17.8	6.3
October	104.0	(-7.73)	14.2	(+0.18)	7.4	(+0.30)	9.4	4	12.4	13.8	30.1	(-51.55)	22	2.3	6.6
November	91.1	(+20.40)	8.8	(-0.94)	2.6	(-1.24)	4.4	11	8.6	11.0	85.7	(+9.04)	21	56.2	8.0
December	68.7	(+14.91)	8.7	(+1.77)	2.1	(+0.40)	4.3	18	6.7	8.8	26.2	(-43.28)	24	12.9	6.0
Year	1634.6	(+42.31)	14.2	(+0.58)	6.5	(+0.50)	7.6	104.0	11.1	11.3	679.3	(-53.66)	227.0	399.0	7.9

* Number of nights grass minimum was below 0.0 °C

** 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 : 2016

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

	Sunshine		Mean temperatures oC								Rain			Wind
			Maximum		Minimum		Dew	Ground	In ground under grass		Total mm		Rain	***
	Hours	( )		( )		( )	point	frosts *	30 cm	100 cm	Tipping bucket		days **	km/hr
												( )		
January	59.2	(-0.86)	8.5	(+1.43)	2.3	(+0.99)	3.1	19	6.6	9.3	73.6	(+19.10)	21	10.3
February	110.0	(+35.12)	8.5	(+1.15)	1.3	(+0.41)	2.1	20	6.0	8.0	37.8	(-4.36)	12	10.5
March	119.6	(+6.18)	9.6	(-0.75)	1.0	(-1.65)	2.8	19	6.3	7.2	73.0	(+27.12)	13	8.3
April	168.7	(+17.81)	12.5	(-0.53)	3.0	(-0.75)	4.0	17	9.3	8.6	51.5	(-0.68)	19	7.6
May	203.5	(+16.28)	17.7	(+1.12)	6.8	(+0.27)	8.5	9	13.3	10.6	56.1	(+2.85)	12	7.5
June	-	-	19.7	(+0.10)	11.1	(+1.71)	12.0	0	16.9	13.4	141.9	(+91.85)	18	-
July	-	-	22.6	(+0.46)	12.6	(+0.96)	13.1	0	18.9	15.6	22.2	(-27.67)	9	-
August	216.8	(+28.00)	23.2	(+1.28)	12.1	(+0.54)	13.3	0	18.6	16.6	43.1	(-14.75)	13	7.9
September	134.3	(-2.75)	20.8	(+2.10)	12.3	(+2.75)	14.0	0	17.4	16.6	56.5	(-0.62)	16	7.2
October	106.5	(-5.29)	14.9	(+0.50)	6.3	(-0.61)	9.6	9	12.7	14.6	21.6	(-49.20)	16	5.3
November	78.8	(+12.56)	9.1	(-0.86)	2.1	(-1.66)	4.5	17	8.4	11.8	78.3	(+15.86)	22	6.9
December	59.7	(+14.06)	9.3	(+2.12)	1.7	(+0.26)	4.4	18	6.3	9.4	34.4	(-21.31)	20	6.1
Year	-	-	14.7	(+0.68)	6.1	(+0.26)	7.7	128.0	11.8	11.8	690.2	(+38.21)	191.0	-

* Number of nights grass minimum was below 0.0 oC

** Number of days rain was 0.2 mm or more

*** At 2 metres above ground

Due to an electrical Storm on 07/06/2016 sensors and data were compromised - RAIN DATA from 16/06/2016 to 20/07/2016 was provided by Met Office © Crown Copyright Met Office 2016