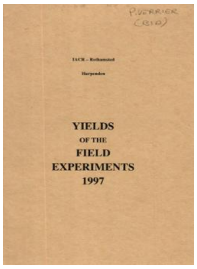
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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1997

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IACR – Rothamsted

Harpenden

YIELDS OF THE FIELD EXPERIMENTS 1997

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YIELDS

OF THE

FIELD

EXPERIMENTS

1997

This report is produced by members of the Statistics and Crop and Disease Management Departments. It includes only experiments at Rothamsted and Woburn. Only those experiments which have the determination of crop yields as an object are included. For many of these, other determinations are of equal or greater importance.

Published 1998

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CONTENTS 1997

			Page
CONVENTIONS			
PESTICIDES USED			
EXPERIMENTS	**CLASSICALS**		
Broadbalk	W. wheat, w.oats, forage maize	R/BK/1	11
Hoos Barley	S. barley	R/HB/2	18
Wheat & Fallow	W. wheat	R/WF/3	23
Exhaustion Land	W. wheat	R/EX/4	24
Park Grass	Old grass	R/PG/5	27
Barnfield	Ley	R/BN/7	33
Garden Clover	Clover	R/GC/8	38
	ROTATIONS		
Ley/Arable	Leys, w. beans, w. wheat, w. rye, s. barley	W/RN/3	40
Organic Manuring	W. wheat	W/RN/12	50
	CROP SEQUENCES		
Chemical Reference Plots	S. barley	R/CS/140	55
Eyespot Resistance to MBC	W. wheat	R/CS/302	59
Long-term Straw Incorporation	W. wheat	R&W/CS/309	61
Effects of Shallow Straw Incorporation	W. wheat	R/CS/311	65
Amounts of Straw	W. wheat	R&W/CS/326	67
Rates of N and Mineralization	W. wheat	R/CS/355	70
Miscanthus sinensis Giganteus Study	Grass	R/CS/408	72
Panicum spp Study	Grass	R/CS/411	73
Winter Rye as an Energy Crop	W. rye	R/CS/429	75
Ryegrass, Wheat Volunteers and Diseases	W. wheat	W/CS/435	77
Set-aside, Cultivations and Crops	W. wheat	R/CS/437	79
Phalaris Lines	Grass	R/CS/442	82
Ryegrass, Wheat Volunteers and Diseases	W. wheat	W/CS/446	85
Set-Aside, Cultivations and Crops	W. wheat, w. rape	R/CS/457	87
Cereals and Seed Treatments	W. wheat, w. barley	R/CS/472	90
Efficiency of S Fertilizers	W. wheat	W/CS/474	92
Fungicide Sequences and Take-all	W. wheat	R/CS/476	94

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CROP SEQUENCES

Continuous Maize	Maize, s. barley	R/CS/477	96
Continuous Maize	Maize, s. barley	W/CS/478	98
Severe Take-all in Wheat	S. wheat	R/CS/483	100

ANNUALS

WINTER WHEAT

Prediction of Weed Competition	R/WW/1	102
Sulphur, Variety and Nitrogen	W/WW/1	104
Weed Growth and Development	R/WW/2	106
Plant N Indicators	R/WW/3	108
Fungicides and Take-all	W/WW/3	110
Semiochemicals and Aphids	R/WW/5	112
Herbicide Resistant Black-grass	R/WW/6	114
Fungicides and Take-all	R/WW/8	117
Stem Base Diseases and Fungicides	R/WW/10	119
Chemical Control of Take-all	R/WW/11	121

SPRING WHEAT

Neem Study	R/WS/3	123

WINTER BARLEY

Beta-acids, Aphids and BYDV	R/BW/1	125

WINTER OILSEED RAPE

Growth of Weeds and Rape	R/RAW/1	127
Diagnosis of S Deficiency	W/RAW/1	130
Varieties, Fungicide and Disease	R/RAW/3	132

SPRING OILSEED RAPE

Sulphur for Spring Oilseed Rape	W/RAS/1	134
Neem Study	R/RAS/3	136

SPRING BEANS

Mustard Competition in Beans	R/BES/3	138

LUPINS

Pod Development and Yield	R/LP/3	141
Fusarium and Sowing Date	R/LP/4	143
Genotype, Row Spacing and Seed Rate	R/LP/10	146
Spring-sown Genotypes	R/LP/12	149
Spring Genotypes and Sowing Dates	R/LP/13	151

LINSEED

Leaf Browning Symptoms	R/LN/2	153

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MIXED CROPS

Effects of Behaviour Modifying Chemicals	W. rape, turnip rape	R/M/6	155

MISCELLANEOUS DATA

METEOROLOGICAL RECORDS

Rothamsted & Woburn 157

ERRATUM

96/R/CS/442 The plot area was found to be incorrect, the corrected tables appear on page 84.

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CONVENTIONS 1997

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

For each experiment, other than annuals, references are given to previous years. These refer to the '(Numerical)(Results) 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 and plant numbers are per hectare.

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

'Nitro-Chalk' contains 27.5% N and 'Nitram' 34.5% N.

'34.5% N' means 34.5% N as ammonium nitrate.

'46% N' means N as urea.

'Dolomite' means magnesian limestone.

Compound fertilizers indicated thus - (20:10:10) = (20% N, 10% P_2O_5, 10% K_2O), granular unless otherwise stated.

Cereal straw is removed unless otherwise stated.

In the experimental diary;
T: Refers to treatments applied to part of the experiment.
B: Refers to basal operations and applications across the whole experiment.

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Tables of means

The following abbreviations are used in variate headings:

Wheat, barley, oats, beans etc.

Grain:	Grain (at 85% dry matter)
Straw:	Straw (at 85% dry matter)

Sugar beet

Roots:	Roots (washed) (fresh weight)
Sugar %:	Sugar percentage of washed roots

Potatoes

Tubers	Unwashed (fresh weight)

All crops

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

Standard errors

NOTES: (1) This report gives standard errors of differences, not of means.

(2) Annotations (e.g. * min rep, max-min, max rep) to S.E.Ds are only explained the first time they occur in any experiment.

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PESTICIDES USED

The following list of pesticides is based on The UK Pesticides Guide, C.A.B. International and British Crop Protection Council. Published by University Press, Cambridge.

KEY TO ABBREVIATIONS

A	Acaricide	**AD**	Adjuvant
D	Desiccant	**F**	Fungicide
GR	Growth regulator	**H**	Herbicide
I	Insecticide	**M**	Molluscicide
N	Nematicide		

TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Actipron	AD	97 % highly refined mineral oil
Agral	AD	948 g/l alkyl phenol ethylene oxide
Alto 100 SL	F	100 g/l cyproconazole
Ambush C	I	100 g/l cypermethrin
Amistar	H	250 g/l azoxystrobin
Anchor	F	200:200 g/l carboxin + thiram
Atlas Dimethoate 40	F	400 g/l dimethoate
Auger	H	500 g/l isoproturon
Autumn Kite	H	300:200 g/l isoproturon + trifluralin
Avadex BW Granular	H	10 % w/w tri-allate
Avadex Excel 15G	H	15 % w/w tri-allate
Barclay Eyetak	F	450 g/l prochloraz
Barclay Gallup	H	360 g/l glyphosate
Barclay Holdup	GR	700 g/l chlormequat
Barclay Mutiny	H	250 g/l bromoxynil
BASF Dimethoate 40	I	400 g/l dimethoate
Baytan Flowable	F	22.5:187.5 g/l fuberidazole + triadimenol
Beret Gold	F	25 g/l fludioxonil
Benlate Fungicide	F	50 % w/w benomyl
Butisan S	H	500 g/l metazachlor
Campbell's CMPP	H	570 g/l mecoprop
Carbetamex	H	70 % w/w carbetamide
Cheetah Super	H	55 g/l fenoxaprop-P-ethyl
Clayton Epoxicon	F	125 g/l epoxiconazole
Clayton Turret	F	500 g/l chlorothalonil
Compass	F	167:167 g/l iprodione + thiophanate-methyl
Comulin	AD	97 % mineral oil
Contrast	F	125:250 g/l carbendazim + flusilazole
Cyperkill 10	I	100 g/l cypermethrin
Danadim Dimethoate 40	F	400 g/l dimethoate
Decis	I	25 g/l deltamethrin
Deloxil	H	190:190 g/l bromoxynil + ioxynil
Dorin	F	125:375 g/l triadimenol + tridemorph

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Dow Shield	H	200 g/l clopyralid
Draza	M,I	4 % w/w methiocarb
Fastac	I	100 g/l alpha-cypermethrin
Folicur	F	250 g/l tebuconazole
Folio 575 SC	F	500:75 g/l chlorothalonil + metalaxyl
Fonofos Seed Treatment	I	433 g/l fonofos
Galtak 50 SC	H	500 g/l benazolin
Gammasan 30	I	30 % w/w gamma-HCH
Halo	F	375:47 g/l chlorothalonil + flutriafol
Harvest	H	150 g/l glufosinate-ammonium
Hawk	H	12:383 g/l clodinafop-propargyl + trifluralin
Isoproturon 500	H	500 g/l isoproturon
Javelin Gold	H	20:500 g/l diflufenican + isoproturon
Katamaran	H	375:125 g/l metazachlor + quinmerac
Laser	H	200 g/l cycloxydim
Legumex Extra	H	27:237:42.8 g/l benazolin + 2,4-DB + MCPA
Lindex-Plus FS	F,I	43:545:73 g/l fenpropimorph + gamma-HCH + thiram
Logran 20 WG	H	20 % w/w triasulfuron
Lorate 20 DF	H	20 % w/w metsulfuron-methyl
Mallard 750 EC	F	750 g/l fenpropidin
Mesurol	M,I	methiocarb seed treatment
Mistral	F	750 g/l fenpropimorph
MSS Iprofile	H	500 g/l isoproturon
MSS Optica	H	600 g/l mecoprop-P
MSS Simazine 50 FL	H	500 g/l simazine
MTM Trifluralin	H	480 g/l trifluralin
Panoctine	F	300 g/l guazatine
Panther	H	50:500 g/l diflufenican + isoproturon
Pointer	F	125 g/l flutriafol
Prelude 20 LF	F	200 g/l prochloraz
Radar	F	250 g/l propiconazole
Raxil S	F	20:20 g/l tebuconazole + triazoxide
Reglone	H,D	200 g/l diquat
Roundup	H	360 g/l glyphosate
Rovral Flo	F	255 g/l iprodine
Sanction	F	400 g/l flusilazole
Scythe LC	H	200 g/l paraquat
Sibutol	F	375:23 g/l biteranol + fuberidazole
Spannit	A,I	480 g/l chlorpyrifos
Sportak 45	F	450 g/l prochloraz
Sprayprover	AD	Adjuvant oil containing 95 % highly refined mineral oil
Standon Fluroxypyr	H	200 g/l fluroxypyr

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Standon Tebuconazole	F	250 g/l tebuconazole
Starane 2	H	200 g/l fluroxypyr
Stefes CCC 700	GR	700 g/l chlormequat
Stefes Glyphosate	H	360 g/l glyphosate
Stefes IPU	H	500 g/l isoproturon
Sting CT	H	120 g/l glyphosate
Stomp 400 SC	H	400 g/l pendimethalin
Tigress	H	313:14 g/l diclofop-methyl + fenoxaprop-P-ethyl
Topik	H	240 g/l clodinafop-propargyl
Tribunil	H	70 % w/w methabenzthiazuron
Tripart Defensor FL	F	500 g/l carbendazim
Unix	F	75 % w/w cyprodinil
Vassgro Non-ionic	AD	90 % w/w ethylene oxide condensates
Vindex	H	240:50 g/l bromoxynil + clopyralid
Vitavax RS	F	45:675:90 g/l carboxin + gamma-HCH + thiram
Yaltox	I,N	5 % w/w carbofuran

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97/R/BK/1

BROADBALK

Object: To study the effects of organic and inorganic manures on continuous w. wheat. From 1968 two three-year rotations were included: potatoes, beans, w. wheat and fallow, w. wheat, w. wheat. In 1979 the first rotation was changed to fallow, potatoes, w. wheat. In 1980 the second rotation reverted to continuous w. wheat. Since 1985 part of the second rotation has been added to the first to extend the rotation to fallow, potatoes, w. wheat, w. wheat, w. wheat, in 1996 the fallow was replaced by w.oats and potatoes replaced by maize in 1997.

The 154th 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 1978, Part 2, Station Report for 1982, Part 2, pp. 5-44 and 74-96/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00351
	1	0.00645
	4,5,6 and 7	0.00533
	8 and 9	0.00561
Oats:	2	0.00533
Maize:	3	0.00162

Treatments:

Whole plots

PLOT Fertilizers and organic manures:-

	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985
01DN4PK	01	-	D N2 P K	D N4 P K
21DN2	21	D	D N2	D N2
22D	22	D	D	D
030	03	None	None	None
05F	05	P K Na Mg	P K (Na) Mg	PK Mg
06N1F	06	N1 P K Na Mg	N1 P K (Na) Mg	N1 P K Mg
07N2F	07	N2 P K Na Mg	N2 P K (Na) Mg	N2 P K Mg
08N3F	08	N3 P K Na Mg	N3 P K (Na) Mg	N3 P K Mg
09N4F	09	N*1 P K Na Mg	N4 P K (Na) Mg	N4 P K Mg
10N2	10	N2	N2	N2
11N2P	11	N2 P	N2 P	N2 P
12N2PNA	12	N2 P Na	N2 P Na	N2 P Na
13N2PK	13	N2 P K	N2 P K	N2 P K
14N2PKMG	14	N2 P Mg	N2 P K Mg	N2 P K Mg
15N5F	15	N2 P K Na Mg	N3 P K (Na) Mg	N5 P K Mg
16N6F	16	N*2 P K Na Mg	N2 P K (Na) Mg	N6 P K Mg
17N0+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	N0+3 1/2(PK Mg)+
18N1+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK Mg)+
19(C)	19	C	C	(C) (since 1989)
20N2KMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating

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97/R/BK/1

\+ This change since 1980. Treatments shown are those to w. wheat; autumn N alternates. Maize received N3 1/2 (PK Mg) on both plots 17 and 18.

W. oats; Nitrogen and dung were not applied.

N1,N2,N3,N4,N5,N6:	48, 97, 144, 192, 240, 288 kg N as sulphate of ammonia until 1977, except N* which was nitrate of soda. All as 'Nitro-Chalk' in spring from 1978 to 1985, as 34.5% N since 1986.
N0+3; N1+3:	None in autumn + 144 kg N in spring; 48 kg N in autumn + 144 kg N in spring
P:	35 kg P as triple superphosphate in 1974 and since 1988, single superphosphate in other years
K:	90 kg K as sulphate of potash
Na:	55 kg Na as sulphate of soda
(Na):	16 kg Na as sulphate of soda until 1973
Mg:	30 kg Mg annually to Plot 14, 35 kg Mg every third year to other plots since 1974. All as kieserite since 1974, previously as sulphate of magnesia annually
D:	Farmyard manure at 35 t
(C):	Castor meal to supply 97 kg N until 1988, none since
F:	P K (Na) Mg H: Half rate

Strips of sub-plots: Until 1977 wheat alone was grown on the experiment, with some bare fallowing. From 1978, ten strips of sub-plots (sections) were started with the following cropping:-

SECTION	1/W31	9/W39	0/W46	8/W3	6/W20	5/W1	3/M	7/W3	4/W2	2/O
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1968	W	W	W	W	F	W	W	P	W	BE
1969	W	W	W	W	W	F	W	BE	P	W
1970	W	W	W	W	W	W	F	W	BE	P
1971	W	W	W	W	F	W	W	P	W	BE
1972	W	W	W	W	W	F	W	BE	P	W
1973	W	W	W	W	W	W	F	W	BE	P
1974	W	W	W	W	F	W	W	P	W	BE
1975	W	W	W	W	W	F	W	BE	P	W
1976	W	W	W	W	W	W	F	W	BE	P
1977	W	W	W	W	F	W	W	P	W	BE
1978	W	W	W	W	W	F	W	BE	P	W
1979	W	W	W	W	W	W	F	W	P	F
1980	W	W	W	W	W	W	W	F	W	P
1981	W	W	W	F	W	W	W	P	F	W
1982	W	W	W	W	W	W	W	W	P	F
1983	W	W	W	W	W	W	W	F	W	P
1984	W	W	W	W	W	W	W	P	F	W
1985	W	W	W	W	W	F	W	W	P	W
1986	W	W	W	W	W	P	F	W	W	W
1987	W	W	W	W	W	W	P	W	W	F
1988	W	W	W	F	W	W	W	F	W	P

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SECTION	1/W31	9/W39	0/W46	8/W3	6/W20	5/W1	3/M	7/W3	4/W2	2/O
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1989	W	W	W	W	W	W	W	P	F	W
1990	W	W	W	W	W	F	W	W	P	W
1991	W	W	W	W	W	P	F	W	W	W
1992	W	W	W	W	W	W	P	W	W	F
1993	W	W	W	W	W	W	W	F	W	P
1994	W	W	W	F	W	W	W	P	F	W
1995	W	W	W	W	W	F	W	W	P	W
1996	W	W	W	W	W	P	O	W	W	W
1997	W	W	W	W	W	W	M	W	W	O

W = w. wheat, O = w. oats, 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 2.9 t each autumn to all plots in sets of Sections on a three-year cycle. Year 1: Sections 1,2,3. Year 2: Sections 6,7,8,9. Year 3: Sections 0,4,5. From autumn 1988 until autumn 1992 a five-year cycle was used. Year 1: Sections 1,3. Year 2: Sections 2,8. Year 3: Sections 7,9. Year 4: Sections 4,6. Year 5: Sections 0,5. None applied since autumn 1991.

Experimental diary:

All sections:

25-Sep-96 : **T** : PK Na and Mg applied.
28-Sep-96 : B : Ploughed and furrow pressed.
14-Oct-96 : B : Rotary harrowed.

Cropped sections:

W. wheat:

20-Aug-96 : **T** : Straw chopped (section 0 only), straw baled (sections 1, 2, 3, 4, 6, 7, 8 and 9).
26-Sep-96 : **T** : Autumn N treatment applied.
27-Sep-96 : **T** : Farmyard manure applied.
15-Oct-96 : **T** : Rotary harrowed, Hereward, dressed Beret Gold and Fonophos Seed Treatment at 380 seeds per m^2.
02-Apr-97 : **T** : Topik at 125 ml with Sprayprover at 1.0 l in 200 l (except section 8).
10-Apr-97 : **T** : MSS Optica at 2.5 l in 300 l (except section 8).
: **T** : Barclay Holdup at 2.3 l in 300 l (except section 6).
11-Apr-97 : **T** : Spring N treatments applied.
01-May-97 : **T** : Barclay Eyetak at 0.9 l in 200 l (except section 6).
29-May-97 : **T** : Starane 2 at 0.5 l in 300 l (except section 8).
30-May-97 : **T** : Folicur at 0.5 l with Pointer at 0.5 l in 300 l (except section 6).
09-Jul-97 : **T** : Hand rogued wild oats.
01-Sep-97 : **T** : Combine harvested.

https://doi.org/10.23637/ERADOC-1-53 *pp 15*

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97/R/BK/1

Experimental diary:

W. oats:

20-Aug-96 : **T** : Wheat straw baled.
16-Oct-96 : **T** : Rotary harrowed, Image, dressed Anchor, drilled at 350 seeds per m^2.
17-Oct-96 : **T** : Tribunil at 2.25 kg in 200 l.
22-May-97 : **T** : Radar at 0.5 l with Stefes CCC 700 at 2.3 l in 300 l.
20-Aug-97 : **T** : Combine harvested.

Forage Maize:

20-Aug-96 : **T** : Oat straw baled.
27-Sep-96 : **T** : Farmyard manure applied.
16-Apr-97 : **T** : Scythe LC at 3.0 l with Vassgro Non-ionic at 200 ml in 200 l.
23-Apr-97 : **T** : Spring N treatments applied, heavy spring-tine cultivated, rotary harrowed, Hudson, dressed Mesurol, drilled at 11 seeds per m^2.
09-Jun-97 : **T** : Barclay Mutiny at 1.5 l in 300 l.
17-Sep-97 : **T** : Hand harvested.

NOTE: Samples of wheat grain and straw from sections 1, 5, 6 and 9, samples of oat grain and straw and whole crop maize were taken for chemical analysis. Unground grain and straw and maize samples from selected treatments were archived.

W. WHEAT

GRAIN TONNES/HECTARE

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

SECTION / PLOT	5/W1	4/W2	7/W3	8/W3	6/W20	1/W31	9/W39	0/W46
01DN4PK	9.18	9.56	9.27	*	8.21	*	*	*
21DN2	9.57	8.38	8.04	5.67	7.44	7.88	7.82	6.70
22D	9.44	5.65	5.14	4.18	5.73	5.61	4.47	4.30
030	4.52	0.71	0.63	1.31	0.91	1.03	0.77	1.06
05F	2.59	0.67	0.68	2.17	0.99	1.01	0.91	0.96
06N1F	6.17	3.05	2.65	2.47	3.07	2.95	3.11	2.77
07N2F	8.62	5.76	4.95	3.77	5.11	5.63	5.17	5.17
08N3F	9.56	6.89	6.76	5.00	6.74	6.96	6.59	6.58
09N4F	9.61	7.89	7.72	6.02	6.91	7.12	7.37	7.61
10N2	7.82	4.19	2.56	2.09	2.25	2.59	2.54	2.68
11N2P	7.43	5.20	5.22	1.53	2.54	3.07	2.66	4.41
12N2PNA	7.77	5.49	5.20	3.32	4.33	3.71	3.61	5.06
13N2PK	8.46	5.59	5.30	3.96	5.07	5.29	5.62	5.34
14N2PKMG	7.99	5.39	5.25	4.19	5.39	5.31	5.81	5.34
15N5F	9.40	8.87	8.98	3.79	8.30	8.47	7.83	8.12
16N6F	9.23	8.91	8.97	3.97	8.03	8.46	8.83	8.28
17N0+3FH	9.12	8.06	7.65	4.64	7.77	7.70	7.31	7.67
18N1+3FH	9.41	8.06	7.76	5.13	8.02	7.61	7.33	7.68
19(C)	4.68	0.99	0.58	2.09	1.12	1.93	1.29	1.67
20N2KMG	*	*	*	*	*	1.87	*	2.10

GRAIN MEAN DM% 83.2

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97/R/BK/1 W. WHEAT

STRAW TONNES/HECTARE

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

SECTION PLOT	5/W1	6/W20	1/W31	9/W39
01DN4PK	3.88	*	*	*
21DN2	4.40	3.95	4.84	3.07
22D	5.33	3.47	3.53	2.67
030	2.07	0.60	0.49	0.14
05F	1.54	0.57	0.69	0.37
06N1F	3.17	1.36	1.33	1.31
07N2F	3.81	1.89	2.26	1.73
08N3F	4.08	2.23	2.86	1.87
09N4F	3.78	2.29	2.72	2.28
10N2	2.91	*	1.16	*
11N2P	2.42	*	1.00	*
12N2PNA	2.91	*	1.00	*
13N2PK	3.13	*	1.87	*
14N2PKMG	3.30	*	1.63	*
15N5F	4.37	2.89	3.22	2.44
16N6F	4.19	2.85	3.80	3.16
17N0+3FH	4.29	*	3.09	*
18N1+3FH	4.21	*	2.82	*
19(C)	2.32	*	0.82	*
20N2KMG	*	*	1.08	*

STRAW MEAN DM% 87.3

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97/R/BK/1 W. OATS

GRAIN TONNES/HECTARE

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

PLOT	GRAIN	STRAW
01DN4PK	7.53	6.18
21DN2	7.14	4.76
22D	7.24	5.12
030	1.32	0.43
05F	1.80	0.74
06N1F	1.81	0.65
07N2F	2.23	0.94
08N3F	2.73	1.19
09N4F	2.79	1.37
10N2	2.24	1.04
11N2P	2.44	0.98
12N2PNA	2.34	0.84
13N2PK	1.97	0.93
14N2PKMG	1.86	0.71
15N5F	5.14	2.94
16N6F	6.71	3.62
17N0+3FH	3.70	2.19
18N1+3FH	2.18	0.89
19(C)	1.85	0.84

GRAIN MEAN DM% 86.8 STRAW MEAN DM% 77.5

NOTE: Dung and nitrogen treatments are residual from previous wheat.

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97/R/BK/1 MAIZE

WHOLE CROP (100% DM) TONNES/HECTARE

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

PLOT	WHOLE CROP
01DN4PK	16.36
21DN2	17.45
22D	17.53
030	3.64
05F	4.79
06N1F	11.85
07N2F	14.86
08N3F	18.62
09N4F	18.50
10N2	5.77
11N2P	6.46
12N2PNA	8.73
13N2PK	15.52
14N2PKMG	14.97
15N5F	15.85
16N6F	18.72
17N0+3FH	15.81
18N1+3FH	16.35
19(C)	5.44

CROP MEAN DM% 36.1

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97/R/HB/2

HOOS BARLEY

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

The 146th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-96/R/HB/2.

Treatments: All combinations of:-

Whole plots

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

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

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97/R/HB/2

Form of N: A, sulphate of ammonia: N, nitrate of soda - each to supply 48 kg N: C, castor meal to supply 97 kg N
P: 35 kg P as triple superphosphate in 1974 and since 1988, single superphosphate in other years
K: 90 kg K as sulphate of potash
(Na): 16 kg Na as sulphate of soda until 1973
Mg: 35 kg Mg, as kieserite every third year since 1974 (sulphate of magnesia annually until 1973)
Si: Silicate of soda at 450 kg
D: Farmyard manure at 35 t. (D): until 1871 only
(Ashes): Weed ash 1852-1916, furnace ash 1917-1932, none since

Sub-plots

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

0
48
96
144

Plus extra plots testing all combinations of:-

Whole plots

1 **MANURE** Fertilizers other than magnesium:

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

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

Sub-plots

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

0
35

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

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97/R/HB/2

Experimental diary:

02-Sep-96 : B : Straw baled.
26-Nov-96 : T : P applied.
04-Dec-96 : T : K applied.
05-Dec-96 : T : Si applied.
17-Dec-96 : T : Farmyard manure applied.
19-Dec-96 : B : Ploughed.
10-Mar-97 : B : Spring-tine cultivated.
11-Mar-97 : B : Rotary harrowed, Cooper, dressed Baytan Flowable, drilled at 350 seeds per m^2.
12-Mar-97 : B : Rolled.
24-Apr-97 : T : N applied.
22-May-97 : B : MSS Optica at 2.0 l with Vindex at 1.0 l in 300 l.
01-Jul-97 : B : Hand rogued wild oats.
22-Jul-97 : B : Hand rogued wild oats.
22-Aug-97 : B : Combine harvested.

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

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97/R/HB/2 MAIN PLOTS

GRAIN TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	1.89	1.73	1.93	2.18	1.93
-P-	1.89	2.74	2.03	2.01	2.17
--K	2.19	3.07	3.48	3.22	2.99
-PK	2.10	3.84	4.96	5.02	3.98
A--	1.71	2.08	2.18	1.88	1.96
AP-	1.43	0.97	0.70	1.49	1.15
A-K	1.82	2.54	2.67	2.44	2.37
APK	2.24	3.77	4.94	4.95	3.98
N----	1.90	2.33	2.71	2.51	2.36
NP---	2.33	1.99	2.24	2.38	2.24
N-K--	2.08	2.59	3.41	3.17	2.81
NPK--	2.36	4.33	5.49	5.03	4.30
N--S-	2.22	3.05	3.72	4.27	3.31
NP-S-	2.60	3.56	3.50	2.54	3.05
N-KS-	2.22	4.07	4.26	3.82	3.59
NPKS-	2.54	4.31	5.51	5.34	4.43
N---S	2.44	3.58	3.71	3.59	3.33
NP--S	2.15	3.31	3.79	3.54	3.20
N-K-S	2.67	4.07	3.75	4.33	3.70
NPK-S	2.39	4.31	5.52	5.62	4.46
N--SS	2.22	3.50	3.71	3.63	3.26
NP-SS	2.60	3.10	3.37	3.37	3.11
N-KSS	2.61	3.94	4.33	4.41	3.82
NPKSS	2.40	4.37	5.15	5.35	4.32
C(--)	2.36	3.59	4.05	3.67	3.42
C(P-)	2.33	3.59	3.64	2.91	3.12
C(-K)	2.12	3.78	4.53	4.36	3.70
C(PK)	2.23	4.16	4.81	4.88	4.02
D	6.73	6.61	6.83	6.51	6.67
(D)	2.32	3.74	3.80	5.42	3.82
(A)	2.23	3.02	3.84	3.07	3.04
-	1.95	2.48	2.83	2.50	2.44
Mean	2.35	3.38	3.79	3.73	3.31

GRAIN MEAN DM% 85.8

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97/R/HB/2 MAIN PLOTS

STRAW TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.62	0.71	0.89	1.33	0.89
-P-	0.55	1.13	0.88	0.89	0.86
--K	0.69	1.71	1.64	1.57	1.40
-PK	0.58	1.63	2.13	2.46	1.70
A--	0.58	0.89	0.73	0.51	0.68
AP-	0.44	0.39	0.34	0.62	0.45
A-K	0.70	1.29	1.21	1.51	1.18
APK	0.58	1.62	1.94	2.24	1.60
D	3.25	3.58	4.34	3.90	3.77
(D)	0.79	1.63	1.70	2.69	1.70
(A)	0.69	1.14	1.46	1.04	1.08
-	0.67	1.19	1.33	1.50	1.17
Mean	0.84	1.41	1.55	1.69	1.37

STRAW MEAN DM% 88.2

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	Mean
MGNESIUM					
0	4.52	1.19	3.46	2.67	2.96
35	4.74	1.31	3.16	2.70	2.98
Mean	4.63	1.25	3.31	2.68	2.97

GRAIN MEAN DM% 87.5

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97/R/WF/3

WHEAT AND FALLOW

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

The 142nd year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-96/R/WF/3.

Whole plot dimensions: 9.0 x 211.

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

Experimental diary:
Wheat plot:
05-Oct-96 : **T** : Ploughed.
16-Oct-96 : **T** : Heavy spring-tine cultivated, spring-tine cultivated, Hereward, dressed Beret Gold and Fonofos Seed Treatment, drilled at 380 seeds per m^2.
17-Mar-97 : **T** : Topik at 1.25 l with Sprayprover at 1.0 l in 200 l.
10-Jun-97 : **T** : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
14-Aug-97 : **T** : Combine harvested.
Fallow plot:
05-Oct-96 : **T** : Ploughed.
15-Apr-97 : **T** : Heavy spring-tine cultivated.
08-Jul-97 : **T** : Thistle barred.
14-Aug-97 : **T** : Thistle barred.

NOTE: A sample of unground grain and straw was archived.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	2.01	1.16
MEAN DM%	85.7	92.4

PLOT AREA HARVESTED 0.023232

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97/R/EX/4

EXHAUSTION LAND

Object: To study the residual effects of manures applied 1876-1901, and of additional phosphate applied since 1986, on the yield of continuous s. barley up to 1991, w. wheat since - Hoosfield.

The 142nd year, w. wheat.

For previous years see 'Details' 1977, 1973 and 74-96/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	97 kg N as ammonium salts
	P	34 kg P as superphosphate
	NPKNAMG	N and P as above plus 137 kg K as sulphate of potash, 16 kg Na as sulphate of soda, 11 kg Mg as sulphate of magnesia
2.	**P RES**	Residues of phosphate (kg P) applied annually from 1986, as single superphosphate in 1986 and 1987, triple superphosphate from 1988 until 1992, none since:
	O	None
	P1	44
	P2	87
	P3	131

plus

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

	OLD RES	Residues of manures applied annually 1876-1901:
	O	None
	D	Farmyard manure at 35 t
	N*	97 kg N as nitrate of soda
	PK	34 kg P as superphosphate, 137 kg K as sulphate of potash
	N*PK	N, P and K as above

Experimental diary:

K test:

26-Sep-96 : **T** : Muriate of potash at 167 kg.

P test:

26-Sep-96 : **T** : Triple superphosphate at 319 kg.

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97/R/EX/4

Experimental diary:
All plots:
05-Oct-96 : B : Ploughed.
08-Oct-96 : B : Spring-tine cultivated, rotary harrowed, Hereward, dressed Beret Gold, drilled at 380 seeds per m^2.
17-Mar-97 : B : Topik at 1.25 l with Sprayprover at 1.0 l in 200 l.
07-Apr-97 : B : 34.5% N at 556 kg.
16-Apr-97 : B : Dow Shield at 0.35 l with Deloxil at 1.5 l in 200 l.
30-May-97 : B : Folicur at 0.5 l with Pointer at 0.5 l in 300 l.
14-Aug-97 : B : Combine harvested.

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

P TEST

GRAIN TONNES/HECTARE

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

P RES / OLD RES	0	P1	P2	P3	Mean
0	1.28	5.01	6.86	7.25	5.10
D	4.78	6.61	7.60	7.47	6.61
N	1.68	5.71	7.40	7.46	5.56
P	4.58	6.69	7.71	7.44	6.61
NPKNAMG	4.09	6.56	7.33	7.70	6.42
Mean	3.28	6.12	7.38	7.46	6.06

GRAIN MEAN DM% 86.9

STRAW TONNES/HECTARE

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

P RES / OLD RES	0	P1	P2	P3	Mean
0	0.31	2.02	2.82	2.81	1.99
D	1.61	2.66	3.01	2.58	2.46
N	0.66	2.07	2.99	2.90	2.16
P	1.50	2.41	2.96	2.78	2.41
NPKNAMG	1.46	2.49	3.09	2.89	2.48
Mean	1.11	2.33	2.97	2.79	2.30

STRAW MEAN DM% 89.9

PLOT AREA HARVESTED 0.00614

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97/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

OLD RES	
O	6.55
D	7.18
N*	7.27
PK	7.84
N*PK	7.47
Mean	7.26

GRAIN MEAN DM% 87.3

STRAW TONNES/HECTARE

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

OLD RES	
O	2.59
D	2.84
N*	2.89
PK	3.00
N*PK	2.73
Mean	2.81

STRAW MEAN DM% 89.3

PLOT AREA HARVESTED 0.00614

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97/R/PG/5

PARK GRASS

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

The 142nd year, hay.

For previous years see 'Details' 1977 and 1973 and 74-96/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)
O(D)	Plot 2/2	None (D until 1863)
O	Plot 3	None
P	Plot 4/1	P
N2P	Plot 4/2	N2 P
N1MN	Plot 6	N1 P K Na Mg
MN	Plot 7	P K Na Mg
PNAMG	Plot 8	P Na Mg
MN(N2)	Plot 9/1	P K Na Mg (N2 until 1989)
N2MN	Plot 9/2	N2 P K Na Mg
N2PNAMG	Plot 10	N2 P Na Mg
N3MN	Plot 11/1	N3 P K Na Mg
N3MNSI	Plot 11/2	N3 P K Na Mg Si
O	Plot 12	None
(D/F)	Plot 13/1	None (D/F until 1994)
D/F	Plot 13/2	D/F
MN(N2*)	Plot 14/1	P K Na Mg (N2* until 1989)
N2*MN	Plot 14/2	N2* P K Na Mg
MN(N2*)	Plot 15	P K Na Mg (N2* until 1875)
N1*MN	Plot 16	N1* P K Na Mg
N1*	Plot 17	N1*
N2KNAMG	Plot 18	N2 K Na Mg
D	Plot 19	D
D/N*PK	Plot 20	D/N*P K

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

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97/R/PG/5

Sub-plots

2. **LIME** Liming plots 1-17:

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

NOTE: Lime was applied regularly at the same rate, to all 'a' and 'b' sub-plots of plots 1 to 17 (except 12) from 1924. Differential liming started in 1975 on certain 'b' and 'c' sub-plots (except on plot 12) and in 1976 on certain 'a' sub-plots (including plot 12) and 12b. Lime last applied in 1997.

Liming plots 18-20:

Differential rates of lime were applied to sub-plots 2 and 3 regularly 1920-1974. Since 1975 plot 18-1 has been split into two for treatments 'c' and 'd' above and plot 18-3 split into two for treatments 'a' and 'b'. Plots 19 and 20 received no further chalk after 1978; plot 18/2 no further chalk after 1972.

Chalk applied 1997 (tonnes Ca CO_3):

Plot	a	b	c
1	3.0	1.5	1.5
2/1	3.0	0.8	0.3
2/2	3.0	0.8	0.3
3	3.0	0.8	-
4/1	3.0	0.8	0.3
4/2	5.1	3.6	2.1
6	3.0	1.5	-
7	3.0	0.8	0.3
8	3.0	0.8	0.3
9/1	6.0	1.5	1.5
9/2	10.2	3.6	2.1
10	10.2	7.2	4.2
11/1	12.0	4.5	6.0
11/2	12.0	4.5	3.0
12	3.0	-	-
13/1	3.0	-	-
13/2	3.0	-	-
14/1	3.0	-	-
14/2	2.2	-	-
15	3.0	0.8	0.3
16	2.2	-	-
17	2.2	-	-
18	5.1	3.6	2.1

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

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97/R/PG/5

Experimental diary:

26-Nov-96	**T**	(Not plot 20) P applied.
10-Dec-96	**T**	(Not plot 20) K, Na, Mg and Si applied.
11-Dec-96	**T**	Plot 20: P and K applied.
07-Jan-97	**T**	Chalk application started.
29-Jan-97	**T**	Farmyard manure applied.
31-Jan-97	**T**	Chalk application finished.
09-Apr-97	**T**	Sulphate of ammonia applied.
10-Apr-97	**T**	Nitrate of soda applied.
07-Jul-97	B	Cut.
09-Jul-97	B	Hay turned twice.
10-Jul-97	B	Hay rowed up and baled.
10-Nov-97	B	Cut and herbage removed.

NOTE: Samples of herbage from selected plots were taken for chemical analysis. Unground herbage samples from all plots from both cuts were archived.

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97/R/PG/5

1ST CUT (8/7/97) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	2.68	2.98	2.12	0.87	2.16
K	2/1	1.68	2.37	1.46	1.75	1.82
O(D)	2/2	1.94	2.51	1.51	1.84	1.95
O	3	1.84	1.89	1.75	2.13	1.90
P	4/1	2.08	2.65	2.51	2.94	2.55
N2P	4/2	2.29	2.37	3.06	1.90	2.40
N1MN	6	3.10	3.11			3.11
MN	7	3.17	2.63	3.16	2.08	2.76
PNAMG	8	2.06	2.59	2.57	2.46	2.42
MN(N2)	9/1	2.65	2.79	1.38	0.95	1.94
N2MN	9/2	3.21	3.54	2.80	3.03	3.15
N2PNAMG	10	2.55	2.50	2.82	2.03	2.47
N3MN	11/1	3.52	3.59	2.59	3.70	3.35
N3MNSI	11/2	4.12	3.27	2.81	3.94	3.54
O	12	1.64	1.60	1.40	1.44	1.52
(D/F)	13/1	2.22	2.43	2.87	2.76	2.57
D/F	13/2	3.05	4.57	4.79	4.61	4.26
MN(N2*)	14/1	2.71	2.92	2.65	2.43	2.68
N2*MN	14/2	3.42	2.99	3.19	3.67	3.32
MN(N2*)	15	2.74	2.79	2.22	2.39	2.54
N1*MN	16	3.48	3.26	3.61	3.40	3.43
N1*	17	2.79	3.17	3.06	3.30	3.08
N2KNAMG	18/1			3.40	0.98	2.19
N2KNAMG	18/2					3.94
N2KNAMG	18/3	2.89	3.74			3.31
D	19/1					5.47
D	19/2					4.80
D	19/3					4.43
D/N*PK	20/1					4.69
D/N*PK	20/2					4.31
D/N*PK	20/3					4.40

1ST CUT MEAN DM% 31.3

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97/R/PG/5

2ND CUT (11/11/97) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	1.13	1.49	1.00	0.37	1.00
K	2/1	1.28	1.66	1.60	1.57	1.53
O(D)	2/2	0.71	1.01	0.86	0.87	0.86
O	3	0.73	0.75	1.07	1.30	0.96
P	4/1	0.79	1.13	1.33	1.29	1.14
N2P	4/2	1.10	1.28	0.76	0.74	0.97
N1MN	6	0.83	0.82			0.83
MN	7	0.90	1.08	1.53	0.70	1.05
PNAMG	8	1.14	1.02	1.18	0.96	1.07
MN(N2)	9/1	0.92	0.78	0.47	0.43	0.65
N2MN	9/2	0.85	1.04	0.62	0.90	0.85
N2PNAMG	10	0.91	1.09	0.82	0.66	0.87
N3MN	11/1	0.95	0.83	0.64	1.39	0.95
N3MNSI	11/2	1.14	1.18	0.70	1.53	1.14
O	12	0.88	0.91	0.97	0.80	0.89
(D/F)	13/1	1.25	1.20	1.59	1.25	1.32
D/F	13/2	1.64	2.49	2.08	1.89	2.02
MN(N2*)	14/1	0.92	0.90	0.80	0.93	0.89
N2*MN	14/2	1.30	1.05	1.16	1.14	1.16
MN(N2*)	15	1.26	1.19	1.12	0.92	1.12
N1*MN	16	1.44	1.25	1.48	1.13	1.33
N1*	17	1.19	1.38	1.52	1.64	1.43
N2KNAMG	18/1			0.42	0.13	0.27
N2KNAMG	18/2					0.98
N2KNAMG	18/3	0.62	0.96			0.79
D	19/1					1.25
D	19/2					1.41
D	19/3					1.19
D/N*PK	20/1					1.20
D/N*PK	20/2					0.79
D/N*PK	20/3					0.93

2ND CUT MEAN DM% 28.2

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97/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	3.81	4.47	3.12	1.23	3.16
K	2/1	2.96	4.03	3.06	3.33	3.34
O(D)	2/2	2.65	3.52	2.37	2.70	2.81
O	3	2.57	2.64	2.81	3.43	2.86
P	4/1	2.88	3.78	3.85	4.23	3.68
N2P	4/2	3.39	3.66	3.82	2.64	3.37
N1MN	6	3.94	3.94			3.94
MN	7	4.07	3.72	4.69	2.79	3.82
PNAMG	8	3.20	3.61	3.75	3.42	3.49
MN(N2)	9/1	3.57	3.57	1.84	1.38	2.59
N2MN	9/2	4.05	4.58	3.42	3.94	4.00
N2PNAMG	10	3.45	3.58	3.64	2.69	3.34
N3MN	11/1	4.47	4.41	3.23	5.09	4.30
N3MNSI	11/2	5.26	4.45	3.50	5.48	4.67
O	12	2.52	2.52	2.37	2.24	2.41
(D/F)	13/1	3.47	3.63	4.46	4.01	3.89
D/F	13/2	4.69	7.06	6.87	6.50	6.28
MN(N2*)	14/1	3.63	3.82	3.44	3.36	3.56
N2*MN	14/2	4.73	4.04	4.35	4.81	4.48
MN(N2*)	15	3.99	3.98	3.34	3.31	3.66
N1*MN	16	4.92	4.50	5.09	4.53	4.76
N1*	17	3.98	4.55	4.58	4.94	4.51
N2KNAMG	18/1			3.82	1.11	2.46
N2KNAMG	18/2					4.92
N2KNAMG	18/3	3.51	4.70			4.10
D	19/1					6.72
D	19/2					6.21
D	19/3					5.62
D/N*PK	20/1					5.89
D/N*PK	20/2					5.11
D/N*PK	20/3					5.34

TOTAL OF 2 CUTS MEAN DM% 29.7

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97/R/BN/7

BARNFIELD

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

Sections 1 and 2, 3rd year of clover. Sections 3-6, 3rd year of grass/clover.

For previous years see 'Details' 1967 and 1973 and 74-96/R/BN/7.

Plot dimensions: 10.7 x 55.9.

Treatments to grass/clover, Sections 3-6: All combinations of:-

Whole plots

1. **MANURE**	Fertilizers and organic manures:
(D)	(D)
(D)PK	(D) P K
PKMG	P K (Na) Mg
P	P
PK	P K
PMG	P (Na) Mg
0	0

P: 35 kg P as triple superphosphate in 1974 and since 1987, single superphosphate in other years
K: 225 kg K as sulphate of potash
(Na): 90 kg Na as sodium chloride until 1973, none since
Mg: 90 kg Mg as kieserite every fourth year since 1974 (sulphate of magnesia until 1973)
(D): Farmyard manure at 35 t until 1975, none since

Sub-plots

2. **N PERCUT**	Nitrogen fertilizer in 1997 (kg N per cut) as 34.5% N, cumulative to previous dressings and residues of forms of N previously each supplying 96 kg N per annum:
75	75, previously nitrate of soda, section 3
100	100, previously sulphate of ammonia, section 4
125	125, previously sulphate of ammonia + castor meal, section 5
150	150, previously castor meal, section 6

No nitrogen fertilizer applied in 1995. Castor meal last applied 1971, nitrate of soda and sulphate of ammonia until 1959.

Plus one plot **MANURE** KMG 100

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97/R/BN/7

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

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

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

Experimental diary:

02-Dec-96 : **T** : P applied.
04-Dec-96 : **T** : K applied.
07-Mar-97 : **T** : N applied.
11-Jun-97 : B : Cut, herbage removed.
01-Jul-97 : **T** : N applied.
29-Jul-97 : B : Cut, herbage removed.
11-Aug-97 : **T** : N applied.
11-Nov-97 : B : Cut, herbage removed.

NOTE: Herbage samples were taken for chemical analysis.

GRASS/CLOVER

1ST CUT (9/6/97) DRY MATTER TONNES/HECTARE

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

N PERCUT / **MANURE**	75	100	125	150	Mean
(D)	2.14	2.47	2.93	3.84	2.84
(D)PK	2.42	4.06	3.66	4.47	3.65
PKMG	2.46	3.80	4.19	3.08	3.38
P	0.96	0.62	0.67	0.23	0.62
PK	1.94	4.14	3.80	3.61	3.37
PMG	1.00	1.10	0.56	0.73	0.85
0	1.30	1.31	1.28	1.39	1.32
Mean	1.74	2.50	2.44	2.48	2.29

MANURE KMG 100 2.34

Grand mean 2.29

1ST CUT MEAN DM% 23.7

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97/R/BN/7

GRASS/CLOVER

2ND CUT (29/7/97) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
(D)	1.99	2.13	2.97	3.23	2.58
(D)PK	2.81	3.31	3.90	4.54	3.64
PKMG	3.17	3.75	3.80	3.96	3.67
P	0.66	0.72	0.68	0.61	0.67
PK	3.41	3.29	4.34	4.34	3.85
PMG	0.97	0.80	0.54	0.27	0.64
0	1.03	1.12	0.93	0.79	0.97
Mean	2.01	2.16	2.45	2.54	2.29

MANURE KMG 100 2.26

Grand mean 2.29

2ND CUT MEAN DM% 26.2

3RD CUT (11/11/97) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
(D)	0.76	1.30	2.27	2.81	1.78
(D)PK	1.92	2.37	1.85	2.06	2.05
PKMG	1.67	2.28	2.20	1.64	1.95
P	0.57	0.81	1.13	0.52	0.76
PK	1.90	2.32	2.28	2.69	2.30
PMG	0.79	1.13	1.07	0.66	0.91
0	0.73	1.19	1.21	0.99	1.03
Mean	1.19	1.63	1.72	1.62	1.54

MANURE KMG 100 2.11

Grand mean 1.56

3RD CUT MEAN DM% 22.1

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97/R/BN/7

GRASS/CLOVER

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
(D)	4.90	5.89	8.16	9.88	7.21
(D)PK	7.14	9.74	9.41	11.07	9.34
PKMG	7.31	9.83	10.19	8.69	9.00
P	2.18	2.15	2.48	1.37	2.05
PK	7.24	9.76	10.42	10.64	9.52
PMG	2.76	3.04	2.17	1.66	2.41
0	3.06	3.62	3.43	3.17	3.32
Mean	4.94	6.29	6.61	6.64	6.12

MANURE KMG 100 6.71

Grand mean 6.14

TOTAL OF 3 CUTS MEAN DM% 24.0

CLOVER

1ST CUT (9/6/97) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D)PK	PKMG	P	PK	PMG	0	Mean
	3.44	3.34	2.58	1.48	3.16	2.13	1.46	2.51

1ST CUT MEAN DM% 17.8

2ND CUT (29/7/97) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D)PK	PKMG	P	PK	PMG	0	Mean
	2.86	3.30	3.19	2.23	2.93	2.88	2.05	2.78

2ND CUT MEAN DM% 23.2

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97/R/BN/7

CLOVER

3RD CUT (11/11/97) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D)PK	PKMG	P	PK	PMG	0	Mean
	0.54	0.91	0.70	0.34	1.04	0.88	0.66	0.72

3RD CUT MEAN DM% 19.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D)PK	PKMG	P	PK	PMG	0	Mean
	6.83	7.55	6.47	4.05	7.13	5.88	4.17	6.01

TOTAL OF 3 CUTS MEAN DM% 20.1

PLOT AREA HARVESTED 0.00155

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97/R/GC/8

GARDEN CLOVER

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

The 144th year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-96/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:

15-Jul-97 : B : Cut, hand weeded, patches re-sown with Merviot.
04-Sep-97 : B : Cut, hand weeded, PK as (0:18:36) at 420 kg and Epsom salts at 530 kg.

NOTE: There was severe rabbit damage to the crop between the first and second cut.

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97/R/GC/8

1ST CUT (15/7/97) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	6.13	6.80	6.47

1ST CUT MEAN DM% 25.6

2ND CUT (4/9/97) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	1.36	1.73	1.55

2ND CUT MEAN DM% 23.2

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	7.49	8.54	8.01

TOTAL OF 2 CUTS MEAN DM% 24.4

PLOT AREA HARVESTED 0.00010

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97/W/RN/3

LEY/ARABLE

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

Sponsor: P.R. Poulton.

The 60th year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-96/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

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

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97/W/RN/3

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

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 only from the leys and the test crops.

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

Whole plots

1. **ROTATION** Rotations before wheat:

   LLN 8
   LN 3
   LLC 8
   LC 3
   AF
   AB

1/2 plots

2. **FYMRES66** Farmyard manure residues, last applied 1966:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1997 (kg N) as 27.5% N:

   0
   70
   140
   210

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97/W/RN/3

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

Whole plots

1. **ROTATION** Rotations before first test crop:

   LLN 8
   LN 3
   LLC 8
   LC 3
   AF
   AB

1/2 plots

2. **FYMRES65** Farmyard manure residues, last applied 1965:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1997 (kg N) as 27.5% N:

   0
   40
   80
   120

Treatments to leys:

FYM RES Farmyard manure residues:

NONE
FYM 38 t on each occasion, last applied 1964 to 1st and 6th year leys, 1963 to 2nd and 7th year leys, 1962 to 3rd and 8th year leys, 1966 to 4th year leys, 1965 to 5th year leys

NOTE: Corrective K dressings (kg K_2O) as muriate of potash, applied to first test crop w. wheat and long-term leys in the wheat block, applied 14-Mar-97:

Continuous rotations before wheat	No FYM half plots	FYM half plots
AF	300	300
AB	300	300

None to other plots.

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97/W/RN/3

Experimental diary:

Treatment crops:

Grass ley and clover/grass ley, 1st year (**ROTATION** LN1, LC1, LLN1 and LLC1):

04-Sep-96 : **T** : Ploughed.
: **T** : LC1 and LLC1 only: 27.5% N at 182 kg.
: **T** : LN1 and LLN1 only: 27.5% N at 273 kg.
06-Sep-96 : **T** : Rotary harrowed.
09-Sep-96 : **T** : LC1 and LLC1 only: 40% Rossa meadow fescue, 48% Erecta RVP Timothy and 12% Huia white clover mixture drilled at 30 kg.
: **T** : LN1 and LLN1 only: 50% Rossa meadow fescue and 50% Erecta RVP Timothy mixture drilled at 30 kg.
10-Sep-96 : **T** : Rolled.
25-Mar-96 : **T** : PK as (0:20:32) at 469 kg.
: **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
01-Apr-97 : **T** : Legumex Extra at 7.0 l in 200 l.
09-Jun-97 : **T** : First cut.
18-Jun-97 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
30-Oct-97 : **T** : Second cut.

Grass leys, 2nd to 8th years (**ROTATION** LN2-3, LLN2-8)

01-Oct-96 : **T** : LLN5 only: Dolomite at 5.0 t.
20-Mar-97 : **T** : Chain harrowed.
25-Mar-97 : **T** : PK as (0:20:32) at 469 kg. NK as (25:0:16) at 300 kg.
01-Apr-97 : **T** : Legumex Extra at 7.0 l in 200 l.
09-Jun-97 : **T** : First cut.
18-Jun-97 : **T** : NK as (25:0:16) at 300 kg.
30-Oct-97 : **T** : Second cut.

Clover/grass leys, 2nd to 8th years (**ROTATION** LC2-3 and LLC2-8):

01-Oct-96 : **T** : LLC5 only: Dolomite at 5.0 t.
20-Mar-97 : **T** : Chain harrowed.
25-Mar-97 : **T** : PK as (0:20:32) at 469 kg. Muriate of potash at 80 kg.
01-Apr-97 : **T** : Legumex Extra at 7.0 l in 200 l.
09-Jun-97 : **T** : First cut.
18-Jun-97 : **T** : Muriate of potash at 80 kg.
30-Oct-97 : **T** : Second cut.

S. barley, 1st and 2nd treatment crops (**ROTATION** AB):

13-Mar-97 : **T** : NPK as (20:10:10) at 400 kg. Rotary harrowed, Cooper, dressed Raxil S, drilled at 375 seed per m^2.
11-Apr-97 : **T** : Cooper, dressed Raxil S, redrilled at 420 seeds per m^2.
29-May-97 : **T** : MSS Optica at 2.0 l with Vindex at 1.0 l in 200 l.
24-Jun-97 : **T** : Dorin at 1.0 l in 300 l.
20-Aug-97 : **T** : Combine harvested.

W. beans, 3rd treatment crop (**ROTATION** AF and AB):

23-Oct-96 : **T** : PK as (0:24:24) at 168 kg. Punch, undressed, broadcast at 21 seeds per m^2, ploughed.
05-Dec-96 : **T** : Carbetamex at 3.0 kg in 200 l.
13-Aug-97 : **T** : Reglone at 3.0 l with Vassgro Non-ionic at 400 ml in 400 l.
21-Aug-97 : **T** : Combine harvested.

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97/W/RN/3

Experimental diary:

Fallow, 1st and 2nd treatment years (**ROTATION** AF):

14-Mar-97 : **T** : Spring-tine cultivated.
17-Apr-97 : **T** : Spike rotary cultivated
11-Jul-97 : **T** : Rotary cultivated.

W. wheat, 1st test crop (W):

07-Oct-96 : **T** : Roundup at 4.0 l in 200 l.
14-Oct-96 : **T** : Ploughed and rolled.
16-Oct-96 : **T** : Yaltox at 150 kg. Rotary harrowed. Hereward, dressed Anchor, drilled at 400 seeds per m^2.
06-Dec-96 : **T** : Panther at 2.0 l in 200 l.
09-Jan-97 : **T** : PK as (0:24:24) at 260 kg.
04-Apr-97 : **T** : **N** 70, 140, 210: N applied as 27.5% N.
16-May-97 : **T** : Halo at 2.0 l in 300 l.
16-Aug-97 : **T** : Combine harvested.

W. rye, 2nd test crop (R).

27-Sep-96 : **T** : Ploughed.
28-Sep-96 : **T** : Rolled.
30-Sep-96 : **T** : PK as (0:24:24) at 260 kg.
01-Oct-96 : **T** : Yaltox at 150 kg. Rotary harrowed.
02-Oct-96 : **T** : Amando, dressed Baytan Flowable, drilled at 400 seeds per m^2.
11-Dec-96 : **T** : Stomp 400 SC at 3.3 l in 200 l.
04-Apr-97 : **T** : **N** 40, 80, 120: N applied as 27.5% N.
04-Jun-97 : **T** : Mistral at 1.0 l in 300 l.
13-Aug-97 : **T** : Combine harvested.

NOTE: Samples of grass, grass and clover, wheat and rye grain were taken for chemical analysis.

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97/W/RN/3

LEYS

1ST CUT (9/6/97) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.51	0.64	0.57
LC2	1.89	2.81	2.35
LC3	3.29	3.80	3.55
LN1	2.44	3.01	2.72
LN2	5.19	5.21	5.20
LN3	4.63	4.88	4.75
LLC1	0.85	0.70	0.77
LLC2	1.01	1.85	1.43
LLC3	2.74	2.78	2.76
LLC4	3.86	3.77	3.82
LLC5	4.65	4.29	4.47
LLC6	3.53	2.75	3.14
LLC7	2.93	2.17	2.55
LLC8	4.86	3.79	4.33
LLN1	2.46	2.76	2.61
LLN2	5.33	4.87	5.10
LLN3	5.02	5.38	5.20
LLN4	6.56	6.53	6.54
LLN5	4.16	4.69	4.43
LLN6	5.20	5.43	5.31
LLN7	6.21	5.80	6.01
LLN8	5.62	5.32	5.47
Mean	3.77	3.78	3.78

1ST CUT MEAN DM% 28.6

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97/W/RN/3

LEYS

2ND CUT (30/10/97) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.17	0.15	0.16
LC2	0.44	0.61	0.53
LC3	0.00	0.00	0.00
LN1	1.90	1.77	1.83
LN2	2.56	2.35	2.45
LN3	0.00	0.00	0.00
LLC1	0.32	0.30	0.31
LLC2	0.33	0.42	0.37
LLC3	0.51	0.63	0.57
LLC4	0.34	0.37	0.36
LLC5	0.32	1.24	0.78
LLC6	0.42	0.52	0.47
LLC7	1.03	0.83	0.93
LLC8	0.00	0.00	0.00
LLN1	2.72	2.39	2.55
LLN2	2.48	1.45	1.96
LLN3	2.78	3.05	2.91
LLN4	1.81	1.95	1.88
LLN5	2.02	1.28	1.65
LLN6	1.79	1.76	1.78
LLN7	2.70	2.29	2.49
LLN8	0.00	0.00	0.00
Mean	1.12	1.06	1.09

2ND CUT MEAN DM% 40.9

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97/W/RN/3

LEYS

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.68	0.79	0.73
LC2	2.33	3.43	2.88
LC3	3.29	3.80	3.55
LN1	4.34	4.78	4.56
LN2	7.75	7.57	7.66
LN3	4.63	4.88	4.75
LLC1	1.16	0.99	1.08
LLC2	1.34	2.26	1.80
LLC3	3.25	3.41	3.33
LLC4	4.20	4.14	4.17
LLC5	4.97	5.53	5.25
LLC6	3.95	3.28	3.61
LLC7	3.96	3.00	3.48
LLC8	4.86	3.79	4.33
LLN1	5.17	5.15	5.16
LLN2	7.81	6.32	7.06
LLN3	7.80	8.43	8.12
LLN4	8.37	8.48	8.42
LLN5	6.18	5.96	6.07
LLN6	6.99	7.19	7.09
LLN7	8.91	8.09	8.50
LLN8	5.62	5.32	5.47
Mean	4.89	4.84	4.87

TOTAL OF 2 CUTS MEAN DM% 33.5

PLOT AREA HARVESTED 0.00200

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97/W/RN/3

W. WHEAT

GRAIN TONNES/HECTARE

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

FYMRES66	NONE	FYM	Mean
ROTATION			
LLN 8	5.40	6.05	5.72
LN 3	3.63	4.24	3.93
LLC 8	6.55	6.28	6.42
LC 3	6.88	7.33	7.10
AF	6.78	6.93	6.85
AB	5.33	5.96	5.64
Mean	5.76	6.13	5.95

N	0	70	140	210	Mean
ROTATION					
LLN 8	2.53	6.20	6.93	7.25	5.72
LN 3	1.74	3.83	5.15	5.02	3.93
LLC 8	4.10	6.78	7.36	7.43	6.42
LC 3	4.40	7.70	8.01	8.30	7.10
AF	2.40	6.52	9.25	9.24	6.85
AB	1.58	5.73	7.37	7.88	5.64
Mean	2.79	6.12	7.35	7.52	5.95

N	0	70	140	210	Mean
FYMRES66					
NONE	2.50	5.84	7.18	7.53	5.76
FYM	3.08	6.41	7.52	7.51	6.13
Mean	2.79	6.12	7.35	7.52	5.95

N		0	70	140	210
ROTATION	**FYMRES66**				
LLN 8	NONE	2.27	5.24	6.72	7.38
	FYM	2.79	7.15	7.14	7.11
LN 3	NONE	0.96	3.33	5.29	4.96
	FYM	2.52	4.33	5.02	5.09
LLC 8	NONE	4.29	7.55	6.74	7.61
	FYM	3.90	6.01	7.98	7.24
LC 3	NONE	3.84	7.30	8.13	8.24
	FYM	4.97	8.10	7.89	8.36
AF	NONE	2.40	6.72	8.60	9.41
	FYM	2.40	6.33	9.91	9.07
AB	NONE	1.26	4.90	7.59	7.55
	FYM	1.91	6.55	7.16	8.21

GRAIN MEAN DM% 88.6

SUB-PLOT AREA HARVESTED 0.00183

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97/W/RN/3

W. RYE 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES65	NONE	FYM	Mean
ROTATION			
LLN 8	5.37	5.41	5.39
LN 3	4.89	4.65	4.77
LLC 8	4.83	5.32	5.08
LC 3	5.29	5.34	5.31
AF	3.28	3.64	3.46
AB	3.91	4.62	4.26
Mean	4.59	4.83	4.71

N	0	40	80	120	Mean
ROTATION					
LLN 8	3.61	5.50	6.16	6.29	5.39
LN 3	3.21	4.92	5.73	5.23	4.77
LLC 8	3.68	5.30	5.65	5.68	5.08
LC 3	3.28	5.19	6.11	6.68	5.31
AF	1.14	3.12	4.51	5.08	3.46
AB	2.11	3.79	5.19	5.97	4.26
Mean	2.84	4.64	5.56	5.82	4.71

N	0	40	80	120	Mean
FYMRES65					
NONE	2.74	4.47	5.60	5.57	4.59
FYM	2.93	4.80	5.52	6.07	4.83
Mean	2.84	4.64	5.56	5.82	4.71

N		0	40	80	120
ROTATION	**FYMRES65**				
LLN 8	NONE	3.52	5.33	6.27	6.35
	FYM	3.70	5.67	6.05	6.24
LN 3	NONE	3.46	4.94	6.29	4.87
	FYM	2.95	4.89	5.18	5.59
LLC 8	NONE	3.87	4.68	5.88	4.89
	FYM	3.48	5.92	5.42	6.47
LC 3	NONE	3.02	5.48	5.86	6.78
	FYM	3.53	4.89	6.37	6.58
AF	NONE	0.89	2.82	4.56	4.85
	FYM	1.39	3.42	4.46	5.32
AB	NONE	1.67	3.54	4.73	5.71
	FYM	2.56	4.03	5.65	6.23

GRAIN MEAN DM% 87.5

PLOT AREA HARVESTED 0.00183

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97/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.

Sponsor: P.R. Poulton.

The 33rd year, w. wheat.

For previous years see 'Details' 1973 and 74-96/W/RN/12.

Design: 4 blocks of 8 plots split into 6 sub-plots.

Whole plot dimensions: 8.0 x 30.5.

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. An arable rotation was started on two blocks in 1972 and the remaining two blocks in 1973. After a period of testing the residues built up, 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.

Whole blocks

1.	**CROPSEQ**	Crop sequence:
	RYE A	Rye, after w. wheat 1988, potatoes 1989, w. wheat 1990, w. beans 1991, w. wheat 1992-6
	RYE B	Rye, after w. wheat 1987, potatoes 1988, w. wheat 1989, w. beans 1990, w. wheat 1991-6

Whole plots

2.	**TREATMNT**	Previous treatments:
	LC 8 GM	Eight-year clover/grass ley until 1987 (RYE A) or 1986 (RYE B), green manure in the preliminary period
	LC 8 PT	As above, peat in the preliminary period
	LC 6 LC	Six-year clover/grass ley until 1987 (RYE A) or 1986 (RYE B), clover/grass ley in the preliminary period
	LC 6 LN	As above, grass ley with N in the preliminary period
	FYM	Farmyard manure annually 1981 to 1986 (RYE A) or 1985 (RYE B) and in the preliminary period
	STRAW	Straw in both periods
	FERT-FYM	Fertilizers only in both periods, rates of P, K & Mg equivalent to amounts in FYM
	FERT-STR	Fertilizers only in both periods, rates of P, K & Mg equivalent to amounts in straw (+P)

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97/W/RN/12

Sub-plots

3. **N** Residual effects of nitrogen fertilizer last applied in 1994 (kg N) as 'Nitro-Chalk':

(0)
(50)
(100)
(150)
(200)
(250)

NOTE: In 1995 and 1996, 100 kg N was applied to all plots. None was applied in 1997.

Experimental diary:

27-Sep-96 : B : Ploughed.
28-Sep-96 : B : Rolled.
30-Sep-96 : B : PK as (0:20:32) at 500 kg.
01-Oct-96 : B : Rotary harrowed, Amando, dressed Baytan Flowable, drilled at 400 seeds per m^2.
11-Dec-96 : B : Stomp 400 SC at 3.3 l in 200 l.
04-Jun-97 : B : Mistral at 1.0 l in 300 l.
12-Aug-97 : B : Combine harvested.

NOTE: Samples of grain were taken for chemical analysis.

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97/W/RN/12

GRAIN TONNES/HECTARE

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

CROPSEQ	RYE A	RYE B	Mean
TREATMNT			
LC 8 GM	2.44	2.25	2.34
LC 8 PT	2.38	2.05	2.22
LC 6 LC	2.39	2.20	2.30
LC 6 LN	2.64	2.31	2.47
FYM	2.31	2.16	2.24
STRAW	2.06	1.91	1.99
FERT-FYM	1.76	1.65	1.70
FERT-STR	1.83	1.66	1.74
Mean	2.23	2.02	2.13

N	(0)	(50)	(100)	(150)	(200)	(250)	Mean
TREATMNT							
LC 8 GM	2.19	2.19	2.38	2.37	2.34	2.59	2.34
LC 8 PT	2.01	2.23	2.18	2.23	2.34	2.31	2.22
LC 6 LC	2.06	2.37	2.39	2.41	2.05	2.49	2.30
LC 6 LN	2.29	2.51	2.55	2.63	2.43	2.41	2.47
FYM	2.23	2.14	2.33	2.20	2.25	2.28	2.24
STRAW	1.68	1.85	1.92	2.07	2.07	2.33	1.99
FERT-FYM	1.47	1.52	1.86	1.71	1.90	1.77	1.70
FERT-STR	1.54	1.72	1.75	1.82	1.89	1.74	1.74
Mean	1.93	2.07	2.17	2.18	2.16	2.24	2.13

N	(0)	(50)	(100)	(150)	(200)	(250)	Mean
CROPSEQ							
RYE A	2.06	2.16	2.26	2.28	2.29	2.31	2.23
RYE B	1.81	1.98	2.08	2.08	2.03	2.17	2.02
Mean	1.93	2.07	2.17	2.18	2.16	2.24	2.13

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97/W/RN/12

GRAIN TONNES/HECTARE

TREATMNT	N CROPSEQ	(0)	(50)	(100)	(150)	(200)	(250)
LC 8 GM	RYE A	2.37	2.28	2.54	2.38	2.44	2.61
	RYE B	2.01	2.11	2.22	2.37	2.25	2.56
LC 8 PT	RYE A	2.22	2.34	2.34	2.39	2.48	2.51
	RYE B	1.79	2.12	2.02	2.07	2.21	2.11
LC 6 LC	RYE A	2.14	2.42	2.59	2.37	2.32	2.49
	RYE B	1.97	2.32	2.20	2.44	1.79	2.49
LC 6 LN	RYE A	2.52	2.71	2.74	2.90	2.58	2.37
	RYE B	2.06	2.32	2.35	2.36	2.29	2.45
FYM	RYE A	2.27	2.29	2.32	2.37	2.34	2.31
	RYE B	2.19	1.99	2.33	2.04	2.16	2.26
STRAW	RYE A	1.79	1.82	1.95	2.10	2.29	2.43
	RYE B	1.57	1.88	1.89	2.04	1.86	2.24
FERT-FYM	RYE A	1.47	1.46	1.88	1.92	1.94	1.91
	RYE B	1.47	1.58	1.84	1.50	1.86	1.63
FERT-STR	RYE A	1.70	1.94	1.74	1.78	1.93	1.89
	RYE B	1.39	1.50	1.75	1.85	1.86	1.60

*** Standard errors of differences of means ***

TREATMNT	N	CROPSEQ* TREATMNT	CROPSEQ* N
0.105	0.052	0.149	0.073

TREATMNT* N	CROPSEQ* TREATMNT N
0.147	0.241

* Within the same level of **CROPSEQ** only

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.149	7.0
BLOCK.WP.SP	80	0.208	9.8

GRAIN MEAN DM% 86.2

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97/W/RN/12

STRAW TONNES/HECTARE

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

TREATMNT	FYM	FERT-FYM	Mean
CROPSEQ			
RYE A	2.29	1.87	2.08
RYE B	1.89	1.64	1.77
Mean	2.09	1.76	1.92

N	(0)	(50)	(100)	(150)	(200)	(250)	Mean
CROPSEQ							
RYE A	1.94	1.93	2.09	2.06	2.19	2.27	2.08
RYE B	1.59	1.72	1.89	1.69	1.86	1.85	1.77
Mean	1.77	1.83	1.99	1.87	2.03	2.06	1.92

N	(0)	(50)	(100)	(150)	(200)	(250)	Mean
TREATMNT							
FYM	1.91	2.09	2.17	2.10	2.14	2.13	2.09
FERT-FYM	1.62	1.56	1.81	1.65	1.91	1.98	1.76
Mean	1.77	1.83	1.99	1.87	2.03	2.06	1.92

N		(0)	(50)	(100)	(150)	(200)	(250)
CROPSEQ	TREATMNT						
RYE A	FYM	2.15	2.41	2.19	2.35	2.42	2.19
	FERT-FYM	1.74	1.45	1.99	1.77	1.96	2.34
RYE B	FYM	1.67	1.77	2.15	1.84	1.86	2.07
	FERT-FYM	1.51	1.68	1.63	1.53	1.87	1.62

STRAW MEAN DM% 93.3

SUB PLOT AREA HARVESTED 0.00183

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97/R/CS/140

CHEMICAL REFERENCE PLOTS

Object: To study the persistence in soil of agricultural chemicals applied annually, singly and in combination, and their effects on soil microflora and yield of continuous s. barley - Long Hoos V 3.

Sponsors: R.H. Bromilow, A.A. Evans, P.H. Nicholls.

The 24th year, s. barley.

For previous years see 74-96/R/CS/140.

Design: Single replicate of 32 plots.

Whole plot dimensions: 4.06 x 4.57.

Treatments: Applied cumulatively every year until 1993, none since.

All combinations of:-

1.	**WEEDKLLR**	Weedkiller in autumn:
	(NONE)	None
	(GLYPHOS)	Glyphosate to barley stubble
2.	**FUNGCIDE[1]**	Fungicide in autumn:
	(NONE)	None
	(TRIADIM)	Triadimefon in autumn
3.	**FUNGCIDE[2]**	Fungicide in spring:
	(NONE)	None
	(BENOMYL)	Benomyl to the seedbed
4.	**INSCTCDE**	Insecticide:
	(NONE)	None
	(CHLORFEN)	Chlorfenvinphos to the seedbed
5.	**NEMACIDE**	Nematicide:
	(NONE)	None
	(ALDICARB)	Aldicarb to the seedbed

Experimental diary:

02-Dec-96 : B : PK as (0:20:32) at 1563 kg.
20-Jan-97 : B : Ploughed.
11-Mar-97 : B : Spring-tine cultivated.
12-Mar-97 : B : Rotary harrowed, Alexis undressed, drilled at 350 seeds per m^2.
14-May-97 : B : 34.5% N at 435 kg.
26-May-97 : B : Campbell's CMPP at 2.1 l with Vindex at 1.0 l in 300 l.
09-Jul-97 : B : Hand pulled wild oats.

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97/R/CS/140

Experimental diary:
21-Jul-97 : B : Hand pulled wild oats.
21-Aug-97 : B : Combine harvested.

GRAIN TONNES/HECTARE

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

FUNGCIDE[1]	(NONE)	(TRIADIM)	Mean
WEEDKLLR			
(NONE)	4.72	5.02	4.87
(GLYPHOS)	5.47	5.21	5.34
Mean	5.10	5.11	5.10

FUNGCIDE[2]	(NONE)	(BENOMYL)	Mean
WEEDKLLR			
(NONE)	4.82	4.93	4.87
(GLYPHOS)	5.26	5.41	5.34
Mean	5.04	5.17	5.10

FUNGCIDE[2]	(NONE)	(BENOMYL)	Mean
FUNGCIDE[1]			
(NONE)	5.09	5.10	5.10
(TRIADIM)	4.99	5.24	5.11
Mean	5.04	5.17	5.10

INSCTCDE	(NONE)	(CHLORFEN)	Mean
WEEDKLLR			
(NONE)	5.01	4.74	4.87
(GLYPHOS)	5.34	5.34	5.34
Mean	5.17	5.04	5.10

INSCTCDE	(NONE)	(CHLORFEN)	Mean
FUNGCIDE[1]			
(NONE)	5.05	5.15	5.10
(TRIADIM)	5.29	4.93	5.11
Mean	5.17	5.04	5.10

INSCTCDE	(NONE)	(CHLORFEN)	Mean
FUNGCIDE[2]			
(NONE)	5.07	5.01	5.04
(BENOMYL)	5.27	5.07	5.17
Mean	5.17	5.04	5.10

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97/R/CS/140

GRAIN TONNES/HECTARE

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

NEMACIDE / WEEDKLLR	(NONE)	(ALDICARB)	Mean
(NONE)	4.85	4.89	4.87
(GLYPHOS)	5.43	5.24	5.34
Mean	5.14	5.07	5.10

NEMACIDE / FUNGCIDE[1]	(NONE)	(ALDICARB)	Mean
(NONE)	5.16	5.04	5.10
(TRIADIM)	5.13	5.10	5.11
Mean	5.14	5.07	5.10

NEMACIDE / FUNGCIDE[2]	(NONE)	(ALDICARB)	Mean
(NONE)	4.91	5.17	5.04
(BENOMYL)	5.37	4.97	5.17
Mean	5.14	5.07	5.10

NEMACIDE / INSCTCDE	(NONE)	(ALDICARB)	Mean
(NONE)	5.24	5.10	5.17
(CHLORFEN)	5.04	5.03	5.04
Mean	5.14	5.07	5.10

	FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR	FUNGCIDE[2]	(NONE)	(BENOMYL)	(NONE)	(BENOMYL)
(NONE)		4.59	4.86	5.04	4.99
(GLYPHOS)		5.59	5.35	4.93	5.48

	FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR	INSCTCDE	(NONE)	(CHLORFEN)	(NONE)	(CHLORFEN)
(NONE)		4.78	4.66	5.23	4.81
(GLYPHOS)		5.31	5.63	5.36	5.05

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
WEEDKLLR	INSCTCDE	(NONE)	(CHLORFEN)	(NONE)	(CHLORFEN)
(NONE)		4.79	4.84	5.22	4.63
(GLYPHOS)		5.36	5.17	5.31	5.51

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
FUNGCIDE[1]	INSCTCDE	(NONE)	(CHLORFEN)	(NONE)	(CHLORFEN)
(NONE)		5.09	5.09	5.00	5.21
(TRIADIM)		5.05	4.92	5.54	4.94

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97/R/CS/140

GRAIN TONNES/HECTARE

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

FUNGCIDE[1]		(NONE)		(TRIADIM)	
WEEDKLLR	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		4.72	4.72	4.97	5.07
(GLYPHOS)		5.59	5.35	5.28	5.13

FUNGCIDE[2]		(NONE)		(BENOMYL)	
WEEDKLLR	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		4.63	5.00	5.07	4.79
(GLYPHOS)		5.19	5.34	5.68	5.15

FUNGCIDE[2]		(NONE)		(BENOMYL)	
FUNGCIDE[1]	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.01	5.17	5.30	4.91
(TRIADIM)		4.80	5.17	5.45	5.02

INSCTCDE		(NONE)		(CHLORFEN)	
WEEDKLLR	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.08	4.93	4.62	4.85
(GLYPHOS)		5.41	5.26	5.46	5.22

INSCTCDE		(NONE)		(CHLORFEN)	
FUNGCIDE[1]	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.18	4.91	5.13	5.16
(TRIADIM)		5.30	5.29	4.95	4.91

INSCTCDE		(NONE)		(CHLORFEN)	
FUNGCIDE[2]	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.09	5.06	4.73	5.28
(BENOMYL)		5.40	5.14	5.35	4.79

*** Standard errors of differences of means ***

Margins of two factor tables	0.254
Two factor tables	0.359
Three factor tables	0.507

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	6	0.718	14.1

GRAIN MEAN DM% 88.0

PLOT AREA HARVESTED 0.00110

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97/R/CS/302

EYESPOT RESISTANCE TO MBC

Object: To study the development of resistance to MBC fungicides in eyespot and the ability of resistant strains to survive, spread and infect - Meadow.

Sponsor: G.L. Bateman.

The 13th year, w. wheat.

For previous years see 85-93,95-96/R/CS/302

Design: 2 randomised blocks of 4 plots split into 6 sub-plots.

Whole plot dimensions: 12.0 X 24.0.
Sub-plot dimensions: 4.5 x 6.0.

Treatments: All combinations of:-

Whole plots

1. **FUNGCIDE**		Fungicide applied cumulatively 1985-93 and 1995-97:
	NONE	None
	CARB	Carbendazim at 0.25 kg
	PRO	Prochloraz at 0.40 kg (0.50 kg in 1993, 1995-1997)
	CARB+PRO	Carbendazim and prochloraz as above

Sub-plots

2. **EYE INOC**		Eyespot inoculum, applied in first year only:
	NATURAL	Natural background population (duplicated)
	W 19R 1S	Inoculated with wheat strains in proportion 19 resistant to one sensitive
	W 1R 19S	As above but one resistant to 19 sensitive
	R 19R 1S	Inoculated with rye strains, 19 resistant to one sensitive
	R 1R 19S	As above but one resistant to 19 sensitive

NOTE: The inoculum was colonized on oat seed and broadcast in October, 1984.

Experimental diary:

19-Sep-96 : B : Ploughed and furrow pressed.
03-Oct-96 : B : Rotary harrowed, Hereward, dressed Beret Gold, drilled at 380 seeds per m^2.
05-Dec-96 : B : Isoproturon 500 at 2.6 l with Stomp 400 SC at 3.1 l in 200 l.
11-Mar-97 : B : 34.5% N at 118 kg.
20-Mar-97 : **T** : **FUNGCIDE** CARB+PRO: Barclay Eyetak at 1.1 l with Tripart Defensor FL at 0.5 l in 200 l.
: **T** : **FUNGCIDE** PRO: Barclay Eyetak at 1.1 l in 200 l.

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97/R/CS/302

Experimental diary:

```
   20-Mar-97 : T : FUNGCIDE CARB: Tripart Defensor FL at 0.5 l in 200 l.
   04-Apr-97 : T : 34.5% N at 463 kg.
   16-Apr-97 : T : FUNGCIDE CARB+PRO: Barclay Eyetak at 1.1 l with Tripart
                   Defensor FL at 0.5 l in 200 l.
             : T : FUNGCIDE PRO: Barclay Eyetak at 1.1 l in 200 l.
             : T : FUNGCIDE CARB: Tripart Defensor FL at 0.5 l in 200 l.
   18-Apr-97 : B : Starane 2 at 0.75 l with Barclay Holdup at 2.3 l in 300 l.
   18-Aug-97 : B : Combine harvested.
```

NOTE: Plant samples were taken in July from **EYE INOC** NATURAL plots for assessment of stem base diseases.

GRAIN TONNES/HECTARE

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

EYE INOC / **FUNGCIDE**	NATURAL	W 19R 1S	W 1R 19S	R 19R 1S	R 1R 19S	Mean
NONE	4.94	5.77	3.64	4.56	5.75	4.93
CARB	4.78	5.13	5.01	5.34	5.16	5.04
PRO	5.20	4.27	5.41	5.46	5.46	5.17
CARB+PRO	5.62	5.28	4.98	4.95	6.13	5.43
Mean	5.13	5.11	4.76	5.08	5.63	5.14

*** Standard errors of differences of means ***

EYE INOC	**FUNGCIDE*** **EYE INOC**	
0.299	0.598	min.rep
0.259	0.518	max-min

	EYE INOC
max-min	NATURAL v any of the remainder
min.rep	Any of the remainder

* Within the same level of **FUNGCIDE** only

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	24	0.598	11.6

GRAIN MEAN DM% 88.1

SUB-PLOT AREA HARVESTED 0.00144

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97/R/CS/309 and 97/W/CS/309

LONG-TERM STRAW INCORPORATION

Object: To study the effects of rotational ploughing and time of sowing after the incorporation or burning of straw on soil conditions and pests, diseases, weeds and yield of w. wheat - Rothamsted (R) Great Knott III and Woburn (W) Far Field I.

Sponsors: J.F. Jenkyn, E.T.G. Bacon, R.J. Gutteridge, W. Powell, A.D. Todd.

The 13th year, w. wheat.

For previous years see 85-96/R & W/CS/309.

Design: 4 randomised blocks of 12 plots split into 2 sub-plots (R).
2 randomised blocks of 12 plots split into 2 sub-plots (W).

Whole plot dimensions: 9.0 x 28.0 (R).
9.0 x 30.0 (W).

Treatments: All combinations of:-

Whole plots

1. **STRAWCUL** Treatment of straw of previous crop and type of cultivation up to 1994 (before the space) and subsequently (after the space):

   BT1 BTTTT
   BT1T2 CTTTT
   BP2 BPPPP
   BT1P2 CPPPP
   CT1 CTTTT
   CT1 CPTTP
   CT1T2 CTPTT
   CT1T2 CTTPT
   CP2 CPPPP
   CP2 CPTTP
   CT1P2 CTPTT
   CT1P2 CTTPT

Sub-plots

2. **SOW DATE** Date of sowing:

   E Early
   L Late

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97/R/CS/309 and 97/W/CS/309

NOTES: (1) The following codes are used:
B Straw burnt
C Straw chopped and spread
T1 Cultivated to 10 cm depth
T1P2 Cultivated to 10 cm depth, ploughed to 20 cm
T1T2 Cultivated to 10 cm depth and again to 20 cm
P2 Ploughed to 20 cm depth
(2) From 1994 T plots were cultivated to 10 cm and P plots were ploughed to 20 cm depth.
(3) In the experimental diary only the code after the space is used. i.e. BTTTT, CTTTT, BPPPP, CPPPP, etc.

Experimental diary:

Great Knott III (R):

08-Aug-96 : B : Straw chopped.
20-Aug-96 : T : **STRAWCUL** BTTTT, BPPPP: Straw burnt, ash incorporated with discs.
23-Sep-96 : B : Sting CT at 2.0 l in 200 l.
30-Sep-96 : T : **STRAWCUL** BTTTT, CTTTT, CTPTT, CTTPT: Heavy spring-tine cultivated.
: T : **STRAWCUL** BPPPP, CPPPP, CPTTP: Ploughed.
01-Oct-96 : B : Heavy spring-tine cultivated.
02-Oct-96 : T : **STRAWCUL** BTTTT, CTTTT, CTPTT, CTTPT: Rotary harrowed.
02-Oct-96 : T : **SOW DATE** E: Rotary harrowed, Hereward, dressed Beret Gold, drilled at 380 seeds per m^2.
03-Oct-96 : T : **SOW DATE** E: Rolled.
09-Oct-96 : B : Draza at 5.5 kg.
23-Oct-96 : T : **SOW DATE** L: Rotary harrowed, Hereward, dressed Beret Gold, drilled at 380 seeds per m^2.
14-Nov-96 : B : Avadex BW Granular at 22.1 kg.
16-Dec-96 : B : Isoproturon 500 at 4.2 l with Stomp 400 SC at 3.1 l in 200 l.
10-Mar-97 : B : 34.5% N at 118 kg.
07-Apr-97 : B : 34.5% N at 463 kg.
18-Apr-97 : B : Starane 2 at 0.75 l with Barclay Holdup at 2.3 l in 300 l.
04-Jun-97 : B : Folicur at 0.3 l with Pointer at 0.5 l in 300 l.
19-Aug-97 : B : Combine harvested.

Far Field I (W):

15-Aug-96 : T : **STRAWCUL** BTTTT, BPPPP: Straw burnt, ash incorporated with spring-tines.
30-Aug-96 : T : **STRAWCUL** BTTTT, CTTTT, CTPTT, CTTPT: Heavy spring-tine cultivated.
18-Sep-96 : T : **STRAWCUL** BTTTT, CTTTT, CTPTT, CTTPT: Heavy spring-tine cultivated.
20-Sep-96 : T : **STRAWCUL** BPPPP, CPPPP, CPTTP: Ploughed and rolled.
02-Oct-96 : B : Scythe LC at 3.0 l in 200 l.
03-Oct-96 : B : Rotary harrowed.
: T : **SOW DATE** E: Hereward, dressed Sibutol, drilled at 325 seeds per m^2.
24-Oct-96 : T : **SOW DATE** L: Hereward, dressed Sibutol, drilled at 350 seeds per m^2.
22-Nov-96 : B : Avadex Excel 15G at 15 kg.

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97/R/CS/309 and 97/W/CS/309

Experimental diary:
Far Field I (W):
12-Dec-96 : B : Stomp 400 SC at 2.5 l with Isoproturon 500 at 1.0 l in 200 l.
07-Mar-97 : B : 34.5% N at 116 kg.
15-Apr-97 : B : 34.5% N at 464 kg.
16-May-97 : B : Halo at 2.0 l in 300 l.
08-Aug-97 : B : Barclay Gallup at 2.0 l in 300 l.
15-Aug-97 : B : Combine harvested.

NOTE: Plant samples were taken in July to assess root and stem base diseases.

97/R/CS/309 GREAT KNOTT III (R)

GRAIN TONNES/HECTARE

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

SOW DATE / STRAWCUL	E	L	Mean
BT1 BTTTT	7.69	8.21	7.95
BT1T2 CTTTT	5.02	4.43	4.73
BP2 BPPPP	7.62	7.86	7.74
BT1P2 CPPPP	6.89	7.70	7.30
CT1 CTTTT	5.50	4.86	5.18
CT1 CPTTP	5.96	7.57	6.76
CT1T2 CTPTT	6.42	5.29	5.85
CT1T2 CTTPT	7.63	6.92	7.28
CP2 CPPPP	7.00	7.75	7.38
CP2 CPTTP	6.10	7.51	6.80
CT1P2 CTPTT	6.11	6.25	6.18
CT1P2 CTTPT	6.49	6.46	6.48
Mean	6.54	6.73	6.63

*** Standard errors of differences of means ***

STRAWCUL	SOW DATE	STRAWCUL SOW DATE
0.321	0.140	0.470

Except when comparing means with the same level(s) of STRAWCUL 0.485

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.454	6.8
BLOCK.WP.SP	36	0.686	10.3

GRAIN MEAN DM% 89.1 SUB-PLOT AREA HARVESTED 0.00672

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97/W/CS/309 FAR FIELD I (W)

GRAIN TONNES/HECTARE

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

SOW DATE	E	L	Mean
STRAWCUL			
BT1 BTTTT	6.98	5.76	6.37
BT1T2 CTTTT	6.25	5.88	6.06
BP2 BPPPP	7.32	6.46	6.89
BT1P2 CPPPP	5.14	5.15	5.15
CT1 CTTTT	6.75	5.19	5.97
CT1 CPTTP	5.78	6.83	6.31
CT1T2 CTPTT	6.26	6.13	6.19
CT1T2 CTTPT	7.50	4.85	6.17
CP2 CPPPP	6.17	6.07	6.12
CP2 CPTTP	6.89	7.06	6.98
CT1P2 CTPTT	5.15	4.61	4.88
CT1P2 CTTPT	6.72	5.92	6.32
Mean	6.41	5.82	6.12

*** Standard errors of differences of means ***

STRAWCUL	SOW DATE	STRAWCUL SOW DATE
0.578	0.179	0.725

Except when comparing means with the same level(s) of STRAWCUL 0.619

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.578	9.4
BLOCK.WP.SP	12	0.619	10.1

GRAIN MEAN DM% 90.3

SUB-PLOT AREA HARVESTED 0.00660

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97/R/CS/311

EFFECTS OF SHALLOW STRAW INCORPORATION

Object: To study the effects of straw incorporation by rotational ploughing, with shallow cultivation in the intervening years, on diseases and yield of winter wheat - West Barnfield I.

Sponsors: J.F. Jenkyn, R.J. Gutteridge, A.D. Todd.

The 13th year, w. wheat.

For previous years see 85-96/R/CS/311.

Design: 6 x 4 criss-cross split into 2 sub-plots. Originally a single replicate of 3 x 2 x 2 x 2 x 2.

Whole plot dimensions: 4.5 x 12.0.

Treatments: Combinations of:-

Whole plots

1. **STRAW**		Treatments to straw of previous wheat:
	BURNT	Burnt (duplicated)
	BALED	Baled and removed (duplicated)
	CHOPPED	Chopped and incorporated (duplicated)

Criss-cross with

2. **CULTIVTN**		Autumn cultivations since 1993, previously all shallow cultivated:
	S P94	Shallow tine cultivated to 10 cm, (ploughed to 20 cm in autumn 1993)
	S P95	Shallow tine cultivated to 10 cm, (ploughed to 20 cm in autumn 1994)
	S P96	Shallow tine cultivated to 10 cm, (ploughed to 20 cm in autumn 1995)
	P97	Ploughed to 20 cm, (shallow tine cultivated previously)

NOTE: Only the first letter (the treatment in 1997) is used in the experimental diary.

Experimental diary:

08-Aug-96 : **T** : **STRAW** BALED: Straw baled and removed.
08-Aug-96 : **T** : **STRAW** CHOPPED: Straw chopped with trailer chopper.
20-Aug-96 : **T** : **STRAW** BURNT: Straw burnt and ash incorporated with discs.
30-Sep-96 : B : Gramoxone 100 at 3.0 l in 200 l.
09-Oct-96 : **T** : **CULTIVTN** P: Ploughed.
: **T** : **CULTIVTN** S: Heavy spring-tine cultivated.
10-Oct-96 : B : Rotary harrowed twice, Soissons, dressed Sibutol and Gammasan 30, drilled at 380 seeds per m^2.
15-Nov-96 : B : Avadex Excel 15G at 15.0 kg.
27-Nov-96 : B : Stefes IPU at 1.0 l with Stomp 400 SC at 2.5 l in 200 l.

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97/R/CS/311

Experimental diary:
03-Mar-97 : B : 34.5% N at 116 kg.
04-Apr-97 : B : 34.5% N at 580 kg.
08-Aug-97 : B : Combine harvested.

NOTE: Plant samples were taken in July to assess root and stem base diseases.

GRAIN TONNES/HECTARE

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

CULTIVTN STRAW	S P94	S P95	S P96	P97	Mean
BURNT	7.17	6.80	6.94	7.05	6.99
BALED	5.00	6.18	6.15	6.09	5.85
CHOPPED	5.24	6.06	6.42	6.68	6.10
Mean	5.80	6.35	6.50	6.61	6.32

GRAIN MEAN DM% 86.4

SUB-PLOT AREA HARVESTED 0.00288

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97/R/CS/326 and 97/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: M.J. Glendining, N.J. Bradbury, J.F. Jenkyn.

The eleventh year, w. wheat.

For previous years see 87-96/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).
3.0 x 14.5 (W).

Treatments:

STRAW Amounts of straw incorporated into the seedbed (t per ha 85% DM), cumulative to previous annual dressings:

		R	W
NONE	None	-	-
NORMAL	Normal	4.5	4.6
2 NORMAL	Twice normal	9.0	9.2
4 NORMAL	Four times normal	18.0	18.4

Experimental diary:

Great Knott III (R):

20-Aug-96 : **T** : **STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied and chopped.
: **T** : **STRAW** NONE: Straw removed.
23-Sep-96 : B : Sting CT at 2.0 l in 200 l.
01-Oct-96 : B : Ploughed.
02-Oct-96 : B : Spring-tine cultivated, rotary harrowed, Hereward, dressed Beret Gold, drilled at 380 seeds per m^2.
03-Oct-96 : B : Rolled.
09-Oct-96 : B : Draza at 5.5 kg.
14-Nov-96 : B : Avadex BW Granular at 22.1 kg.
16-Dec-96 : B : Isoproturon 500 at 4.2 l with Stomp 400 SC at 3.1 l in 200 l.
18-Apr-97 : B : Starane 2 at 0.75 l in 300 l.
04-Jun-97 : B : Folicur at 0.3 l with Pointer at 0.5 l in 300 l.
19-Aug-97 : B : Combine harvested.

Far Field I (W):

21-Aug-96 : **T** : **STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied.
: **T** : **STRAW** NONE: Straw removed.
22-Aug-96 : B : Straw chopped.
02-Oct-96 : B : Scythe LC at 3.0 l in 200 l.
03-Oct-96 : B : Rotary harrowed, Hereward, dressed Sibutol, drilled at 325 seeds per m^2.
22-Nov-96 : B : Avadex Excel 15G at 15 kg.

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97/R/CS/326 and 97/W/CS/326

Experimental diary:

Far Field I (W):

12-Dec-96 : B : Stomp 400 SC at 2.5 l with Isoproturon 500 at 1.0 l in 200 l.
16-May-97 : B : Halo at 2.0 l in 300 l.
08-Aug-97 : B : Barclay Gallup at 2.0 l in 300 l.
15-Aug-97 : B : Combine harvested.

NOTES: (1) No nitrogen fertilizer was applied in 1997.
(2) Crop and soil samples were taken in March and August for nitrogen and carbon content.

97/R/CS/326 GREAT KNOTT III (R)

GRAIN TONNES/HECTARE

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

STRAW	
NONE	2.26
NORMAL	2.65
2 NORMAL	2.58
4 NORMAL	2.78
Mean	2.57

*** Standard errors of differences of means ***

STRAW
0.158

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.223	8.7

GRAIN MEAN DM% 89.4

STRAW TONNES/HECTARE

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

STRAW	
NONE	1.10
NORMAL	0.93
2 NORMAL	0.64
4 NORMAL	0.94
Mean	0.94

STRAW MEAN DM% 92.4 PLOT AREA HARVESTED 0.00324

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97/W/CS/326 FAR FIELD I (W)

GRAIN TONNES/HECTARE

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

	STRAW
NONE	2.60
NORMAL	2.21
2 NORMAL	2.02
4 NORMAL	2.02
Mean	2.21

*** Standard errors of differences of means ***

STRAW
0.347

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.425	19.2

GRAIN MEAN DM% 89.0

STRAW TONNES/HECTARE

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

	STRAW
NONE	1.45
NORMAL	0.97
2 NORMAL	1.32
4 NORMAL	1.21
Mean	1.24

STRAW MEAN DM% 61.3

PLOT AREA HARVESTED 0.00319

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97/R/CS/355

RATES OF N AND MINERALIZATION

Object: To study the cumulative effects of rates of nitrogen fertilizer on soil mineralization capacity and yields of continuous winter wheat - Claycroft.

Sponsor: P.R. Poulton.

The seventh year, w. wheat.

For previous years see 91-96/R/CS/355.

Design: 3 randomised blocks of 7 plots.

Whole plot dimensions: 21.0 x 23.0.

Treatments:

N	Nitrogen fertilizer (kg N) as 34.5% N cumulative to previous dressings:
0	
50	
100	
150	
200	
250	
300	

Experimental diary:

15-Sep-96 : B : Roundup at 1.5 l with Vassgro Non-ionic at 300 ml in 200 l.
25-Sep-96 : B : Ploughed and furrow pressed.
30-Sep-96 : B : Harrowed.
17-Oct-96 : B : Rotary harrowed, Mercia dressed Sibutol, drilled at 380 seeds per m^2.
23-Oct-96 : B : Draza at 5.5 kg.
15-Nov-96 : B : Avadex BW Granular at 22.1 kg.
03-Mar-97 : B : Autumn Kite at 6.0 l in 200 l.
17-Mar-97 : B : Topik at 1.25 l with Sprayprover at 1.0 l in 200 l.
11-Apr-97 : **T** : **N** 50, 100, 150, 200, 250, 300: 34.5% N at 145, 290, 435, 580, 725 and 870 kg respectively.
04-Jun-97 : **T** : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
14-Aug-97 : B : Combine harvested.

NOTE: Crop samples were taken for chemical analysis.

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97/R/CS/355

GRAIN TONNES/HECTARE

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

N	
0	3.03
50	5.04
100	5.90
150	6.09
200	6.59
250	6.89
300	6.74
Mean	5.76

*** Standard errors of differences of means ***

N
0.238

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.292	5.1

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00504

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97/R/CS/408

MISCANTHUS SINENSIS GIGANTEUS STUDY

Object: To quantify the biomass yield potential of *Miscanthus sinensis* Giganteus - Road Piece West.

Sponsor: D.G. Christian.

The fifth year, grass.

For previous years see 94-96/R/CS/408.

Design: 3 randomised blocks of 3 plots.

Whole plot dimensions: 10.0 x 10.0.

Treatments:

N	Nitrogen fertilizer cumulative to previous dressings, kg N:
-	None
N1	60
N2	120

Experimental diary:
10-Mar-97 : B : Barclay Gallup at 4.0 l in 200 l.
11-Apr-97 : B : Muriate of potash at 281 kg.
22-May-97 : **T** : **N** N1, N2: 34.5% N applied at 174 and 348 kg respectively.
04-Feb-98 : B : Hand harvested.

NOTE: Stems per plant and heights were measured regularly. Biomass and nutrient content were measured regularly.

DRY MATTER TONNES/HECTARE

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

N	-	N1	N2	Mean
	14.34	14.09	14.76	14.40

*** Standard errors of differences of means ***

N
0.540

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.661	4.6

MEAN DM% 48.5 PLOT AREA HARVESTED 0.00423

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97/R/CS/411

PANICUM STUDY

Object: To quantify the biomass yield potential of varieties of *Panicum virgatum* species - Road Piece West.

Sponsor: D.G. Christian.

The fifth year, grass.

For previous year see 94-96/R/CS/411

Design: 3 blocks of 7 x 2 plots.

Whole plot dimensions: 5.0 x 2.0.

Treatments:

1. **VARIETY**

CAVIN R	Cave in Rock
KANLOW	Kanlow
PATHFIND	Pathfinder
SUNBURST	Sunburst
FORESTB	Forestburg
NEBR 28	NEBR 28
DACOTAH	Dacotah

2. **N** Nitrogen fertilizer, kg N cumulative to previous dressings:

-	None
N1	60

Experimental diary:

10-Mar-97 : B : Barclay Gallup at 4.0 l in 200 l.
16-Apr-97 : **T** : **N** N1: 34.5% N at 174 kg.
02-Jul-97 : B : Hand weeded sow thistles.
01-Dec-97 : **T** : All but **VARIETY** KANLOW: Hand harvested.
15-Jan-98 : **T** : **VARIETY** KANLOW: Hand harvested.

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97/R/CS/411

DRY MATTER TONNES/HECTARE

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

N	-	N1	Mean
SPECIES			
CAVIN R	10.94	11.70	11.32
KANLOW	12.66	15.27	13.97
PATHFIND	13.38	10.60	11.99
SUNBURST	10.20	10.70	10.45
FORESTB	10.05	15.75	12.90
NEBR 28	15.12	11.91	13.51
DACOTAH	8.45	9.18	8.82
Mean	11.54	12.16	11.85

*** Standard errors of differences of means ***

SPECIES	N	SPECIES N
1.312	0.701	1.856

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK	2	0.517	4.4
BLOCK.WP	26	2.273	19.2

MEAN DM% 49.5

PLOT AREA HARVESTED 0.00011

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97/R/CS/429

WINTER RYE AS AN ENERGY CROP

Object: To measure the effects of different levels of nitrogen fertilizer on the biomass yield of w. rye - Road Piece West.

Sponsor: D.G. Christian.

The fourth year, w. rye.

For previous years see 94-96/R/CS/429.

Design: 3 randomised blocks of 5 plots.

Plot dimensions: 3.0 x 15.0.

Treatments:

N	Nitrogen fertilizer (kg N), cumulative to previous dressings:
-	None
N1	30
N2	60
N3	90
N4	120

Experimental diary:

09-Sep-96 : B : Straw baled.
16-Oct-96 : B : Ploughed.
21-Oct-96 : B : Spring-tine cultivated.
22-Oct-96 : B : Rotary harrowed, Amando undressed, drilled at 350 seeds per m^2.
10-Apr-97 : **T** : **N** N1, N2, N3, N4: 34.5% N at 87, 174, 261 and 347 kg respectively.
13-Aug-97 : B : Combine harvested.

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97/R/CS/429

GRAIN TONNES/HECTARE

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

N	
-	3.22
N1	3.67
N2	3.47
N3	3.53
N4	3.11
Mean	3.40

*** Standard errors of differences of means ***

N
0.460

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.563	16.6

GRAIN MEAN DM% 85.2

STRAW TONNES/HECTARE

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

N	
-	2.58
N1	3.46
N2	3.36
N3	3.32
N4	3.16
Mean	3.18

STRAW MEAN DM% 90.8

PLOT AREA HARVESTED 0.00240

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97/W/CS/435

RYEGRASS, WHEAT VOLUNTEERS AND DISEASE

Object: To study how different populations of cereal volunteers and ryegrass sown as a cover crop affect the survival of cereal diseases - Woburn, School Field.

Sponsors: J.F. Jenkyn, R.J. Gutteridge.

The third year, w. wheat.

For previous years see 95-96/W/CS/435

Design: 4 randomised blocks of 10 x 2 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments:

1. **COV CROP**		Crop, seed rate and soil inoculation in 1995:
	(R)	Ryegrass at 30 kg
	(RW)	Ryegrass at 30 kg + wheat at 50 seeds per m^2
	(RI)	Ryegrass at 30 kg + soil inoculated with *Phialophora graminicola*
	(RWI)	Ryegrass at 30 kg + wheat at 50 seeds per m^2 + soil inoculated with *P. graminicola*
	(M)	Mustard at 300 seeds per m^2
	(MW1)	Mustard at 100 seeds per m^2 + wheat at 4 seeds per m^2
	(MW2)	Mustard at 100 seeds per m^2 + wheat at 9 seeds per m^2
	(MW3)	Mustard at 100 seeds per m^2 + wheat at 50 seeds per m^2
	(MW4)	Mustard at 100 seeds per m^2 + wheat at 200 seeds per m^2
	(MW5)	Mustard at 30 seeds per m^2 + wheat at 400 seeds per m^2
2. **PLOUGH**		Time of ploughing in 1995:
	(PE)	Early (12 May)
	(PL)	Late (17 Aug)

Experimental diary:

25-Sep-96 : B : Disced.
08-Oct-96 : B : Rotary harrowed.
09-Oct-96 : B : Hereward, dressed Sibutol, drilled at 325 seeds per m^2.
12-Dec-96 : B : Javelin Gold at 5.0 l in 200 l.
07-Mar-97 : B : 34.5% N at 116 kg.
11-Mar-97 : B : Vytel Manganese at 3.0 l with Vassgro Non-ionic at 30 ml in 200 l.
12-Mar-97 : B : Stefes Tiger 90 at 15 kg.
15-Apr-97 : B : 34.5% N at 464 kg.
23-May-97 : B : Standon Fluroxypyr at 0.75 l with Halo at 2.0 l in 300 l.
15-Aug-97 : B : Combine harvested.

NOTES: (1) Stefes Tiger 90 is a sulphur fertilizer.
(2) Plant samples were taken in April and July to assess root and stem base diseases.

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97/W/CS/435

GRAIN TONNES/HECTARE

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

PLOUGH COV CROP	(PE)	(PL)	Mean
(R)	6.84	8.03	7.43
(RW)	7.06	8.17	7.61
(RI)	8.31	7.85	8.08
(RWI)	8.36	6.04	7.20
(M)	7.21	7.24	7.22
(MW1)	7.96	7.01	7.48
(MW2)	6.74	7.04	6.89
(MW3)	6.20	6.74	6.47
(MW4)	5.86	6.76	6.31
(MW5)	6.63	6.92	6.77
Mean	7.12	7.18	7.15

*** Standard errors of differences of means ***

COV CROP	PLOUGH	COV CROP PLOUGH
0.766	0.343	1.084

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	57	1.532	21.4

GRAIN MEAN DM% 89.7

PLOT AREA HARVESTED 0.00476

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97/R/CS/437

SET-ASIDE, CULTIVATION AND CROPS

Object: To measure the establishment, growth and yield of w. wheat and w. rape following a range of cultivations and herbicide applications after natural regeneration set-aside. To assess levels of soil nitrogen and weeds in the two crops and diseases in the wheat - Bylands.

Sponsors: J.F. Jenkyn and R.J. Gutteridge.

The third year, w. wheat.

For previous year see 96/R/CS/437

Design: 3 randomised blocks of 5 x 2 plots split into 2 sub-plots.

Whole plot dimensions: 12.0 x 26.0.
Sub-plot dimensions: 10.0 x 12.0.

Treatments: All combinations of:-

Whole plots

1. **SETDESTR** Method and time of destruction of set-aside in 1995:

(PG)	Ploughed in May, glyphosate pre-drilling
(PC)	Ploughed in May, cultivated in June and July
(MP)	Minimally cultivated in May, ploughed in August
(HP)	Herbicide in May, ploughed in August
(-P)	Ploughed in August

2. **CROP** Crop in 1996:

(R)	Winter rape
(W)	Winter wheat

Sub-plots

3. **NITROGEN** Fertilizer nitrogen in 1996 (kg N):

(-)	None
(N)	160

Experimental diary:

23-Aug-96 : B : Ploughed and furrow pressed.
10-Oct-96 : B : Roundup at 4.0 l in 200 l.
16-Oct-96 : B : Spring-tine cultivated. Rotary harrowed, Genesis dressed Sibutol, drilled at 380 seeds per m^2. Rolled.
27-Jan-97 : B : Panther at 2.0 l in 200 l.
10-Mar-97 : B : 34.5% N at 118 kg.
01-Apr-97 : B : 34.5% N at 320 kg.
26-May-97 : B : Folicur at 0.5 l with Pointer at 0.5 l in 300 l.
11-Aug-97 : B : Combine harvested.

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97/R/CS/437

NOTE: Plant samples were taken in July to assess root and stem base diseases.

GRAIN TONNES/HECTARE

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

CROP	(R)	(W)	Mean
SETDESTR			
(PG)	7.32	7.06	7.19
(PC)	7.48	6.76	7.12
(MP)	7.28	6.55	6.91
(HP)	7.72	6.72	7.22
(-P)	7.09	6.66	6.87
Mean	7.38	6.75	7.06

NITROGEN	(-)	(N)	Mean
SETDESTR			
(PG)	7.16	7.21	7.19
(PC)	7.07	7.17	7.12
(MP)	6.64	7.18	6.91
(HP)	7.12	7.32	7.22
(-P)	6.74	7.01	6.87
Mean	6.95	7.18	7.06

NITROGEN	(-)	(N)	Mean
CROP			
(R)	7.15	7.60	7.38
(W)	6.74	6.75	6.75
Mean	6.95	7.18	7.06

NITROGEN		(-)	(N)
SETDESTR	CROP		
(PG)	(R)	7.27	7.37
	(W)	7.05	7.06
(PC)	(R)	7.43	7.54
	(W)	6.71	6.80
(MP)	(R)	6.87	7.69
	(W)	6.41	6.68
(HP)	(R)	7.42	8.02
	(W)	6.82	6.62
(-P)	(R)	6.76	7.42
	(W)	6.71	6.60

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97/R/CS/437

GRAIN TONNES/HECTARE

*** Standard errors of differences of means ***

SETDESTR	CROP	NITROGEN	SETDESTR CROP
0.177	0.112	0.093	0.251

SETDESTR NITROGEN	CROP NITROGEN	SETDESTR CROP NITROGEN
0.230	0.146	0.326

Except when comparing means with the same level(s) of

SETDESTR	0.208		
CROP		0.132	
SETDESTR.CROP			0.294

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.307	4.4
BLOCK.WP.SP	20	0.360	5.1

GRAIN MEAN DM% 90.0

SUB-PLOT AREA HARVESTED 0.00240

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97/R/CS/442

PHALARIS LINES

Object: To assess the growth and yield of *Phalaris* lines for biofuel - Road Piece West.

Sponsor: D.G. Christian.

The third year.

For previous years see 96/R/CS/442.

Design: 6 randomised blocks of 15 plots.

Whole plot dimensions: 1.5 x 2.5.

Treatments:

LINES	*Phalaris* lines:
1	A
2	B
3	C
4	D
5	E
6	F
7	G
8	H
9	I
10	J
11	K
12	L
13	M
14	N
15	O

Experimental diary:

10-Apr-97 : B : Muriate of potash at 180 kg, triple superphosphate at 140 kg and 34.5% N at 348 kg.
13-May-97 : B : Atlas Dimethoate 40 at 1.7 l in 220 l.
04-Dec-97 : **T** : Hand harvested three replicates.
29-Jan-98 : **T** : Hand harvested remaining three blocks.

NOTES: (1) During the growing period observations were made on crop height, ground cover, flower emergence, lodging and duration of green leaf.
(2) Yields presented come from the hand harvest on 29-Jan-98.
(3) **LINES** 3, 4 failed to grow and have been omitted from the analysis.

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97/R/CS/442

DRY MATTER TONNES/HECTARE

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

LINES	
1	7.00
2	6.90
5	6.44
6	5.06
7	6.46
8	9.29
9	7.15
10	8.91
11	7.99
12	6.19
13	7.19
14	7.46
15	8.15
Mean	7.25

*** Standard errors of differences of means ***

LINES
1.028

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	24	1.259	17.4

MEAN DM% 72.2

PLOT AREA HARVESTED 0.00023

The wrong plot area was used in the 1996 analysis. The corrected yields follow.

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96/R/CS/442

DRY MATTER TONNES/HECTARE

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

LINES	
1	9.65
2	8.69
3	0.96
4	1.15
5	8.54
6	5.75
7	9.71
8	9.13
9	7.46
10	8.74
11	8.91
12	7.66
13	8.29
14	9.07
15	5.92
Mean	7.31

*** Standard errors of differences of means ***

LINES
1.128

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	1.382	18.9

MEAN DM% 78.6

PLOT AREA HARVESTED 0.00023

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97/W/CS/446

RYEGRASS, WHEAT VOLUNTEERS AND DISEASES

Object: To study how different populations of cereal volunteers and ryegrass sown as a cover crop affect the survival of cereal diseases - Woburn, White Horse.

Sponsors: J.F. Jenkyn, R.J. Gutteridge.

For previous year see 96/W/CS/446.

The second year, w. wheat.

Design: 4 randomised blocks of 10 x 2 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments:

Whole plots

1.	**COV CROP**	Crop, seed rate and soil inoculation in 1996:
	(R)	Ryegrass at 30 kg
	(RW)	Ryegrass at 30 kg + wheat at 50 seeds per m^2
	(RI)	Ryegrass at 30 kg + soil inoculated with *Phialophora graminicola*
	(RWI)	Ryegrass at 30 kg + wheat at 50 seeds per m^2 + soil inoculated with *P. graminicola*
	(M)	Mustard at 300 seeds per m^2
	(MW1)	Mustard at 100 seeds per m^2 + wheat at 4 seeds per m^2
	(MW2)	Mustard at 100 seeds per m^2 + wheat at 9 seeds per m^2
	(MW3)	Mustard at 100 seeds per m^2 + wheat at 50 seeds per m^2
	(MW4)	Mustard at 100 seeds per m^2 + wheat at 200 seeds per m^2
	(MW5)	Mustard at 30 seeds per m^2 + wheat at 400 seeds per m^2
2.	**PLOUGH**	Time of ploughing in 1996:
	(PE)	Early (17 May)
	(PL)	Late (14 Aug)

Experimental diary:

24-Sep-96 : B : Disced.
25-Sep-96 : B : Rotary harrowed, Hereward, dressed Sibutol, drilled at 375 seeds per m^2.
12-Dec-96 : B : Javelin Gold at 5.0 l in 200 l.
07-Mar-97 : B : 34.5% N at 116 kg.
11-Mar-97 : B : Vytel Manganese at 3.0 l with Vassgro Non-ionic at 30 ml in 200 l.
12-Mar-97 : B : Stefes Tiger 90 at 15 kg.
15-Apr-97 : B : 34.5% N at 348 kg.
23-May-97 : B : Standon Fluroxypyr at 0.75 l with Halo at 2.0 l in 300 l.
16-Aug-97 : B : Combine harvested.

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97/W/CS/446

NOTES: (1) Stefes Tiger 90 is a sulphur fertilizer.
(2) Plant samples were taken in April and July to assess root and stem base diseases.

GRAIN TONNES/HECTARE

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

PLOUGH / COV CROP	(PE)	(PL)	Mean
(R)	6.25	4.92	5.59
(RW)	5.39	6.38	5.89
(RI)	6.93	5.93	6.43
(RWI)	7.40	7.72	7.56
(M)	7.87	6.03	6.95
(MW1)	7.42	7.31	7.37
(MW2)	7.74	6.41	7.08
(MW3)	7.36	6.17	6.76
(MW4)	5.43	4.06	4.74
(MW5)	5.22	4.51	4.86
Mean	6.70	5.94	6.32

*** Standard errors of differences of means ***

COV CROP	PLOUGH	COV CROP PLOUGH
0.621	0.278	0.878

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	57	1.241	19.6

GRAIN MEAN DM% 89.3

PLOT AREA HARVESTED 0.00478

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97/R/CS/457

SET-ASIDE, CULTIVATIONS AND CROPS

Object: To measure the establishment, growth and yield of w. wheat and w. rape following a range of cultivations and herbicide applications after natural regeneration set-aside. To assess soil nitrogen and weeds in the two crops and diseases in the wheat - Scout.

Sponsors: J.F. Jenkyn and R.G. Gutteridge.

The second year, w. wheat and w. rape.

Design: 3 randomised blocks of 5 x 2 split into 2 sub-plots.

Whole plot dimensions: 12.0 x 26.0.
Sub-plot dimensions: 10.0 x 12.0.

Treatments: All combinations of:-

1. **SETDESTR** Method and time of destruction of set-aside in 1996:

(PG)	Ploughed in May, glyphosate pre-drilling
(PC)	Ploughed in May, cultivated in June and July
(MP)	Minimally cultivated in May, ploughed in August
(HP)	Herbicide in May, ploughed in August
(-P)	Ploughed in August

2. **CROP** Crop in 1997

R	Winter rape
W	Winter wheat

Sub-plots

3. **NITROGEN** Fertilizer nitrogen in 1997 (kg N):

-	None
N	160

Experimental diary:

14-May-96 : **T** : **SETDESTR** (PG), (PC), (MP), (P): Topped.
15-May-96 : **T** : **SETDESTR** (MP): Heavy spring-tine cultivated to 10 cm.
: **T** : **SETDESTR** (PG), (PC): Ploughed.
30-May-96 : **T** : **SETDESTR** (MP): Roundup at 1.5 l with Vassgro Non-ionic at 200 ml in 200 l.
27-Jun-96 : **T** : **SETDESTR** (PC): Heavy spring-tine cultivated.
01-Jul-96 : **T** : **SETDESTR** (MP), (P): Topped.
23-Jul-96 : B : Chalk at 5.0 t.
25-Jul-96 : B : PK as (0:20:32) at 1384 kg.
30-Jul-96 : **T** : **SETDESTR** (PC): Heavy spring-tine cultivated.
: **T** : **SETDESTR** (MP), (HP), (-P): Topped, ploughed.
15-Aug-96 : **T** : **SETDESTR** (PG): Roundup at 3.0 l in with Vassgro Non-ionic at 150 ml in 392 l.
28-Aug-96 : B : Heavy spring-tine cultivated.

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97/R/CS/457

Experimental diary:

28-Aug-96 : **T** : **CROP** R: Rotary harrowed, Apex, dressed Vitavax RS, drilled at 120 seeds per m^2.
03-Oct-96 : **T** : **CROP** W: Rotary harrowed, Genesis, dressed Sibutol, drilled at 380 seeds per m^2.
10-Oct-96 : **T** : **CROP** R: Butisan S at 1.5 l in 200 l.
28-Jan-97 : **T** : **CROP** W: Panther at 2.0 l in 200 l.
28-Feb-97 : **T** : **CROP** R, **NITROGEN** N: 34.5% N at 175 kg.
10-Mar-97 : **T** : **CROP** W, **NITROGEN** N: 34.5% N at 118 kg.
18-Mar-97 : **T** : **CROP** R, **NITROGEN** N: 34.5% N at 289 kg.
04-Apr-97 : **T** : **CROP** W, **NITROGEN** N: 34.5% N at 347 kg.
04-Jun-97 : **T** : **CROP** W: Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
16-Jul-97 : **T** : **CROP** R: Reglone 360 at 3.0 l with Vassgro Non-ionic at 392 ml in 400 l.
23-Jul-97 : **T** : **CROP** R: Combine harvested and straw chopped.
11-Aug-97 : **T** : **CROP** W: Combine harvested and straw chopped.

Previous crops: Linseed 1994, w. wheat 1995.

NOTE: Wheat plants were sampled in April and July to assess root and stem bases diseases.

GRAIN TONNES/HECTARE

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

CROP	R	W	Mean
SETDESTR			
(PG)	3.49	5.88	4.68
(PC)	3.18	7.19	5.18
(MP)	2.76	5.84	4.30
(HP)	2.93	5.76	4.35
(-P)	2.35	5.03	3.69
Mean	2.94	5.94	4.44

NITROGEN	-	N	Mean
SETDESTR			
(PG)	3.47	5.90	4.68
(PC)	3.84	6.53	5.18
(MP)	2.77	5.83	4.30
(HP)	3.29	5.40	4.35
(-P)	2.13	5.25	3.69
Mean	3.10	5.78	4.44

NITROGEN	-	N	Mean
CROP			
R	2.05	3.83	2.94
W	4.14	7.74	5.94
Mean	3.10	5.78	4.44

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97/R/CS/457

GRAIN TONNES/HECTARE

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

CROP	R		W	
SETDESTR NITROGEN	-	N	-	N
(PG)	2.79	4.19	4.14	7.61
(PC)	2.14	4.22	5.54	8.84
(MP)	1.72	3.80	3.82	7.87
(HP)	2.17	3.70	4.41	7.11
(-P)	1.46	3.24	2.81	7.25

*** Standard errors of differences of means ***

SETDESTR	CROP	NITROGEN	SETDESTR CROP
0.359	0.227	0.145	0.508

SETDESTR NITROGEN	CROP NITROGEN	SETDESTR CROP NITROGEN
0.426	0.269	0.602

Except when comparing means with the same level(s) of

SETDESTR	0.324		
CROP		0.205	
SETDESTR.CROP			0.458

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.622	14.0
BLOCK.WP.SP	20	0.561	12.6

GRAIN MEAN DM% 91.9

SUB-PLOT AREA HARVESTED 0.00240

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97/R/CS/472

CEREALS AND SEED TREATMENTS

Object: To test seed treatment fungicides on root and stem base diseases of winter wheat and barley - Highfield IV/Road Piece East.

Sponsors: W.A.J.M. Dawson, G.L. Bateman, J.F. Jenkyn.

The first year, w. wheat and w. barley.

Design: 4 randomised blocks of 8 x 2.

Plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **FUNGCIDE** Seed dressing:

-	None (duplicated)
E	CR21528
B	CR21529

2. **CROP**

WW	Winter wheat
BW	Winter barley

NOTE: Fungicides CR21528 and CR21529 are under commercial development, composition undisclosed.

Experimental diary:

27-Aug-96 : B : PK as (0:20:32) at 1400 kg.
24-Sep-96 : B : Stefes Glyphosate at 4.0 l in 200 l, weeds spot treated.
05-Oct-96 : B : Ploughed and furrow pressed.
14-Oct-96 : **T** : **CROP** BW: Rotary harrowed, Pipkin, dressed as treatment, drilled at 350 seeds per m^2.
: **T** : **CROP** WW: Rotary harrowed, Brigadier, dressed as treatment, drilled at 380 seeds per m^2.
28-Nov-96 : B : Auger at 2.6 l with Stomp 400 SC at 3.1 l in 200 l.
07-Mar-97 : B : 34.5% N at 118 kg.
03-Apr-97 : **T** : **CROP** BW: 34.5% N at 400 kg.
: **T** : **CROP** WW: 34.5% N at 463 kg.
09-Jun-97 : B : Mallard 750 EC at 1.0 l in 300 l.
22-Jul-97 : **T** : **CROP** BW: Combine harvested.
13-Aug-97 : **T** : **CROP** WW: Combine harvested.

Previous crops: W. and s. rape 1995, w. wheat 1996.

NOTE: Plant samples were taken in January, May and June to isolate and identify rhizosphere and stem base fungi, and in late June to assess take-all and stem base diseases.

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97/R/CS/472

GRAIN TONNES/HECTARE

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

CROP / FUNGCIDE	WW	BW	Mean
-	7.66	7.08	7.37
E	8.79	7.05	7.92
B	8.78	6.95	7.86
Mean	8.22	7.04	7.63

*** Standard errors of differences of means ***

FUNGCIDE	CROP	FUNGCIDE CROP	
0.244		0.345	min.rep
0.211	0.172	0.299	max-min
		0.244	max.rep

FUNGCIDE
min.rep - only
max-min - v any of the remainder
max.rep Any of the remainder

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	55	0.689	9.0

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00239

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97/W/CS/474

EFFICIENCY OF S FERTILIZERS

Object: To measure the effect of different forms of sulphur on the yield of winter wheat and the following oilseed rape crop - Woburn, Lansome III.

Sponsors: F.J. Zhao, S.P. McGrath.

The first year, w. wheat.

Design: 4 randomised blocks of 4 x 2 + 1.

Plot dimensions: 8.0 x 12.0.

Treatments: All combinations of:-

1. **FORM** Form of sulphur to provide 30 kg S:

T+A	50% Stefes Tiger 90 and 50% ammonium sulphate
AS	Ammonium sulphate
T90	Stefes Tiger 90
NAS	Sodium thiosulphonate

2. **TIMING**

SB	To seedbed, pre-sowing
MAR	In March

EXTRA

-	None

NOTE: The nitrogen was balanced on all plots to match that supplied by the ammonium sulphate treatment, this was 26.25 kg N to the seedbed and a spring dressing to provide a total of 180 kg N.

Experimental diary:

23-Sep-96 : B : Ploughed.
24-Sep-96 : B : Rolled.
07-Oct-96 : **T** : All plots except **FORM** AS, **TIMING** SB: Balancing nitrogen applied as 27.5% N.
08-Oct-96 : **T** : **FORM** T+A, AS, T90, NAS, **TIMING** SB: Seedbed sulphur treatments applied.
: B : Rotary harrowed, Riband, dressed Sibutol, drilled at 325 seeds per m^2.
11-Dec-96 : B : Stomp 400 SC at 2.5 l with Isoproturon 500 at 1.0 l in 200 l.
12-Mar-97 : **T** : **FORM** T+A, AS, T90, NAS, **TIMING** MAR: Sulphur treatments applied.
14-Mar-97 : **T** : All plots: Balanced spring nitrogen applied as 27.5% N.
23-May-97 : B : Halo at 2.0 l in 300 l.
14-Aug-97 : B : Combine harvested.

Previous crops: W. Barley and potatoes 1995, s. rape 1996.

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97/W/CS/474

GRAIN TONNES/HECTARE

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

TIMING / FORM	SB	MAR	Mean
T+A	6.19	7.05	6.62
AS	6.62	7.19	6.90
T90	8.10	6.30	7.20
NAS	6.56	6.55	6.56
Mean	6.87	6.77	6.82

EXTRA	7.27
Grand mean	6.87

*** Standard errors of differences of means ***

FORM	TIMING	FORM TIMING & EXTRA
0.845	0.597	1.195

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	24	1.690	24.6

GRAIN MEAN DM% 87.6

PLOT AREA HARVESTED 0.00220

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97/R/CS/476

FUNGICIDE SEQUENCES AND TAKE-ALL

Object: To determine the effects of fungicidal seed treatments on take-all (*Gaeumannomyces graminis*) development in w.wheat - Long Hoos IV 4.

Sponsors: G.L. Bateman, J.F. Jenkyn.

The first year, w. wheat.

Design: 4 randomised blocks of 2 x 2 x 2.

Plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **FUNG97** Fungicidal seed dressing to the 1997 crop:

   F97 Seed dressed
   -97 None

2. **FUNG98** Fungicidal seed dressing to the 1998 crop:

   F98 Seed dressed
   -98 None

3. **FUNG99** Fungicidal seed dressing to the 1999 crop:

   F99 Seed dressed
   -99 None

NOTE: The seed dressing is under commercial development, composition undisclosed.

Experimental diary:

17-Oct-96 : B : Spring-tine cultivated, rotary harrowed, Brigadier, dressed as treatment, drilled at 380 seeds per m^2.
28-Jan-97 : B : Panther at 2.0 l in 200 l.
11-Mar-97 : B : 34.5% N at 118 kg.
14-Apr-97 : B : 34.5% N at 463 kg.
16-Apr-97 : B : Deloxil at 1.5 l with Dow Shield at 0.35 l in 200 l.
30-May-97 : B : Folicur at 0.5 l in 300 l.
19-Aug-97 : B : Combine harvested.

Previous crops: S. wheat 1995, linseed 1996.

NOTE: Plant samples were taken in April to assess take-all on the roots and in July to assess root and stem base diseases. Soil samples were taken after harvest and used in bioassays to measure take-all infectivity.

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97/R/CS/476

GRAIN TONNES/HECTARE

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

	FUNG97
F97	10.31
-97	10.02
Mean	10.17

*** Standard errors of differences of means ***

FUNG97
0.225

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.637	6.3

GRAIN MEAN DM% 90.0

PLOT AREA HARVESTED 0.00240

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97/R/CS/477

CONTINUOUS MAIZE

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

Sponsors: P.R. Poulton, J. Gaunt.

The first year, maize and s. barley.

Design: 3 randomised blocks of 6 plots.

Plot dimensions: 12.0 x 25.0.

Treatments:-

CROP	Crop and straw treatments:
BM	Spring barley, straw removed then maize after three years
BTM	Continuous spring barley, straw removed plus 10 t maize tops incorporated, then s. barley after five years
B	Continuous spring barley, straw removed
M	Continuous maize, stubble incorporated
MB	Maize, stubble incorporated then s. barley after five years
MTB	Maize, stubble plus 10 t maize tops incorporated, then s. barley after five years

Experimental diary:

17-Dec-96 : B : Ploughed.
12-Mar-97 : B : Spring-tine cultivated.
13-Mar-97 : **T** : **CROP** BM, BTM, B: Rotary harrowed, Cooper, dressed Raxil S, drilled at 350 seeds per m^2.
22-Apr-97 : B : 34.5% N at 290 kg.
23-Apr-97 : **T** : **CROP** M, MB, MTB: Rotary harrowed, Hudson, dressed Mesurol, drilled at 11 seeds per m^2.
09-Jun-97 : **T** : **CROP** M, MB, MTB: Barclay Mutiny at 1.5 l in 300 l.
24-Jul-97 : B : Hand rogued wild oats.
21-Aug-97 : **T** : **CROP** BM, BTM, B: Combine harvested.
17-Sep-97 : **T** : **CROP** M, MB, MTB: Hand harvested.

Previous crops: Linseed 1995 and 1996.

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

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97/R/CS/477 MAIZE

WHOLE CROP YIELD TONNES/HECTARE

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

CROP	
M	9.25
MB	10.71
MTB	9.18
Mean	9.71

*** Standard errors of differences of means ***

CROP
0.802

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.983	10.1

CROP MEAN DM% 29.7

PLOT AREA HARVESTED 0.00108

BARLEY

GRAIN TONNES/HECTARE

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

CROP	
BM	6.56
BTM	6.46
B	6.34
Mean	6.45

*** Standard errors of differences of means ***

CROP
0.263

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.323	5.0

GRAIN MEAN DM% 87.5 PLOT AREA HARVESTED 0.00600

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97/W/CS/478

CONTINUOUS MAIZE

Object: To monitor the fate of organic carbon in the soil organic matter - Woburn, Stackyard A I.

Sponsors: P.R. Poulton, J. Gaunt.

The first year, maize and s. barley.

Design: 3 randomised blocks of 6 plots.

Plot dimensions: 9.0 x 25.0.

Treatments:

CROP	Crop and straw treatments:
BM	Spring barley, straw removed then maize after three years
BTM	Continuous spring barley plus 10 t maize tops incorporated, then s. barley after five years
B	Continuous spring barley, straw removed
M	Continuous maize, stubble incorporated
MB	Maize, stubble incorporated then s. barley after five years
MTB	Maize, stubble plus 10 t maize tops incorporated, then s. barley after five years

Experimental diary:

28-Jan-97 : B : Scythe LC at 3.0 l in 200 l.
14-Mar-97 : B : Ploughed.
17-Mar-97 : B : PK as (0:24:24) at 145 kg, muriate of potash at 91.6 kg and gypsum (17.5% S) at 171 kg.
18-Mar-97 : B : Rotary harrowed.
18-Mar-97 : **T** : **CROP** BM, BTM, B: Cooper, dressed Raxil S, drilled at 375 seeds per m^2.
08-Apr-97 : **T** : **CROP** BM, BTM, B: Scythe LC at 3.0 l in 300 l.
09-Apr-97 : **T** : **CROP** BM, BTM, B: Rotary harrowed, Cooper, dressed Raxil S, re-drilled at 420 seeds per m^2.
01-May-97 : **T** : **CROP** M, MB, MTB: Rotary harrowed, Hudson, dressed Mesurol, drilled at 11.5 seeds per m^2.
13-May-97 : B : 34.5% N at 278 kg.
29-May-97 : **T** : **CROP** BM, BTM, B: MSS Optica at 2.0 l with Vindex at 1.0 l in 200 l.
17-Jun-97 : **T** : **CROP** M, MB, MTB: Mutiny at 2.4 l in 300 l.
24-Jun-97 : **T** : **CROP** BM, BTM, B: Dorin at 1.0 l in 300 l.
20-Aug-97 : **T** : **CROP** BM, BTM, B: Combine harvested.
01-Sep-97 : **T** : **CROP** BM, BTM, B: Straw removed.
16-Sep-97 : **T** : **CROP** M, MB, MTB: Hand harvested.
29-Sep-97 : **T** : **CROP** MTB, BTM: Spread chopped maize at 10 t.

Previous crops: Lupins 1995, w. wheat 1996.

NOTE: Samples of whole crop maize and barley grain were taken for chemical analysis.

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97/W/CS/478 MAIZE

WHOLE CROP YIELD TONNES/HECTARE

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

CROP	
M	9.16
MB	10.04
MTB	11.15
Mean	10.12

*** Standard errors of differences of means ***

CROP
0.457

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.560	5.5

CROP MEAN DM% 41.8

PLOT AREA HARVESTED 0.00108

BARLEY

GRAIN TONNES/HECTARE

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

CROP	
BM	4.32
BTM	4.75
B	4.38
Mean	4.49

*** Standard errors of differences of means ***

CROP
0.089

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.109	2.4

GRAIN MEAN DM% 89.9 PLOT AREA HARVESTED 0.00550

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97/R/CS/483

SEVERE TAKE-ALL IN WHEAT

Object: To create severe take-all (*Gaeumannomyces graminis*) in winter wheat by applying inoculum artificially to a preceding spring wheat - Summerdells I.

Sponsors: G.L. Bateman, R.J. Gutteridge.

Design: 4 randomised blocks of 14 plots.

Plot dimensions: 3.0 x 10.0.

Treatments:-

INOCULTN	Inoculum:
-	None
TA	Take-all inoculum on sterile oat grain

NOTE: Each treatment appears seven times in each block.

Experimental diary:

08-Jul-96	B	Deep tine cultivated with vibrating tines 60 cm apart and 45 cm deep.
10-Jul-96	B	Rolled.
25-Oct-96	B	Ploughed.
11-Mar-97	B	Rotary harrowed, spring-tine cultivated twice.
	T	**INOCULTN** TA: Inoculated oat grain broadcast.
12-Mar-97	B	Rotary harrowed, Chablis, undressed, drilled at 400 seeds per m^2.
14-Mar-97	B	Rolled.
12-May-97	B	34.5% N at 370 kg.
22-May-97	B	Campbell's CMPP at 2.1 l with Vindex at 1.0 l in 300 l.
05-Sep-97	B	Combine harvested.

Previous crops: W. and S. rape 1995, set-aside 1996.

NOTE: Take-all patches were assessed in July.

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97/R/CS/483

GRAIN TONNES/HECTARE

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

INOCULTN	
-	7.29
TA	6.26
Mean	6.77

*** Standard errors of differences of means ***

INOCULTN
0.142

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	51	0.529	7.8

GRAIN MEAN DM% 84.5

PLOT AREA HARVESTED 0.00240

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97/R/WW/1

WINTER WHEAT

PREDICTION OF WEED COMPETITION

Object: To predict the yield response of winter wheat to competition from three contrasting weed species - Great Harpenden I.

Sponsors: J.W. Cussans, P.J.W. Lutman.

Design: 3 randomised blocks of 3 x 6 plots.

Whole plot dimensions: 3.0 x 8.0.

Treatments: All combinations of:-

1. **WEED SP** Weed species:

SM	*Stellaria media* (chickweed)
AM	*Alopecurus myosuroides* (black-grass)
GA	*Galium aparine* (cleavers)

2. **WEED DEN** Average weed density, plants per m^2:

	SM	AM	GA
0	0	0	0
2	62.7	93.8	8.3
4	124.2	126.9	13.7
8	245.6	175.7	28.0
16	500.6	447.2	53.8
32	737.2	666.4	99.0

NOTE: Target weed densities, plants per m^2: SM, AM: 0, 40, 80, 160, 320 and 640, GA: 0, 3, 6, 12, 24 and 48 respectively.

Experimental diary:

28-Aug-96 : B : PK as (0:20:32) at 1400 kg.
23-Sep-96 : B : Roundup at 1.5 l with Vassgro Non-ionic at 0.5 l in 200 l.
02-Oct-96 : B : Ploughed and furrow pressed.
08-Oct-96 : B : Harrowed.
: **T** : Weeds broadcast.
: B : Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
16-Dec-96 : **T** : **WEED SP** AM, **WEED SP** SM **WEED DEN** 0, **WEED SP** GA **WEED DEN** 0: Starane 2 at 1.0 l in 200 l.
24-Jan-97 : **T** : **WEED SP** SM, **WEED SP** GA, **WEED SP** AM **WEED DEN** 0: Topik 240 EC at 0.25 l in 220 l.
11-Mar-97 : B : 34.5% N at 118 kg.
14-Apr-97 : B : 34.5% N at 463 kg. Clayton Turret at 1.5 l in 200 l.
16-Jun-97 : B : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
13-Aug-97 : B : Hand harvested.

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97/R/WW/1

NOTE: Weed and crop densities were assessed at emergence, in autumn and in spring. Biomass of crop and weeds was assessed on five occasions. Nitrogen content of grain and straw was measured.

GRAIN TONNES/HECTARE

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

WEED DEN / WEED SP	0	2	4	8	16	32	Mean
SM	6.69	7.15	6.92	6.48	6.17	5.85	6.54
AM	7.74	6.60	5.35	5.62	4.73	3.46	5.58
GA	7.72	6.50	6.33	5.94	5.31	4.46	6.04
Mean	7.38	6.75	6.20	6.02	5.40	4.59	6.06

*** Standard errors of differences of means ***

WEED SP	WEED DEN	WEED SP WEED DEN
0.177	0.251	0.435

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	32	0.532	8.8

GRAIN MEAN DM% 89.4

PLOT AREA HARVESTED 0.00020

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97/W/WW/1

WINTER WHEAT

SULPHUR, VARIETY AND QUALITY

Object: To measure yield and quality response to sulphur fertilizer on three varieties of wheat - Woburn, Butt Close.

Sponsors: S.P. McGrath, F. Zhao.

Design: 3 randomised blocks of 3 x 2 x 3 plots

Plot dimensions: 3.0 x 12.0.

Treatments: All combinations of:-

1. **VARIETY**

H	Hereward dressed Sibutol
S	Spark dressed Sibutol
R	Rialto dressed Panoctine

2. **NITROGEN** Nitrogen fertilizer (kg N) as 27.5% N:

N1	180
N2	230

3. **SULPHUR** Sulphur fertilizer (kg S) as gypsum (17.5% S):

S-	None
S1	20
S2	100

Experimental diary:

01-Oct-96 : B : Ploughed.
02-Oct-96 : B : Rolled. Rotary harrowed.
03-Oct-96 : **T** : **VARIETY** H, S, R: Varieties drilled at 350 seeds per m^2.
06-Dec-96 : B : Panther at 2.0 l in 200 l.
20-Mar-97 : **T** : **SULPHUR** S1, S2: Gypsum applied at 114 and 571 kg respectively.
20-Mar-97 : B : 27.5% N at 145 kg.
03-Apr-97 : **T** : **NITROGEN** N1, N2: 27.5% N applied at 509 and 691 kg respectively.
23-May-97 : B : Standon Fluroxypyr at 0.75 l with Halo at 2.0 l in 300 l.
08-Aug-97 : B : Barclay Gallup at 2.0 l in 300 l.
14-Aug-97 : B : Combine harvested.

Previous crops: Potatoes 1995, s. barley 1996.

NOTE: Plant samples were taken in May and June for measurement of sulphur and nitrogen content. Harvest samples of straw and grain were also analysed for sulphur and nitrogen. Grain samples from selected plots were tested for bread making quality.

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97/W/WW/1

GRAIN TONNES/HECTARE

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

VARIETY / NITROGEN	H	S	R	Mean
N1	3.30	5.15	3.89	4.12
N2	3.94	4.09	4.29	4.11
Mean	3.62	4.62	4.09	4.11

SULPHUR / NITROGEN	S-	S1	S2	Mean
N1	4.21	3.99	4.15	4.12
N2	3.27	4.29	4.77	4.11
Mean	3.74	4.14	4.46	4.11

SULPHUR / VARIETY	S-	S1	S2	Mean
H	3.34	3.66	3.86	3.62
S	4.20	5.18	4.49	4.62
R	3.67	3.58	5.03	4.09
Mean	3.74	4.14	4.46	4.11

NITROGEN	SULPHUR / VARIETY	S-	S1	S2
N1	H	3.46	3.17	3.28
	S	5.24	5.03	5.18
	R	3.92	3.76	3.99
N2	H	3.23	4.14	4.44
	S	3.16	5.32	3.79
	R	3.41	3.40	6.07

*** Standard errors of differences of means ***

VARIETY	NITROGEN	SULPHUR	VARIETY NITROGEN
0.383	0.313	0.383	0.542

VARIETY SULPHUR	NITROGEN SULPHUR	VARIETY NITROGEN SULPHUR
0.664	0.542	0.939

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	34	1.150	28.0

GRAIN MEAN DM% 87.9 PLOT AREA HARVESTED 0.00220

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97/R/WW/2

WINTER WHEAT

WEED GROWTH AND DEVELOPMENT

Object: To study the growth and seed production of weeds in the presence and absence of a wheat crop with irrigation to avoid water stress - Great Harpenden I.

Sponsors: J.W. Cussans, P.J.W. Lutman.

Design: 4 randomised blocks of 7 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments:

CRP WEED	Crop and/or weed species:
WW	W. wheat
WCH	W. wheat and chickweed (*Stellaria media*)
WBG	W. wheat and black-grass (*Alopecurus myosuroides*)
WCL	W. wheat and cleavers (*Galium aparine*)
CH	Chickweed
BG	Black-grass
CL	Cleavers

Experimental diary:

28-Aug-96 : B : PK as (0:20:32) at 1400 kg.
23-Sep-96 : B : Roundup at 1.5 l with Vassgro Non-ionic at 0.5 l in 200 l.
02-Oct-96 : B : Ploughed and furrow pressed.
08-Oct-96 : **T** : All plots except WW: Weeds broadcast.
: B : Harrowed.
08-Oct-96 : **T** : **CRP WEED** WW, WCH, WBG, WCL: Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
16-Dec-96 : **T** : **CRP WEED** WW, WBG, BG: Starane 2 at 1.0 l in 220 l.
24-Jan-97 : **T** : **CRP WEED** WW, WCH, WCL, CH, CL: Topik 240 EC at 0.25 l in 220 l.
11-Mar-97 : B : 34.5% N at 118 kg.
14-Apr-97 : B : 34.5% N at 463 kg. Clayton Turret at 1.5 l in 200 l.
25-Apr-97 : B : Irrigated 25 mm.
13-May-97 : B : Irrigated 30 mm.
04-Jun-97 : B : Irrigated 25 mm.
16-Jun-97 : B : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
12-Aug-97 : B : Hand harvested.

Previous crops: S. wheat 1995, s. barley 1996.

NOTE: Weed and crop densities were assessed at emergence, in autumn and in spring. Biomass of crop and weeds was assessed on five occasions. Nitrogen content of grain and straw was measured.

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97/R/WW/2

GRAIN TONNES/HECTARE

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

CRP	WEED	
	WW	6.76
	WCH	6.31
	WBG	4.89
	WCL	3.26
	Mean	5.31

*** Standard errors of differences of means ***

CRP	WEED
	0.451

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.638	12.0

GRAIN MEAN DM% 87.8

PLOT AREA HARVESTED 0.00020

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97/R/WW/3

WINTER WHEAT

PLANT N INDICATORS

Object: To relate chlorophyll concentrations in individual leaves of two varieties of w. wheat to nitrogen supply and crop yield - Fosters.

Sponsors: P.B. Barraclough.

Design: 3 randomised blocks of 14 plots.

Whole plot dimensions: 3.0 x 20.0.

Treatments:

1. **N** Nitrogen (kg N):

-
50
100
150
200
250
300

2. **VARIETY**

H	Hereward dressed Beret Gold
R	Riband dressed Sibutol

Experimental diary:

04-Sep-96	B	Ploughed and furrow pressed.
26-Sep-96	B	Rolled, spring-tine cultivated.
	T	Rotary harrowed, varieties drilled at 380 seeds per m^2.
27-Sep-96	B	Rolled.
01-Oct-96	B	Stefes Tiger 90 at 40 kg.
27-Nov-96	B	Stefes IPU at 2.6 l with Stomp 400 SC at 3.1 l and Cyperkill 10 at 250 ml in 200 l.
11-Mar-97	**T**	**N** 50, 100, 150, 200, 250, 300: 34.5% N at 118 kg.
10-Apr-97	**T**	**N** 50, 100, 150, 200, 250, 300: 34.5% N at 27, 172, 317, 462, 607 and 752 kg respectively.
18-Apr-97	B	Starane 2 at 0.75 l with Barclay Holdup at 2.3 l in 300 l.
30-May-97	B	Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
18-Aug-97	B	Combine harvested.

Previous crops: Set-aside 1995, w. rape 1996.

NOTES: (1) Stefes Tiger 90 is a sulphur fertilizer.
(2) Plants were sampled periodically for growth and chemical analysis. Chlorophyll was measured in the field with an experimental meter. Grain and straw was analysed for nitrogen content.

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97/R/WW/3

GRAIN TONNES/HECTARE

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

VARIETY N	H	R	Mean
-	4.73	4.95	4.84
50	6.34	7.03	6.68
100	7.87	8.40	8.14
150	9.24	9.87	9.55
200	9.36	10.18	9.77
250	10.04	10.57	10.30
300	9.70	10.68	10.19
Mean	8.18	8.81	8.50

*** Standard errors of differences of means ***

N	VARIETY	N VARIETY
0.204	0.109	0.289

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	26	0.354	4.2

GRAIN MEAN DM% 85.7

PLOT AREA HARVESTED 0.00360

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97/W/WW/3

WINTER WHEAT

FUNGICIDES AND TAKE-ALL

Object: To test fungicides to control take-all (*Gaeumannomyces graminis*) - Woburn, Stackyard C.

Sponsors: G.L. Bateman, R.J. Gutteridge.

Design: 4 randomised blocks of 6 x 2 plots.

Plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **SEED TRT** Seed Treatment:

-	None
F1R1	Fungicide 1 rate 1
F1R2	Fungicide 1 rate 2
F2R1	Fungicide 2 rate 1
F2R2	Fungicide 2 rate 1
B	Fuberidazole and triadimenol (Baytan Flowable)

2. **SPORTAK** Eyespot control

O	None
S	Prochloraz (Sportak 45)

NOTE: Fungicide 1 and 2 are under commercial development, composition undisclosed.

Experimental diary:

30-Sep-96 : B : Ploughed.
16-Oct-96 : B : Rotary harrowed, Brigadier, dressed as treatment, drilled at 400 seeds per m^2.
06-Dec-96 : B : Panther at 2.0 l in 200 l.
21-Mar-97 : B : 27.5% N at 145 kg.
14-Apr-97 : **T** : **SPORTAK** S: Sportak 45 at 0.9 l in 200 l.
15-Apr-97 : B : 34.5% N at 348 kg.
16-May-97 : B : Halo at 2.0 l in 300 l.
04-Jun-97 : B : Alto 100 SL at 0.8 l with Mistral at 1.0 l in 300 l.
17-Aug-97 : B : Combine harvested.

Previous crops: W.wheat 1995 and 1996.

NOTE: In April plant populations were estimated, shoot dry weight measured and take-all assessed. In June take-all and stem base diseases were measured.

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97/W/WW/3

GRAIN TONNES/HECTARE

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

SPORTAK	O	S	Mean
SEED TRT			
-	3.58	3.94	3.76
F1R1	4.09	4.50	4.30
F1R2	4.24	5.53	4.89
F2R1	4.96	4.23	4.59
F2R2	4.65	5.03	4.84
B	3.54	3.86	3.70
Mean	4.18	4.51	4.35

*** Standard errors of differences of means ***

SEED TRT	SPORTAK	SEED TRT SPORTAK
0.580	0.335	0.821

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	1.161	26.7

GRAIN MEAN DM% 89.5

PLOT AREA HARVESTED 0.00236

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97/R/WW/5

WINTER WHEAT

SEMIOCHEMICALS AND APHIDS

Object: To test semiochemicals on cereal aphids in autumn and spring migratory periods - Great Harpenden I.

Sponsors: L.E. Smart, B.J. Pye, L.J. Wadhams.

Design: 5 x 5 quasi-complete Latin square.

Whole plot dimensions: 6.0 x 6.0.

Treatments:

SEMIOCHM	Semiochemicals:
-	None
A	Polygodial applied by electrostatic sprayer
B	Methylsalicylate
C	Neptalactone
D	Methylsalicylate and neptalactone

SEMIOCHM B, C and D were released from point sources at the plot centres from 24-Oct-96.

Experimental diary:

28-Aug-96 : B : PK as (0:20:32) at 1400 kg.
23-Sep-96 : B : Roundup at 1.5 l with Vassgro Non-ionic at 0.5 l in 200 l.
01-Oct-96 : B : Ploughed and furrow pressed.
08-Oct-96 : B : Spring-tine cultivated. Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
14-Nov-96 : **T** : **SEMIOCHM** A: Polygodial at 50 g a.i. in 10.4 l.
05-Dec-96 : B : Isoproturon 500 at 2.6 l with Stomp 400 SC at 3.1 l in 200 l.
11-Mar-97 : B : 34.5% N at 118 kg.
11-Apr-97 : B : 34.5% N at 464 kg. Clayton Turret at 1.5 l with Barclay Holdup at 2.3 l in 300 l.
09-Jun-97 : **T** : **SEMIOCHM** A: Polygodial at 50 g a.i. in 10.4 l.
16-Jun-97 : B : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
17-Jun-97 : **T** : **SEMIOCHM** A: Polygodial at 50 g a.i. in 10.4 l.
12-Aug-97 : B : Combine harvested.

Previous crops: S. wheat 1995 and 1996.

NOTES: Aphid populations were assessed frequently in November and May to July.

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97/R/WW/5

GRAIN TONNES/HECTARE

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

SEMIOCHM

-	8.23
A	8.35
B	8.37
C	8.12
D	8.18
Mean	8.25

*** Standard errors of differences of means ***

SEMIOCHM
0.146

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.231	2.8

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00144

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97/R/WW/6

WINTER WHEAT

HERBICIDE RESISTANT BLACK-GRASS

Object: To evaluate the efficacy of different herbicides on a herbicide-resistant black-grass (*Alopecurus myosuroides*) population and to determine any changes in the degree of resistance in the progeny of surviving plants - Claycroft.

Sponsor: S.R. Moss.

Design: 2 blocks of 15 plots duplicated.

Whole plot dimensions: 3.0 x 12.0.

Treatments:

HERBCIDE	Herbicide type, rate of active ingredient and timing (black-grass growth stage):
A	Isoproturon 500 at 2.5 kg post emergence
B	Isoproturon 500 at 1.5 kg post emergence
C	Tri-allate at 2.25 kg pre-emergence and isoproturon at 1.5 kg at two leaf stage
D	Trifluralin at 0.96 kg pre-emergence and isoproturon at 1.5 kg at two leaf stage
E	Trifluralin at 0.96 kg at two leaf stage and isoproturon at 1.5 kg at two leaf stage
F	Pendimethalin at 1.32 kg at two leaf stage and isoproturon at 1.5 kg at two leaf stage
G	Trifluralin at 0.96 kg at one leaf stage and isoproturon at 1.5 kg at two leaf stage
H	Clodinafop-propargyl at 0.5 kg with trifluralin at 1.2 kg at two leaf stage
J	Fenoxaprop-P-ethyl at 0.069 kg at two leaf stage
K	Clodinafop-propargyl at 0.03 kg with adjuvant at two leaf stage
L	JV485 pre-emergence
M	Agent X at two leaf stage
N	JV485 pre-emergence and Agent X at two leaf stage
O	None
P	None

NOTE: Herbicides JV485 and Agent X are under commercial development, composition undisclosed

Experimental diary:

15-Sep-96 : B : Roundup at 1.5 l with Vassgro Non-ionic at 300 ml in 200 l.
23-Sep-96 : B : Harrowed.
25-Sep-96 : B : Ploughed and furrow pressed.
30-Sep-96 : B : Harrowed.
17-Oct-96 : B : Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.

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97/R/WW/6

Experimental diary:

17-Oct-96 : B : Scythe LC at 2.0 l with Vassgro Non-ionic at 100 ml in 200 l.
22-Oct-96 : T : **HERBCIDE** C: Avadex BW Granular at 22.5 kg.
: T : **HERBCIDE** L, N: JV485 at 0.35 l in 220 l.
: T : **HERBCIDE** D: MTM Trifluralin at 2.0 l in 220 l.
23-Oct-96 : B : Draza at 5.5 kg.
08-Nov-96 : T : **HERBCIDE** G: MTM Trifluralin at 2.0 l in 220 l.
03-Mar-97 : T : **HERBCIDE** J: Cheetah Super at 1.25 l in 220 l.
: T : **HERBCIDE** H: Hawk at 2.5 l with Actipron at 1.0 l in 220 l.
: T : **HERBCIDE** B, C, D, E, F, G: MSS Iprofile at 3.0 l in 220 l.
: T : **HERBCIDE** A: MSS Iprofile at 5.0 l in 220 l.
: T : **HERBCIDE** M, N: Agent X at 20 g in 220 l.
: T : **HERBCIDE** F: Stomp 400 SC at 3.3 l in 220 l.
: T : **HERBCIDE** K: Topik at 0.125 l with Actipron at 1.0 l in 220 l.
11-Apr-97 : B : 34.5% N at 568 kg.
04-Jun-97 : B : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
14-Aug-97 : B : Combine harvested.

Previous crops: W. wheat 1995 and 1996.

NOTE: Black-grass plant populations were assessed in December 1996 and heads were counted in June 1997.

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96/R/WW/6

GRAIN TONNES/HECTARE

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

HERBCIDE	
A	5.53
B	5.13
C	6.41
D	6.26
E	5.67
F	5.26
G	5.99
H	6.50
J	4.99
K	6.43
L	6.66
M	5.67
N	6.17
NIL	4.27
Mean	5.68

*** Standard errors of differences of means ***

HERBCIDE	
0.264	min.rep
0.229	max-min

	HERBCIDE
min.rep	Any of the remainder
max-min	NIL v any of the remainder

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	45	0.374	6.6

GRAIN MEAN DM% 86.2

PLOT AREA HARVESTED 0.00230

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97/R/WW/8

WINTER WHEAT

FUNGICIDES AND TAKE-ALL

Object: To test fungicides to control take-all (*Gaeumannomyces graminis*) and eyespot (*Tapesia yallundae*) - Stubbings.

Sponsors: G.L. Bateman, R.J. Gutteridge.

Design: 4 randomised blocks of 6 x 2 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

1.	**SEED TRT**	Seed treatment:
	-	None
	F1R1	Fungicide 1 rate 1
	F1R2	Fungicide 1 rate 2
	F2R1	Fungicide 2 rate 1
	F2R2	Fungicide 2 rate 2
	B	Fuberidazole and triadimenol (Baytan Flowable)
2.	**SPORTAK**	Eyespot control:
	O	None
	S	Prochloraz (Sportak 45)

NOTE: Fungicide 1 and 2 are under commercial development, composition undisclosed.

Experimental diary:

28-Aug-96 : B : PK as (0:20:32) at 1400 kg.
05-Oct-96 : B : Ploughed and furrow pressed.
14-Oct-96 : **T** : Rotary harrowed, Brigadier, dressed as treatment, drilled at 380 seeds per m^2.
28-Nov-96 : B : Auger at 2.5 l with Stomp 400 SC at 3.1 l in 200 l.
10-Mar-97 : B : 34.5% N at 118 kg.
01-Apr-97 : **T** : **SPORTAK** S: Sportak 45 at 0.9 l in 220 l.
07-Apr-97 : B : 34.5% N at 464 kg.
04-Jun-97 : B : Folicur at 0.5 l with Mallard 750 EC at 0.3 l and Pointer at 0.5 l in 300 l.
09-Jun-97 : B : Mistral at 1.0 l in 300 l.
12-Aug-97 : B : Combine harvested.

Previous crops: W. wheat 1995 and 1996.

NOTE: Plant samples were taken in April and July to assess take-all and stem base diseases, Septoria (*Septoria tritici*) was also assessed in July.

https://doi.org/10.23637/ERADOC-1-53 **pp 119**

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97/R/WW/8

GRAIN TONNES/HECTARE

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

SPORTAK SEED TRT	O	S	Mean
-	7.60	8.08	7.84
F1R1	8.63	8.70	8.67
F1R2	8.29	8.34	8.31
F2R1	8.05	7.88	7.97
F2R2	8.28	8.27	8.28
B	7.88	8.02	7.95
Mean	8.12	8.21	8.17

*** Standard errors of differences of means ***

SEED TRT	SPORTAK	SEED TRT SPORTAK
0.174	0.100	0.246

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.347	4.3

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00237

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97/R/WW/10

WINTER WHEAT

STEM BASE DISEASES AND FUNGICIDES

Object: To evaluate sampling methods and molecular diagnostics for assessing risk of stem base diseases and the effects of fungicides - Highfield IV/ Road Piece East.

Sponsors: G.L. Bateman.

Design: 4 randomised blocks of 4 x 5 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **CULTIVAR** Variety:

L	Lynx
B	Brigadier
M	Mercia
S	Soissons

2. **FUNGCIDE** Fungicides:

-	None
PR	Prochloraz
CY	Cyprodinil
ST	Strobilurin
FL	Flusilazole

Experimental diary:

27-Aug-96 : B : PK as (0:20:32) at 1400 kg.
05-Oct-96 : B : Ploughed and furrow pressed.
09-Oct-96 : **T** : **CULTIVAR** L, B, M, S: Lynx, Brigadier and Mercia, undressed, drilled at 380 seeds per m^2, Soissons, undressed, drilled at 400 seeds per m^2.
28-Nov-96 : B : Auger at 2.6 l with Stomp 400 SC at 3.1 l in 200 l.
10-Mar-97 : B : 34.5% N at 118 kg.
03-Apr-97 : B : 34.5% N at 463 kg.
08-Apr-97 : **T** : **FUNGCIDE** ST: Amistar at 1.0 l in 220 l.
: **T** : **FUNGCIDE** CY: Unix at 1.0 kg in 220 l.
: **T** : **FUNGCIDE** FL: Sanction at 0.5 l in 220 l.
: **T** : **FUNGCIDE** PR: Sportak 45 at 0.889 l in 220 l.
30-May-97 : B : Clayton Epoxicon at 1.0 l in 300 l.
09-Jun-97 : B : Mistral at 1.0 l in 300 l.
20-Aug-97 : B : Combine harvested.

Previous crops: W. and s. rape 1995, w. wheat 1996.

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97/R/WW/10

NOTES: (1) Because of a combine error the yield of one plot with **CULTIVAR** M **FUNGCIDE** CY was lost. An estimated value was used in the analysis.
(2) Plant samples were taken in March, April, May and July to assess stem base diseases and extract DNA to identify stem base pathogens.

GRAIN TONNES/HECTARE

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

FUNGCIDE	-	PR	CY	ST	FL	Mean
CULTIVAR						
L	9.83	9.20	9.89	10.29	9.58	9.76
B	8.53	9.11	8.65	10.58	9.35	9.24
M	8.07	7.94	8.37	7.86	7.95	8.04
S	7.97	7.85	8.32	8.53	8.17	8.17
Mean	8.60	8.53	8.81	9.31	8.76	8.80

*** Standard errors of differences of means ***

CULTIVAR	**FUNGCIDE**	**CULTIVAR FUNGCIDE**
0.212	0.237	0.474

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	56	0.670	7.6

GRAIN MEAN DM% 88.0

PLOT AREA HARVESTED 0.00240

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97/R/WW/11

WINTER WHEAT

CHEMICAL CONTROL OF TAKE-ALL

Object: To test a 'plant activator' to control take-all (*Gaeumannomyces graminis*) - Highfield IV/Road Piece East.

Sponsors: R. Gutteridge.

Design: 2 randomised blocks of 2 treatments duplicated.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

CHEMICAL

-	None
S	Benzo (1,2,3) thiadiazole-7-carbothionic acid-S-methyl ester (CGA 245704)

NOTE: CGA 245704 contains 50% active ingredient.

Experimental diary:

27-Aug-96 : B : PK as (0:20:32) at 1400 kg.
05-Oct-96 : B : Ploughed, and furrow pressed.
10-Oct-96 : B : Rotary harrowed, Rialto, dressed Panoctine, drilled at 380 seeds per m^2.
28-Nov-96 : B : Auger at 2.6 l with Stomp 400 SC at 3.1 l in 200 l.
10-Mar-97 : B : 34.5% N at 118 kg.
03-Apr-97 : B : 34.5% N at 463 kg.
14-Apr-97 : **T** : **CHEMICAL** S: CGA 245704 at 60 g in 200 l.
30-May-97 : B : Clayton Epoxicon at 1.0 l in 300 l.
20-Aug-97 : **T** : Combine harvested.

Previous crops: W. and s. rape 1995, w. wheat 1996.

NOTE: Plant samples were taken in May and July to assess root and stem base diseases.

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97/R/WW/11

GRAIN TONNES/HECTARE

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

CHEMICAL	
-	9.89
S	9.86
Mean	9.87

*** Standard errors of differences of means ***

CHEMICAL
0.334

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	5	0.472	4.8

GRAIN MEAN DM% 89.2

PLOT AREA HARVESTED 0.00240

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97/R/WS/3

SPRING WHEAT

NEEM STUDY

Object: To field test formulations of neem on cereal aphids - Summerdells I.

Sponsors: L.E. Smart, B.J. Pye.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 3.0 x 5.0.

Treatments:

NEEMFORM

-	None
I	Insecticide
OH	Neem oil applied by hydraulic sprayer
OE	Neem oil applied by electrostatic sprayer
EH	Neem extract applied by hydraulic sprayer
EE	Neem extract applied by electrostatic sprayer

Experimental diary:

08-Jul-96 : B : Deep-tine cultivated with vibrating tines 60 cm apart and 45 cm deep.
10-Jul-96 : B : Rolled.
30-Oct-96 : B : Ploughed.
11-Mar-97 : B : Rotary harrowed. Spring-tine cultivated twice.
12-Mar-97 : B : Rotary harrowed, Chablis, dressed Sibutol, drilled at 400 seeds per m^2.
14-Mar-97 : B : Rolled.
12-May-97 : B : 34.5% N at 370 kg.
22-May-97 : B : Campbell's CMPP at 2.1 l with Vindex at 1.0 l in 300 l.
10-Jun-97 : **T** : **NEEMFORM** OH, OE, EH, EE: Neem treatments applied.
17-Jun-97 : **T** : **NEEMFORM** I: Decis at 250 ml in 200 l.
: **T** : **NEEMFORM** OH, OE, EH, EE: Neem treatments applied.
24-Jun-97 : **T** : **NEEMFORM** OH, OE, EH, EE: Neem treatments applied.
05-Sep-97 : B : Combine harvested.

Previous crops: W. wheat 1995, set-aside 1996.

NOTES: (1) Neem products applied at 2.5 l product in 200 l for hydraulic sprayer and in 10.4 l for electrostatic sprayer.
(2) Aphid populations were assessed weekly from mid-May till harvest.

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97/R/WS/3

GRAIN TONNES/HECTARE

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

NEEMFORM	
-	7.65
I	8.03
OH	7.88
OE	7.69
EH	7.82
EE	7.61
Mean	7.78

*** Standard errors of differences of means ***

NEEMFORM
0.214

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.303	3.9

GRAIN MEAN DM% 84.8

PLOT AREA HARVESTED 0.00120

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97/R/BW/1

WINTER BARLEY

BETA-ACIDS, APHIDS AND BYDV

Object: To investigate the effects of beta-acids from hops on the aphid colonization and BYDV infection on winter barley - Osier.

Sponsors: B.J. Pye, J.A. Pickett, R.T. Plumb.

Design: 4 randomised blocks of 4 plots split into 3 sub-plots, systematically arranged.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

Whole plots

APHCONT	Aphid control and timing:
-	None
C	Cypermethrin in October
F	Formulated control applied on three occasions in autumn
BA	Beta-acids applied on three occasions in autumn

NOTE: Composition of beta-acids application was 10% beta-acids, 10% water, 80% ethanol and of formulation, 20% water, 80% ethanol.

Experimental diary:

15-Aug-96 : B : Ploughed and pressed.
02-Sep-96 : B : Rotary harrowed, Puffin, dressed Raxil S at 350 seeds per m^2.
17-Oct-96 : **T** : **APHCONT** BA: Beta acids applied in 10.4 l.
: **T** : **APHCONT** F: Formulation applied in 10.4 l.
22-Oct-96 : **T** : **APHCONT** C: Ambush C at 250 g in 10.4 l.
01-Nov-96 : **T** : **APHCONT** BA: Beta acids applied in 10.4 l.
: **T** : **APHCONT** F: Formulation applied in 10.4 l.
14-Nov-96 : **T** : **APHCONT** BA: Beta acids applied in 10.4 l.
: **T** : **APHCONT** F: Formulation applied in 10.4 l.
22-Nov-96 : B : Landgold DFF 625 at 2.0 l in 200 l.
07-Mar-97 : B : 34.5% N at 118 kg.
26-Mar-97 : B : 34.5% N at 240 kg.
18-Apr-97 : B : Contrast at 0.625 l in 300 l.
21-Jul-97 : B : Combine harvested.

Previous crops: W. barley 1995, set-aside 1996.

NOTE: Observations of BYDV were made in June.

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97/R/BW/1

GRAIN TONNES/HECTARE

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

APHCONT	
-	5.40
C	5.19
F	5.15
BA	5.81
Mean	5.39

*** Standard errors of differences of means ***

APHCONT
0.537

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.758	14.1

GRAIN MEAN DM% 89.3

SUB-PLOT AREA HARVESTED 0.00720

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97/R/RAW/1

WINTER OILSEED RAPE

GROWTH OF WEEDS AND RAPE

Object: To investigate factors influencing the vigour of w. rape grown in competition with chickweed and volunteer barley - Bones Close

Sponsors: P.J.W. Lutman.

Design: 2 randomised blocks of 30 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments:

1. **BARL DEN** Barley (Gleam dressed Raxil S) density, mean plants per m^2:

B0	0
B1	66
B2	160
B3	280
B4	448
B5	461
B6	567

2. **CHCK DEN** Chickweed (*Stellaria media*) density, mean plants per m^2:

C0	0
C1	119
C2	327
C3	598
C4	734
C5	1536
C6	2118

NOTE: Target weed populations and combinations were as follows:

Target weed populations: Plants per m^2.

		Barley						
		0	50	100	200	300	400	500
Chickweed	0	(x2)	x	x	x	x	x	x
	100	x	x	x	x	x		
	200	x	x	x	x	x		
	400	x	x	x	x	x		
	600	x	x	x	x	x		
	500	x						
	1200	x						

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97/R/RAW/1

Experimental diary:

09-Sep-96 : B : Chalk at 2.5 t.
09-Sep-96 : B : Ploughed and furrow pressed.
10-Sep-96 : B : Harrowed.
11-Sep-96 : **T** : Chickweed and barley broadcast by hand. Rotary harrowed, Apex, dressed Vitavax RS, drilled at 120 seeds per m^2.
12-Sep-96 : B : Rolled.
17-Oct-96 : B : Irrigated 25 mm.
14-Nov-96 : B : Tigress at 1.75 l in 200 l.
21-Nov-96 : **T** : **BARL DEN** 0, **CHCK DEN** 0: Katamaran at 2.5 l in 220 l.
05-Dec-96 : **T** : **CHCK DEN** 0: Galtak 50 SC at 1.5 l in 200 l.
28-Feb-97 : B : 34.5% N at 175 kg.
11-Mar-97 : **T** : **CHCK DEN** 0: Galtak 50 SC at 1.5 l in 220 l.
26-Mar-97 : B : 34.5% N at 350 kg.
09-Apr-97 : B : Barclay Eyetak at 1.1 l with Fastac at 200 ml in 300 l.
21-Jul-97 : B : Reglone at 3.0 l with Vassgro Non-ionic at 392 ml in 400 l.
28-Jul-97 : B : Combine harvested.

Previous crops: W. wheat 1995, s. wheat 1996.

NOTE: (1) The crop failed on 12 plots and one plot (treatment **BARL DEN** B6, **CHCK DEN** C0) yield was lost because of a combine error. The blocks were removed as a covariate to avoid estimating missing values. For treatment combinations lost see note after SED table in the analysis.

(2) Assessments of weed emergence were made in autumn. Crop and weed biomass was measured in December, May and June. Visual assessments of ground cover were made in December and plant heights were measured in March.

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97/R/RAW/1

CLEANED GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

CHCK DEN / BARL DEN	C0	C1	C2	C3	C4	C5	C6
B0	3.97	3.80	3.76	3.40	3.10	2.84	2.86
B1	2.91	2.68	2.81	2.60	2.38		
B2	2.15	3.40	2.71	2.28	2.42		
B3	2.06	1.62	1.63	1.37	1.99		
B4	1.41	2.17	1.83	1.46	1.00		
B5	1.55						
B6	0.74						

*** Standard errors of differences of means ***

BARL DEN / CHCK DEN	
0.397	min.rep
0.362	max-min

BARL DEN / CHCK DEN	
min.rep	Any of the remainder
max-min	B0.C0 v any of the remainder

NOTE: SED applies only to the following treatment combinations:-
B0.C0, B0.C2, B0.C5, B0.C6, B1.C1, B1.C2, B1.C3, B1.C4, B2.C2, B2.C3, B2.C4, B3.C0, B3.C3, B3.C4, B4.C0, B4.C1 and B4.C3.

***** Stratum standard errors and coefficients of variation

Stratum	d.f.	s.e.	cv%
BLOCK.WP	17	0.397	16.5

GRAIN MEAN DM% 88.0

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97/W/RAW/1

WINTER OILSEED RAPE

DIAGNOSIS OF S DEFICIENCY

Object: To study the effects of rates of sulphur on the yield and sulphur content of winter oilseed rape - Woburn, Far Field II.

Sponsors: F. Zhao, S.P. McGrath.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 3.0 x 12.0.

Treatments:

SULPHUR	Sulphur as gypsum (17.5% S) kg S:
S0	0
S1	5
S2	10
S3	20
S4	40
S5	80

Experimental diary:

02-Sep-96 : **T** : **SULPHUR** 5, 10, 20, 40, 80: Gypsum applied at 28.6, 57.1, 114, 229, 457 kg respectively.
02-Sep-96 : B : Drilled Apex, dressed Lindex-Plus FS at 6.6 kg per ha.
24-Jul-97 : B : Reglone at 3.0 l with Vassgro Non-ionic at 400 ml in 400 l.
05-Aug-97 : B : Combine harvested.

Previous crops: Potatoes 1995, w. wheat 1996.

NOTE: Plant samples were taken on four occasions between March and May to measure total sulphur content, sulphate-S and glutathione.

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97/W/RAW/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SULPHUR	
S0	4.51
S1	4.17
S2	4.39
S3	4.44
S4	4.27
S5	4.33
Mean	4.35

*** Standard errors of differences of means ***

SULPHUR
0.151

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.213	4.9

GRAIN MEAN DM% 90.6

PLOT AREA HARVESTED 0.00288

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97/R/RAW/3

WINTER OILSEED RAPE

VARIETIES, FUNGICIDE AND DISEASE

Object: To study the development of light leaf spot (*Pyrenopeziza brassicae*) and stem canker (*Leptosphaeria maculans*) and to measure yield loss under various fungicide regimes - Little Hoos.

Sponsors: B.D.L. Fitt.

Design: 3 blocks of 2 plots split into 10.

Whole plot dimensions: 3.0 x 20.0.

Treatments:

1.	**CULTIVAR**	Variety:
	B	Bristol
	C	Capitol
2.	**FUNGICIDE**	Fungicide rate (kg) and timing:
	-	None
	R	Tebuconazole at 0.125 kg monthly October to April
	O	Tebuconazole at 0.25 kg in October
	N	Tebuconazole at 0.25 kg in November
	D	Tebuconazole at 0.25 kg in December
	OS	Tebuconazole at 0.125 kg in October and spring
	NS	Tebuconazole at 0.125 kg in November and spring
	DS	Tebuconazole at 0.125 kg in December and spring
	SF	Tebuconazole at 0.25 kg in spring
	FF	Tebuconazole at 0.25 kg during flowering

Experimental diary:

23-Jul-96	B	Chalk at 2.5 t.
26-Jul-96	B	Ploughed and furrow pressed. Rolled.
30-Aug-96	B	Spring-tine cultivated.
	T	**CULTIVAR** B: Rotary harrowed, Bristol, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
	T	**CULTIVAR** C: Rotary harrowed, Capitol, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
	B	Rolled.
25-Sep-96	B	Irrigated 25 mm.
07-Oct-96	B	Decis at 250 ml in 200 l.
09-Oct-96	B	Draza at 5.5 kg.
23-Oct-96	B	Draza at 5.5 kg.
30-Oct-96	B	Butisan S at 1.5 l in 200 l.
	T	**FUNGICIDE** R, OS: Folicur at 0.5 l in 220 l.
	T	**FUNGICIDE** O: Folicur at 1.0 l in 220 l.
21-Nov-96	**T**	**FUNGICIDE** R, NS: Folicur at 0.5 l in 220 l.
	T	**FUNGICIDE** N: Folicur at 1.0 l in 220 l.
16-Dec-96	**T**	**FUNGICIDE** R, DS: Folicur at 0.5 l in 220 l.
	T	**FUNGICIDE** D: Folicur at 1.0 l in 220 l.

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97/R/RAW/3

Experimental diary:

```
   24-Jan-97 : T : FUNGCIDE R: Folicur at 0.5 l in 220 l.
   27-Feb-97 : T : FUNGCIDE R: Folicur at 0.5 l in 220 l.
   28-Feb-97 : B : 34.5% N at 175 kg.
   18-Mar-97 : B : 34.5% N at 350 kg.
   24-Mar-97 : T : FUNGCIDE R, OS, NS, DS: Folicur at 0.5 l in 220 l.
             : T : FUNGCIDE S: Folicur at 1.0 l in 220 l.
   09-Apr-97 : B : Fastac at 200 ml in 300 l.
   22-Apr-97 : T : FUNGCIDE F: Folicur at 1.0 l in 200 l.
             : T : FUNGCIDE R: Folicur at 0.5 l in 200 l.
   16-Jul-97 : B : Reglone at 3.0 l with Vassgro Non-ionic at 392 ml in
                   400 l.
   23-Jul-97 : B : Combine harvested.
```

Previous crops: W. wheat 1995, set-aside 1996.

NOTE: Samples were taken monthly to assess levels of disease. Oil content of grain was measured after harvest.

GRAIN TONNES/HECTARE

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

CULTIVAR	B	C	Mean
FUNGCIDE			
-	3.96	5.00	4.48
R	5.35	5.26	5.30
O	4.69	5.27	4.98
N	4.43	5.44	4.93
D	4.46	5.25	4.85
OS	4.76	5.48	5.12
NS	4.64	5.71	5.17
DS	4.79	5.47	5.13
SF	4.61	5.37	4.99
FF	4.43	5.54	4.99
Mean	4.61	5.38	4.99

*** Standard errors of differences of means ***

FUNGCIDE	**CULTIVAR*** **FUNGCIDE**
0.122	0.172

* Within the same level of **CULTIVAR** only

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	36	0.211	4.2

GRAIN MEAN DM% 92.2 SUB-PLOT AREA HARVESTED 0.00408

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97/W/RAS/1

SPRING OILSEED RAPE

SULPHUR FOR SPRING OILSEED RAPE

Object: To study the effects of rates of sulphur fertilizer on the yield and sulphur content of spring oilseed rape - Woburn, Stackyard I.

Sponsors: S.P. McGrath, F. Zhao.

Design: 5 randomised blocks of 5 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments:

SULPHUR	Sulphur as potassium sulphate (kg S):
S0	0 (duplicated)
S1	10
S2	20
S4	40

NOTE: Potassium chloride was applied to balance the potassium to supply 111 kg K_2O.

Experimental diary:

13-Nov-97 : B : Ploughed.
26-Mar-97 : B : Heavy spring-tine cultivated.
02-Apr-97 : B : 34.5% N at 290 kg.
18-Apr-97 : **T** : **SULPHUR** S1, S2, S4: Potassium sulphate at 56, 111, 222 kg respectively.
: **T** : **SULPHUR** S0, S1, S2: Muriate of potash at 185, 138, 93 kg respectively.
: B : Rotary harrowed, Starlight, dressed Lindex-Plus FS, drilled at 250 seeds per m^2.
02-Sep-97 : B : Combine harvested.

Previous crops: W. wheat 1995, w. rye 1996.

NOTE: Samples were taken on three occasions between green-bud and mid-flowering for analysis of sulphur, sulphate-S and glutathione.

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97/W/RAS/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SULPHUR	
S0	1.97
S1	2.07
S2	2.01
S4	2.03
Mean	2.01

*** Standard errors of differences of means ***

SULPHUR	
0.077	min.rep
0.066	max-min

	SULPHUR
min.rep	Any of the remainder
max-min	S0 v any of the remainder

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	17	0.121	6.0

GRAIN MEAN DM% 88.7

PLOT AREA HARVESTED 0.00286

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97/R/RAS/3

SPRING OILSEED RAPE

NEEM STUDY

Object: To test two formulations of neem on cereal aphids in spring wheat - Delafield.

Sponsors: L.E. Smart, B.J. Pye.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

NEEMFORM	Formulation and timing:
-	None
I	Deltamethrin at aphid migration
O1	Neem oil at 2.5 kg in 10.4 l by electrostatic sprayer
O2	Neem oil at 2.5 kg in 200 l by hydraulic sprayer
E1	Neem extract at 7.5 g a.i. in 10.4 l by electrostatic sprayer
E2	Neem extract at 7.5 g a.i. in 200 l by hydraulic sprayer

Experimental diary:

31-Oct-96 : B : Ploughed.
21-Mar-97 : B : Rolled. Spring-tine cultivated.
06-Apr-97 : B : MTM Trifluralin at 2.3 l in 390 l. Spring-tine cultivated twice.
07-Apr-97 : B : Rotary harrowed, Starlight, recleaned, drilled at 120 seeds per m^2. Rolled.
09-Apr-97 : B : Irrigated 13 mm.
18-Apr-97 : B : Irrigated 13 mm.
01-May-97 : B : Cyperkill 10 at 300 ml with Vassgro Non-ionic at 50 ml in 300 l.
15-May-97 : B : Cyperkill 10 at 300 ml with Vassgro Non-ionic at 50 ml in 300 l.
30-May-97 : B : 34.5% N at 290 kg.
10-Jun-97 : **T** : **NEEMFORM** I: Decis at 0.5 l in 200 l.
: **T** : **NEEMFORM** O1, O2, E1 and E2: Neem treatments applied.
17-Jun-97 : **T** : **NEEMFORM** O1, O2, E1 and E2: Neem treatments applied.
24-Jun-97 : **T** : **NEEMFORM** O1, O2, E1 and E2: Neem treatments applied.
04-Sep-97 : B : Combine harvested.

Previous crops: S. rape 1995, w. wheat 1996.

NOTES: (1) Neem products applied at 2.5 l product in 200 l for hydraulic sprayer and in 10.4 l for electrostatic sprayer.
(2) Pollen beetle populations were assessed weekly through the flowering period.

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97/R/RAS/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

NEEMFORM	
-	1.25
I	1.33
O1	1.39
O2	1.25
E1	1.39
E2	1.19
Mean	1.30

*** Standard errors of differences of means ***

NEEMFORM
0.101

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.143	11.0

GRAIN MEAN DM% 83.6

PLOT AREA HARVESTED 0.00240

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97/R/BES/3

SPRING BEANS

MUSTARD COMPETITION IN BEANS

Object: To study the effects of time of weed (mustard and oats) emergence on the growth and yield of spring beans - Long Hoos I/II.

Sponsor: P.J.W. Lutman.

Design: 3 randomised blocks of 6 x 2 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

TREATMNT	Weed density and time of sowing weeds:
M0	None (duplicated)
SE M1	Sown with crop, mustard density 1
SE M2	Sown with crop, mustard density 2
SE M3	Sown with crop, mustard density 3
SE M4	Sown with crop, mustard density 4
SL M1	Sown 10 days after crop, mustard density 1
SL M2	Sown 10 days after crop, mustard density 2
SL M3	Sown 10 days after crop, mustard density 3
SL M4	Sown 10 days after crop, mustard density 4
SE O	Oats sown with crop
SL O	Oats sown 10 days after crop

Plant densities:-

Average mustard plants per m^2:

SE M1	0
M2	0
M3	24
M4	20
SL M1	31
M2	36
M3	57
M4	152

Average oat plants per m^2:

SE 0	90
SL 0	48

NOTE: Plants in treatment SE M1 and SE M2 failed.

Experimental diary:

11-Dec-96 : B : Ploughed.
24-Mar-97 : **T** : **TREATMNT** SE; M1, M2, M3, M4: Mustard broadcast.
: **T** : **TREATMNT** SE 0: Oats broadcast.
: B : Heavy spring-tine cultivated, rotary harrowed twice, Alfred, undressed, drilled at 50 seeds per m^2.
06-Apr-97 : B : Irrigated 25 mm.

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97/R/BES/3

Experimental diary:

10-Apr-97 : T : **TREATMNT** SL; M1, M2, M3, M4: Mustard broadcast.
: T : **TREATMNT** SL 0: Oats broadcast.
12-Apr-97 : B : Cyperkill 10 at 300 ml with Vassgro Non-ionic at 200 ml in 200 l.
16-Apr-97 : B : Irrigated 15 mm.
22-Apr-97 : B : Cyperkill 10 at 300 ml with Vassgro Non-ionic at 50 ml in 200 l.
23-Apr-97 : B : Irrigated 30 mm.
30-Apr-97 : B : Cyperkill 10 at 300 ml with Vassgro Non-ionic at 50 ml in 200 l.
19-May-97 : B : Cyperkill 10 at 300 ml with Vassgro Non-ionic at 50 ml in 300 l.
29-May-97 : B : Cyperkill 10 at 250 ml with Vassgro Non-ionic at 50 ml in 300 l.
08-Jul-97 : B : Clayton Turret at 2.0 l with Folio 575 SC at 2.0 l in 300 l.
21-Aug-97 : B : Hand harvested.

Previous crops: W. wheat 1995, s. oats 1996.

NOTES: (1) Treatment SE M1 and SE M2 failed and are omitted from the analysis. Samples were taken in June and July of crops and weeds for biomass production.
(2) Emerging plants were counted in early April and again in May. Stems per plant, heights of beans and mustard plants, oats shoot number and weights were measured in June and July.

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97/R/BES/3

GRAIN TONNES/HECTARE

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

TREATMNT	
M0	4.16
SE M3	2.77
SE M4	2.85
SL M1	2.99
SL M2	2.71
SL M3	2.44
SL M4	1.83
SE O	2.45
SL O	3.57
Mean	2.99

*** Standard errors of differences of means ***

TREATMNT	
0.444	min.rep
0.385	max-min

	TREATMNT
max-min	M0 v any of the remainder
min.rep	any of the remainder

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	19	0.544	18.2

GRAIN MEAN DM% 86.4

PLOT AREA HARVESTED 0.00020

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97/R/LP/3

LUPINS

POD DEVELOPMENT AND YIELD

Object: To monitor the role of nitrogen in pod abortion, development and yield. To determine the relationship between leaves and pods in supplying carbohydrate to the seed - Stackyard.

Sponsors: J.E. Leach, G.F.J. Milford, I. Shield.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 6.0 x 9.0.

Treatments:

T	Nitrogen or leaf removal:
-	None
SN	Spring nitrogen
FN	Foliar nitrogen
HL	Half leaves removed
AL	All leaves removed

Experimental diary:

25-Jun-96 : B : Ploughed and furrow pressed.
26-Jul-96 : B : Rolled.
12-Sep-96 : B : Spring-tine cultivated.
13-Sep-96 : B : Rotary harrowed.
16-Sep-96 : B : Rotary harrowed, DETN 20, undressed, drilled at 40 seeds per m^2.
23-Sep-96 : B : Stomp 400 SC at 5.0 l in 294 l. Spannit at 1.5 l in 294 l.
04-Oct-96 : B : Irrigated 25 mm.
08-Nov-96 : B : Carbetamex at 3.0 kg with MSS Simazine 50 FL at 2.3 l in 200 l. Decis at 300 ml in 200 l.
12-Dec-96 : B : Rovral Flo at 1.0 l in 200 l. Standon Tebuconazole at 0.5 l in 200 l.
20-Mar-97 : **T** : **T** SN: 46% N at 217 kg.
27-Mar-97 : **T** : **T** SN: 46% N at 217 kg.
01-May-97 : B : Compass at 3.0 l in 200 l.
19-May-97 : **T** : **T** SN: 46% N at 217 kg.
18-Jun-97 : B : Mistral at 1.0 l in 300 l.
24-Jun-97 : **T** : **T** FN: 46% N at 32.6 kg.
01-Jul-97 : **T** : **T** FN: 46% N at 32.6 kg.
03-Jul-97 : **T** : **T** HL, AL: Leaf removal started.
07-Jul-97 : **T** : **T** FN: 46% N at 32.6 kg.
08-Jul-97 : B : Danadim Dimethoate 40 at 850 ml in 300 l.
14-Jul-97 : **T** : **T** FN: 46% N at 32.6 kg.
16-Jul-97 : **T** : **T** HL, AL: Leaf removal finished.
05-Sep-97 : B : Harvest at 3.0 l in 400 l.
23-Sep-97 : B : Combine harvested.

Previous crops: W. wheat 1995, set-aside 1996.

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97/R/LP/3

NOTES: (1) Dry matter was assessed regularly and light interception measured April to August. Leaf pod photosynthesis was measured frequently. Components of yield were measured at harvest and plant nitrogen content.
(2) 46% N was applied to one half plot of **T** -, in error, this has been omitted from the analysis.
(3) Because of poor emergence the yields of one block was lost and omitted from the analysis.

GRAIN TONNES/HECTARE

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

T	
-	1.75
SN	1.90
FN	1.56
HL	1.41
AL	0.91
Mean	1.51

*** Standard errors of differences of means ***

T
0.208

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.294	19.5

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00216

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97/R/LP/4

LUPINS

FUSARIUM AND SOWING DATES

Object: To assess the effects of seed treatment fungicides and autumn fungicide spray on *Fusarium* and plant survival - Sawyers II.

Sponsors: G.L. Bateman, J. Etheridge.

Design: 3 different half replicates of 4 x 2 x 2 x 2.

Plot dimensions: 5.4 x 9.0.

Treatments: All combinations of:-

1.	**FUNGCIDE**	Fungicide:
	-	None
	IC	Iprodione and carbendazim seed dressing
	BG	Fludioximil seed dressing
	P	Prochloraz foliar spray
2.	**SOW DATE**	Sowing date:
	S1	04-Sep-96
	S2	01-Oct-96
3.	**INOC**	*Fusarium avenaceum* inoculum:
	F-	None
	FI	Inoculated
4.	**SUM FUNG**	Summer fungicide:
	-	None
	SP	Tebuconazole spray in May and June

NOTE: *Fusarium* inoculum was on sterile oat grain applied to the seedbed.

Experimental diary:

29-Jul-96 : B : Subsoiled.
31-Jul-96 : B : Ploughed and furrow pressed.
03-Sep-96 : B : Rotary harrowed.
: **T** : **SOW DATE** S1: Inoculum applied.
04-Sep-96 : **T** : **SOW DATE** S1: Rotary harrowed twice, CH304/70, dressed as treatment, drilled at 40 seeds per m^2.
06-Sep-96 : **T** : **SOW DATE** S1: Stomp 400 SC at 5.0 l in 220 l.
01-Oct-96 : **T** : **SOW DATE** S2: *Fusarium* inoculum applied, rotary harrowed twice, CH304/70, dressed as treatment, drilled at 40 seeds per m^2.
02-Oct-96 : **T** : **SOW DATE** S2: Stomp 400 SC at 5.0 l in 220 l.
08-Nov-96 : B : Carbetamex at 3.0 kg with MSS Simazine 50 FL at 2.3 l in 200 l. Decis at 300 ml in 200 l.
14-Nov-96 : **T** : **FUNGCIDE** P: Sportak 45 at 1.0 l in 220 l.

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97/R/LP/4

Experimental diary:

17-Mar-97 : B : *Pleiochaeta setosa* inoculum applied at 72 kg.
13-May-97 : **T** : **SUM FUNG** SP: Folicur at 1.0 l in 220 l.
09-Jun-97 : **T** : **SUM FUNG** SP: Folicur at 1.0 l in 220 l.
02-Sep-97 : B : Harvest at 3.0 l in 400 l.
22-Sep-97 : B : Combine harvested.

Previous crops: S. oats 1995, set-aside 1996.

NOTES: (1) *Pleiochaeta* inoculum was also on sterile oat grain.
(2) Plant populations were assessed monthly October to July. Plant samples were assessed for disease on four occasions in winter. Foliar diseases were assessed in summer.
(3) Only 2 way tables are presented except **FUNGCIDE INOC**.

GRAIN TONNES/HECTARE

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

SOW DATE	S1	S2	Mean
FUNGCIDE			
-	0.22	0.03	0.12
IC	1.30	0.25	0.77
BG	1.21	0.15	0.68
P	1.72	0.09	0.90
Mean	1.11	0.13	0.62

INOC	F-	FI	Mean
FUNGCIDE			
-	0.16	0.08	0.12
IC	0.78	0.76	0.77
BG	0.71	0.64	0.68
P	0.88	0.93	0.90
Mean	0.63	0.60	0.62

INOC	F-	FI	Mean
SOW DATE			
S1	1.11	1.10	1.11
S2	0.15	0.10	0.13
Mean	0.63	0.60	0.62

SUM FUNG	-	SP	Mean
SOW DATE			
S1	0.28	1.94	1.11
S2	0.02	0.23	0.13
Mean	0.15	1.09	0.62

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97/R/LP/4

GRAIN TONNES/HECTARE

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

SUM FUNG INOC	-	SP	Mean
F-	0.12	1.15	0.63
FI	0.18	1.03	0.60
Mean	0.15	1.09	0.62

*** Standard errors of differences of means ***

FUNGCIDE	SOW DATE	INOC	FOLICUR
0.156	0.110	0.110	0.135

FUNGCIDE SOW DATE	FUNGCIDE INOC	SOW DATE INOC	SOW DATE FOLICUR
0.220	0.220	0.156	0.174

Except when comparing means with the same level(s) of

SOW DATE	0.191

INOC FOLICUR
0.174

Except when comparing means with the same level(s) of

INOC	0.191

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.382	61.7

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED 0.00216

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97/R/LP/10

LUPINS

GENOTYPE, ROW SPACING AND SEED RATE

Object: To test seed rate and row spacing on the structure and performance of existing determinate and new dwarf-determinate genotypes - Stackyard.

Sponsors: I. Shield, G.F.J. Milford, J.E. Leach.

Design: 3 randomised blocks of 4 x 2 x 2 plots.

Whole plot dimensions: 9.0 x 9.0.

Treatments: All combinations of :-

1. **GENOTYPE**

70	CH304/70
73	CH304/73
12	DTN 12
20	DTN 20

2. **ROW SPAC** Row spacing, cm:

R1	11
R2	36

3. **SEED RAT** Seed rate, seeds per m^2:

S1	40
S2	80

Experimental diary:

25-Jun-96 : B : Ploughed and furrow pressed.
26-Jul-96 : B : Rolled.
12-Sep-96 : B : Spring-tine cultivated.
13-Sep-96 : B : Rotary harrowed.
: **T** : Genotypes undressed drilled at 40 and 80 seeds per m^2 respectively.
23-Sep-96 : B : Stomp 400 SC at 5.0 l in 294 l. Spannit at 1.5 l in 294 l.
04-Oct-96 : B : Irrigated 25 mm.
08-Nov-96 : B : Carbetamex at 3.0 kg with MSS Simazine 50 FL at 2.3 l. Decis at 300 ml in 200 l.
12-Dec-96 : B : Rovral Flo at 1.0 l in 200 l, Standon Tebuconazole at 0.5 l in 200 l.
01-May-97 : B : Compass at 3.0 l in 200 l.
18-Jun-97 : B : Mistral at 1.0 l in 300 l.
08-Jul-97 : B : Danadim Dimethoate 40 at 850 ml in 300 l.
05-Sep-97 : B : Harvest at 3.0 l in 400 l.
23-Sep-97 : B : Combine harvested.

Previous crops: W. wheat 1995, set-aside 1996.

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97/R/LP/10

NOTES: (1) Plant populations were assessed in autumn, January, April and at harvest. Leaf and branch numbers were assessed in June, time of flowering was noted, light interception was measured frequently during the growing season. Dry matter and nitrogen accumulation was assessed at intervals on certain plots. After harvest oil and nitrogen content and grain density was measured.

(2) Most plots of **GENOTYPE** 73 failed and it has been omitted from the analysis.

GRAIN TONNES/HECTARE

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

ROW SPAC	R1	R2	Mean
GENOTYPE			
70	2.21	2.04	2.12
12	2.35	1.74	2.05
20	2.22	1.74	1.98
Mean	2.26	1.84	2.05

SEED RAT	S1	S2	Mean
GENOTYPE			
70	1.52	2.73	2.12
12	1.44	2.66	2.05
20	2.03	1.93	1.98
Mean	1.66	2.44	2.05

SEED RAT	S1	S2	Mean
ROW SPAC			
R1	1.88	2.64	2.26
R2	1.45	2.24	1.84
Mean	1.66	2.44	2.05

	SEED RAT	S1	S2
GENOTYPE	**ROW SPAC**		
70	R1	1.56	2.86
	R2	1.48	2.59
12	R1	1.58	3.12
	R2	1.30	2.19
20	R1	2.50	1.94
	R2	1.56	1.93

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97/R/LP/10

GRAIN TONNES/HECTARE

*** Standard errors of differences of means ***

GENOTYPE	ROW SPAC	SEED RAT	GENOTYPE ROW SPAC
0.218	0.178	0.178	0.309

GENOTYPE SEED RAT	ROW SPAC SEED RAT	GENOTYPE ROW SPAC SEED RAT
0.309	0.252	0.437

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	22	0.535	26.1

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00216

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97/R/LP/12

WINTER LUPINS

SPRING-SOWN GENOTYPES

Object: To evaluate some new spring-sown genotypes of lupins - Pastures.

Sponsors: I. Shield, G.J.F. Milford, H.J. Stevenson, J.E. Leach, T. Scott.

Design: 3 randomised blocks of 6 plots, plus 2 extra plots.

Whole plot dimensions: 4.0 x 7.0.

Treatments:

1. **VARIETY** Variety and nitrogen:

73	Ludet
AG	Agena
AR	Arthur
MI	Minori
73N	Ludet with nitrogen fertilizer
MIN	Minori with nitrogen fertilizer

2. **EXTRA**

34	DTN 34
BA	Bardo

Experimental diary:

06-Mar-97 : B : Spring-tine cultivated.
10-Mar-97 : B : Rotary harrowed.
: **T** : **VARIETY**: Varieties drilled at 80 seeds per m^2.
11-Mar-97 : B : Stomp 400 SC at 5.0 l in 200 l.
06-Apr-97 : B : Irrigated 25 mm.
15-Apr-97 : B : Irrigated 14 mm.
30-Apr-97 : B : Decis at 300 ml in 200 l.
04-Jun-97 : B : Logran 20 WG at 18.75 g in 300 l.
16-Jun-97 : B : Laser at 1.0 l with Comulin at 1.6 l in 200 l.
17-Jun-97 : **T** : **VARIETY** MIN: 46% N at 163 kg.
09-Jul-97 : B : Mistral at 1.0 l with BASF Dimethoate 40 at 850 ml in 300 l.
31-Jul-97 : **T** : **VARIETY** 73N: 46% N at 163 kg.
22-Oct-97 : B : Combine harvested.

NOTE: **EXTRA** DTN 34 failed to mature.

Previous crops: W. oats 1995, w. wheat 1996.

NOTE: Plant numbers, date of flowering, canopy expansion, crop structure and components of yield were measured. Four pre-harvest and harvest samples were taken for dry matter and nitrogen content determinations.

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97/R/LP/12

GRAIN TONNES/HECTARE

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

VARIETY	
73	3.38
AG	2.49
AR	2.60
MI	1.19
73N	3.33
MIN	1.98
Mean	2.49

EXTRA	
BA	0.95

*** Standard errors of differences of means ***

VARIETY
0.309

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	10	0.378	15.2

GRAIN MEAN DM% 77.2

PLOT AREA HARVESTED 0.00168

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97/R/LP/13

LUPINS

SPRING GENOTYPES AND SOWING DATES

Object: To measure the gas exchange, nitrogen economy and morphological characters of three spring lupin genotypes - Pastures

Sponsors: I. Shield, G.F.J. Milford, J.E. Leach, M. Dracup.

Design: 3 randomised blocks of 2 x 3 plots.

Whole plot dimensions: 4.0 x 9.0.

Treatments: All combinations of:-

1 **GENOTYPE**

ME	Merrit
X	88AA29

2 **SOW DATE** Dates of sowing:

SE	07-Mar-97
SM	01-Apr-97
SL	14-Apr-97

Experimental diary:

06-Mar-97 : B : Spring-tine cultivated.
17-Mar-97 : B : Rotary harrowed.
17-Mar-97 : **T** : **SOW DATE** SE: Genotypes undressed drilled at 60 seeds per m^2. MSS Simazine 50 FL at 2.0 l in 220 l.
24-Mar-97 : B : Stomp 400 SC at 5.0 l in 200 l.
01-Apr-97 : **T** : **SOW DATE** SM: Genotypes undressed drilled at 60 seeds per m^2.
04-Apr-97 : B : Irrigated 25 mm.
07-Apr-97 : **T** : **SOW DATE** SM: MSS Simazine 50 FL at 2.0 l in 220 l.
14-Apr-97 : **T** : **SOW DATE** SL: Rotary harrowed, Genotypes undressed drilled at 60 seeds per m^2.
15-Apr-97 : B : Irrigated 14 mm.
18-Apr-97 : **T** : **SOW DATE** SL: MSS Simazine 50 FL at 2.0 l in 220 l.
30-Apr-97 : B : Decis at 300 ml in 200 l.
09-Jul-97 : B : Mistral at 1.0 l with BASF Dimethoate 40 at 850 ml in 300 l.
05-Sep-97 : B : Harvest at 3.0 l in 400 l.
22-Sep-97 : B : Combine harvested.

Previous crops: W. oats 1995, w. wheat 1996.

NOTE: Plant populations were assessed in spring and before harvest. Leaf and branch numbers were assessed in July. Light interception was measured frequently through the growing season. Dry matter and nitrogen content was measured on four occasions. After harvest oil and nitrogen content and grain density was measured.

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97/R/LP/13

GRAIN TONNES/HECTARE

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

SOW DATE / GENOTYPE	SE	SM	SL	Mean
ME	1.48	1.34	1.37	1.40
X	1.18	0.89	0.67	0.91
Mean	1.33	1.12	1.02	1.16

*** Standard errors of differences of means ***

GENOTYPE	SOW DATE	GENOTYPE SOW DATE
0.124	0.152	0.215

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	10	0.263	22.7

GRAIN MEAN DM% 84.7

PLOT AREA HARVESTED 0.00216

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97/R/LN/2

LINSEED

LEAF BROWNING SYMPTOMS

Object: To distinguish pathogens associated with leaf browning symptoms on linseed and to monitor seasonal changes in such pathogen populations under different fungicide regimes - Appletree.

Sponsors: B.D.L. Fitt.

Design: 15 plots fully randomised.

Plot dimensions: 3.0 x 15.0.

Treatments:

FUNGCIDE	Fungicide:
-	None (three plots)
A	Iprodione (six plots)
B	Benomyl (six plots)

Experimental diary:

15-Oct-96 : B : Chalk at 5.0 t.
05-Nov-96 : B : Farmyard manure at 25.0 t.
12-Nov-96 : B : Ploughed.
14-Apr-97 : B : Rolled.
17-Apr-97 : B : Scythe LC at 3.0 l with Vassgro Non-ionic at 200 ml in 200 l.
18-Apr-97 : B : Spring-tine cultivated. Rotary harrowed, Antares, dressed Prelude 20 LF, drilled at 700 seeds per m^2. Rolled.
15-May-97 : B : Cyperkill 10 at 300 ml with Vassgro Non-ionic at 50 ml in 300 l.
30-May-97 : B : Nitram 34.5% N at 218 kg.
04-Jun-97 : B : Lorate 20 DF at 30 g in 200 l.
24-Jun-97 : **T** : **FUNGCIDE** A: Rovral Flo at 2.0 l in 220 l.
: **T** : **FUNGCIDE** B: Benlate Fungicide at 1.1 kg in 220 l.
24-Jul-97 : **T** : **FUNGCIDE** A: Rovral Flo at 2.0 l in 220 l.
: **T** : **FUNGCIDE** B: Benlate Fungicide at 1.1 kg in 220 l.
24-Jul-97 : B : Hand rogued wild oats.
02-Sep-97 : B : Harvest at 3.0 l in 400 l.
11-Sep-97 : B : Combine harvested.

Previous crops: W. barley 1995, lupins 1996.

NOTE: Plant samples were taken fortnightly from late July to early September for disease assessment.

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97/R/LN/2

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

FUNGCIDE	
-	1.60
B	2.64
A	1.84
Mean	2.11

*** Standard errors of differences of means ***

FUNGCIDE	
0.141	max-min
0.115	max.rep

	FUNGCIDE
max-min	- v any of the remainder
max.rep	Any of the remainder

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
WP	12	0.199	9.4

GRAIN MEAN DM% 89.3

PLOT AREA HARVESTED 0.00302

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97/R/M/6

MIXED 6

EFFECTS OF BEHAVIOUR MODIFYING CHEMICALS

Object: To test insect behaviour modifying chemicals on oilseed rape and to provide an attractive trap crop; turnip rape - Little Hoos.

Sponsor: L.E. Smart.

Design: 6 x 6 quasi-complete Latin square.

Whole plot dimensions: 9.0 x 9.0.

Treatments:

CROPCHEM	Crop, chemical and timing:
-	Oilseed rape, no chemical
A	Oilseed rape, 0.1% Agral in 200 l applied 10-Oct-96, 21-Oct, 14-Nov, 25-Mar-97, 10-Apr
B	Oilseed rape, 2-phenylethyl isothiocyanate point source from 23-Sep-96
C	Oilseed rape, (Z)-3-hexen-1-ol point source from 23-Sep-96
D	Oilseed rape, Hexan-1-ol point source 23-Sep-96 to 6-Mar-97, Phenylacetonitrile point source from 6-Mar-97
TR	Turnip rape no chemical

Experimental diary:

23-Jul-96	B	Chalk at 2.5 t.
26-Jul-96	B	Ploughed and furrow pressed, rolled.
30-Aug-96	B	Spring-tine cultivated.
30-Aug-96	**T**	**CROPCHEM** -, A, B, C, D: Rotary harrowed, Apex, undressed, drilled at 120 seeds per m^2.
	T	**CROPCHEM** TR: Rotary harrowed, Salut, undressed, drilled at 120 seeds per m^2.
	B	Rolled.
24-Sep-96	**T**	**CROPCHEM** TR: Salut, broadcast at 90 seeds per m^2.
27-Sep-96	B	Irrigated 25 mm.
30-Oct-96	B	Butisan S at 1.5 l in 200 l.
28-Feb-97	B	34.5% N at 175 kg.
18-Mar-97	B	34.5% N at 350 kg.
09-Jul-97	B	Reglone at 3.0 l with Vassgro Non-ionic at 392 ml in 400 l.
16-Jul-97	B	Combine harvested.

Previous crops: W. wheat 1995, set-aside 1996.

NOTE: Plant samples were taken in December to assess investigation of cabbage stem flea beetles. Pollen beetle populations were assessed on five occasions in March and April. Raceme samples were taken in April to assess pollen beetle eggs and larvae. Pod samples were taken in May and June to assess seed weevil and pod midge eggs and larvae.

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97/R/M/6

GRAIN TONNES/HECTARE

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

CROPCHEM	
-	3.90
A	3.95
B	3.75
C	3.95
D	3.89
TR	2.62
Mean	3.68

*** Standard errors of differences of means ***

CROPCHEM
0.163

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
ROW.COL	20	0.283	7.7

GRAIN MEAN DM% 89.4

PLOT AREA HARVESTED 0.00216

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METEOROLOGICAL RECORDS 1997 - ROTHAMSTED

(Departure from 30-year means in brackets)

MONTH	Total sunshine: hours		Mean temperature: °C Air(1)		Dew point	In ground under grass 30cm	100cm
JAN	61	(+9)	1.7	(-1.4)	0.3	2.6	5.1
FEB	58	(-7)	6.3	(+3.1)	4.1	5.2	5.5
MAR	138	(+32)	8.1	(+2.9)	4.9	7.8	7.1
APR	191	(+53)	8.6	(+1.0)	4.0	9.1	8.4
MAY	262	(+75)	11.5	(+0.6)	7.7	12.2	10.3
JUN	160	(-31)	14.3	(+0.4)	10.7	15.0	12.7
JUL	230	(+41)	16.6	(+0.7)	12.5	16.8	14.3
AUG	202	(+23)	19.5	(+3.7)	16.2	18.1	16.0
SEP	180	(+40)	14.6	(+1.0)	11.1	15.3	15.3
OCT	164	(+60)	10.1	(-0.3)	7.0	12.4	13.6
NOV	64	(-1)	8.1	(+2.1)	6.3	8.8	10.5
DEC	42	(+5)	5.4	(+1.4)	3.8	6.9	8.8
YEAR*	1752	(+289)	10.4	(+1.3)	7.4	10.9	10.6

MONTH	Ground frosts (2)	Total rainfall:mm 12.7cm (5 in) gauge		Rain days (3)	Drainage through 50.8cm (20 in) soil:mm	Wind km per hour (4)
JAN	23	13	(-53)	12	9	6.0
FEB	10	88	(+40)	16	58	14.0
MAR	13	12	(-46)	10	1	8.6
APR	21	15	(-38)	7	0	7.0
MAY	13	31	(-22)	13	0	6.5
JUN	0	117	(+59)	19	49	6.5
JUL	0	43	(-4)	12	1	3.6
AUG	0	49	(-4)	14	14	5.1
SEP	0	12	(-43)	6	0	5.6
OCT	10	54	(-12)	8	24	5.3
NOV	9	82	(+18)	20	80	5.5
DEC	14	61	(-8)	18	50	8.9
YEAR*	113	576	(-113)	155	286	6.9

30-year means are for the period 1961-90

(1) Mean of maximum and minimum

(2) Number of nights grass min. was below 0.0°C

(3) Number of days rainfall was 0.2 mm or more

(4) At 2 metres above ground level

*Mean or total

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METEOROLOGICAL RECORDS 1997 - WOBURN

(Departure from 30-year means in brackets)

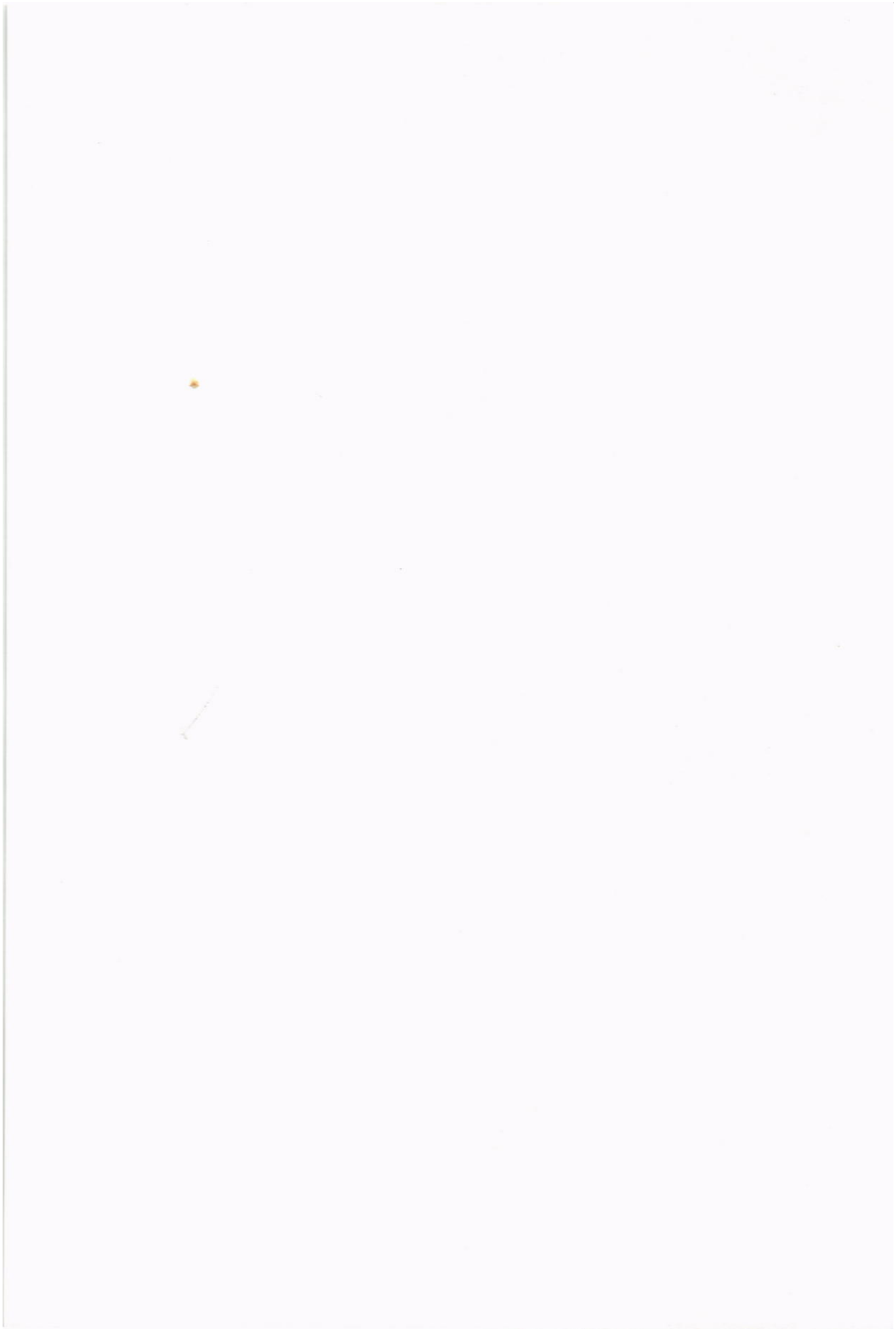
Mean temperature: °C

MONTH	Total sunshine: hours	Air(1)	Dew point	In ground under grass 30 cm	In ground under grass 100 cm	Ground frosts (2)	Total rainfall: mm 12.7 cm (5in) gauge	Rain days (3)	Wind km per hour (4)
JAN	45 (-4)	1.6 (-1.8)	0.0	1.9	5.1	23	14 (-38)	10	4.4
FEB	51 (-9)	6.5 (+3.1)	4.0	5.1	5.6	9	55 (+15)	14	15.2
MAR	138 (+35)	8.3 (+2.8)	5.2	7.9	7.3	12	7 (-45)	8	7.6
APR	169 (+40)	8.2 (+0.6)	3.7	10.0	8.6	18	11 (-40)	7	2.3
MAY	260 (+77)	11.1 (+0.2)	7.3	12.9	10.4	7	60 (-7)	14	8.4
JUN	145 (-39)	14.3 (+0.4)	10.0	16.1	13.3	0	98 (+43)	23	5.3
JUL	219 (+39)	16.6 (+0.7)	12.3	17.9	14.7	0	35 (-14)	12	5.2
AUG	190 (+21)	19.7 (+3.9)	15.0	19.9	16.5	0	30 (-29)	8	5.3
SEP	157 (+21)	14.6 (+1.0)	10.6	15.8	15.9	0	18 (-34)	7	6.3
OCT	150 (+49)	9.8 (-0.7)	6.7	11.9	14.0	10	61 (+5)	8	4.5
NOV	53 (-4)	8.2 (+2.0)	6.3	8.3	10.8	7	65 (+8)	16	5.1
DEC	37 (-6)	5.5 (+1.3)	3.7	6.3	9.0	13	52 (-7)	14	8.6
YEAR*	1613(+220)	10.4 (+1.2)	7.1	11.2	10.9	99	503 (-129)	141	6.5

https://doi.org/10.23637/ERADOC-1-53 *pp 160*

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CONVERSION FACTORS

Factors for the Conversion of Imperial to Metric Units

1 inch (in.)	= 2·540 centimetres (cm)
1 foot (ft) (=12 in.)	= 30·48 cm
1 yard (yd) (=3 ft)	= 0·9144 metre (m)
1 square yard (yd²)	= 0·8361 m²
1 acre (ac) (=4840 yd²)	= 0·4047 hectare (ha)
1 ounce (oz)	= 28·35 grams (g)
1 pound (lb)	= 0·4536 kilogram (kg)
1 hundredweight (cwt) (=112 lb)	= 50·80 kg
1 ton (=2240 lb)	= 1016 kg = 1·016 metric tons (tonnes) (t)
1 pint	= 0·5682 litre (l)
1 gallon (gal) (=8 pints)	= 4·546 litres
1 fluid ounce = 1/20 pint	= 0·02841 litre = 28·41 ml
1 cubic foot	= 28·32 litres

To convert	*Multiply by*
oz ac^{-1} to g ha^{-1}	70·06
lb ac^{-1} to kg ha^{-1}	1·121
cwt ac^{-1} to kg ha^{-1}	125·5
cwt ac^{-1} to t ha^{-1}	0·1255
ton ac^{-1} to kg ha^{-1}	2511
ton ac^{-1} to t ha^{-1}	2·511
gal ac^{-1} to l ha^{-1}	11·233

The following factors are accurate to about 2 parts in 100:

1 lb ac^{-1} = 1·1 kg ha^{-1}
1 gal ac^{-1} = 11 litres ha^{-1}
1 ton ac^{-1} = 2·5 t ha^{-1}

In general reading of the text there will be no great inaccuracy in regarding:

1 lb = 0·5 kg
1 lb ac^{-1} = 1 kg ha^{-1}

Temperatures

To convert °F into °C subtract 32 and multiply by $\frac{5}{9}$ (0.556)
To convert °C into °F multiply by $\frac{9}{5}$ (1·8) and add 32

https://doi.org/10.23637/ERADOC-1-53 *pp 163*

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CONVERSION FACTORS

Factors for the Conversion of Metric to Imperial Units

1 centimetre (cm)	=	0·3937 inch (in.) = 0·03281 ft
1 metre (m)	=	1·094 yards (yd)
1 square metre (m^2)	=	1·196 square yards (yd^2)
1 hectare (ha)	=	2·471 acres (ac)
1 gram (g)	=	0·03527 ounce (oz)
1 kilogram (kg)	=	2·205 pounds (lb)
1 kg	=	0·01968 hundredweight (cwt) = 0·0009842 ton
1 metric ton (tonne) (t)	=	0·9842 ton
1 litre	=	1·760 pints = 0·2200 gallon (gal)

1 litre = 1000 millilitres (ml) = 35·20 fluid ounces = 0·03531 cubic foot (ft^3)

To convert	*Multiply by*
g ha^{-1} to oz ac^{-1}	0·01427
kg ha^{-1} to lb ac^{-1}	0·8921
kg ha^{-1} to cwt ac^{-1}	0·007966
t ha^{-1} to cwt ac^{-1}	7·966
kg ha^{-1} to tons ac^{-1}	0·0003983
t ha^{-1} to tons ac^{-1}	0·3983
l ha^{-1} to gal ac^{-1}	0·08902

Plant nutrients

Plant nutrients are best stated in terms of amounts of the elements (P, K, Na, Ca, Mg, S); the old 'oxide' terminology (P_2O_5, K_2O, Na_2O, CaO, MgO, SO_3) is still used in work involving fertilisers and liming since Regulations require statements of P_2O_5, K_2O, etc.

For quick conversions

(accurate to within 2%) the following factors may be used:

$2\frac{1}{3} \times P = P_2O_5$	$\frac{3}{7} \times P_2O_5 = P$
$1\frac{1}{5} \times K = K_2O$	$\frac{5}{6} \times K_2O = K$
$1\frac{2}{5} \times Ca = CaO$	$\frac{7}{10} \times CaO = Ca$
$1\frac{2}{3} \times Mg = MgO$	$\frac{3}{5} \times MgO = Mg$

For accurate conversions:

To convert	*Multiply by*	*To convert*	*Multiply by*
P_2O_5 to P	0·4364	P to P_2O_5	2·2915
K_2O to K	0·8301	K to K_2O	1·2047
CaO to Ca	0·7146	Ca to CaO	1·3994
MgO to Mg	0·6031	Mg to MgO	1·6581

https://doi.org/10.23637/ERADOC-1-53 *pp 164*