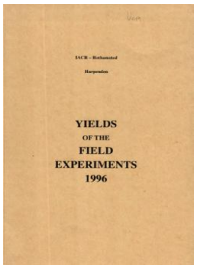
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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1996

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YIELDS OF THE FIELD EXPERIMENTS 1996

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YIELDS

OF THE

FIELD

EXPERIMENTS

1996

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 1997

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CONVENTIONS 1996

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' - (t) indicates a year when treatments were described. Since 1973 treatments have been described annually for all experiments and (t) is not used for these years.

For the classical and some long-term experiments reference is made to 'Details' - separate publications, giving full descriptions of treatments until 1967 & 1973, with full titles 'Details of the Classical and Long Term Experiments up to 1967' 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 seed rates, 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% N and 'Nitram' 34.5% N.

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

'Dolomite' means magnesian limestone.

Compound fertilizers indicated thus - (20:10:10) = compound fertilizer (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 activities 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

Tables of means are presented directly from computer output. Both factor and level names are presented in upper case characters. Vertical and horizontal lines are omitted e.g.:-

FACTOR C	LEVEL C1		LEVEL C2		LEVEL C3	
FACTOR B	LEVEL B1	LEVEL B2	LEVEL B1	LEVEL B2	LEVEL B1	LEVEL B2
FACTOR A						
LEVEL A1	*	*	*	*	*	*
LEVEL A2	*	*	*	*	*	*

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
Adjust	GR	620 g/l chlormequat
Agral	AD	948 g/l alkyl phenol ethylene oxide
Ally	H	20 % w/w metsulfuron-methyl
Alto 100 SL	F	100 g/l cyproconazole
Ambush C	I	100 g/l cypermethrin
Atlas Adjuvant Oil	AD	Adjuvant oil containing 95 % refined mineral oil
Atlas Simazine	H	500 g/l simazine
Avadex BW Granular	H	10 % w/w tri-allate
Barclay Eyetak	F	450 g/l prochloraz
Barclay Holdup	GR	700 g/l chlormequat
Bavistin DF	F	50 % w/w carbendazim
Baytan Flowable	F	22.5:187.5 g/l fuberidazole + triadimenol
Benlate Fungicide	F	50 % w/w benomyl
Benazalox	H	30:5 % w/w benazolin + clopyralid
Beret 050FS	F	50 g/l fenpiclonil
Birlane 24	I	240 g/l chlorfenvinphos
Brasoran 50WP	H	50 % w/w aziprotryne
Bravo 500	F	500 g/l chlorothalonil
Butisan S	H	500 g/l metazachlor
Calirus	F	50 % w/w benodanil
Campbell's Linuron 45% Flowable	H	450 g/l linuron
Carbetamex	H	70 % w/w carbetamide
Cheetah Super	H	55 g/l fenoxaprop-P-ethyl
Clayton Turret	F	500 g/l chlorothalonil
Compass	F	167:167 g/l iprodione + thiophanate-methyl
Cultar	GR	250 g/l paclobutrazol
Cyperkill 10	I	100 g/l cypermethrin
Dagger	H	300 g/l imazamethabenz-methyl
Decis	I	25 g/l deltamethrin
Dow Shield	H	200 g/l clopyralid
Draza	M,I	4 % w/w methiocarb
Duplosan New System CMPP	H	600 g/l mecoprop-P
Fastac	I	100 g/l alpha-cypermethrin
Folicur	F	250 g/l tebuconazole

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Fonofos Seed Treatment	I	433 g/l fonofos
Fortrol	H	500 g/l cyanazine
Fungazil 100 SL	F	100 g/l imazalil
Germipro	F	175:350 g/l carbendazim + iprodione
Gesaprim 500SC	H	500 g/l atrazine
Gramoxone 100	H	200 g/l paraquat
Halo	F	375:47 g/l chlorothalonil + flutriafol
Harvest	H	150 g/l glufosinate-ammonium
Katamaran	H	350:100 g/l metazachlor + quinmerac
Laser	H	200 g/l cycloxydim
Lindex-Plus FS	F,I	43:545:73 g/l fenpropimorph + gamma-HCH + thiram
Lo-gran 20 WG	H	20 % w/w triasulfuron
Mallard 750 EC	F	750 g/l fenpropidin
Mistral	F	750 g/l fenpropimorph
Monicle	F	300:200 g/l fenpropidin + tebuconazole
MSS Iprofile	H	500 g/l isoproturon
MTM Trifluralin	H	480 g/l trifluralin
Oxytril CM	H	200:200 g/l bromoxynil + ioxynil
Panoctine	F	300 g/l guazatine
Panther	H	50:500 g/l diflufenican + isoproturon
Pirimicarb 50 DG	I	50 % w/w pirimicarb
Portman Trifluralin	H	480 g/l trifluralin
Prelude 20LF	F	200 g/l prochloraz
Promet	I	40 % w/w furothiocarb
Punch C	F	125:250 g/l carbendazim + flusilazole
Rappor	F	300 g/l guazatine
Raxil S	F	20:20 g/l tebuconazole + triazoxide
Reglone	H,D	200 g/l diquat
Ronilan FL	F	500 g/l vinclozolin
Roundup	H	360 g/l glyphosate
Roundup Biactive	H	360 g/l glyphosate
Rovral Flo	F	255 g/l iprodine
Rovral Liquid FS	F	500 g/l iprodione
Shirlan	F	500 g/l fluazinam
Sibutol	F	375:23 g/l biteranol + fuberidazole
Silvacur	F	250:125 g/l tebuconazole + triadimenol
Spannit	A,I	480 g/l chlorpyrifos
Sportak 45	F	450 g/l prochloraz
Sprayprover	AD	Adjuvant oil containing 92 % highly refined mineral oil
Standon Diquat	H,D	200 g/l diquat
Starane 2	H	200 g/l fluroxypyr
Stefes Glyphosate	H	360 g/l glyphosate
Stefes IPU	H	500 g/l isoproturon

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Stomp 400 SC	H	400 g/l pendimethalin
Sumico	F	carbendazim + diethofencarb
Tilt 250 EC	F	250 g/l propiconazole
Topik	H	240 g/l clodinafop-propargyl
Treflan	H	480 g/l trifluralin
Tribunil	H	70 % w/w methabenzthiazuron
Tripart Defensor FL	F	500 g/l carbendazim
Tropotox	H	400 g/l MCPB
Trump	H	236:236 g/l isoproturon + pendimethalin
Vassgro Spreader	AD	nonyl phenol-ethylene oxide condensates
Vindex	H	240:50 g/l bromoxynil + clopyralid
Vitaflo Extra	F	300:20:25 g/l carboxin + imazalil + thiabendazole
Wireworm FS Seed Treatment	I	100 g/l gamma-HCH
Yaltox	I,N	5 % w/w carbofuran

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96/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.

The 153rd year, w. wheat, w.oats and potatoes.

For previous years see 'Details' 1967 and 1973, Station Report for 1966, pp. 229-231, Station Report for 1968, Part 2, Station Report for 1982, Part 2, pp. 5-44 and 74-95/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00351
	1	0.00645
	2,4,6 and 7	0.00533
	8 and 9	0.00561
Oats:	3	0.00533
Potatoes:	5	0.00348

Treatments:

Whole plots

PLOT Fertilizers and organic manures:-

	Plot	Treatments until 1967	Treatments from 1968	Treatments from 1985
01DN4PK	01	-	D N2 P K	D N4 P K
21DN2	21	D	D N2	D N2
22D	22	D	D	D
030	03	None	None	None
05F	05	P K Na Mg	P K (Na) Mg	PK Mg
06N1F	06	N1 P K Na Mg	N1 P K (Na) Mg	N1 P K Mg
07N2F	07	N2 P K Na Mg	N2 P K (Na) Mg	N2 P K Mg
08N3F	08	N3 P K Na Mg	N3 P K (Na) Mg	N3 P K Mg
09N4F	09	N*1 P K Na Mg	N4 P K (Na) Mg	N4 P K Mg
10N2	10	N2	N2	N2
11N2P	11	N2 P	N2 P	N2 P
12N2PNA	12	N2 P Na	N2 P Na	N2 P Na
13N2PK	13	N2 P K	N2 P K	N2 P K
14N2PKMG	14	N2 P Mg	N2 P K Mg	N2 P K Mg
15N5F	15	N2 P K Na Mg	N3 P K (Na) Mg	N5 P K Mg
16N6F	16	N*2 P K Na Mg	N2 P K (Na) Mg	N6 P K Mg
17N1+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK Mg)+
18N0+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N0+3 1/2(PK Mg)+
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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\+ This change since 1980. Treatments shown are those to w. wheat; autumn N alternates. Potatoes receive N3 1/2 (PK Mg) on both Plots 17 and 18.

W. oats; N and D were not applied.

N1,N2,N3,N4,N5,N6: 48, 96, 144, 192, 240, 288 kg N as sulphate of ammonia until 1967, except N* which was nitrate of soda. All as 'Nitro-Chalk' in spring from 1968 to 1985, as 34.5% N since 1986.

N0+3; N1+3: None in autumn + 144 kg N in spring; 48 kg N in autumn + 144 kg N in spring

P: 35 kg P as triple superphosphate in 1974 and since 1988, single superphosphate in other years

K: 90 kg K as sulphate of potash

Na: 55 kg Na as sulphate of soda

(Na): 16 kg Na as sulphate of soda until 1973

Mg: 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 96 kg N until 1988, none since

F: P K (Na) Mg H: Half rate

Strips of sub-plots: Until 1967 wheat alone was grown on the experiment, with some bare fallowing. From 1968, ten strips of sub-plots (sections) were started with the following cropping:-

SECTION	1/W30	9/W38	0/W45	8/W2	6/W19	5/P	3/O	7/W2	4/W1	2/W3
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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96/R/BK/1

SECTION	1/W30	9/W38	0/W45	8/W2	6/W19	5/P	3/O	7/W2	4/W1	2/W3
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

W = w. wheat, O = w. oats, P = potatoes, BE = s. beans, F = fallow

* Straw incorporated since autumn 1986. ** No sprays except weedkillers since 1985. + No weedkillers.

NOTES: (1) For a fuller record of treatments see 'Details' etc.
(2) From autumn 1975 to autumn 1986, chalk was applied at 2.9 t each autumn to all plots in sets of Sections on a three-year cycle. Year 1: Sections 1,2,3. Year 2: Sections 6,7,8,9. Year 3: Sections 0,4,5. From autumn 1988 until autumn 1992 a five-year cycle was used. Year 1: Sections 1,3. Year 2: Sections 2,8. Year 3: Sections 7,9. Year 4: Sections 4,6. Year 5: Sections 0,5. None applied since autumn 1991.

Experimental diary:

All sections:

18-Sep-95 : **T** : P applied.
21-Sep-95 : **T** : Mg and Na applied.
22-Sep-95 : **T** : K applied.
29-Sep-95 : B : Ploughed and furrow pressed.
09-Oct-95 : B : Spring-tine cultivated.

Cropped sections:

W. wheat:

11-Aug-95 : **T** : Straw chopped (section 0 only), straw baled (sections 1, 2, 6, 7, 8 and 9).
22-Sep-95 : **T** : Autumn N treatment applied.
26-Sep-95 : **T** : Farmyard manure applied.
11-Oct-95 : **T** : Rotary harrowed, Hereward, dressed Fonofos Seed Treatment, drilled at 380 seeds per m^2.
12-Oct-95 : **T** : Rolled.
17-Apr-96 : **T** : Spring N treatments applied.
26-Apr-96 : **T** : Ally at 30 g with Cheetah Super at 1.25 l in 200 l (except section 8).
: **T** : Barclay Eyetak at 0.9 l in 200 l (except section 6).
29-Apr-96 : **T** : Barclay Holdup at 2.3 l in 200 l (except section 6).
07-Jun-96 : **T** : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 320 l (except section 6).
16-Aug-96 : **T** : Combine harvested.

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96/R/BK/1

Experimental diary:

Potatoes:

26-Sep-95	T	Farmyard manure applied.
17-Apr-96	T	Spring N treatments applied.
24-Apr-96	T	Heavy spring-tine cultivated.
30-Apr-96	T	Heavy spring-tine cultivated.
01-May-96	T	Rotary harrowed, planted Estima, dressed Fungazil 100 SL.
31-May-96	T	Rotary ridged.
04-Jun-96	T	Campbell's Linuron 45% Flowable at 5.0 l in 320 l.
05-Jul-96	T	Clayton Turret at 2.0 l in 260 l.
22-Jul-96	T	Clayton Turret at 2.0 l in 300 l.
02-Aug-96	T	Clayton Turret at 2.0 l in 400 l.
15-Aug-96	T	Shirlan at 0.3 l in 390 l.
02-Sep-96	T	Shirlan at 0.3 l in 260 l.
12-Sep-96	T	Haulm pulverised.
24-Sep-96	T	Potatoes lifted.

W. oats:

11-Aug-95	T	Straw baled.
12-Oct-95	T	Rotary harrowed, Image, dressed Vitaflo Extra, drilled at 350 seeds per m^2, rolled.
13-Oct-95	T	Tribunil at 2.25 kg in 200 l.
30-May-96	T	Tilt 250 EC at 0.5 l with Barclay Holdup at 2.3 l and Vassgro Spreader 200 ml in 200 l.
05-Aug-96	T	Combine harvested.

NOTE: Samples of wheat grain and straw from sections 1, 4, 6 and 9, samples of oat grain and straw and samples of potato tubers were taken for chemical analysis. Unground grain and straw samples were taken from selected plots and archived.

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96/R/BK/1 W. WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	4/W1	7/W2	8/W2	2/W3	6/W19	1/W30	9/W38	0/W45
01DN4PK	9.20	9.49	*	8.50	9.11	*	*	*
21DN2	9.16	8.65	5.49	7.60	8.18	8.53	7.81	7.29
22D	7.77	5.43	5.72	5.61	6.66	7.45	5.42	6.34
030	3.61	1.03	2.85	1.22	1.56	1.93	0.95	1.83
05F	3.03	1.08	2.97	1.45	2.05	1.77	1.62	1.40
06N1F	6.11	3.67	4.60	3.05	4.37	3.66	3.95	3.89
07N2F	7.74	5.70	5.56	5.03	6.27	6.27	5.83	6.53
08N3F	8.50	7.43	6.76	6.73	7.94	7.48	7.11	7.45
09N4F	8.82	8.31	7.01	7.35	8.13	8.04	8.02	8.23
10N2	6.11	4.54	4.63	4.38	4.17	3.80	3.58	4.20
11N2P	6.51	5.21	4.39	4.78	4.35	4.02	3.64	4.51
12N2PNA	6.67	5.59	4.80	4.84	5.67	4.61	4.21	5.21
13N2PK	7.52	5.84	5.56	5.33	6.41	5.46	5.78	6.46
14N2PKMG	7.76	5.99	6.31	5.23	6.48	5.83	5.61	6.35
15N5F	8.98	8.93	7.35	8.06	7.99	8.24	7.89	8.30
16N6F	8.59	8.51	6.65	7.94	7.84	7.97	8.50	8.33
17N1+3FH	8.75	8.78	6.84	7.97	8.38	7.73	8.20	7.60
18N0+3FH	8.59	7.92	6.15	6.78	8.18	7.23	7.36	7.53
19(C)	4.19	1.15	2.58	1.74	1.46	2.53	2.23	2.16
20NKMG	*	*	*	*	*	3.71	*	4.11

GRAIN MEAN DM% 86.0

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96/R/BK/1 W. WHEAT

STRAW TONNES/HECTARE

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

SECTION PLOT	4/W1	6/W19	1/W30	9/W38
01DN4PK	6.23	*	*	*
21DN2	5.50	5.31	6.20	3.74
22D	4.27	3.67	4.66	2.15
030	1.29	0.61	0.68	0.08
05F	0.92	0.67	0.58	0.52
06N1F	2.33	1.45	1.27	1.69
07N2F	3.57	2.68	2.79	2.40
08N3F	4.57	3.93	3.98	2.83
09N4F	4.89	4.36	4.69	3.21
10N2	1.95	*	1.41	*
11N2P	2.56	*	1.32	*
12N2PNA	2.62	*	1.92	*
13N2PK	3.18	*	2.41	*
14N2PKMG	3.54	*	2.46	*
15N5F	5.14	4.23	4.92	3.68
16N6F	4.90	4.69	4.95	4.19
17N1+3FH	4.79	*	4.18	*
18N0+3FH	4.58	*	3.58	*
19(C)	1.61	*	0.76	*
20NKMG	*	*	1.75	*

STRAW MEAN DM% 94.4

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96/R/BK/1 W. OATS

TONNES/HECTARE

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

PLOT	GRAIN	STRAW
01DN4PK	8.31	4.10
21DN2	7.61	3.16
22D	7.49	2.98
030	2.05	0.59
05F	2.27	0.69
06N1F	2.36	0.73
07N2F	3.07	1.13
08N3F	3.70	1.24
09N4F	4.45	1.54
10N2	3.41	1.10
11N2P	3.34	0.87
12N2PNA	3.68	0.98
13N2PK	2.97	1.02
14N2PKMG	2.93	0.95
15N5F	6.94	2.82
16N6F	7.78	3.56
17N3FH	3.72	1.24
18N3FH	3.30	0.93
19(C)	2.17	0.49

GRAIN MEAN DM% 89.3

STRAW MEAN DM% 59.9

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

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96/R/BK/1 POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	35.1	94.1
21DN2	40.9	95.4
22D	38.5	96.6
030	6.3	78.1
05F	11.0	88.8
06N1F	18.2	91.7
07N2F	23.7	94.4
08N3F	26.8	94.6
09N4F	24.0	95.1
10N2	5.2	68.3
11N2P	6.8	68.9
12N2PNA	9.0	68.5
13N2PK	11.4	90.2
14N2PKMG	28.3	94.5
15N5F	28.5	95.8
16N6F	23.6	94.3
17N3FH	15.5	91.1
18N3FH	18.3	93.2
19(C)	9.8	85.6

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96/R/HB/2

HOOS BARLEY

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

The 145th year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-95/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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96/R/HB/2

Form of N: A, sulphate of ammonia: N, nitrate of soda - each to supply 48 kg N: C, castor meal to supply 96 kg N
P: 35 kg P as triple superphosphate in 1974 and since 1988, single superphosphate in other years
K: 90 kg K as sulphate of potash
(Na): 16 kg Na as sulphate of soda until 1973
Mg: 35 kg Mg, as kieserite every third year since 1974 (sulphate of magnesia annually until 1973)
Si: Silicate of soda at 450 kg
D: Farmyard manure at 35 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 1968-85, as 34.5% N since 1986 (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 1968-85, as 34.5% N since 1986. 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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96/R/HB/2

Experimental diary:

06-Aug-95 : B : Straw baled.
02-Nov-95 : T : P applied.
08-Nov-95 : T : K applied.
11-Dec-95 : T : Si applied.
14-Dec-95 : T : Farmyard manure applied.
19-Dec-95 : B : Ploughed.
15-Mar-96 : B : Spring-tine cultivated, rotary harrowed, Cooper, dressed Baytan Flowable, drilled at 350 seeds per m^2.
18-Mar-96 : B : Rolled.
30-Apr-96 : T : N applied.
02-Jun-96 : B : Duplosan New System CMPP at 2.0 l with Vindex at 1.4 l in 200 l.
11-Jul-96 : B : Pulled wild oats by hand.
22-Aug-96 : T : Combine harvested.

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

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96/R/HB/2 MAIN PLOTS

GRAIN TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	1.49	1.82	1.91	1.65	1.72
-P-	1.19	2.14	3.12	3.27	2.43
--K	1.96	3.63	3.91	3.15	3.16
-PK	2.07	2.86	4.98	3.62	3.38
A--	0.58	1.52	2.01	1.60	1.43
AP-	1.81	1.81	2.06	2.62	2.07
A-K	1.26	1.19	2.67	2.32	1.86
APK	1.01	3.95	4.40	4.61	3.49
N----	0.53	1.04	1.39	1.64	1.15
NP---	1.38	3.42	2.78	3.50	2.77
N-K--	1.77	2.31	1.91	2.18	2.04
NPK--	1.98	3.15	4.51	4.78	3.60
N--S-	2.19	2.06	2.46	2.92	2.41
NP-S-	1.79	2.26	3.47	4.20	2.93
N-KS-	2.11	3.06	4.20	3.72	3.27
NPKS-	1.65	3.59	4.99	6.35	4.15
N---S	1.24	2.25	2.77	3.38	2.41
NP--S	2.24	2.58	3.19	3.78	2.95
N-K-S	1.12	3.10	4.57	3.12	2.98
NPK-S	1.71	3.30	4.71	4.85	3.64
N--SS	1.31	2.12	3.33	2.91	2.42
NP-SS	1.52	2.26	3.45	4.06	2.82
N-KSS	1.65	4.30	4.58	3.99	3.63
NPKSS	1.65	3.84	4.45	4.98	3.73
C(--)	1.71	3.98	4.19	3.80	3.42
C(P-)	1.47	2.91	4.24	4.32	3.24
C(-K)	1.71	2.90	4.39	4.10	3.28
C(PK)	2.15	4.96	3.80	4.91	3.95
D	7.99	9.03	8.24	9.89	8.79
(D)	3.58	3.38	4.84	3.84	3.91
(A)	0.77	3.06	2.82	4.20	2.71
-	1.70	2.27	3.21	2.61	2.45
Mean	1.82	3.00	3.67	3.78	3.07

GRAIN MEAN DM% 86.6

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96/R/HB/2 MAIN PLOTS

STRAW TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.38	0.53	0.34	0.59	0.46
-P-	0.19	0.34	0.93	0.99	0.61
--K	0.47	1.44	1.06	0.66	0.91
-PK	0.38	0.42	1.68	0.67	0.79
A--	0.15	0.23	0.48	0.15	0.25
AP-	0.38	0.30	0.50	0.91	0.52
A-K	0.17	0.11	0.84	0.51	0.41
APK	0.15	0.83	1.02	0.80	0.70
D	2.45	2.26	2.41	2.57	2.42
(D)	0.75	0.65	1.68	1.36	1.11
(A)	0.15	0.80	0.55	0.71	0.55
-	0.49	0.50	1.47	0.74	0.80
Mean	0.51	0.70	1.08	0.89	0.79

STRAW MEAN DM% 88.6

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	Mean
MGNESIUM					
0	5.46	0.46	3.82	1.72	2.87
35	5.30	0.53	3.56	1.90	2.82
Mean	5.38	0.49	3.69	1.81	2.84

GRAIN MEAN DM% 87.4

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96/R/WF/3

WHEAT AND FALLOW

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

The 141st year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-95/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:
29-Sep-95 : **T** : Rotary harrowed, Hereward, dressed Fonofos Seed Treatment, drilled at 380 seeds per m^2.
26-Apr-96 : **T** : Ally at 30 g with Cheetah Super at 1.25 l in 200 l.
06-Jun-96 : **T** : Monicle at 1.0 l in 320 l.
16-Aug-96 : **T** : Combine harvested.
Fallow plot:
11-Aug-95 : **T** : Straw baled.
25-Sep-95 : **T** : Ploughed and furrow pressed.
30-Apr-96 : **T** : Heavy spring-tine cultivated.
17-Jul-96 : **T** : Shallow cultivated with thistle-bar.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	2.48	1.35
MEAN DM%	86.3	96.3
PLOT AREA HARVESTED	0.023232	

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96/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 141st year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-95/R/EX/4.

Treatments: All combinations of:-

Whole plots (P test)

1. **OLD RES**		Residues of manures applied annually 1876-1901:
	O	None
	D	Farmyard manure at 35 t
	N	96 kg N as ammonium salts
	P	34 kg P as superphosphate
	NPKNAMG	N and P as above plus 137 kg K as sulphate of potash, 16 kg Na as sulphate of soda, 11 kg Mg as sulphate of magnesia
2. **P 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*	96 kg N as nitrate of soda
	PK	34 kg P as superphosphate, 137 kg K as sulphate of potash
	N*PK	N, P and K as above

Experimental diary:

P test:

18-Sep-95 : **T** : Muriate of potash at 171 kg.

K test:

18-Sep-95 : **T** : Triple superphosphate at 319 kg.

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96/R/EX/4

Experimental diary:
All plots:
11-Aug-95 : B : Straw baled.
25-Sep-95 : B : Ploughed and furrow pressed.
29-Sep-95 : B : Rotary harrowed, Hereward, dressed Panoctine, drilled at 380 seeds per m^2.
15-Apr-96 : B : 34.5% N at 580 kg.
26-Apr-96 : B : Ally at 30 g with Cheetah Super at 1.25 l and Barclay Holdup at 2.3 l in 200 l.
06-Jun-96 : B : Monicle at 1.0 l in 320 l.
08-Jul-96 : B : Pulled wild oats by hand.
15-Aug-96 : 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	3.33	7.16	7.65	7.91	6.51
D	6.81	7.68	7.98	7.56	7.50
N	3.50	7.69	7.53	7.13	6.46
P	6.78	8.20	8.35	8.12	7.86
NPKNAMG	6.27	7.39	7.25	7.47	7.09
Mean	5.34	7.62	7.75	7.64	7.09

GRAIN MEAN DM% 86.9

STRAW TONNES/HECTARE

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

P RES / OLD RES	0	P1	P2	P3	Mean
0	1.54	3.20	4.08	4.46	3.32
D	3.07	3.66	4.04	3.92	3.68
N	1.70	3.80	3.76	3.76	3.26
P	2.85	3.68	3.87	3.81	3.55
NPKNAMG	2.68	3.70	3.39	3.44	3.30
Mean	2.37	3.61	3.83	3.88	3.42

STRAW MEAN DM% 93.1

PLOT AREA HARVESTED 0.00589

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96/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

OLD RES	
O	6.89
D	7.56
N*	7.42
PK	8.30
N*PK	7.82
Mean	7.60

GRAIN MEAN DM% 86.9

STRAW TONNES/HECTARE

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

OLD RES	
O	3.66
D	3.86
N*	3.65
PK	4.45
N*PK	4.27
Mean	3.98

STRAW MEAN DM% 93.2

PLOT AREA HARVESTED 0.00589

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96/R/PG/5

PARK GRASS

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

The 141st year, hay.

For previous years see 'Details' 1967 and 1973 and 74-95/R/PG/5.

Treatments: Combinations of:-

Whole plots

1. **MANURE**	Fertilizers and organic manures:	
N1	Plot 1	N1
K	Plot 2/1	K in 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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96/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, and at the same rate, to all 'a' and 'b' sub-plots of plots 1 to 17 (except 12) from 1924. Differential liming started in 1965 on certain 'b' and 'c' sub-plots (except on plot 12) and in 1976 on certain 'a' sub-plots (including plot 12) and 12b. Lime last applied in 1994.

Liming plots 18-20:

Differential rates of lime were applied to sub-plots 2 and 3 regularly 1920-1964. Since 1965 plot 18-1 has been split into two for treatments 'c' and 'd' above and plot 18-3 split into two for treatments 'a' and 'b'. Plots 19 and 20 received no further chalk after 1968; plot 18/2 no further chalk after 1972.

In 1995 plot 13 was split in two, 13/1 to receive no more manure, 13/2 to receive organic manures as hitherto. In 1996 plot 2 was split in two, 2/1 to test potassium, 2/2 to continue without fertilizers.

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

Experimental diary:

02-Nov-95 : **T** : P applied.
07-Nov-95 : **T** : K, Na, Mg and Si applied.
29-Apr-96 : **T** : N applied.
17-Jun-96 : B : Cut.
19-Jun-96 : B : Hay turned.
20-Jun-96 : B : Hay rowed up and baled.
11-Nov-96 : 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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96/R/PG/5

1ST CUT (17/6/96) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	2.74	2.30	1.58	0.53	1.79
K	2/1	1.79	2.60	1.52	1.87	1.94
O(D)	2/2	2.09	2.77	1.19	1.35	1.85
O	3	1.80	1.88	1.06	1.32	1.51
P	4/1	2.41	3.08	1.80	2.03	2.33
N2P	4/2	2.39	2.18	1.88	0.57	1.75
N1MN	6	4.11	3.78			3.95
MN	7	4.05	4.45	3.14	1.59	3.31
PNAMG	8	2.66	3.41	2.31	2.21	2.65
MN(N2)	9/1	4.34	3.65	0.95	0.51	2.36
N2MN	9/2	4.92	4.09	3.01	1.93	3.49
N2PNAMG	10	4.27	3.20	2.54	1.42	2.86
N3MN	11/1	5.49	4.68	3.62	3.61	4.35
N3MNSI	11/2	5.19	4.21	3.27	4.26	4.23
O	12	1.84	1.99	1.17	1.21	1.55
(D/F)	13/1	3.23	4.23	3.08	3.03	3.39
D/F	13/2	3.52	4.89	4.47	3.84	4.18
MN(N2*)	14/1	3.97	4.08	3.21	4.01	3.82
N2*MN	14/2	4.94	4.94	5.26	4.72	4.97
MN(N2*)	15	3.54	3.66	2.44	1.82	2.87
N1*MN	16	4.07	4.09	2.88	3.28	3.58
N1*	17	2.41	2.23	3.11	2.92	2.67
N2KNAMG0	18/1			2.36	0.14	1.25
N2KNAMG2	18/2					2.91
N2KNAMG1	18/3	2.05	2.40			2.22
D0	19/1					3.39
D2	19/2					4.96
D1	19/3					3.46
D/N*PK0	20/1					4.24
D/N*PK2	20/2					5.01
D/N*PK1	20/3					4.55

1ST CUT MEAN DM% 33.4

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96/R/PG/5

2ND CUT (11/11/96) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	1.20	1.14	0.78	0.16	0.82
K	2/1	0.75	0.73	0.65	0.72	0.71
O(D)	2/2	0.38	0.35	0.32	0.41	0.37
O	3	0.42	0.37	0.43	0.56	0.44
P	4/1	0.44	0.51	0.59	0.68	0.55
N2P	4/2	1.02	0.87	0.64	0.51	0.76
N1MN	6	0.64	0.66			0.65
MN	7	0.45	0.54	0.78	0.50	0.57
PNAMG	8	0.76	0.90	1.02	0.95	0.91
MN(N2)	9/1	0.42	0.49	0.31	0.17	0.35
N2MN	9/2	0.85	0.95	0.77	1.10	0.92
N2PNAMG	10	0.85	1.07	0.85	0.83	0.90
N3MN	11/1	1.43	1.04	1.10	1.71	1.32
N3MNSI	11/2	1.64	0.97	0.75	1.67	1.26
O	12	0.31	0.34	0.49	0.34	0.37
(D/F)	13/1	0.73	0.61	0.38	0.39	0.53
D/F	13/2	1.24	1.33	0.64	0.72	0.99
MN(N2*)	14/1	0.94	0.73	0.69	1.00	0.84
N2*MN	14/2	1.16	1.12	1.40	1.60	1.32
MN(N2*)	15	0.65	0.69	0.68	0.56	0.65
N1*MN	16	0.92	0.82	0.66	0.70	0.78
N1*	17	0.64	0.71	0.90	1.05	0.82
N2KNAMG0	18/1			1.03	0.20	0.61
N2KNAMG2	18/2					1.68
N2KNAMG1	18/3	0.87	1.16			1.02
D0	19/1					0.63
D2	19/2					0.65
D1	19/3					0.64
D/N*PK0	20/1					0.71
D/N*PK2	20/2					0.72
D/N*PK1	20/3					0.68

2ND CUT MEAN DM% 29.5

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96/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	3.94	3.45	2.35	0.68	2.61
K	2/1	2.53	3.33	2.16	2.59	2.65
O(D)	2/2	2.47	3.11	1.51	1.76	2.21
O	3	2.21	2.24	1.49	1.89	1.96
P	4/1	2.85	3.59	2.39	2.71	2.88
N2P	4/2	3.40	3.05	2.52	1.09	2.52
N1MN	6	4.75	4.44			4.60
MN	7	4.50	4.99	3.93	2.08	3.88
PNAMG	8	3.42	4.31	3.34	3.17	3.56
MN(N2)	9/1	4.75	4.14	1.26	0.68	2.71
N2MN	9/2	5.76	5.04	3.78	3.03	4.40
N2PNAMG	10	5.12	4.27	3.40	2.25	3.76
N3MN	11/1	6.92	5.72	4.72	5.32	5.67
N3MNSI	11/2	6.83	5.17	4.02	5.94	5.49
O	12	2.15	2.33	1.66	1.54	1.92
(D/F)	13/1	3.96	4.83	3.46	3.42	3.92
D/F	13/2	4.76	6.22	5.11	4.56	5.16
MN(N2*)	14/1	4.91	4.81	3.90	5.01	4.66
N2*MN	14/2	6.10	6.07	6.66	6.33	6.29
MN(N2*)	15	4.19	4.35	3.12	2.38	3.51
N1*MN	16	4.99	4.91	3.53	3.98	4.36
N1*	17	3.04	2.95	4.00	3.97	3.49
N2KNAMG0	18/1			3.39	0.34	1.86
N2KNAMG2	18/2					4.58
N2KNAMG1	18/3	2.92	3.56			3.24
D0	19/1					4.03
D2	19/2					5.62
D1	19/3					4.10
D/N*PK0	20/1					4.95
D/N*PK2	20/2					5.73
D/N*PK1	20/3					5.23

TOTAL OF 2 CUTS MEAN DM% 31.5

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96/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, 2nd year of clover. Sections 3-6, 2nd year of grass/clover.

For previous years see 'Details' 1967 and 1973 and 74-95/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 1996 (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 1961, nitrate of soda and sulphate of ammonia until 1959.

Plus one plot **MANURE** KMG 100

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96/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:
08-Nov-95 : **T** : P and K applied.
27-Mar-96 : **T** : N applied
25-Apr-96 : B : Rolled.
10-Jun-96 : **T** : Cut, herbage removed.
11-Jun-96 : **T** : N applied.
11-Nov-96 : **T** : Cut, herbage removed.

NOTE: Herbage samples were taken for chemical analysis.

GRASS/CLOVER

1ST CUT (10/6/96) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
D	5.35	6.43	6.49	5.86	6.03
DPK	6.12	6.18	6.63	6.76	6.43
PKMG	5.43	5.52	5.54	5.67	5.54
P	4.30	4.06	4.41	4.54	4.33
PK	4.60	5.61	5.77	5.70	5.42
PMG	3.57	3.73	3.72	3.23	3.56
0	3.29	4.01	3.33	2.67	3.33
Mean	4.67	5.08	5.13	4.92	4.95

MANURE KMG 100 5.62

Grand mean 4.97

1ST CUT MEAN DM% 23.0

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96/R/BN/7

GRASS/CLOVER

2ND CUT (11/11/96) DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
D	1.26	2.31	2.54	3.21	2.33
DPK	2.03	2.80	2.35	3.36	2.63
PKMG	1.57	2.53	2.71	3.10	2.48
P	1.10	1.60	2.58	1.33	1.65
PK	1.29	2.22	2.69	3.50	2.42
PMG	1.06	0.95	1.79	0.75	1.14
0	0.70	0.64	0.58	0.55	0.62
Mean	1.29	1.86	2.18	2.26	1.90

MANURE KMG 100 2.46

Grand mean 1.92

2ND CUT MEAN DM% 22.2

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

N PERCUT MANURE	75	100	125	150	Mean
D	6.61	8.73	9.03	9.07	8.36
DPK	8.15	8.98	8.98	10.12	9.06
PKMG	7.00	8.05	8.25	8.77	8.02
P	5.40	5.66	6.99	5.87	5.98
PK	5.89	7.82	8.46	9.20	7.84
PMG	4.63	4.68	5.52	3.98	4.70
0	3.99	4.65	3.91	3.22	3.94
Mean	5.95	6.94	7.31	7.18	6.84

MANURE KMG 100 8.08

Grand mean 6.89

TOTAL OF 2 CUTS MEAN DM% 22.6

PLOT AREA HARVESTED 0.00155

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96/R/BN/7

CLOVER

1ST CUT (10/6/96) DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	3.54	3.43	2.92	2.69	3.21	3.48	2.23	3.07

1ST CUT MEAN DM% 19.5

2ND CUT (11/11/96) DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	0.82	1.13	0.76	0.38	1.13	0.55	0.46	0.75

2ND CUT MEAN DM% 17.4

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	4.36	4.56	3.67	3.08	4.34	4.03	2.69	3.82

TOTAL OF 2 CUTS MEAN DM% 18.5

PLOT AREA HARVESTED 0.00155

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96/R/GC/8

GARDEN CLOVER

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

The 143rd year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-95/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:

25-Apr-96 : B : Chalk at 1.0 t, PK as (0:18:36) at 420 kg and Epsom salts at 530 kg. Hand dug, roots and stems removed.
31-May-96 : B : Raked, Merviot undressed sown at 30 kg.
18-Jun-96 : B : Irrigated 12.5 mm.
16-Oct-96 : B : Cut, hand weeded, patches re-sown with Merviot.

NOTE: Soils were sampled in March and harvested crop sampled for chemical analysis.

1ST CUT (16/10/96) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	1.91	1.78	1.84

1ST CUT MEAN DM% 19.5

PLOT AREA HARVESTED 0.00010

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96/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 59th year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-95/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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96/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. **FYMRES65** Farmyard manure residues, last applied 1965:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1996 (kg N) as 27.5% N:

   0
   70
   140
   210

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96/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. **FYMRES64** Farmyard manure residues, last applied 1964:

   NONE
   FYM 38 t on each occasion

1/8 plots

3. **N** Nitrogen fertilizer in spring 1996 (kg N) as 27.5% N:

   0
   30
   60
   90

Treatments to leys:

FYM RES Farmyard manure residues:

NONE
FYM 38 t on each occasion, last applied 1963 to 1st and 6th year leys, 1962 to 2nd and 7th year leys, 1966 to 3rd and 8th year leys, 1965 to 4th year leys, 1964 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 18-Sep-95:

Continuous rotations before wheat	No FYM half plots	FYM half plots
LN3	0	0
LC3	0	0
AF	300	300
AB	300	300

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96/W/RN/3

Ex-alternating rotations		
LLN 8 ploughed for w. wheat	0	0
LLN 3 not ploughed	0	0
LLC 8 ploughed for w. wheat	0	0
LLC 3 not ploughed	0	0

Experimental diary:

Treatment crops:

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

18-Sep-95 : **T** : Ploughed.
23-Sep-95 : **T** : Rolled.
29-Sep-95 : **T** : LN1 and LLN1 only: 34.5% N at 217 kg, rotary harrowed, 50% Rossa meadow fescue and 50% Erecta RVP Timothy mixture drilled at 30 kg.
: **T** : LC1 and LLC1 only: 34.5% N at 145 kg, rotary harrowed, 40% Rossa meadow fescue, 48% Erecta RVP Timothy and 12% Huia white clover mixture drilled at 30 kg.
18-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.
13-Jun-96 : **T** : First cut.
17-Jun-96 : **T** : Produce removed.
27-Jun-96 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
11-Oct-96 : **T** : Second cut.

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

05-Oct-95 : **T** : LLN5 only: Dolomite at 5.0 t.
18-Mar-96 : **T** : PK as (0:20:32) at 469 kg. NK as (25:0:16) at 300 kg.
13-Jun-96 : **T** : First cut.
17-Jun-96 : **T** : Produce removed.
27-Jun-96 : **T** : NK as (25:0:16) at 300 kg.
11-Oct-96 : **T** : Second cut.

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

05-Oct-95 : **T** : LLC5 only: Dolomite at 5.0 t.
18-Mar-96 : **T** : PK as (0:20:32) at 469 kg. Muriate of potash at 80 kg.
13-Jun-96 : **T** : First cut.
17-Jun-96 : **T** : Produce removed.
27-Jun-96 : **T** : Muriate of potash at 80 kg.
11-Oct-96 : **T** : Second cut.

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

18-Sep-95 : **T** : Ploughed.
23-Sep-95 : **T** : Rolled.
28-Mar-96 : **T** : NPK applied as (20:10:10) at 400 kg. Rotary harrowed, Cooper, dressed Raxil S, drilled at 350 seeds per m^2.
07-May-96 : **T** : Rotary harrowed, Cooper, dressed Raxil S, re-drilled at 400 seeds per m^2.
02-Jun-96 : **T** : Ally at 30 g with Oxytril CM at 0.5 l in 200 l.
14-Jun-96 : **T** : Tilt 250 EC at 0.5 l in 300 l.
21-Aug-96 : **T** : Combine harvested.

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

20-Oct-95 : **T** : PK as (0:24:24) at 168 kg.
23-Oct-95 : **T** : Punch C broadcast at 21 seeds per m^2, ploughed.

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96/W/RN/3

Experimental diary:

W. beans, 3rd treatment crop (**ROTATION** AF and AB):
- 07-Feb-96 : **T** : Carbetamex at 3.0 kg in 200 l.
- 02-Jun-96 : **T** : Clayton Turret at 2.0 l in 300 l.
- 13-Sep-96 : **T** : Combine harvested.

Fallow, 1st and 2nd treatment years (**ROTATION** AF):
- 18-Sep-95 : **T** : Plots 19 and 20: Ploughed.
- 23-Sep-95 : **T** : Plots 19 and 20: Rolled.
- 23-Oct-95 : **T** : Plots 63 and 64: Ploughed.
- 11-Apr-96 : **T** : Spring-tine cultivated.
- 21-May-96 : **T** : Rotary cultivated.
- 11-Jul-96 : **T** : Spiked rotary cultivated.

W. wheat, 1st test crop (W):
- 18-Sep-95 : **T** : Ploughed.
- 23-Sep-95 : **T** : Rolled.
- 28-Sep-95 : **T** : PK applied as (0:24:24) at 260 kg. Yaltox at 150 kg. Spring-tine cultivated.
- 29-Sep-95 : **T** : Rotary harrowed, Mercia, dressed Sibutol, drilled at 375 seeds per m^2.
- 13-Nov-95 : **T** : Panther at 2.0 l in 200 l.
- 30-Apr-96 : **T** : Halo at 1.5 l in 200 l.
- 02-May-96 : **T** : **N** 70, 140 and 210: Applied as 27.5% N.
- 13-Jun-96 : **T** : Silvacur at 1.0 l in 300 l.
- 18-Aug-96 : **T** : Combine harvested.

W. rye, 2nd test crop (R).
- 18-Sep-95 : **T** : Ploughed.
- 23-Sep-95 : **T** : Rolled.
- 28-Sep-95 : **T** : PK applied as (0:24:24) at 260 kg. Yaltox at 150 kg. Spring-tine cultivated.
- 05-Oct-95 : **T** : Dolomite at 5.0 t.
- 10-Oct-95 : **T** : Rotary harrowed, Amando, dressed Panoctine, drilled at 350 seeds per m^2.
- 13-Nov-95 : **T** : Stomp 400 SC at 3.3 l in 200 l.
- 02-May-96 : **T** : **N** 30, 60 and 90: Applied as 27.5% N.
- 07-Jun-96 : **T** : Calirus at 2.2 kg in 300 l.
- 21-Aug-96 : **T** : Combine harvested.

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

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96/W/RN/3

LEYS

1ST CUT (13/6/96) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.26	2.26	2.26
LC2	4.80	4.78	4.79
LC3	4.85	5.15	5.00
LN1	5.22	4.89	5.06
LN2	6.37	6.06	6.22
LN3	6.47	6.17	6.32
LLC1	1.00	1.29	1.15
LLC2	4.34	4.40	4.37
LLC3	5.44	5.20	5.32
LLC4	4.43	4.27	4.35
LLC5	4.09	2.88	3.49
LLC6	3.39	3.31	3.35
LLC7	5.50	5.18	5.34
LLC8	5.06	5.47	5.26
LLN1	4.00	3.81	3.91
LLN2	6.17	6.19	6.18
LLN3	6.27	5.86	6.07
LLN4	5.12	5.45	5.28
LLN5	4.65	5.58	5.11
LLN6	5.98	5.61	5.79
LLN7	6.35	6.49	6.42
LLN8	5.30	6.05	5.68
Mean	4.87	4.83	4.85

1ST CUT MEAN DM% 26.1

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96/W/RN/3

LEYS

2ND CUT (11/10/96) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	0.08	0.24	0.16
LC2	0.15	0.09	0.12
LC3	0.27	0.77	0.52
LN1	1.20	0.89	1.04
LN2	0.46	0.36	0.41
LN3	0.67	1.07	0.87
LLC1	0.11	0.13	0.12
LLC2	0.09	0.18	0.13
LLC3	0.47	0.25	0.36
LLC4	0.10	0.45	0.27
LLC5	0.12	0.17	0.15
LLC6	0.36	0.23	0.29
LLC7	0.37	0.23	0.30
LLC8	0.07	0.07	0.07
LLN1	0.90	0.78	0.84
LLN2	0.61	0.93	0.77
LLN3	0.53	0.97	0.75
LLN4	0.57	0.46	0.52
LLN5	0.42	0.45	0.43
LLN6	0.82	0.46	0.64
LLN7	1.00	0.97	0.98
LLN8	0.20	0.28	0.24
Mean	0.44	0.47	0.45

2ND CUT MEAN DM% 36.6

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96/W/RN/3

LEYS

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.34	2.50	2.42
LC2	4.95	4.87	4.91
LC3	5.12	5.92	5.52
LN1	6.42	5.78	6.10
LN2	6.84	6.43	6.63
LN3	7.14	7.24	7.19
LLC1	1.11	1.43	1.27
LLC2	4.42	4.57	4.50
LLC3	5.92	5.45	5.68
LLC4	4.53	4.71	4.62
LLC5	4.21	3.06	3.63
LLC6	3.75	3.53	3.64
LLC7	5.87	5.42	5.65
LLC8	5.13	5.54	5.34
LLN1	4.90	4.59	4.75
LLN2	6.78	7.11	6.95
LLN3	6.80	6.83	6.82
LLN4	5.68	5.91	5.80
LLN5	5.06	6.03	5.55
LLN6	6.80	6.06	6.43
LLN7	7.36	7.46	7.41
LLN8	5.50	6.33	5.92
Mean	5.30	5.31	5.30

TOTAL OF 2 CUTS MEAN DM% 31.4

PLOT AREA HARVESTED 0.00200

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96/W/RN/3

W. WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES65	NONE	FYM	Mean
ROTATION			
LLN 8	7.61	8.31	7.96
LN 3	7.02	6.27	6.64
LLC 8	7.46	7.77	7.62
LC 3	7.29	7.64	7.46
AF	5.09	6.27	5.68
AB	5.92	6.41	6.17
Mean	6.73	7.11	6.92

N	0	70	140	210	Mean
ROTATION					
LLN 8	6.37	8.23	8.77	8.46	7.96
LN 3	3.82	7.19	7.15	8.41	6.64
LLC 8	5.73	7.97	8.48	8.28	7.62
LC 3	5.23	7.76	8.19	8.67	7.46
AF	0.65	6.60	7.69	7.79	5.68
AB	1.19	7.24	7.80	8.43	6.17
Mean	3.83	7.50	8.01	8.34	6.92

N	0	70	140	210	Mean
FYMRES65					
NONE	3.87	7.34	7.80	7.92	6.73
FYM	3.80	7.66	8.23	8.76	7.11
Mean	3.83	7.50	8.01	8.34	6.92

	N	0	70	140	210
ROTATION	**FYMRES65**				
LLN 8	NONE	6.12	7.80	8.39	8.12
	FYM	6.62	8.65	9.16	8.81
LN 3	NONE	4.75	7.10	7.33	8.89
	FYM	2.89	7.27	6.98	7.93
LLC 8	NONE	6.27	7.44	8.16	7.98
	FYM	5.20	8.51	8.80	8.58
LC 3	NONE	4.62	8.16	8.29	8.10
	FYM	5.85	7.37	8.08	9.25
AF	NONE	0.23	6.42	7.19	6.53
	FYM	1.07	6.78	8.19	9.05
AB	NONE	1.22	7.10	7.43	7.94
	FYM	1.16	7.38	8.18	8.93

GRAIN MEAN DM% 87.3

PLOT AREA HARVESTED 0.00183

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96/W/RN/3

W. RYE 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES64	NONE	FYM	Mean
ROTATION			
LLN 8	6.35	6.82	6.59
LN 3	6.87	6.73	6.80
LLC 8	7.79	7.08	7.43
LC 3	6.79	6.57	6.68
AF	3.91	4.27	4.09
AB	4.85	4.84	4.84
Mean	6.09	6.05	6.07

N	0	30	60	90	Mean
ROTATION					
LLN 8	4.46	6.33	7.37	8.18	6.59
LN 3	4.73	6.45	7.36	8.67	6.80
LLC 8	5.63	7.99	7.87	8.25	7.43
LC 3	4.46	6.46	7.65	8.15	6.68
AF	1.72	3.45	4.92	6.27	4.09
AB	2.56	4.07	6.08	6.67	4.84
Mean	3.93	5.79	6.87	7.70	6.07

N	0	30	60	90	Mean
FYMRES64					
NONE	3.89	5.78	7.05	7.65	6.09
FYM	3.97	5.80	6.70	7.74	6.05
Mean	3.93	5.79	6.87	7.70	6.07

N	FYMRES64	0	30	60	90
ROTATION					
LLN 8	NONE	4.22	6.28	7.19	7.70
	FYM	4.70	6.38	7.55	8.66
LN 3	NONE	4.96	6.40	7.30	8.85
	FYM	4.50	6.50	7.43	8.50
LLC 8	NONE	5.64	8.12	8.47	8.92
	FYM	5.63	7.86	7.26	7.58
LC 3	NONE	4.45	6.74	8.02	7.93
	FYM	4.46	6.17	7.27	8.37
AF	NONE	1.60	3.00	5.09	5.95
	FYM	1.84	3.90	4.75	6.59
AB	NONE	2.45	4.16	6.24	6.56
	FYM	2.67	3.99	5.92	6.78

GRAIN MEAN DM% 86.8

SUB PLOT AREA HARVESTED 0.00183

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96/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 32nd year, w. wheat.

For previous years see 'Details' 1973 and 74-95/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:

WHEAT 5	5th wheat, after w. wheat 1988, potatoes 1989, w. wheat 1990, w. beans 1991
WHEAT 6	6th wheat, after w. wheat 1987, potatoes 1988, w. wheat 1989, w. beans 1990

Whole plots

2. **TREATMNT** — Previous treatments:

LC 8 GM	Eight-year clover/grass ley until 1987 (WHEAT 5) or 1986 (WHEAT 6), 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 (WHEAT 5) or 1986 (WHEAT 6), 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 (WHEAT 5) or 1985 (WHEAT 6) 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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96/W/RN/12

Sub-plots

3. **N** Residual effects of nitrogen fertilizer 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.

Experimental diary:

15-Sep-95 : B : Ploughed.
23-Sep-95 : B : Rolled.
03-Oct-95 : B : Rotary harrowed, Mercia, dressed Sibutol, drilled at 375 seeds per m^2.
13-Nov-95 : B : Panther at 2.0 l in 200 l.
02-Apr-96 : B : Vytel Manganese at 3.0 l in 300 l.
16-Apr-96 : B : 34.5% N at 290 kg.
30-Apr-96 : B : Halo at 1.5 l in 200 l.
06-Jun-96 : B : Silvacur at 1.0 l in 300 l.
17-Aug-96 : B : Combine harvested.

NOTE: Samples of grain were taken for chemical analysis.

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96/W/RN/12

CROPSEQ WHEAT 5

GRAIN TONNES/HECTARE

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

N / TREATMNT	(0)	(50)	(100)	(150)	(200)	(250)	Mean
LC 8 GM	5.45	5.40	5.93	5.04	5.65	5.18	5.44
LC 8 PT	6.01	6.11	5.51	6.04	5.66	5.75	5.85
LC 6 LC	6.62	5.19	5.57	5.93	5.78	5.88	5.83
LC 6 LN	6.29	6.43	6.95	6.99	5.90	6.09	6.44
FYM	6.49	5.82	6.14	6.37	6.31	6.21	6.22
STRAW	6.45	6.83	6.70	6.47	6.72	6.97	6.69
FERT-FYM	4.95	4.91	5.34	5.20	4.75	5.26	5.07
FERT-STR	5.93	5.85	5.76	5.52	5.66	6.11	5.81
Mean	6.02	5.82	5.99	5.94	5.80	5.93	5.92

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

TREATMNT	N	TREATMNT N
0.730	0.167	0.849

Except when comparing means with the same level(s) of TREATMNT 0.473

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.730	12.3
BLOCK.WP.SP	40	0.473	8.0

GRAIN MEAN DM% 87.9

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96/W/RN/12

CROPSEQ WHEAT 6

GRAIN TONNES/HECTARE

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

N / TREATMNT	(0)	(50)	(100)	(150)	(200)	(250)	Mean
LC 8 GM	6.08	6.53	6.61	6.26	6.45	6.36	6.38
LC 8 PT	6.05	6.11	6.13	6.07	6.25	6.46	6.18
LC 6 LC	6.28	5.91	6.25	6.63	6.05	6.30	6.24
LC 6 LN	6.62	6.58	6.96	6.63	6.84	6.62	6.71
FYM	6.36	6.37	6.67	6.32	6.05	6.24	6.33
STRAW	5.84	5.51	5.47	5.75	6.13	5.92	5.77
FERT-FYM	5.44	5.47	6.23	5.26	5.61	5.61	5.60
FERT-STR	5.09	5.20	5.09	5.28	5.09	5.76	5.25
Mean	5.97	5.96	6.17	6.03	6.06	6.16	6.06

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

TREATMNT	N	TREATMNT N
0.610	0.122	0.686

Except when comparing means with the same level(s) of TREATMNT 0.345

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.610	10.1
BLOCK.WP.SP	40	0.345	5.7

GRAIN MEAN DM% 86.4

SUB PLOT AREA HARVESTED 0.00183

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96/R/CS/10 and 96/W/CS/10

LONG TERM LIMING

Object: To study the effects of different amounts of lime, phosphate and sulphur on the yields and compositions of a sequence of crops - Rothamsted (R) Sawyers I and Woburn (W) Stackyard C.

Sponsor: S.P. McGrath.

The 35th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-95/R&W/CS/10.

Design: 2 randomised blocks of 16 plots split into 2 sub-plots.

Whole plot dimensions: 6.0 x 16.1.

Treatments: All combinations of:-

Whole plots

1. **CHALK** — Residual effects of ground chalk (tonnes CaCO3) (total applied 1962-87):

R	W	Rothamsted total 1962-78	Rothamsted total 1982-87	Woburn total 1962-78	Woburn total 1982-87
0	0	0	0	0	0
15	9	7	8	6	3
24.5	25.5	15	9.5	14	11.5
52.5	45.5	30	22.5	23	22.5

2. **P** — Residual effects of P fertilizer applied:

	Until 1978 R & W	1981 R & W	1982 R & W	1983 R	1983 W	1988 R	1988 W
0	0	0	0	0	0	0	0
P1	0	P1	P1	0	P2	P1	P1
P2	P	P1	0	P2	P2	P1	P1
P3	P	P3	P1	P2	P4	P3	P3

Rates 1981-83 and 1988 P1, P2, P3, P4 = 25, 50, 75, 100 kg P as superphosphate

Sub-plots

3. **SULPHUR** — Sulphur (kg S, as calcium sulphate), applied cumulatively since 1991:

0
30

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96/R/CS/10 and 96/W/CS/10

NOTES: (1) Until 1978 test P was applied cumulatively, rates varied with crop, none in 1979 and 1980. K was also applied cumulatively, to P1 and P3 plots. Since 1981 K has been applied basally (none in 1986, 1987, 1989, 1990 and 1993 to 1996).
(2) Test manganese was applied cumulatively, 1987-90.

Experimental diary:

Sawyers I (R):
10-Aug-95 : B : Straw baled.
22-Aug-95 : B : Sub-soiled.
25-Sep-95 : B : Ploughed.
28-Sep-95 : B : Rotary harrowed, Hereward, dressed Panoctine, drilled at 380 seeds per m^2.
11-Mar-96 : B : 34.5% N at 116 kg.
09-Apr-96 : T : **SULPHUR** 30: Gypsum (17.5% S) at 171 kg.
15-Apr-96 : B : 34.5% N at 463 kg.
26-Apr-96 : B : Ally at 30 g with Cheetah Super at 1.25 l and Barclay Holdup at 2.3 l in 200 l.
13-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 300 l.
09-Aug-96 : B : Combine harvested.

Stackyard C (W):
25-Aug-95 : B : Sub-soiled.
19-Sep-95 : B : Ploughed.
23-Sep-95 : B : Rolled.
03-Oct-95 : B : Rotary harrowed, Hereward, dressed Sibutol, drilled at 375 seeds per m^2.
13-Nov-95 : B : Panther at 2.0 l in 200 l.
13-Mar-96 : B : 34.5% N at 116 kg.
19-Mar-96 : T : **SULPHUR** 30: Gypsum (17.5% S) at 171 kg.
16-Apr-96 : B : 34.5% N at 348 kg.
30-Apr-96 : B : Halo at 1.5 l in 200 l.
06-Jun-96 : B : Silvacur at 1.0 l in 300 l.
19-Aug-96 : B : Combine harvested.

NOTE: At Rothamsted, most **CHALK** 0 plots failed. They have been omitted from the analysis.

96/R/CS/10 SAWYERS I (R)

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
15	7.47	8.38	8.91	8.44	8.30
24.5	8.38	8.83	8.74	9.20	8.79
52.5	8.03	8.94	8.69	8.86	8.63
Mean	7.96	8.72	8.78	8.83	8.57

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96/R/CS/10 SAWYERS I (R)

GRAIN TONNES/HECTARE

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

SULPHUR	0	30	Mean
CHALK			
15	8.44	8.16	8.30
24.5	8.73	8.85	8.79
52.5	8.74	8.52	8.63
Mean	8.63	8.51	8.57

SULPHUR	0	30	Mean
P			
0	8.21	7.71	7.96
P1	8.64	8.79	8.72
P2	8.84	8.71	8.78
P3	8.83	8.83	8.83
Mean	8.63	8.51	8.57

SULPHUR	0	30
CHALK	P	
15	0	7.99	6.94
	P1	8.30	8.46
	P2	9.05	8.76
	P3	8.40	8.48
24.5	0	8.50	8.26
	P1	8.75	8.92
	P2	8.51	8.97
	P3	9.16	9.25
52.5	0	8.15	7.91
	P1	8.88	9.00
	P2	8.97	8.40
	P3	8.95	8.77

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

P	CHALK	SULPHUR	P CHALK
0.263	0.227	0.108	0.455

P SULPHUR	CHALK SULPHUR	P CHALK SULPHUR
0.304	0.263	0.526

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

P	0.217		
CHALK		0.188	
P.CHALK			0.375

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96/R/CS/10 SAWYERS I (R)

GRAIN TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.455	5.3
BLOCK.WP.SP	12	0.375	4.4

GRAIN MEAN DM% 87.8

SUB-PLOT AREA HARVESTED 0.00150

96/W/CS/10 STACKYARD C (W)

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
0	3.58	3.63	4.12	4.45	3.95
9	7.81	8.19	8.12	8.30	8.10
25.5	7.58	7.04	7.76	7.54	7.48
45.5	6.74	8.14	7.46	7.92	7.56
Mean	6.43	6.75	6.86	7.05	6.77

SULPHUR	0	30	Mean
CHALK			
0	4.03	3.86	3.95
9	8.09	8.12	8.10
25.5	7.43	7.53	7.48
45.5	7.51	7.61	7.56
Mean	6.77	6.78	6.77

SULPHUR	0	30	Mean
P			
0	6.25	6.60	6.43
P1	6.65	6.85	6.75
P2	6.90	6.82	6.86
P3	7.26	6.84	7.05
Mean	6.77	6.78	6.77

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96/W/CS/10 STACKYARD C (W)

GRAIN TONNES/HECTARE

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

SULPHUR		0	30
CHALK	P		
0	0	3.28	3.88
	P1	3.32	3.95
	P2	3.87	4.38
	P3	5.68	3.22
9	0	7.40	8.21
	P1	8.42	7.97
	P2	8.31	7.93
	P3	8.25	8.35
25.5	0	7.73	7.43
	P1	6.77	7.30
	P2	7.78	7.73
	P3	7.44	7.64
45.5	0	6.59	6.89
	P1	8.10	8.17
	P2	7.66	7.26
	P3	7.69	8.14

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

CHALK	P	SULPHUR	CHALK P
0.548	0.548	0.133	1.097

CHALK SULPHUR	P SULPHUR	CHALK P SULPHUR
0.580	0.580	1.159

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

CHALK	0.266
P	0.266
CHALK.P	0.531

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	1.097	16.2
BLOCK.WP.SP	15	0.531	7.8

GRAIN MEAN DM% 90.8

SUB-PLOT AREA HARVESTED 0.00143

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96/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 on yield of continuous s. barley - Long Hoos V 3.

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

The 23rd year, s. barley.

For previous years see 74-95/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:

12-Aug-95 : B : Straw baled.
09-Oct-95 : B : Stubble topped.
15-Nov-95 : B : Ploughed.
20-Mar-96 : B : Spring-tine cultivated, rotary harrowed, Alexis, undressed, drilled at 350 seeds per m^2.
08-May-96 : B : 34.5% N at 435 kg.
04-Jun-96 : B : Ally at 30 g with Vindex at 1.0 l in 200 l.

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96/R/CS/140

Experimental diary:
09-Jul-96 : B : Wild oats pulled by hand.
22-Aug-96 : B : Combine harvested.

NOTE: Soils were sampled for chemical analysis and pH.

GRAIN TONNES/HECTARE

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

FUNGCIDE[1]	(NONE)	(TRIADIM)	Mean
WEEDKLLR			
(NONE)	5.38	5.44	5.41
(GLYPHOS)	5.88	5.82	5.85
Mean	5.63	5.63	5.63

FUNGCIDE[2]	(NONE)	(BENOMYL)	Mean
WEEDKLLR			
(NONE)	5.51	5.31	5.41
(GLYPHOS)	5.64	6.06	5.85
Mean	5.58	5.69	5.63

FUNGCIDE[2]	(NONE)	(BENOMYL)	Mean
FUNGCIDE[1]			
(NONE)	5.60	5.67	5.63
(TRIADIM)	5.55	5.70	5.63
Mean	5.58	5.69	5.63

INSCTCDE	(NONE)	(CHLORFEN)	Mean
WEEDKLLR			
(NONE)	5.48	5.35	5.41
(GLYPHOS)	5.92	5.78	5.85
Mean	5.70	5.56	5.63

INSCTCDE	(NONE)	(CHLORFEN)	Mean
FUNGCIDE[1]			
(NONE)	5.47	5.79	5.63
(TRIADIM)	5.92	5.33	5.63
Mean	5.70	5.56	5.63

INSCTCDE	(NONE)	(CHLORFEN)	Mean
FUNGCIDE[2]			
(NONE)	5.60	5.55	5.58
(BENOMYL)	5.80	5.57	5.69
Mean	5.70	5.56	5.63

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GRAIN TONNES/HECTARE

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

NEMACIDE	(NONE)	(ALDICARB)	Mean
WEEDKLLR			
(NONE)	5.49	5.33	5.41
(GLYPHOS)	5.85	5.85	5.85
Mean	5.67	5.59	5.63

NEMACIDE	(NONE)	(ALDICARB)	Mean
FUNGCIDE[1]			
(NONE)	5.65	5.62	5.63
(TRIADIM)	5.69	5.57	5.63
Mean	5.67	5.59	5.63

NEMACIDE	(NONE)	(ALDICARB)	Mean
FUNGCIDE[2]			
(NONE)	5.54	5.61	5.58
(BENOMYL)	5.80	5.57	5.69
Mean	5.67	5.59	5.63

NEMACIDE	(NONE)	(ALDICARB)	Mean
INSCTCDE			
(NONE)	5.67	5.73	5.70
(CHLORFEN)	5.67	5.46	5.56
Mean	5.67	5.59	5.63

FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR FUNGCIDE[2]	(NONE)	(BENOMYL)	(NONE)	(BENOMYL)
(NONE)	5.47	5.29	5.56	5.32
(GLYPHOS)	5.73	6.04	5.55	6.09

FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR INSCTCDE	(NONE)	(CHLORFEN)	(NONE)	(CHLORFEN)
(NONE)	5.34	5.42	5.61	5.27
(GLYPHOS)	5.61	6.16	6.23	5.40

FUNGCIDE[2]	(NONE)		(BENOMYL)	
WEEDKLLR INSCTCDE	(NONE)	(CHLORFEN)	(NONE)	(CHLORFEN)
(NONE)	5.46	5.56	5.49	5.13
(GLYPHOS)	5.73	5.55	6.11	6.02

FUNGCIDE[2]	(NONE)		(BENOMYL)	
FUNGCIDE[1] INSCTCDE	(NONE)	(CHLORFEN)	(NONE)	(CHLORFEN)
(NONE)	5.38	5.82	5.57	5.77
(TRIADIM)	5.81	5.29	6.03	5.38

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GRAIN TONNES/HECTARE

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

	FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.42	5.35	5.57	5.31
(GLYPHOS)		5.88	5.89	5.81	5.82

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
WEEDKLLR	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.61	5.41	5.37	5.25
(GLYPHOS)		5.47	5.81	6.23	5.90

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
FUNGCIDE[1]	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.66	5.54	5.64	5.70
(TRIADIM)		5.42	5.69	5.96	5.45

	INSCTCDE	(NONE)		(CHLORFEN)	
WEEDKLLR	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.38	5.57	5.60	5.09
(GLYPHOS)		5.95	5.89	5.74	5.82

	INSCTCDE	(NONE)		(CHLORFEN)	
FUNGCIDE[1]	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.48	5.46	5.81	5.77
(TRIADIM)		5.85	5.99	5.52	5.14

	INSCTCDE	(NONE)		(CHLORFEN)	
FUNGCIDE[2]	NEMACIDE	(NONE)	(ALDICARB)	(NONE)	(ALDICARB)
(NONE)		5.50	5.69	5.57	5.53
(BENOMYL)		5.83	5.77	5.76	5.38

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

Margins of two factor tables	0.131
Two factor tables	0.186
Three factor tables	0.262

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

Stratum	d.f.	s.e.	cv%
WP	6	0.371	6.6

GRAIN MEAN DM% 88.8

PLOT AREA HARVESTED 0.00105

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96/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 twelfth year, w. wheat.

For previous years see 85-93,95/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 1995-6:
	NONE	None
	CARB	Carbendazim at 0.25 kg
	PRO	Prochloraz at 0.40 kg (0.50 kg in 1993, 1995 and 1996)
	CARB+PRO	Carbendazim at 0.25 kg with prochloraz at 0.40 kg (0.50 kg in 1993, 1995 and 1996)

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:

13-Sep-95 : B : Ploughed and furrow pressed.
28-Sep-95 : B : Rotary harrowed, Hereward, dressed Panoctine, drilled at 380 seeds per m^2.
20-Nov-95 : B : Panther at 2.0 l in 200 l.
11-Mar-96 : B : 34.5% N at 116 kg.
03-Apr-96 : **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.

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96/R/CS/302

Experimental diary:

```
   11-Apr-96 : B : 34.5% N at 463 kg.
   30-Apr-96 : B : Starane 2 at 1.0 l in 200 l.
   13-May-96 : 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.
   13-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in
                   300 l.
   09-Jul-96 : B : Wild oats pulled by hand.
   06-Aug-96 : B : Combine harvested.
```

NOTE: Samples were taken in July to assess eyespot, brown foot rot and take-all.

GRAIN TONNES/HECTARE

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

EYE INOC / FUNGCIDE	NATURAL	W 19R 1S	W 1R 19S	R 19R 1S	R 1R 19S	Mean
NONE	9.33	8.98	8.44	8.74	9.98	9.13
CARB	8.62	8.76	8.59	8.03	8.75	8.56
PRO	8.78	8.45	9.21	9.54	8.91	8.94
CARB+PRO	9.93	8.99	9.46	9.52	10.41	9.71
Mean	9.17	8.79	8.92	8.96	9.51	9.09

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

EYE INOC	FUNGCIDE* EYE INOC	
0.301	0.601	min.rep
0.260	0.521	max-min

	EYE INOC
max-min	NATURAL 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	3	0.489	5.4
BLOCK.WP.SP	24	0.601	6.6

GRAIN MEAN DM% 88.3

SUB-PLOT AREA HARVESTED 0.00138

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96/R/CS/309 and 96/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 twelfth year, w. wheat.

For previous years see 85-95/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 BTTT
   BT1T2 CTTT
   BP2 BPPP
   BT1P2 CPPP
   CT1 CTTT
   CT1 CPTT
   CT1T2 CTPT
   CT1T2 CTTP
   CP2 CPPP
   CP2 CPTT
   CT1P2 CTPT
   CT1P2 CTTP

Sub-plots

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

   E Early
   L Late

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96/R/CS/309 and 96/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. BTTT, CTTT, BPPP, CPPP, etc.

Experimental diary:

Great Knott III (R):

11-Aug-95 : **T** : **STRAWCUL** BTTT, BPPP: Straw burnt, ash incorporated with discs.
27-Sep-95 : **T** : **STRAWCUL** BTTT, CTTT, CPTT, CTPT: Heavy spring-tine cultivated.
29-Sep-95 : **T** : **STRAWCUL** BPPP, CPPP, CTTP: Ploughed.
05-Oct-95 : B : Heavy spring-tine cultivated.
06-Oct-95 : **T** : **SOW DATE** E: Rotary harrowed, Soissons, dressed Sibutol, drilled at 400 seeds per m^2.
26-Oct-95 : **T** : **SOW DATE** L: Rotary harrowed, Soissons, dressed Sibutol, drilled at 400 seeds per m^2.
30-Oct-95 : B : Avadex BW Granular at 22.5 kg.
14-Nov-95 : B : Draza at 5.5 kg.
07-Mar-96 : B : 34.5% N at 116 kg.
15-Apr-96 : B : 34.5% N at 463 kg.
25-Apr-96 : B : Ally at 30 g with Cheetah Super at 1.25 l in 200 l.
06-Jun-96 : B : Monicle at 1.0 l in 320 l.
07-Aug-96 : B : Combine harvested.

Far Field I (W):

10-Aug-95 : **T** : **STRAWCUL** BTTT, BPPP: Straw burnt, ash incorporated by spring-tine cultivator.
13-Sep-95 : **T** : **STRAWCUL** BPPP, CPPP, CTTP: Ploughed and rolled.
: **T** : **STRAWCUL** BTTT, CTTT, CPTT, CTPT: Heavy spring-tine cultivated twice.
02-Oct-95 : B : Harvest at 3.0 l in 300 l.
09-Oct-95 : B : Rotary harrowed.
: **T** : **SOW DATE** E: Soissons, dressed Sibutol, drilled at 400 seeds per m^2.
31-Oct-95 : **T** : **SOW DATE** L: Spring-tine cultivated, Soissons, dressed Sibutol, drilled at 450 seeds per m^2.
13-Nov-95 : B : Trump at 5.5 l in 200 l.
08-Mar-96 : B : 34.5% N at 116 kg.
25-Apr-96 : B : 34.5% N at 348 kg.
30-Apr-96 : B : Halo at 1.5 l in 200 l.
06-Jun-96 : B : Halo at 2.0 l in 300 l.
08-Aug-96 : B : Combine harvested.

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96/R/CS/309 and 96/W/CS/309

NOTES: Establishment counts were made in winter. Grass weeds were counted in April (R) and ears of grass weeds were counted in June (W) and July (R). Samples were taken in July to assess root and stem base diseases. At Rothamsted insect pitfall traps were placed in four plots and sampled between April and August.

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

GRAIN TONNES/HECTARE

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

SOW DATE	E	L	Mean
STRAWCUL			
BT1 BTTT	6.33	8.37	7.35
BT1T2 CTTT	6.26	6.91	6.58
BP2 BPPP	8.53	8.50	8.51
BT1P2 CPPP	9.03	8.62	8.82
CT1 CTTT	6.08	5.76	5.92
CT1 CPTT	7.31	7.51	7.41
CT1T2 CTPT	7.94	7.21	7.58
CT1T2 CTTP	9.21	8.91	9.06
CP2 CPPP	8.81	8.30	8.55
CP2 CPTT	7.35	7.70	7.52
CT1P2 CTPT	8.60	7.81	8.21
CT1P2 CTTP	8.84	8.74	8.79
Mean	7.86	7.86	7.86

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

STRAWCUL	SOW DATE	STRAWCUL SOW DATE
0.404	0.090	0.460

Except when comparing means with the same level(s) of STRAWCUL 0.311

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.571	7.3
BLOCK.WP.SP	36	0.440	5.6

GRAIN MEAN DM% 87.8

SUB-PLOT AREA HARVESTED 0.00644

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

GRAIN TONNES/HECTARE

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

SOW DATE	E	L	Mean
STRAWCUL			
BT1 BTTT	7.79	6.09	6.94
BT1T2 CTTT	7.05	6.43	6.74
BP2 BPPP	8.35	7.28	7.81
BT1P2 CPPP	7.18	5.80	6.49
CT1 CTTT	7.98	7.28	7.63
CT1 CPTT	7.31	7.63	7.47
CT1T2 CTPT	7.54	6.68	7.11
CT1T2 CTTP	8.89	7.62	8.26
CP2 CPPP	7.28	6.43	6.86
CP2 CPTT	7.81	6.51	7.16
CT1P2 CTPT	6.08	5.42	5.75
CT1P2 CTTP	8.02	7.04	7.53
Mean	7.61	6.68	7.15

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

STRAWCUL	SOW DATE	STRAWCUL SOW DATE
0.557	0.117	0.627

Except when comparing means with the same level(s) of STRAWCUL 0.406

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.557	7.8
BLOCK.WP.SP	12	0.406	5.7

GRAIN MEAN DM% 86.9

SUB-PLOT AREA HARVESTED 0.00660

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96/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 twelfth year, w. wheat.

For previous years see 85-95/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)(S)S	Shallow tine cultivated to 10 cm
	(P)(S)S	Shallow tine cultivated to 10 cm, (ploughed to 23 cm in autumn 1993)
	(S)(P)S	Shallow tine cultivated to 10 cm, (ploughed to 23 cm in autumn 1994)
	(S)(S)P	Ploughed to 23 cm, (shallow tine cultivated previously)

NOTE: Only the last letter (the treatment in 1996) is used in the experimental diary.

Experimental diary:

08-Aug-95 : **T** : **STRAW** BALED: Straw baled and removed.
08-Aug-95 : **T** : **STRAW** CHOPPED: Straw chopped with trailed chopper.
10-Aug-95 : **T** : **STRAW** BURNT: Straw burnt and ash incorporated with discs.
29-Sep-95 : B : Gramoxone 100 at 3.0 l in 200 l.
04-Oct-95 : **T** : **CULTIVTN** P: Ploughed.
: **T** : **CULTIVTN** S: Heavy spring-tine cultivated twice.
16-Oct-95 : B : Rotary harrowed twice , Soissons, dressed Sibutol, drilled at 400 seeds per m^2.
30-Oct-95 : B : Avadex BW Granular at 22.5 kg.

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96/R/CS/311

Experimental diary:

13-Nov-95 : B : MSS Iprofile at 2.6 l with Stomp 400 SC at 2.6 l in 200 l.
07-Mar-96 : B : 34.5% N at 116 kg.
15-Apr-96 : B : 34.5% N at 493 kg.
13-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 300 l.
08-Aug-96 : B : Combine harvested.

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

GRAIN TONNES/HECTARE

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

CULTIVTN STRAW	(S)(S)S	(P)(S)S	(S)(P)S	(S)(S)P	Mean
BURNT	8.67	8.92	8.55	8.30	8.61
BALED	8.13	8.22	8.63	8.51	8.37
CHOPPED	8.26	8.22	8.58	8.79	8.46
Mean	8.35	8.45	8.59	8.53	8.48

GRAIN MEAN DM% 86.6

SUB-PLOT AREA HARVESTED 0.00276

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96/R/CS/323

CEREAL SEQUENCES AND TAKE-ALL

Object: To study the effects on take-all (*Gaeumannomyces graminis*) and yield of different cereals grown in various sequences - West Barnfield II.

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

The ninth year, w. wheat.

For previous years see 88-95/R/CS/323

Design: 3 randomised blocks of 26 plots.

Whole plot dimensions: 3.0 x 10.0.

CROPSEQ Crop sequences (1988 to 1995 respectively), all w. wheat in 1996:

TTTTTTTT
OTTTOTTT
TOTTTOTT
TTOTTTOT
TTTOTTTO
WWWWWWWW
OWWWOWWW
WOWWWOWW
WWOWWWOW
WWWOWWWO
BBBBBBBB
OBBBOBBB
BOBBBOBB
BBOBBBOB
BBBOBBBO
WTWTWTWT
WBWBWBWB
TBTBTBTB
SBSBSBSB
WWTTTWWW
WWBBBWWW
TTBBBTTT
TTWWWTTT
BBWWWBBB
BBTTTBBB
WWSSSWWW

W = W. wheat
S = S. barley
B = W. barley
O = W. oats
T = W. triticale

NOTE: Only the last letter of the crop sequence, the crop in 1995, is used in the experimental diary.

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96/R/CS/323

Experimental diary:

20-Jul-95 : **T** : **CROPSEQ** S, B, O: Barley and oat straw baled.
11-Aug-95 : **T** : **CROPSEQ** W: Wheat straw baled.
30-Aug-95 : **T** : **CROPSEQ** T: Triticale straw baled.
18-Sep-95 : B : PK as (0:20:32) at 300 kg.
20-Sep-95 : B : Ploughed and furrow pressed.
25-Sep-95 : B : Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
23-Oct-95 : B : Avadex BW Granular at 22.5 kg.
13-Nov-95 : B : MSS Iprofile at 2.6 l with Stomp 400 SC at 2.6 l in 200 l.
07-Mar-96 : B : 34.5% N at 87 kg.
15-Apr-96 : B : 34.5% N at 580 kg.
25-Apr-96 : B : Cheetah Super at 1.25 l with Halo at 1.5 l in 200 l.
13-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 300 l.
19-Aug-96 : B : Combine harvested.

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

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96/R/CS/323

GRAIN TONNES/HECTARE

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

CROPSEQ	
TTTTTTTT	9.23
OTTTOTTT	8.90
TOTTTOTT	9.26
TTOTTTOT	9.04
TTTOTTTO	9.08
WWWWWWWW	8.25
OWWWOWWW	8.44
WOWWWOWW	8.86
WWOWWWOW	8.91
WWWOWWWO	9.14
BBBBBBBB	8.67
OBBBOBBB	8.35
BOBBBOBB	9.39
BBOBBBOB	9.26
BBBOBBBO	9.30
WTWTWTWT	9.05
WBWBWBWB	8.56
TBTBTBTB	7.63
SBSBSBSB	8.64
WWTTTWWW	8.28
WWBBBWWW	8.59
TTBBBTTT	9.03
TTWWWTTT	8.83
BBWWWBBB	9.02
BBTTTBBB	8.46
WWSSSWWW	7.59
Mean	8.76

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

CROPSEQ
0.377

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	50	0.461	5.3

GRAIN MEAN DM% 89.3

PLOT AREA HARVESTED 0.00229

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96/R/CS/326 and 96/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: N.J. Bradbury, M.J. Glendining, J.F. Jenkyn.

The tenth year, w. wheat.

For previous years see 87-95/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	9.2	7.9
2 NORMAL	Twice normal	18.4	15.8
4 NORMAL	Four times normal	36.7	31.6

Experimental diary:

Great Knott III (R):

10-Aug-95 : **T** : **STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied.
: **T** : **STRAW** NONE: Straw removed.
15-Aug-95 : B : Straw chopped.
29-Sep-95 : B : Ploughed.
05-Oct-95 : B : Heavy spring-tine cultivated.
06-Oct-95 : B : Rotary harrowed, Soissons, dressed Sibutol, drilled at 400 seeds per m^2.
30-Oct-95 : B : Avadex BW Granular at 22.5 kg.
14-Nov-95 : B : Draza at 5.5 kg.
07-Mar-96 : B : 34.5% N at 116 kg.
16-Apr-96 : B : 34.5% N at 174 kg.
25-Apr-96 : B : Ally at 30 g with Cheetah Super at 1.25 l in 200 l.
06-Jun-96 : B : Monicle at 1.0 l in 320 l.
08-Aug-96 : B : Combine harvested.

Far Field I (W):

10-Aug-95 : **T** : **STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied.
: **T** : **STRAW** NONE: Straw removed.
11-Aug-95 : B : Straw chopped.
13-Sep-95 : B : Ploughed. Rolled.
02-Oct-95 : B : Harvest at 3.0 l in 300 l.
09-Oct-95 : B : Rotary harrowed, Soissons, dressed Sibutol, drilled at 400 seeds per m^2.

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96/R/CS/326 and 96/W/CS/326

Experimental diary:
Far Field I (W):
13-Nov-95 : B : Trump at 5.5 l in 200 l.
08-Mar-96 : B : 34.5% N at 116 kg.
25-Apr-96 : B : 34.5% N at 348 kg.
30-Apr-96 : B : Halo at 1.5 l in 200 l.
06-Jun-96 : B : Halo at 2.0 l in 300 l.
08-Aug-96 : B : Combine harvested.

NOTE: Straw was sampled for nitrogen content, grain was sampled for nitrogen content, quality and thousand grain weights.

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

GRAIN TONNES/HECTARE

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

	STRAW
NONE	6.92
NORMAL	7.14
2 NORMAL	7.19
4 NORMAL	7.33
Mean	7.14

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

STRAW
0.090

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.128	1.8

GRAIN MEAN DM% 87.2

PLOT AREA HARVESTED 0.00311

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

GRAIN TONNES/HECTARE

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

	STRAW
NONE	8.81
NORMAL	8.37
2 NORMAL	8.25
4 NORMAL	8.73
Mean	8.54

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

STRAW
0.330

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.404	4.7

GRAIN MEAN DM% 86.4

PLOT AREA HARVESTED 0.00319

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96/W/CS/347

GREEN CROPS FOR SET-ASIDE

Object: To obtain information on the establishment and maintenance of sown crops and unsown vegetation in three-year and five-year set-aside. Effects on soil nitrate and leaching after ploughing are also studied - Woburn, Horsepool Lane Close II.

Sponsors: E.T.G. Bacon, D.P. Yeoman, M.V. Hewitt, J.F. Jenkyn, R.J. Gutteridge.

Design: 3 randomised blocks of 6 plots split into 2 x 2 criss-cross.

Whole plot dimensions: 6.5 x 26.0.

The seventh year, w. wheat.

For previous years see 90-95/W/CS/347.

Treatments:

Test phase (second test crop after 5-year treatment phase)

Whole plots

1. **PREVCROP** Previous crop, cumulative 1990 to 1994:

(RY LF)	Ryegrass, cuttings left in situ
(RY+CL LF)	Ryegrass + clover, cuttings left in situ
(RY+CL RE)	Ryegrass + clover, cuttings removed
(RY+N RE)	Ryegrass given 100 kg N in spring, cuttings removed
(TU LF)	Tumbledown, natural regrowth, cuttings left in situ
(ARABLE)	Arable sequence w. wheat, w. wheat, w. oats, w.wheat, w. oats

Sub-plots (**WHEAT** split-plots, **N** criss-cross)

2. **WHEAT** Time of ploughing and drilling previous w. wheat crop:

(W)	Winter 1994
(S)	Spring 1995

3. **N** Fertilizer nitrogen (kg N) applied in spring cumulative to previous dressings:

NO	None
N OPT	Optimum, 40 early and 160 later

Experimental diary:

03-Oct-95 : B : Roundup at 4.0 l in 300 l.
12-Oct-95 : B : Ploughed.
19-Oct-95 : B : Rotary harrowed, Cadenza, dressed Beret 050FS, drilled at 375 seeds per m^2.
22-Nov-95 : B : Stomp 400 SC at 2.5 l with Dagger at 1.5 l in 200 l.
11-Mar-96 : **T** : **N** N OPT: 34.5% N at 116 kg.

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96/W/CS/347

Experimental diary:

30-Apr-96 : B : Halo at 1.5 l in 200 l.
02-May-96 : **T** : **N** N OPT: 27.5% N at 581 kg.
06-Jun-96 : B : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 300 l.
20-Aug-96 : B : Combine harvested.

NOTE: Soil nitrogen was measured in autumn. Weeds were counted and estimates of ground cover were made in spring.

GRAIN TONNES/HECTARE

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

N	NO	NOPT	Mean
PREVCROP			
(RY LF)	5.14	8.48	6.81
(RY+CL LF)	6.24	9.44	7.84
(RY+CL RE)	6.45	8.58	7.52
(RY+N RE)	4.80	8.56	6.68
(TU LF)	4.36	8.11	6.23
(ARABLE)	4.53	8.58	6.56
Mean	5.25	8.63	6.94

WHEAT	(W)	(S)	Mean
PREVCROP			
(RY LF)	6.41	7.21	6.81
(RY+CL LF)	7.48	8.20	7.84
(RY+CL RE)	7.02	8.02	7.52
(RY+N RE)	6.51	6.85	6.68
(TU LF)	6.29	6.18	6.23
(ARABLE)	6.20	6.91	6.56
Mean	6.65	7.23	6.94

WHEAT	(W)	(S)	Mean
N			
NO	4.76	5.75	5.25
NOPT	8.55	8.71	8.63
Mean	6.65	7.23	6.94

	WHEAT	(W)		(S)	
PREVCROP	**N**	NO	NOPT	NO	NOPT
(RY LF)		4.60	8.23	5.69	8.74
(PC)		5.56	9.40	6.93	9.48
(PCR)		5.76	8.27	7.14	8.90
(RY+N RE)		4.56	8.46	5.04	8.66
(TU LF)		4.07	8.51	4.65	7.71
(ARABLE)		3.99	8.41	5.06	8.75

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96/W/CS/347

GRAIN TONNES/HECTARE

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

	PREVCROP	WHEAT	PREVCROP WHEAT
	1.015	0.166	1.054
Except when comparing means with the same level(s) of			
PREVCROP			0.406

	PREVCROP* N	WHEAT* N	PREVCROP* WHEAT N
	1.218	0.646	1.260
Except when comparing means with the same level(s) of			
PREVCROP	0.740		0.844
WHEAT		0.631	
N	1.060	0.187	1.108
PREVCROP.WHEAT			0.769
PREVCROP.N			0.457
WHEAT.N			1.108

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	10	1.243	17.9
BLOCK.WP1.SP	12	0.497	7.2
BLOCK.WP1.WP2	10	0.532	7.7
BLOCK.WP1.SP.WP2	12	0.366	5.3

GRAIN MEAN DM% 88.1

SUB-PLOT AREA HARVESTED 0.00236 or 0.00325

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96/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 sixth year, w. wheat.

For previous years see 91-95/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:
0	
50	
100	
150	
200	
250	
300	

Experimental diary:

22-Aug-95 : B : Straw chopped.
19-Sep-95 : B : Ploughed and furrow pressed.
22-Sep-95 : B : Rolled.
10-Oct-95 : B : Gramoxone 100 at 3.0 l in 260 l.
12-Oct-95 : B : Rotary harrowed.
13-Oct-95 : B : Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
17-Oct-95 : B : Draza at 5.5 kg.
23-Oct-95 : B : Avadex BW Granular at 22.5 kg.
13-Nov-95 : B : MSS Iprofile at 2.5 l with MTM Trifluralin at 2.5 l in 200 l.
16-Apr-96 : B : Topik at 125 ml with Barclay Holdup at 2.3 l and Sprayprover at 1.0 l in 200 l.
17-Apr-96 : **T** : **N** 50, 100, 150, 200, 250, 300: Nitrogen treatments applied.
12-Jun-96 : B : Monicle at 1.0 l in 300 l.
09-Jul-96 : B : Wild oats pulled by hand.
21-Aug-96 : B : Combine harvested.

NOTE: Crop samples were taken for chemical analysis.

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96/R/CS/355

GRAIN TONNES/HECTARE

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

N	
0	3.44
50	5.49
100	6.61
150	7.24
200	7.27
250	7.67
300	7.68
Mean	6.48

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

N
0.275

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.337	5.2

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00483

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96/W/CS/404

TAKE-ALL SEED TREATMENT

Object: To test new fungicidal seed treatments for the control of take-all (*Gaeumannomyces graminis*) - Woburn, Stackyard II.

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

Design: 6 randomised blocks of 6 plots.

Whole plot dimensions: 3.0 x 19.0.

Treatments:

SEED TRT	Seed treatment:
-	None
BF	Fuberidazole with triadimenol (Baytan Flowable)
A1	Fungicide A, rate 1
A2	Fungicide A, rate 2
B1	Fungicide B, rate 1
B2	Fungicide B, rate 2

NOTE: Fungicides A and B are under commercial development, composition undisclosed.

Experimental diary:

14-Sep-95 : B : Ploughed.
20-Oct-95 : B : Rotary harrowed.
23-Oct-95 : B : Brigadier, drilled at 375 seeds per m^2.
20-Nov-95 : B : Panther at 2.0 l in 200 l.
16-Apr-96 : B : 34.5% N at 348 kg.
30-Apr-96 : B : Halo at 1.5 l in 200 l.
06-Jun-96 : B : Silvacur at 1.0 l in 300 l.
20-Aug-96 : B : Combine harvested.

Previous crops: W. rye 1994, w. wheat 1995.

NOTE: Samples were taken in April to assess take-all and plant growth and in June to assess take-all and eyespot.

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96/W/CS/404

GRAIN TONNES/HECTARE

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

SEED TRT	
-	7.04
BF	6.37
A1	7.24
A2	6.87
B1	7.16
B2	7.35
Mean	7.01

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

SEED TRT
0.417

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	25	0.722	10.3

GRAIN MEAN DM% 88.4

PLOT AREA HARVESTED 0.00415

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96/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 fourth year, grass.

For previous years see 94-5/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:

23-May-96 : B : Muriate of potash at 233 kg.
: **T** : **N** N1, N2: 34.5% N applied.
05-Jun-96 : B : Duplosan New System CMPP at 2.5 l with Oxytril CM at 0.9 l in 200 l.
06-Mar-97 : B : Hand harvested.

NOTE: Stems were sampled periodically to assess dry matter and nutrient content.

DRY MATTER TONNES/HECTARE

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

N	-	N1	N2	Mean
	13.73	11.52	12.35	12.53

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

N
1.146

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	1.404	11.2

MEAN DM% 44.9 PLOT AREA HARVESTED 0.00423

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96/R/CS/411

PANICUM STUDY

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

Sponsor: D.G. Christian.

The fourth year, grass.

For previous year see 94-5/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
FOREST B	Forest Burg
NEBR 28	NEBR 28
DAKOTAH	Dakotah

2. **N** Nitrogen fertilizer, kg N:

-	None
N1	60

Experimental diary:

04-Apr-96 : **T** : **VARIETY** KANLOW: Stefes IPU at 4.0 l in 220 l.
23-May-96 : **T** : **N** N1: 34.5% N at 174 kg.
05-Jun-96 : B : Duplosan New System CMPP at 2.5 l with Oxytril CM at 0.9 l in 200 l.
27-Nov-96 : **T** : **VARIETY** FOREST B, DAKOTAH: Hand harvested
30-Jan-97 : **T** : Hand harvested remaining varieties.

NOTE: Plants were sampled after flowering to assess stem numbers and dry matter.

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96/R/CS/411

DRY MATTER TONNES/HECTARE

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

	N	-	N1	Mean
VARIETY				
CAVIN R		10.88	10.11	10.50
KANLOW		12.48	10.78	11.63
PATHFIND		9.91	9.01	9.46
SUNBURST		7.36	8.60	7.98
FOREST B		11.72	9.95	10.84
NEBR 28		10.56	9.27	9.92
DAKOTAH		5.40	5.37	5.38
Mean		9.76	9.01	9.39

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

VARIETY	N	VARIETY N
1.014	0.542	1.434

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	26	1.757	18.7

MEAN DM% 67.2

PLOT AREA HARVESTED 0.00011

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96/R/CS/420

SET-ASIDE, CULTIVATION AND CROPS

Object: To assess the levels of disease and yield of w. wheat after w. wheat and w. rape following a range of cultivations and herbicide applications to destroy natural regeneration set-aside - Meadow.

Sponsors: E.T.G. Bacon, D.P. Yeoman, M.V. Hewitt, J.F. Jenkyn, R.J. Gutteridge.

The third year, w. wheat.

For previous year see 95/R/CS/420

Design: 4 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:

Whole plots

1. **SETDESTR**		Method and time of destruction of set-aside in 1994:
	(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

Sub-plots

2. **CROP**		Crop in 1995:
	(R)	Winter rape
	(W)	Winter wheat
3. **NITROGEN**		Fertilizer nitrogen in 1995 (kg N):
	(-)	None
	(N)	160

Experimental diary:

13-Sep-95 : B : Ploughed and furrow pressed.
30-Sep-95 : B : Rotary harrowed, Genesis, dressed Sibutol, drilled at 380 seeds per m^2.
11-Mar-96 : B : 34.5% N at 116 kg.
11-Apr-96 : B : 34.5% N at 463 kg.
30-Apr-96 : B : Starane 2 at 1.0 l with Barclay Holdup at 2.3 l in 200 l.
13-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 300 l.

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96/R/CS/420

Experimental diary:
09-Jul-96 : B : Wild oats pulled by hand.
06-Aug-96 : B : Combine harvested.

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

GRAIN TONNES/HECTARE

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

CROP SETDESTR	(R)	(W)	Mean
(PG)	8.69	8.76	8.72
(PC)	8.71	8.53	8.62
(MP)	8.58	8.30	8.44
(HP)	8.74	8.67	8.70
(-P)	9.04	8.03	8.54
Mean	8.75	8.46	8.60

NITROGEN SETDESTR	(-)	(N)	Mean
(PG)	8.92	8.52	8.72
(PC)	8.63	8.61	8.62
(MP)	8.49	8.40	8.44
(HP)	8.98	8.43	8.70
(-P)	8.28	8.80	8.54
Mean	8.66	8.55	8.60

NITROGEN CROP	(-)	(N)	Mean
(R)	8.86	8.64	8.75
(W)	8.45	8.46	8.46
Mean	8.66	8.55	8.60

	CROP	(R)		(W)	
SETDESTR	NITROGEN	(-)	(N)	(-)	(N)
(PG)		8.66	8.71	9.18	8.33
(PC)		8.77	8.65	8.49	8.57
(MP)		8.79	8.38	8.19	8.41
(HP)		9.02	8.46	8.94	8.40
(-P)		9.08	9.00	7.47	8.59

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96/R/CS/420

GRAIN TONNES/HECTARE

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

SETDESTR	CROP	NITROGEN	SETDESTR CROP
0.250	0.158	0.171	0.354

SETDESTR NITROGEN	CROP NITROGEN	SETDESTR CROP NITROGEN
0.368	0.233	0.521

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

SETDESTR	0.383		
CROP		0.242	
SETDESTR.CROP			0.541

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.500	5.8
BLOCK.WP.SP	30	0.765	8.9

GRAIN MEAN DM% 88.9

SUB-PLOT AREA HARVESTED 0.00230

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96/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 third year, w. rye.

For previous years see 94-95/R/CS/429.

Design: 3 randomised blocks of 5 plots.

Plot dimensions: 3.0 x 15.0.

Treatments:

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

Experimental diary:

21-Aug-95 : B : Straw baled.
08-Sep-95 : B : Ploughed.
02-Oct-95 : B : Heavy spring-tine cultivated. Rotary harrowed, Amando, undressed, drilled at 350 seeds per m^2.
30-Apr-96 : **T** : **NITROGEN** N1, N2, N3, N4: 34.5% N at 87, 174, 260 and 347 kg respectively.
21-Aug-96 : B : Combine harvested.

NOTE: Plant populations were assessed and sampled for nitrogen content in spring. Stem counts were made at anthesis and before harvest, dry matter and nutrient content was measured at anthesis. Straw weights were taken at harvest.

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96/R/CS/429

GRAIN TONNES/HECTARE

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

NITROGEN	
-	6.90
N1	6.99
N2	7.40
N3	7.51
N4	7.37
Mean	7.24

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

NITROGEN
0.694

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.851	11.8

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00230

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96/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 second year, w. wheat.

For previous year see 95/W/CS/435

Design: 4 randomised blocks of 10 x 2 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments:

1. **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. **CULT**		Time of ploughing in 1995:
	(PE)	Early (12 May)
	(PL)	Late (17 Aug)

Experimental diary:

03-Oct-95 : B : Disced.
10-Oct-95 : B : Rotary harrowed, Hereward, dressed Fonofos Seed Treatment and Beret 050FS, drilled at 375 seeds per m^2.
20-Nov-95 : B : Panther at 2.0 l in 200 l.
08-Mar-96 : B : 34.5% N at 116 kg.
02-Apr-96 : B : Vytel Manganese at 3.0 l in 300 l.
18-Apr-96 : B : 34.5% N at 348 kg.
30-Apr-96 : B : Starane 2 at 1.0 l with Halo at 1.5 l in 200 l.
06-Jun-96 : B : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 300 l.
16-Aug-96 : B : Combine harvested.

Previous crops: W. and s. rape 1993, w.wheat 1994.

NOTE: Plants were sampled to assess root and stem base diseases in April and July.

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96/W/CS/435

GRAIN TONNES/HECTARE

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

CULT CROP	(PE)	(PL)	Mean
(R)	10.16	9.91	10.03
(RW)	9.89	10.63	10.26
(RI)	10.09	10.25	10.17
(RWI)	10.61	9.01	9.81
(M)	9.16	9.72	9.44
(MW1)	10.04	10.07	10.05
(MW2)	10.01	10.04	10.02
(MW3)	9.56	9.85	9.70
(MW4)	9.77	9.70	9.74
(MW5)	9.54	9.46	9.50
Mean	9.88	9.86	9.87

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

CROP	CULT	CROP CULT
0.482	0.215	0.681

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	57	0.963	9.8

GRAIN MEAN DM% 87.9

PLOT AREA HARVESTED 0.00437

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96/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: E.T.G. Bacon, D.P. Yeoman, M.V. Hewitt, J.F. Jenkyn and R.J. Gutteridge.

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

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:

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

Sub-plots

2. **CROP**		Crop in 1996:
	R	Winter rape
	W	Winter wheat
3. **NITROGEN**		Fertilizer nitrogen in 1996 (kg N):
	-	None
	N	160

Experimental diary:

15-May-95 : **T** : **SETDESTR** (MP), (-P): Topped.
16-May-95 : **T** : **SETDESTR** (PG), (PC), (HP): Roundup Biactive at 4.0 l in 200 l.
25-May-95 : **T** : **SETDESTR** (PG), (PC): Ploughed.
26-May-95 : **T** : **SETDESTR** (MP): Heavy spring-tine cultivated to 10 cm.
03-Jul-95 : **T** : **SETDESTR** (PC): Heavy spring-tine cultivated to 10 cm.
03-Jul-95 : **T** : **SETDESTR** (MP): Topped, heavy spring-tine cultivated twice.
31-Jul-95 : **T** : **SETDESTR** (MP), (HP), (-P): Roundup Biactive at 4.0 l in 200 l.
16-Aug-95 : B : PK as (0:20:32) at 1407 kg.
22-Aug-95 : **T** : **SETDESTR** (MP), (HP), (-P): Ploughed.

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Experimental diary:

06-Sep-95 : **T** : **CROP** R: Rotary harrowed, Apex, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
26-Sep-95 : **T** : **CROP** W: Rotary harrowed, Genesis, dressed Sibutol, drilled at 380 seeds per m^2.
27-Sep-95 : B : Draza at 5.5 kg.
05-Oct-95 : **T** : **CROP** R: Butisan S at 1.5 l with Cyperkill 10 at 250 ml and Agral at 200 ml in 200 l.
20-Nov-95 : **T** : **CROP** W: Panther at 2.0 l in 200 l.
02-Feb-96 : **T** : **CROP** R: Benazalox at 2.3 kg in 200 l.
: **T** : **CROP** W: Birlane 24 at 2.8 l in 200 l.
28-Feb-96 : **T** : **CROP** R, **NITROGEN** N: 34.5% N at 174 kg.
08-Mar-96 : **T** : **CROP** W, **NITROGEN** N: 34.5% N at 116 kg.
09-Apr-96 : **T** : **CROP** R, **NITROGEN** N: 34.5% N at 290 kg.
11-Apr-96 : **T** : **CROP** W, **NITROGEN** N: 34.5% N at 348 kg.
: **T** : **CROP** R: Folicur at 0.5 l in 300 l.
25-Apr-96 : **T** : **CROP** R: Decis at 0.5 l in 200 l.
30-Apr-96 : **T** : **CROP** W: Starane 2 at 1.0 l with Barclay Holdup at 2.3 l in 200 l.
13-Jun-96 : **T** : **CROP** W: Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 300 l.
19-Jul-96 : **T** : **CROP** R: Standon Diquat at 3.0 l with Vassgro Spreader at 390 ml in 390 l.
31-Jul-96 : **T** : **CROP** R: Combine harvested.
06-Aug-96 : **T** : **CROP** W: Combine harvested.

NOTE: Soil and plant samples were taken in November and March for nitrogen content. Weed counts were made in November and March. Wheat was sampled in April and July to assess root and stem base diseases. Grain quality was assessed at harvest.

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96/R/CS/437

WINTER RAPE

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

NITROGEN	-	N	Mean
SETDESTR			
(PG)	1.38	2.29	1.84
(PC)	2.77	3.42	3.10
(MP)	2.41	3.75	3.08
(HP)	1.51	2.88	2.20
(-P)	1.43	2.52	1.97
Mean	1.90	2.97	2.44

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

	SETDESTR	NITROGEN	SETDESTR NITROGEN
	0.477	0.179	0.555
Except when comparing means with the same level(s) of SETDESTR			0.401

GRAIN MEAN DM% 92.3 SUB-PLOT AREA HARVESTED 0.00230

WINTER WHEAT

GRAIN TONNES/HECTARE

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

NITROGEN	-	N	Mean
SETDESTR			
(PG)	5.59	8.29	6.94
(PC)	4.53	8.08	6.31
(MP)	4.36	7.60	5.98
(HP)	5.10	7.50	6.30
(-P)	4.10	7.72	5.91
Mean	4.74	7.84	6.29

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

	SETDESTR	NITROGEN	SETDESTR NITROGEN
	0.524	0.232	0.640
Except when comparing means with the same level(s) of SETDESTR			0.519

GRAIN MEAN DM% 87.7 SUB-PLOT AREA HARVESTED 0.00230

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96/R/CS/442

PHALARIS LINES

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

Sponsor: D.G. Christian.

Design: 6 randomised blocks of 15 plots.

Whole plot dimensions: 1.25 x 2.25.

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:

23-May-95 : **T** : **LINES** 1-15: Transplanted.
29-Apr-96 : B : Muriate of potash at 180 kg, triple superphosphate at 49 kg and 34.5% N at 348 kg.
13-May-96 : B : Duplosan New System CMPP at 2.5 l with Oxytril CM at 1.4 l in 200 l.
07-Jan-97 : **T** : Hand harvested three blocks.
05-Feb-97 : **T** : Hand harvested remaining three blocks.

NOTES: (1) Visual assessments were made of ground cover, stem height, leaf colour, date of flowering and incidence of diseases during the season.
(2) In the early harvested blocks, one plot of Line B was exchanged with one plot of Line B in the late harvested blocks.
(3) The yields presented are from the harvest on 07-Jan-97.

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96/R/CS/442

DRY MATTER TONNES/HECTARE

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

LINES	
1	10.72
2	9.65
3	1.06
4	1.28
5	9.49
6	6.39
7	10.79
8	10.14
9	8.29
10	9.71
11	9.90
12	8.51
13	9.21
14	10.08
15	6.58
Mean	8.12

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

LINES
1.254

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	1.535	18.9

MEAN DM% 78.6

PLOT AREA HARVESTED 0.00020

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96/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.

The first year, ryegrass, wheat and mustard.

Design: 4 randomised blocks of 10 x 2 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments:

1. **CROP**		Crop, seed rate and soil inoculation:
	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. **CULT**		Time of ploughing:
	PE	Early (17 May)
	PL	Late (14 Aug)

Experimental diary:

```
22-Aug-95 : B : Disced.
05-Sep-95 : B : Ploughed.
20-Sep-95 : B : Rotary harrowed.
          : T : Seeds sown and soil inoculated.
17-May-96 : T : CULT PE: Ploughed.
27-Jun-96 : T : CULT PL: Topped.
05-Jul-96 : T : CULT PE: Spiked rotary cultivated.
14-Aug-96 : T : CULT PL: Topped, ploughed.
          : T : CULT PE: Topped
15-Aug-96 : B : Roundup at 2.0 l in 300 l.
```

Previous crops: S. beans 1994, w. wheat 1995.

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96/W/CS/446

NOTES: (1) Mustard variety was Tilney, wheat, Soissons and ryegrass, Borvi, all undressed.
(2) No yields were taken in 1996.
(3) soil samples were taken in May and July and bioassayed to determine the presence of *Phialophora graminicola* and *Gaeumannomyces graminis* var *tritici*. Wheat was sampled in April and July to assess root and stem base diseases.

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96/R/CS/447

TAKE-ALL SEED TREATMENT

Object: To test fungicidal seed treatments for the control of take-all (*Gaeumannomyces graminis*) - Pennells Piece.

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

Design: 4 blocks of 6 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

SEED TRT	Seed treatment:
-	None
BF	Fuberidazole with triadimenol (Baytan Flowable)
A1	Fungicide A, Rate 1
A2	Fungicide A, Rate 2
B1	Fungicide B, Rate 1
B2	Fungicide B, Rate 2

NOTE: Fungicides A and B are under commercial development, composition undisclosed.

Experimental diary:

17-Aug-95 : B : Straw baled.
03-Oct-95 : B : Ploughed and furrow pressed.
19-Oct-95 : B : Rotary harrowed, Brigadier drilled at 380 seeds per m^2.
16-Apr-96 : B : 34.5% N at 347 kg.
25-Apr-96 : B : Ally at 30 g with Cheetah Super at 1.25 l in 200 l.
06-Jun-96 : B : Monicle at 1.0 l in 320 l.
08-Aug-96 : B : Roundup at 4.0 l in 300 l.
21-Aug-96 : B : Combine harvested.

Previous crops: S. wheat 1994 and 1995.

NOTE: Crop vigour was assessed and plants counted in November. Samples were taken in April and July for assessment of take-all.

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96/R/CS/447

GRAIN TONNES/HECTARE

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

SEED TRT	
-	9.96
BF	9.26
A1	10.21
A2	9.70
B1	9.76
B2	9.68
Mean	9.76

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

SEED TRT
0.277

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.391	4.0

GRAIN MEAN DM% 85.4

PLOT AREA HARVESTED 0.00227

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96/R/CS/456

TAKE-ALL SEED TREATMENT

Object: To test fungicidal seed treatments for the control of take-all (*Gaeumannomyces graminis*) - Long Hoos V 1 + O&E N.

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

The first year, w. wheat.

Design: 4 randomised blocks of 6 plots.

Plot dimensions: 3.0 x 10.0.

Treatments:

SEED TRT	Seed treatment:
-	None
BF	Fuberidazole with triadimenol (Baytan Flowable)
A1	Fungicide A, rate 1
A2	Fungicide A, rate 2
B1	Fungicide B, rate 1
B2	Fungicide B, rate 2

NOTE: Fungicides A and B are under commercial development, composition undisclosed.

Experimental diary:

12-Aug-95 : B : Straw baled and removed.
09-Oct-95 : B : Topped.
18-Oct-95 : B : Gramoxone 100 at 3.0 l in 200 l.
19-Oct-95 : B : Heavy spring-tine cultivated, cultivated by rotary grubber. Rotary harrowed, Brigadier, dressed as treatments, drilled at 380 seeds per m^2.
16-Apr-96 : B : 34.5% N at 347 kg.
13-Jun-96 : B : Alto 100 SL at 0.6 l in 300 l.
: B : Mallard 750 EC at 0.4 l in 300 l.
09-Jul-96 : B : Wild oats pulled by hand.
21-Aug-96 : B : Combine harvested.

Previous crops: S. barley 1994, s. wheat after failed lupins 1995.

NOTE: Emergence was assessed and plant counts were made in November. Samples were taken in April to assess take-all on plant growth and in July to assess take-all and eyespot.

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96/R/CS/456

GRAIN TONNES/HECTARE

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

SEED TRT	
-	9.99
BF	9.93
A1	10.03
A2	9.92
B1	10.24
B2	10.57
Mean	10.11

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

SEED TRT
0.324

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.458	4.5

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00227

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96/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 - Delafield.

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. **SPECIES** Weed species:

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

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

	SM	AM	GA
0	0	0	0
2	3.8	19.9	2.1
4	10.9	28.8	3.8
8	29.8	57.7	4.1
16	90.3	92.8	9.6
32	130	183	24.9

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:

01-Aug-95	B	Straw baled.
14-Sep-95	B	Ploughed and furrow pressed.
03-Oct-95	**T**	Weeds broadcast.
	B	Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
16-Jan-96	**T**	**SPECIES** AM: Ally at 30 g in 220 l.
	T	**DENSITY** 0: Panther at 2.0 l in 220 l.
08-Mar-96	B	34.5% N at 116 kg.
15-Apr-96	B	34.5% N at 463 kg.
08-Aug-96	B	Hand harvested.

Previous crops: Linseed 1994, set-aside 1995.

NOTE: Weed and crop densities were assessed in November and March. Assessments of weed and crop growth and leaf area were taken in November, March, April, May and June. Soil nitrogen and water content were measured in March. Weed seed production was estimated in July and at harvest grain and straw were sampled for nitrogen content.

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96/R/WW/1

GRAIN TONNES/HECTARE

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

DENSITY / SPECIES	0	2	4	8	16	32	Mean
SM	7.97	8.44	8.42	8.06	7.25	6.89	7.84
AM	8.14	8.00	7.83	7.71	6.78	7.23	7.61
GA	8.17	7.88	8.39	7.80	7.54	7.38	7.86
Mean	8.09	8.11	8.21	7.86	7.19	7.17	7.77

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

SPECIES	DENSITY	SPECIES DENSITY
0.186	0.263	0.456

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	34	0.559	7.2

GRAIN MEAN DM% 88.5

PLOT AREA HARVESTED 0.00020

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96/W/WW/1

WINTER WHEAT

VARIETY, SULPHUR AND NITROGEN

Object: To measure yield and quality response to sulphur fertilizer on two varieties of wheat - Woburn, Stackyard AI.

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

Design: 3 randomised blocks of (2 x 6) + 6 plots

Plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **NITROGEN** Nitrogen fertilizer (kg N) as 34.5% N at growth stage 32 in addition to a basal dressing of 180 kg N:

N1	None
N2	50

2. **SULPHUR** Sulphur fertilizer (kg S) as gypsum (17.5% S) at growth stage 23:

S0	0
S1	10
S2	20
S3	40
S4	70
S5	100

plus 6 extra plots

3. **EXTRA** Variety, timing (growth stage (GS)) and rates of nitrogen fertilizer as urea (kg N), sulphur as ammonium sulphate or gypsum (kg S):

	Variety	N as urea	S as $(NH_4)SO_4$	S as gypsum	Timing (GS)	
EUS0	Hereward	50.0	0	0	65	
EUS1	Hereward	41.2	10	0	65	
EUS2	Hereward	32.6	20	0	65	
EUS3	Hereward	32.6	20	20	65	(gypsum at GS 23)
RNS0	Riband	0	0	0	-	
RNS2	Riband	0	0	20	23	

NOTE: All treatments were sown to variety Hereward, except RNS0 and RNS2 which were sown to Riband.

Experimental diary:

14-Sep-95 : B : Ploughed.
23-Sep-95 : B : Rolled.
05-Oct-95 : B : Rotary harrowed.

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96/W/WW/1

Experimental diary:

05-Oct-95 : **T** : All plots except RNS0, RNS2: Hereward, dressed Sibutol, drilled at 375 seeds per m^2.
: **T** : **EXTRA** RNS0, RNS2: Riband, dressed Sibutol, drilled at 375 seeds per m^2.
13-Nov-95 : B : Panther at 2.0 l in 200 l.
08-Mar-96 : B : 34.5% N at 116 kg.
11-Mar-96 : **T** : **SULPHUR** S1-S5, **EXTRA** EUS3, RNS2: Gypsum applied.
16-Apr-96 : B : 34.5% N at 406 kg.
30-Apr-96 : B : Halo at 1.5 l in 200 l.
02-May-96 : **T** : **NITROGEN** N2: 34.5% N at 145 kg.
06-Jun-96 : B : Silvacur at 1.0 l in 300 l.
10-Jul-96 : **T** : **EXTRA** EUS0, EUS1, EUS2, EUS3: Urea applied.
: **T** : **EXTRA** EUS1, EUS2, EUS3: Ammonium sulphate applied.
18-Jul-96 : **T** : **EXTRA** EUS0, EUS1, EUS2, EUS3: Urea applied.
: **T** : **EXTRA** EUS1, EUS2, EUS3: Ammonium sulphate applied.
19-Aug-96 : B : Combine harvested.

NOTE: Plants were sampled monthly April to August for nitrogen and sulphur content. Grain was analysed for nitrogen and sulphur content and bread making quality. Soils were sampled in autumn, spring and at harvest for sulphur content.

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96/W/WW/1

GRAIN TONNES/HECTARE

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

SULPHUR / **NITROGEN**	S0	S1	S2	S3	S4	S5	Mean
N1	6.24	7.43	6.71	6.86	6.32	6.76	6.72
N2	7.13	6.47	7.02	6.68	6.27	7.07	6.77
Mean	6.68	6.95	6.86	6.77	6.30	6.91	6.74

EXTRA	EUS0	EUS1	EUS2	EUS3	RNS0	RNS2	Mean
	6.52	7.08	6.30	7.14	7.87	8.19	7.18

Grand mean 6.89

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

NITROGEN	**SULPHUR**	**NITROGEN SULPHUR & EXTRA**
0.212	0.367	0.519

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	34	0.636	9.2

GRAIN MEAN DM% 90.1

PLOT AREA HARVESTED 0.00176

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96/R/WW/2

WINTER WHEAT

WATER STRESS AND WEED COMPETITION

Object: To study the competitive effects of weeds in winter wheat, with and without irrigation - Delafield.

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

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

Whole plot dimensions: 8.0 x 30.0.
Sub-plot dimensions: 4.0 x 15.0.

Treatments:

Whole plots

1.	**IRRIGATN**	Irrigation:
	I	Irrigated
	0	None

Sub-plots

2.	**WEED**	Weed species sown:
	-	None
	SM	*Stellaria media* (chickweed)
	AM	*Alopecurus myosuroides* (black-grass)
	GA	*Galium aparine* (cleavers)

Experimental diary:

14-Sep-95	B	Ploughed and furrow pressed.
02-Oct-95	**T**	**WEED** SM, AM: Seed broadcast at 320 seeds per m^2.
	T	**WEED** GA: Seed broadcast at 24 seeds per m^2.
	B	Rotary harrowed, Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
16-Jan-96	**T**	**WEED** AM: Ally at 30 g in 220 l.
	T	**WEED** -: Panther at 2.0 l in 220 l.
08-Mar-96	B	34.5% N at 116 kg.
15-Apr-96	B	34.5% N at 463 kg.
14-May-96	**T**	**IRRIGATN** I: Irrigated 25 mm.
05-Jun-96	**T**	**IRRIGATN** I: Irrigated 30 mm.
18-Jun-96	**T**	**IRRIGATN** I: Irrigated 25 mm.
26-Jun-96	**T**	**IRRIGATN** I: Irrigated 25 mm.
04-Jul-96	**T**	**IRRIGATN** I: Irrigated 25 mm.
15-Jul-96	**T**	**IRRIGATN** I: Irrigated 25 mm.
15-Aug-96	B	Hand harvested.

Previous crops: Linseed 1994, set-aside 1995.

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96/R/WW/2

NOTES: (1) Weed and crop populations were assessed at emergence and in November and February. Weed and crop biomass and green area were assessed on six occasions through the season. Seed production of black-grass and cleavers were measured. Components of yield were assessed at harvest.

(2) Weeds failed to establish on two plots, with treatment combinations:-

IRRIGATN	I0	I1
WEED	SM	SM

Estimated values were used in the analysis.

GRAIN TONNES/HECTARE

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

WEED / **IRRIGATN**	-	SM	AM	GA	Mean
I	7.06	5.13	6.87	3.75	5.70
0	7.20	4.94	6.24	6.07	6.11
Mean	7.13	5.03	6.55	4.91	5.91

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

WEED	**IRRIGATN*** **WEED**
0.494	0.698

* Within the same level of **IRRIGATN** only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	16	0.988	16.7

GRAIN MEAN DM% 89.8

SUB-PLOT AREA HARVESTED 0.00020

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96/R/WW/3

WINTER WHEAT

PLANT N INDICATORS

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

Sponsors: P.B. Barraclough, S. Haysman.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 3.0 x 17.0.

Treatments:

N	Timing and rate of nitrogen (kg N):			
	Early March	Mid-April	Mid-May	Total
1	40	80	0	120
2	40	80	20	140
3	40	80	40	160
4	40	80	60	180
5	40	80	80	200
6	40	80	100	220
7	40	120	0	160
8	40	160	0	200
9	40	200	0	240
10	40	240	0	280

Experimental diary:

29-Jul-95 : B : Straw baled.
05-Aug-95 : B : PK as (0:20:32) at 1407 kg.
25-Sep-95 : B : Ploughed and furrow pressed.
26-Sep-95 : B : Rotary harrowed, Hereward, dressed Panoctine, drilled at 380 seeds per m^2.
23-Oct-95 : B : Avadex BW Granular at 22.5 kg.
20-Nov-95 : B : MSS Iprofile at 2.6 l with Stomp 400 SC at 2.6 l in 200 l.
28-Feb-96 : B : Tiger 90 (90% S)at 35 kg.
07-Mar-96 : B : 34.5% N at 116 kg.
03-Apr-96 : **T** : **N** 1, 2, 3, 4, 5, 6: 34.5% N at 232 kg.
: **T** : **N** 7: 34.5% N at 348 kg.
: **T** : **N** 8: 34.5% N at 464 kg.
: **T** : **N** 9: 34.5% N at 580 kg.
: **T** : **N** 10: 34.5% N at 696 kg.
30-Apr-96 : B : Starane 2 at 1.0 l with Barclay Holdup at 2.3 l in 200 l.
29-May-96 : **T** : **N** 2: 34.5% N at 58 kg.
: **T** : **N** 3: 34.5% N at 116 kg.
: **T** : **N** 4: 34.5% N at 174 kg.
: **T** : **N** 5: 34.5% N at 232 kg.
: **T** : **N** 6: 34.5% N at 290 kg.

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96/R/WW/3

Experimental diary:

07-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 320 l.
15-Aug-96 : B : Combine harvested.

Previous crops: W. beans 1994, w. oats 1995.

NOTE: Plant numbers and soil nitrogen were measured in March. Chlorophyll meter readings were taken on nine occasions. Growth analysis measurements were made on five occasions, this included dry matter and nitrogen content of leaf and shoots, growth area index, leaf area and chlorophyll in leaves. Grain and straw were analysed for nitrogen content.

GRAIN TONNES/HECTARE

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

N	
1	9.64
2	9.98
3	10.18
4	10.46
5	10.36
6	10.53
7	10.19
8	10.68
9	10.87
10	10.74
Mean	10.36

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

N
0.186

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.263	2.5

GRAIN MEAN DM% 85.3

PLOT AREA HARVESTED 0.00253

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96/R/WW/6

WINTER WHEAT

HERBICIDE RESISTANT BLACK-GRASS

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

Sponsor: S.R. Moss.

Design: 4 blocks of 15 plots.

Whole plot dimensions: 3.0 x 12.0.

Treatments:

HERBCIDE	Herbicide type, rate of active ingredient and timing (black-grass growth stage):
1	None (duplicated)
3	Isoproturon at 2.5 kg at two leaf stage
4	Tri-allate at 2.24 kg pre-emergence, plus isoproturon at 2.5 kg at two leaf stage
5	Trifluralin at 0.96 kg pre-emergence, plus isoproturon at 2.5 kg at two leaf stage
6	Pendimethalin at 2.0 kg pre-emergence, plus isoproturon at 2.5 kg at two leaf stage
7	Tri-allate at 2.24 kg plus trifluralin at 0.96 kg pre-emergence, plus isoproturon at 2.5 kg at two leaf stage
8	Tri-allate at 2.24 kg plus trifluralin at 0.96 kg pre-emergence, isoproturon at 2.5 kg at two leaf stage and at 2.1 kg at one tiller stage
9	Tri-allate at 2.24 kg plus trifluralin at 0.96 kg pre-emergence, isoproturon at 2.5 kg at two leaf stage and fenoxaprop-P-ethyl at 0.069 kg at one tiller stage
10	Tri-allate at 2.24 kg plus trifluralin at 0.96 kg pre-emergence, isoproturon at 2.5 kg at two leaf stage clodinafop-propargyl at 0.06 kg at one tiller stage
11	Tri-allate at 2.24 kg plus trifluralin at 0.96 kg pre-emergence, isoproturon at 1.5 kg plus simazine at 0.25 kg at two leaf stage
12	Fenoxaprop-P-ethyl at 0.069 kg at two leaf stage
13	Fenoxaprop-P-ethyl at 0.069 kg at one tiller stage
14	Clodinafop-propargyl at 0.06 kg at two leaf stage
15	Clodinafop-propargyl at 0.06 kg at one tiller stage

Experimental diary:

20-Sep-95 : B : Ploughed and furrow pressed.
22-Sep-95 : B : Rolled.
10-Oct-95 : B : Gramoxone 100 at 3.0 l in 260 l.
12-Oct-95 : B : Rotary harrowed.

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96/R/WW/6

Experimental diary:

13-Oct-95 : B : Rotary harrowed Mercia, dressed Sibutol, drilled at 380 seeds per m^2.
17-Oct-95 : B : Draza at 5.5 kg.
18-Oct-95 : T : **HERBCIDE** 5, 7, 8, 9, 10, 11: Portman Trifluralin at 2.0 l in 220 l.
: T : **HERBCIDE** 6: Stomp 400 SC at 5.0 l in 220 l.
19-Oct-95 : T : **HERBCIDE** 4, 7, 8, 9, 10, 11: Avadex BW Granular at 22.4 kg.
10-Jan-96 : T : **HERBCIDE** 11: Atlas Simazine at 0.5 l with Stefes IPU at 3.0 l in 220 l.
: T : **HERBCIDE** 12: Cheetah Super at 1.25 l in 220 l.
: T : **HERBCIDE** 3, 4, 5, 6, 7, 8, 9, 10: Stefes IPU at 5.0 l in 220 l.
: T : **HERBCIDE** 14: Topik at 0.25 l in 220 l.
02-Apr-96 : T : **HERBCIDE** 8: Stefes IPU at 4.2 l in 220 l.
: T : **HERBCIDE** 9, 13: Cheetah Super at 1.25 l in 220 l.
: T : **HERBCIDE** 10, 15: Topik at 0.25 l in 220 l.
18-Apr-96 : B : 34.5% N at 586 kg.
12-Jun-96 : B : Monicle at 1.0 l in 300 l.
20-Aug-96 : B : Combine harvested.

Previous crops: W. wheat 1994 and 1995.

NOTE: Black-grass and wheat plants were counted in December. Black-grass heads were counted in June.

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96/R/WW/6

GRAIN TONNES/HECTARE

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

HERBCIDE

1	5.17
3	7.03
4	7.48
5	7.54
6	7.33
7	7.19
8	7.19
9	7.01
10	7.25
11	6.99
12	6.13
13	5.78
14	6.99
15	6.15
Mean	6.69

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

HERBCIDE
0.256 min.rep
0.222 max-min

HERBCIDE
max-min 1 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	43	0.362	5.4

GRAIN MEAN DM% 88.2

PLOT AREA HARVESTED 0.00219

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96/R/WW/10

WINTER WHEAT

PHEROMONES IN WINTER WHEAT

Object: To test the effects of aphid sex pheromones on aphid parasitoids in w. wheat - Great Field I/II.

Sponsors: R. Glinwood, W. Powell.

Design: 4 x 4 Latin square balanced for neighbours.

Whole plot dimensions: 6.0 x 6.0.

Treatments:

PHERMONE	Pheromone nepetalactone, vials per plot:
C	None
L1	1
L2	2
L3	3

Experimental diary:

29-Jul-95 : B : Straw baled.
05-Aug-95 : B : PK as 0:20:32 at 1407 kg.
12-Sep-95 : B : Ploughed and furrow pressed.
13-Oct-95 : B : Spring-tine cultivated.
20-Oct-95 : B : Rotary harrowed, Hereward, dressed Sibutol, drilled at 380 seeds per m^2.
23-Oct-95 : B : Avadex BW Granular at 22.5 kg.
12-Mar-96 : B : 34.5% N at 116 kg.
16-Apr-96 : B : 34.5% N at 470 kg.
29-Apr-96 : B : Ally at 30 g with Barclay Holdup at 2.3 l in 200 l.
13-May-96 : **T** : **PHERMONE** L1, L2, L3: Nepetalactone placed in the crop.
13-Jun-96 : B : Alto 100 SL at 0.6 l with Mallard 750 EC at 0.4 l in 300 l.
19-Aug-96 : B : Combine harvested.

Previous crops: W. wheat 1994 and 1995.

NOTE: Aphid populations were monitored from June to August.

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96/R/WW/10

GRAIN TONNES/HECTARE

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

PHERMONE	
C	8.34
L1	8.17
L2	8.02
L3	8.04
Mean	8.14

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

PHERMONE
0.278

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

Stratum	d.f.	s.e.	cv%
ROW.COL	6	0.393	4.8

GRAIN MEAN DM% 89.2

PLOT AREA HARVESTED 0.00138

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96/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 - Highfield V.

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: 9.0 x 10.0.

Treatments:

APHCONT	Aphid control and timing:
-	None
C	Cypermethrin in November
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:

24-Aug-95 : B : Ploughed and furrow pressed.
25-Sep-95 : B : Spring-tine cultivated. Rotary harrowed, Gaelic, dressed Vitaflo Extra, drilled at 350 seeds per m^2.
18-Oct-95 : **T** : **APHCONT** BA: Beta-acids applied at 10.4 l.
: **T** : **APHCONT** F: Formulation applied at 10.4 l.
01-Nov-95 : **T** : **APHCONT** BA: Beta-acids applied at 10.4 l.
: **T** : **APHCONT** F: Formulation applied at 10.4 l.
14-Nov-95 : B : Panther at 2.0 l in 200 l.
16-Nov-95 : **T** : **APHCONT** BA: Beta-acids applied at 10.4 l.
: **T** : **APHCONT** F: Formulation applied at 10.4 l.
: **T** : **APHCONT** C: Ambush C at 250 g in 10.4 l.
07-Mar-96 : B : 34.5% N at 116 kg.
09-Apr-96 : B : 34.5% N at 348 kg.
27-Apr-96 : B : Starane 2 at 1.0 l with Punch C at 0.8 l in 200 l.
10-Jun-96 : B : Punch C at 0.6 l in 320 l.
02-Aug-96 : B : Combine harvested.

Previous crops: Set-aside 1994, w. rape 1995.

NOTE: Counts were made of virus infected plants in May and June.

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96/R/BW/1

GRAIN TONNES/HECTARE

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

APHCONT	
-	10.03
C	9.88
F	9.94
BA	9.67
Mean	9.88

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

APHCONT
0.172

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.243	2.5
BLOCK.WP.SP	32	0.288	2.9

GRAIN MEAN DM% 86.8

PLOT AREA HARVESTED 0.00230

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96/W/BW/1

WINTER BARLEY

RHYNCHOSPORIUM STUDY

Object: To characterise two geographically separated *Rhynchosporium* populations and to assess their susceptibility to fungicides - Woburn, Butt Close I - IV. The experiment was repeated at Long Ashton Research Station, Bristol.

Sponsor: D.W. Holloman, Long Ashton Research Station.

Design: 2 randomised blocks of 4 plots.

Whole plot dimensions: 20.0 x 24.0.

Treatments:

FUNGCIDE	Fungicide:
-	None
CARB	Carbendazim (Bavistin DF)
CARB+DTB	Carbendazim and diethofencarb (Sumico)
DTB	Diethofencarb

Experimental diary:

20-Sep-95 : B : Ploughed.
24-Nov-95 : B : Rotary harrowed, Chariot, dressed Wireworm FS Seed Treatment, drilled at 440 seeds per m^2.
19-Mar-96 : B : 34.5% N at 116 kg.
10-May-96 : B : 34.5% N at 290 kg.
02-Jun-96 : B : Ally at 30 g in 200 l.
14-Jun-96 : **T** : **FUNGCIDE** CARB: Bavistin DF at 0.5 kg in 300 l.
: **T** : **FUNGCIDE** DTB: Diethofencarb at 2.0 kg in 300 l.
: **T** : **FUNGCIDE** CARB+DTB: Sumico at 2.0 kg in 300 l.
05-Aug-96 : B : Combine harvested.

Previous crops: Various 1994, potatoes 1995.

NOTE: Leaf samples were taken on three occasions and isolates of *Rhynchosporium* were tested for sensitivity to fungicides.

GRAIN TONNES/HECTARE

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

FUNGCIDE	-	CARB	CARB+DTB	DTB	Mean
	2.12	3.27	3.43	2.74	2.89

GRAIN MEAN DM% 89.8

PLOT AREA HARVESTED 0.00440

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96/R/RAW/5

WINTER OILSEED RAPE

DISEASE CONTROL

Object: To compare standard and forecast fungicidal spray programmes for control of light leaf spot and canker in w. oilseed rape - Great Knott II.

Sponsors: B.D.L. Fitt, S. Mitchell.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 3.0 x 20.0.

Treatments:

FUNGCIDE	Fungicide rate and timing:	Autumn	Winter	Spring
-	None (duplicated)	-	-	-
S3	Standard	0.5	0.5	0.5
S2	Standard	1.0	-	0.5
F3	Forecast	0.5	0.5	0.5
F2	Forecast	1.0	-	0.5

NOTE: 1.0 = Full rate, 0.5 = Half rate.

Experimental diary:

05-Aug-95 : B : PK as (0:20:32) at 1407 kg.
07-Aug-95 : B : Ploughed and furrow pressed.
04-Sep-95 : B : Irrigated 20 mm.
05-Sep-95 : B : Rotary harrowed, Envol, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
02-Oct-95 : B : Butisan S at 1.5 l with Cyperkill 10 at 250 ml and Agral at 200 ml in 200 l.
12-Oct-95 : B : Draza at 5.5 kg.
07-Nov-95 : **T** : **FUNGCIDE** S3: Folicur at 0.5 l in 220 l.
: **T** : **FUNGCIDE** S2: Folicur at 1.0 l in 220 l.
10-Jan-96 : **T** : **FUNGCIDE** F3: Folicur at 0.5 l in 220 l.
: **T** : **FUNGCIDE** F2: Folicur at 1.0 l in 220 l.
27-Feb-96 : **T** : **FUNGCIDE** S3, F3: Folicur at 0.5 l in 220 l.
29-Feb-96 : B : 34.5% N at 174 kg.
02-Apr-96 : **T** : **FUNGCIDE** S3, S2, F3, F2: Folicur at 0.5 l in 220 l.
09-Apr-96 : B : 34.5% N at 348 kg.
25-Apr-96 : B : Fastac at 200 ml in 200 l.
19-Jul-96 : B : Standon Diquat at 3.0 l with Vassgro Spreader at 390 ml in 390 l.
30-Jul-96 : B : Combine harvested.

Previous crops: W. wheat 1994, set-aside 1995.

NOTE: Plant samples were taken regularly to assess the incidence and severity of diseases on leaves, stems and pods.

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96/R/RAW/5

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

FUNGCIDE

-	3.92
S3	4.12
S2	4.36
F3	4.16
F2	4.18
Mean	4.11

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

FUNGCIDE

0.142	min.rep
0.123	max-min

FUNGCIDE

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

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	16	0.200	4.9

GRAIN MEAN DM% 89.5

PLOT AREA HARVESTED 0.00391

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96/R/RAW/6

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 - Fosters.

Sponsor: P.J.W. Lutman.

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

Sub-plot dimensions: 3.0 x 14.0.

Treatments:

Whole plots

1.	**SOW DATE**	Sowing date:
	SE	Early, 06-Sep-95
	SL	Late, 21-Sep-95

Sub-plots

2.	**CROP DEN**	Crop density, seeds per m^2:
	DL	100
	DM	180
	DH	260
3.	**WEED**	Weed type and seed rate:
	-	None
	WC	Chickweed (*Stellaria media*), sown at 2000 seeds per m^2
	WB	S. barley (cv. Magie, dressed Rappor), sown at 320 seeds per m^2

NOTE: Weeds were broadcast just before drilling the w. rape.

Experimental diary:

05-Aug-95 : B : Ploughed and furrow pressed. Rolled.
05-Sep-95 : B : Irrigated 20 mm.
06-Sep-95 : **T** : **SOW DATE** SE: Rotary harrowed, Apex, dressed Lindex-Plus FS, drilled.
21-Sep-95 : **T** : **SOW DATE** SL: Rotary harrowed, Apex, dressed Lindex-Plus FS, drilled.
22-Sep-95 : B : Draza at 5.5 kg.
23-Sep-95 : B : Cyperkill 10 at 250 ml with Agral at 300 ml in 300 l.
29-Sep-95 : **T** : **SOW DATE** SE, **WEED** -, WB: Butisan S at 1.5 l in 220 l.
30-Oct-95 : **T** : **SOW DATE** SL, **WEED** -: Butisan S at 1.5 l in 220 l.
10-Jan-96 : **T** : **SOW DATE** SE, **WEED** WC: Carbetamex at 3.0 kg in 220 l.
29-Feb-96 : B : 34.5% N at 174 kg.
09-Apr-96 : B : 34.5% N at 348 kg.
11-Apr-96 : B : Folicur at 0.5 l in 300 l.

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96/R/RAW/6

Experimental diary:

25-Apr-96 : B : Decis at 0.5 l in 200 l.
22-Jul-96 : B : Reglone at 3.0 l with Vassgro Spreader at 390 ml in 390 l.
31-Jul-96 : B : Combine harvested.

Previous crops: W. wheat 1994, set-aside 1995.

NOTES: (1) Rape and weed plant densities were assessed in autumn. Crop and weed samples were taken on four occasions for dry matter assessments.

(2) Crop failed on three plots with treatment combinations:

SOW DATE	SE	SL	SE
CROP DEN	DL	DL	DH
WEED	WB	-	WC

Estimated values were used in the analysis.

(3) A sub-sample was taken to measure weed contamination in the grain. Estimated cleaned grain yields are presented

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

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

CROP DEN	DL	DM	DH	mean
SOW DATE				
SE	3.62	3.88	4.04	3.84
SL	2.85	3.18	3.07	3.03
mean	3.23	3.53	3.55	3.44

WEED	-	WC	WB	mean
SOW DATE				
SE	4.85	4.66	2.02	3.84
SL	4.31	2.92	1.87	3.03
mean	4.58	3.79	1.95	3.44

WEED	-	WC	WB	mean
CROP DEN				
DL	4.64	3.76	1.30	3.23
DM	4.68	3.96	1.96	3.53
DH	4.43	3.66	2.58	3.55
mean	4.58	3.79	1.95	3.44

WEED		-	WC	WB
SOW DATE	**CROP DEN**			
SE	DL	4.85	4.69	1.33
	DM	4.82	4.79	2.04
	DH	4.90	4.52	2.69
SL	DL	4.43	2.83	1.28
	DM	4.53	3.13	1.88
	DH	3.96	2.80	2.46

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96/R/RAW/6

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

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

CROP DEN	WEED	SOW DATE* CROP DEN
0.209	0.209	0.295

SOW DATE* WEED	CROP DEN WEED	SOW DATE* CROP DEN WEED
0.295	0.361	0.511

* Within the same level of **SOW DATE** only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	29	0.626	18.2

GRAIN MEAN DM% 88.2

SUB-PLOT AREA HARVESTED 0.00281 (36 Plots) or 0.00258 (18(Plots)

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96/R/RAW/7

WINTER OILSEED RAPE

PHEROMONES IN W. RAPE

Object: To test the effects of aphid sex pheromones on aphid parasitoids in w. rape - Great Knott II.

Sponsors: R. Glinwood, W. Powell.

Design: 4 x 4 Latin square balanced for neighbours.

Whole plot dimensions: 6.0 x 6.0.

Treatments:

PHERMONE	Pheromones:
C	None
L	Nepetalactone
LO	Nepetalactol
R	Nepetalactone and nepetalactol

Experimental diary:

07-Aug-95 : B : Ploughed and furrow pressed.
11-Sep-95 : B : Rotary harrowed, Envol, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
02-Oct-95 : B : Butisan S at 1.5 l with Cyperkill 10 at 250 ml in 200 l.
29-Feb-96 : B : 34.5% N at 174 kg.
09-Apr-96 : B : 34.5% N at 348 kg.
11-Apr-96 : B : Folicur at 0.5 l in 300 l.
13-May-96 : **T** : **PHERMONE** L, LO, R: Pheromones in vials placed in the crop.
30-Jul-96 : B : Combine harvested.

Previous crops: S. beans 1994, set-aside 1995.

NOTE: Samples of aphids and parasitoids were taken weekly.

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96/R/RAW/7

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

PHERMONE	
C	4.03
L	3.71
LO	3.62
R	3.62
Mean	3.74

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

PHERMONE
0.126

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

Stratum	d.f.	s.e.	cv%
ROW.COL	6	0.178	4.7

GRAIN MEAN DM% 84.8

PLOT AREA HARVESTED 0.00138

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96/R/RAS/1

SPRING OILSEED RAPE

SULPHUR AND MAGNESIUM FOR SPRING OILSEED RAPE

Object: To study the effects of rates of sulphur and magnesium fertilizers on the yield and sulphur content of spring oilseed rape - Great Harpenden II.

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

Design: 4 randomised blocks of 12 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments:

SULMAG Sulphur and magnesium, rate (kg) and form:

	S	Mg	
-	None	None	(duplicated)
KS1	10	-	as potassium sulphate to seedbed
KS2	20	-	as potassium sulphate to seedbed
KS4	40	-	as potassium sulphate to seedbed
KS8	80	-	as potassium sulphate to seedbed
S2	20	-	as 'Thiovit' to seedbed
S4	40	-	as 'Thiovit' to seedbed
E2	20	15.4	as Epsom salts to crop
E4	40	30.8	as Epsom salts to crop
MG1	-	15.4	as magnesium chloride to crop
MG2	-	30.8	as magnesium chloride to crop

NOTES: (1) Potassium chloride as muriate of potash was applied to balance the potassium to supply 222 kg K_2O. Epsom salts and magnesium chloride dressings were split and applied one week apart and as two or four sprays on each occasion.
(2) Thiovit contains 80% elemental S.

Experimental diary:

25-Oct-95 : B : Deep tine cultivated, twice.
30-Jan-96 : B : Ploughed.
01-Apr-96 : **T** : **SULMAG:** Potassium chloride applied.
: **T** : **SULMAG:** Potassium sulphate applied.
: B : Spring-tine cultivated.
02-Apr-96 : **T** : **SULMAG:** Thiovit applied.
: B : 34.5% N at 145 kg.
: B : Treflan at 2.3 l in 300 l. Spring-tine cultivated.
03-Apr-96 : B : Rotary harrowed, Starlight, dressed thiram, drilled at 7 kg.
04-Apr-96 : B : Rolled.
27-Apr-96 : B : Decis at 0.3 l in 200 l.
08-May-96 : B : 34.5% N at 144 kg.
13-May-96 : B : Cyperkill 10 at 250 ml in 200 l.

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96/R/RAS/1

Experimental diary:

```
   05-Jun-96 : T : SULMAG: Epsom salts and magnesium chloride applied with
                     Vassgro Spreader at 56 ml in 750 l.
             : B : Dow Shield at 0.5 l in 320 l.
   12-Jun-96 : B : Fastac at 200 ml in 320 l.
   13-Jun-96 : T : SULMAG: Epsom salts and magnesium chloride applied with
                     Vassgro Spreader at 56 ml in 750 l.
   30-Aug-96 : B : Combine harvested.
```

Previous crops: W. barley 1994, potatoes 1995.

NOTE: Leaves were sampled for nitrogen and sulphur content at flowering. Soil was sampled to measure sulphur content before drilling.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SULMAG	
-	2.87
KS1	2.62
KS2	2.84
KS4	2.88
KS8	2.72
S2	2.80
S4	2.81
E2	2.99
E4	2.72
MG1	2.92
MG2	2.90
Mean	2.83

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

SULMAG	
0.104	min.rep
0.090	max-min

SULMAG
min.rep Any of the remainder
max-min - v any of the remainder

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	34	0.147	5.2

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00299 (32 Plots) or 0.00253 (16 Plots)

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96/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, Lansome II.

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

Design: 4 randomised blocks of 6 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
S8	80

NOTE: Potassium chloride was applied to balance the potassium to supply 222 kg K_2O.

Experimental diary:

14-Feb-96 : B : Ploughed.
28-Feb-96 : B : Heavy spring-tine cultivated.
02-Apr-96 : B : Portman Trifluralin at 2.0 l in 300 l, rotary harrowed.
03-Apr-96 : **T** : **SULPHUR** S0, S1, S2, S4: Muriate of potash to balance potassium applied.
: **T** : **SULPHUR** S1, S2, S4, S8: Potassium sulphate applied.
: B : 34.5% N at 145 kg. Starlight, dressed Lindex-Plus FS, drilled at 140 seeds per m^2.
04-Apr-96 : B : Rolled.
13-May-96 : B : 34.5% N at 290 kg.
13-Jun-96 : B : Fastac at 200 ml in 200 l.
31-Aug-96 : B : Combine harvested.

Previous crops: S. barley 1994, s. rape 1995.

NOTE: Leaves were sampled for nitrogen and sulphur content at flowering. Soil was sampled to measure sulphur content before drilling

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96/W/RAS/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SULPHUR	
S0	1.91
S1	2.27
S2	2.24
S4	1.89
S8	2.10
Mean	2.05

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

SULPHUR	
0.193	min.rep
0.167	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	16	0.272	13.3

GRAIN MEAN DM% 86.5

PLOT AREA HARVESTED 0.00286

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96/R/RAS/3

SPRING OILSEED RAPE

INDUSTRIAL CULTIVARS AND DISEASE A

Object: To determine the effects of disease on the yield and quality of industrial rape cultivars - Bones Close.

Sponsors: K.J. Doughty, H.A. McCartney.

Design: 4 randomised blocks of 2 plots.

Whole plot dimensions: 3.0 x 17.0.

Treatments:

INOCFUNG	Inoculation or fungicide applied:
I	Inoculated with infected rape straw
F	Iprodione, thiophanate-methyl and vinclozolin

Experimental diary:

18-Aug-95 : B : Wheat straw removed.
19-Jan-96 : B : Ploughed.
01-Apr-96 : B : Heavy spring-tine cultivated. Rotary harrowed, Industry, dressed Lindex-Plus FS, drilled at 180 seeds per m^2.
03-Apr-96 : B : Butisan S at 1.5 l in 200 l.
25-Apr-96 : B : Decis at 0.3 l in 200 l.
08-May-96 : B : 34.5% N at 290 kg.
13-May-96 : B : Cyperkill 10 at 250 ml in 200 l.
10-Jun-96 : B : Fastac at 200 ml in 320 l.
14-Jun-96 : T : **INOCFUNG** I: Inoculated with one bale of rape straw per plot.
05-Jul-96 : T : **INOCFUNG** F: Compass at 3.0 l in 200 l.
18-Jul-96 : T : **INOCFUNG** F: Ronilan FL at 1.5 l in 260 l.
28-Aug-96 : B : Combine harvested.

Previous crops: Potatoes 1994, w. wheat 1995.

NOTE: Plant samples were taken at harvest for assessment of diseases. Grain samples were analysed for oil content and fatty acids.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

FUNGCIDE	
I	1.18
F	1.13
Mean	1.16

GRAIN MEAN DM% 86.3 PLOT AREA HARVESTED 0.00391

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96/R/RAS/5

SPRING OILSEED RAPE

INDUSTRIAL CULTIVARS AND DISEASE C

Object: To determine the effects of disease on the yield and quality of industrial rape cultivars - Sawyers I E.

Sponsors: K.J. Doughty, H.A. McCartney.

Design: 4 randomised blocks of 2 plots.

Whole plot dimensions: 3.0 x 17.0.

Treatments:

INOCFUNG	Inoculation or fungicide applied:
I	Inoculated with infected rape straw.
F	Iprodione, thiophanate-methyl and vinclozolin

Experimental diary:

23-Jan-96 : B : Ploughed.
01-Apr-96 : B : Heavy spring-tine cultivated. Rotary harrowed, Starlight, dressed Lindex-Plus FS, drilled at 180 seeds per m^2.
03-Apr-96 : B : Butisan S at 1.5 l in 200 l.
27-Apr-96 : B : Decis at 0.3 l in 200 l.
07-May-96 : B : 34.5% N at 290 kg.
13-May-96 : B : Cyperkill 10 at 250 ml in 200 l.
04-Jun-96 : B : Laser at 2.25 l with Atlas Adjuvant Oil at 1.8 l in 200 l.
10-Jun-96 : B : Fastac at 200 ml in 320 l.
14-Jun-96 : T : **INOCFUNG** I: Inoculated with one bale of rape straw per plot.
05-Jul-96 : T : **INOCFUNG** F: Compass at 3.0 l in 200 l.
18-Jul-96 : T : **INOCFUNG** F: Ronilan FL at 1.5 l in 260 l.
28-Aug-96 : B : Combine harvested.

Previous crops: W. wheat 1994, lupins 1995.

NOTE: Plant samples were taken at harvest for assessment of diseases. Grain samples were analysed for oil content and fatty acids.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

INOCFUNG	
I	1.12
F	1.22
Mean	1.17

GRAIN MEAN DM% 79.2 PLOT AREA HARVESTED 0.00391

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96/R/RAS/6

SPRING OILSEED RAPE

INDUSTRIAL CULTIVARS AND DISEASE D

Object: To determine the effects of disease on the yield and quality of industrial rape cultivars - Long Hoos III 3.

Sponsors: K.J. Doughty, H.A. McCartney.

Design: 4 randomised blocks of 2 plots.

Whole plot dimensions: 3.0 x 17.0.

Treatments:

INOCFUNG	Inoculation or fungicide applied:
I	Inoculated with infected rape straw
F	Iprodione with thiophanate-methyl and vinclozolin

Experimental diary:

08-Dec-95	B	Ploughed.
01-Apr-96	B	Heavy spring-tine cultivated twice.
	B	Rotary harrowed, A110L, dressed Rovral Liquid FS and Hydraguard, drilled at 180 seeds per m^2.
03-Apr-96	B	Butisan S at 1.5 l in 200 l.
25-Apr-96	B	Decis at 300 ml in 200 l.
08-May-96	B	34.5% N at 290 kg.
13-May-96	B	Cyperkill 10 at 250 ml in 200 l.
10-Jun-96	B	Fastac at 200 ml in 320 l.
14-Jun-96	**T**	**INOCFUNG** I: Inoculated with one bale of rape straw per plot.
05-Jul-96	**T**	**INOCFUNG** F: Compass at 3.0 l in 200 l.
18-Jul-96	**T**	**INOCFUNG** F: Ronilan FL at 1.5 l in 260 l.
28-Aug-96	B	Combine harvested.

Previous crops: Clover 1994, s. beans and s. wheat 1995.

NOTE: Plant samples were taken at harvest for assessment of diseases. Grain samples were analysed for oil content and fatty acids.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

INOCFUNG	
I	1.35
F	1.21
Mean	1.28

GRAIN MEAN DM% 75.7 PLOT AREA HARVESTED 0.00391

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96/R/BES/6

SPRING BEANS

WEED COMPETITION AND SPRING BEANS

Object: To study the effects of two weed species on the growth and yield of spring beans - Great Knott I.

Sponsor: P.J.W. Lutman.

Design: 3 randomised blocks of (3 x 5) + 1 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **WEED** Weed and time of sowing:

CE	Charlock (*Sinapis arvensis*), sown early
CL	Charlock sown late
CW	Chickweed (*Stellaria media*), sown early

2. **RATE** Average number of established plants per m^2:

	CL	CW
0	-	-
1	31.8	16.3
2	61.2	31.5
3	159.2	75.0
4	219.0	138.3

Plus extra treatment

CULT OAT Cultivated oats (*Avena sativa*), sown early, approximately 170.5 plants were established per m^2

NOTES: (1) Each weed was sown on the same day as the beans and the charlock was also sown 24 days later. All the early-sown charlock (CE) failed and has been omitted from the analysis.

(2) Oats were cultivar Dula, dressed Cerevax Extra, sown at 240 seeds per m^2.

(3) Target weed densities, plants per m^2:

	Charlock	Chickweed
1	50	100
2	100	200
3	200	400
4	400	800

Experimental diary:

17-Nov-95 : B : Ploughed.
14-Mar-96 : B : Heavy spring-tine cultivated.
18-Mar-96 : B : Heavy spring-tine cultivated, rotary harrowed.
: **T** : **WEED** CE, CW **CULT OAT**: Charlock, chickweed and oats broadcast.

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96/R/BES/6

Experimental diary:

18-Mar-96 : B : Rotary harrowed, Alfred, recleaned, drilled at 50 seeds per m^2.
11-Apr-96 : **T** : **WEED** CL: Charlock broadcast.
25-Apr-96 : B : Decis at 0.3 l in 200 l.
13-May-96 : B : Cyperkill 10 at 250 ml in 200 l.
05-Jun-96 : B : Cyperkill 10 at 250 ml in 200 l.
20-Jun-96 : B : Bravo 500 at 2.0 l in 200 l.
15-Aug-96 : B : Hand harvested.

Previous crops: S. wheat 1994, set-aside 1995.

NOTES: (1) Bean and weed populations were assessed in April and May. Crop and oat leaf area and dry matter was measured in May. Crop and weed height, dry matter and number of stems were assessed in June and July, pod numbers were also counted in July.
(2) Weeds failed to establish on two plots, with treatment combinations:-

WEED	CL	CL
RATE	3	1

Estimated values were used in the analysis.

GRAIN TONNES/HECTARE

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

RATE	0	1	2	3	4	Mean
WEED						
CL	3.84	3.29	2.77	2.79	2.26	2.99
CW	3.88	3.77	3.72	3.99	3.50	3.77
Mean	3.86	3.53	3.25	3.39	2.88	3.38

CULT OAT
0.41

Grand mean 3.11

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

WEED	**RATE**	**RATE WEED & CULT OAT**
0.147	0.233	0.330

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.404	13.0

GRAIN MEAN DM% not measured

PLOT AREA HARVESTED 0.00020

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96/R/LP/1

LUPINS

LUPIN GENOTYPES

Object: To assess the overwintering survival, crop structure, yield and date of maturity of several lines of winter lupins - Appletree.

Sponsors: G.F.J. Milford, H.J. Stevenson.

Design: 3 randomised blocks of 13 plots.

Plot dimensions: 2.88 x 9.0.

Treatments:

GENOTYPE	
A	Detn 02
B	Detn 12
C	Detn 15
D	Detn 17
E	Detn 19
F	Detn 20
G	Detn 34
H	Detn 37
I	Detn 83
J	Detn 102
70	CH 304/70 (duplicated)
AR	Arthur

Experimental diary:

26-Jul-95 : B : Straw removed.
02-Aug-95 : B : Ploughed and furrow pressed.
11-Sep-95 : B : Rotary harrowed. All genotypes drilled at 40 seeds per m^2.
14-Sep-95 : B : Stomp 400 SC at 5.0 l in 200 l, Spannit at 1.5 l in 200 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
10-Jul-96 : B : Mistral at 1.0 l in 260 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 kg with Pirimicarb 50 DG at 280 g and Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
11-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTES: (1) Plant density was monitored from October to May. Plant height was measured in March and July. Main stem leaf number and date of flowering were recorded. Plant structure was assessed in June and components of yield at harvest.

(2) Because of a harvesting error, the yield of one plot with **GENOTYPE** I was lost. An estimated value was used in the analysis. **GENOTYPE** AR failed and has been omitted from the analysis.

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96/R/LP/1

GRAIN TONNES/HECTARE

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

GENOTYPE

A	1.26
B	2.04
C	2.47
D	2.95
E	2.03
F	1.89
G	2.68
H	2.17
I	2.23
J	1.98
70	1.21
Mean	2.01

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

GENOTYPE
0.357 min.rep
0.309 max-min

GENOTYPE
max-min 70 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	22	0.437	21.8

GRAIN MEAN DM% 75.5

PLOT AREA HARVESTED 0.00130

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96/W/LP/1

LUPINS

ESTABLISHMENT STUDY ON LIGHT SOIL

Object: To identify seedbed conditions for the establishment and survival of autumn-sown lupins - Woburn, Stackyard C.

Sponsor: I. Shield.

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

Plot dimensions: 3.0 x 9.0.

Treatments:

Whole plots

1.	**CULTIVTN**	Cultivations and other operations during and after drilling:
	1	Subsoiled, ploughed early, cultivated, rolled, shallow cultivated and tine drilled
	2	As 1 then rolled
	3	As 1 then netted
	4	As 3 with nematicide and insecticide at drilling
	5	Direct drilled with slug pellets

Sub-plots

2.	**FERT**	Fertilizer:
	F0	None
	F1	N, P, K, gypsum (17.5% S) and trace elements

Experimental diary:

12-Sep-95 : **T** : **CULTIVTN** 1, 2, 3, 4: Subsoiled.
18-Sep-95 : **T** : **CULTIVTN** 1, 2, 3, 4: Ploughed.
21-Sep-95 : **T** : **CULTIVTN** 1, 2, 3, 4: Spring-tine cultivated, rolled.
25-Sep-95 : **T** : **CULTIVTN** 1, 2, 3, 4: Rotary harrowed, tine drilled CH307/40 at 42 seeds per m^2.
: **T** : **CULTIVTN** 5: Direct drilled CH307/40 at 42 seeds per m^2 with Draza at 5.5 kg.
: **T** : **CULTIVTN** 2: Rolled.
: **T** : **CULTIVTN** 4: Yaltox at 100 kg.
28-Sep-95 : B : Stomp 400 SC at 3.3 l in 300 l.
02-Oct-95 : **T** : **CULTIVTN** 3 and 4: Netted.
01-Nov-95 : **T** : **FERT** F1: 20:10:10 at 250 kg, gypsum at 85.7 kg, Librel BMX at 1.0 kg.
27-Mar-96 : B : Atlas Simazine at 1.15 l in 200 l.
08-May-96 : **T** : **FERT** F1: 0:24:24 at 104 kg, gypsum at 85.7 kg, Librel BMX at 1.0 kg.
08-May-96 : **T** : **FERT** F1: 27.5% N at 182 kg.
30-May-96 : B : Lo-gran 20 WG at 37.5 g in 300 l.
13-Sep-96 : **T** : Combine harvested.

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96/W/LP/1

Previous crops: W. beans 1994, w. wheat 1995.

NOTES: (1) Plant density was monitored from October to April, Dry matter assessments and leaf counts were made in January. Soil penetration resistance measurements were done in November.
(2) **CULTIVTN** 1, 2 and 5 failed and are omitted from the analysis.

GRAIN TONNES/HECTARE

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

FERT / **CULTIVTN**	F0	F1	Mean
3	3.15	2.78	2.96
4	2.78	2.31	2.55
Mean	2.96	2.55	2.75

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

FERT	**CULTIVTN*** **FERT**
0.119	0.168

* Within the same level of **CULTIVTN** only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	4	0.205	7.5

GRAIN MEAN DM% 84.5

SUB-PLOT AREA HARVESTED 0.00154

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96/R/LP/2

LUPINS

LINES AND SOWING DATES

Object: To test the effects of sowing date on the plant architecture and winter survival of lines of autumn-sown lupins - Appletree.

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

Design: 3 randomised blocks of 4 x 3 plots, analysed as (2 x 2) + 4.

Plot dimensions: 5.76 x 9.0.

Treatments: All combinations of:-

1. **SEED LIN** Line:

70	CH 304/70
73	CH 304/73
DA	Dwarf 1
DB	Dwarf 2

2. **SOW DATE** Sowing date:

E	Early 22-Aug-95
M	Middle 07-Sep-95
L	Late 20-Sep-95

For analysis only

3.

LATE	**SEED LIN**	**SOW DATE**
70	70	L
73	73	L
LDA	DA	L
LDB	DB	L

NOTE: Early and middle sown seed lines CH304/70 and CH304/73 failed and have been omitted from the analysis.

Experimental diary:

26-Jul-95 : B : Straw removed.
04-Aug-95 : B : Ploughed and furrow pressed, rolled.
22-Aug-95 : **T** : **SOW DATE** E: Cultivated by rotary grubber four times, rotary harrowed. Lines drilled at 42 seeds per m^2.
23-Aug-95 : B : Irrigated 20 mm.
24-Aug-95 : **T** : **SOW DATE** E: Stomp 400 SC at 5.0 l in 220 l. Spannit at 1.5 l in 220 l.
29-Aug-95 : B : Irrigated 20 mm.
07-Sep-95 : **T** : **SOW DATE** M: Rotary harrowed. Lines drilled at 42 seeds per m^2.
12-Sep-95 : **T** : **SOW DATE** M: Stomp 400 SC at 5.0 l in 220 l.
20-Sep-95 : **T** : **SOW DATE** L: Rotary harrowed. Lines drilled at 42 seeds per m^2.

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Experimental diary:

21-Sep-95 : **T** : **SOW DATE** L: Stomp 400 SC at 5.0 l in 220 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
11-Apr-96 : **T** : **SEED LIN** 70 (two plots), 73 (two plots), DA (three plots) and DB (one plot), **SOW DATE** L: Inter-row sprayed Gramoxone 100 at 4.0 l in 220 l.
10-Jul-96 : B : Mistral at 1.0 l in 260 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 kg with Pirimicarb 50 DG at 280 g and Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
10-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTE: Plant density was monitored from October to April. Dry matter was assessed weekly April to August. Light interception measurements were made twice weekly April to August. Leaf and pod photosynthesis measurements were made frequently. Components of yield were assessed at harvest.

GRAIN TONNES/HECTARE

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

SEED LIN / **SOW DATE**	DA	DB	Mean
E	1.60	2.07	1.84
M	1.47	1.07	1.27
Mean	1.54	1.57	1.55

LATE	70	73	LDA	LDB	Mean
	1.62	1.59	2.81	2.52	2.13

Grand mean 1.84

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

SOW DATE	**SEED LIN**	**SOW DATE SEED LIN & LATE**
0.476	0.476	0.674

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.825	44.7

GRAIN MEAN DM% 51.3 PLOT AREA HARVESTED 0.00130

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96/R/LP/3

LUPINS

SOWING DATES, PESTS AND DISEASES

Object: To study overwinter losses of autumn-sown lupins - Appletree.

Sponsors: G.L. Bateman, I. Shield.

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

Whole plot dimensions: 5.76 x 9.0.

Treatments: All combinations of:-

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

   S1 12-Sep-95
   S2 28-Sep-95

2. **INSCTCDE** Insecticide:

   I- None
   IC Chlorpyrifos to seedbed
   IF Furathiocarb to seed

3. **AUT FUNG** Fungicide in autumn:

   F- None
   FS Prochloraz
   FRB Vinclozolin and chlorothalonil

Experimental diary:

26-Jul-95 : B : Barley straw removed.
04-Aug-95 : B : Ploughed and furrow pressed.
12-Sep-95 : B : Rotary harrowed.
: **T** : **SOW DATE** S1: Drilled CH304/70 at 42 seeds per m^2.
13-Sep-95 : **T** : **SOW DATE** S1, **INSCTCDE** IC: Spannit at 1.5 l in 220 l.
14-Sep-95 : **T** : **SOW DATE** S1: Stomp 400 SC at 5.0 l in 200 l.
: **T** : **SOW DATE** S2 (5 plots): Stomp 400 SC at 5.0 l in 200 l.
28-Sep-95 : **T** : **SOW DATE** S2: Drilled CH304/70 at 42 seeds per m^2.
29-Sep-95 : **T** : **SOW DATE** S2, **INSCTCDE** IC: Spannit at 1.5 l in 220 l.
: **T** : **SOW DATE** S2 (plots not sprayed on 14 Sep): Stomp 400 SC at 5.0 l in 220 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
20-Nov-95 : **T** : **AUT FUNG** FS: Sportak 45 at 1.0 l in 220 l.
: **T** : **AUT FUNG** FRB: Ronilan FL at 0.75 l with Bravo 500 at 2.25 l in 220 l.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
: **T** : **SOW DATE** S2 (5 plots): Inter-row sprayed Gramoxone 100 at 4.0 l in 220 l.
10-Jul-96 : B : Mistral at 1.0 l in 260 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 kg in 260 l.

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96/R/LP/3

Experimental diary:

18-Jul-96 : B : Pirimicarb 50 DG at 280 g with Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
11-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTE: Plant density was monitored October to April and thrips assessed. Samples were also taken monthly from October to April for disease assessment.

GRAIN TONNES/HECTARE

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

INSCTCDE / **SOW DATE**	I-	IC	IF	Mean
S1	1.21	1.23	1.28	1.24
S2	2.52	2.69	2.61	2.60
Mean	1.87	1.96	1.94	1.92

AUT FUNG / **SOW DATE**	F-	FS	FRB	Mean
S1	1.51	1.14	1.07	1.24
S2	2.48	2.72	2.61	2.60
Mean	2.00	1.93	1.84	1.92

AUT FUNG / **INSCTCDE**	F-	FS	FRB	Mean
I-	2.06	1.83	1.71	1.87
IC	2.04	1.91	1.93	1.96
IF	1.89	2.05	1.88	1.94
Mean	2.00	1.93	1.84	1.92

SOW DATE	**INSCTCDE**	**AUT FUNG**	F-	FS	FRB
S1	I-		1.79	0.93	0.92
	IC		1.34	1.13	1.23
	IF		1.41	1.36	1.05
S2	I-		2.32	2.72	2.51
	IC		2.74	2.69	2.63
	IF		2.37	2.74	2.71

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96/R/LP/3

GRAIN TONNES/HECTARE

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

SOW DATE	INSCTCDE	AUT FUNG	SOW DATE INSCTCDE
0.135	0.166	0.166	0.235

SOW DATE AUT FUNG	INSCTCDE AUT FUNG	SOW DATE INSCTCDE AUT FUNG
0.235	0.287	0.406

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	17	0.406	21.1

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00176

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96/R/LP/4

LUPINS

FUSARIUM STUDY ON LUPINS

Object: To assess the effects of fungicidal seed treatments on plant survival and *fusarium* infection - Appletree.

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

Design: 4 randomised blocks of 2 x 4 plots.

Plot dimensions: 2.88 x 9.0.

Treatments: All combinations of:-

1. **INOC**	Inoculation:	
	I-	None
	IF	*Fusarium avenaceum*
2. **SEED TR**	Seed treatment:	
	-	None
	IC	Iprodione and carbendazim
	FEN	Fenpiclonil
	FLU	Fludioxinil

Experimental diary:

26-Jul-95 : B : Straw removed.
04-Aug-95 : B : Ploughed and furrow pressed, rolled.
12-Sep-95 : **T** : **INOC** IF: Inoculum applied.
13-Sep-95 : B : Rotary harrowed twice, CH304/70 drilled, at 40 seeds per m^2.
14-Sep-95 : B : Stomp 400 SC at 5.0 l in 200 l, Spannit at 1.5 l in 200 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
10-Jul-96 : B : Mistral at 1.0 l in 260 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 kg with Pirimicarb 50 DG at 280 g and Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
11-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTES: (1) Inoculum was applied on oat seed at 2 kg per plot.
(2) Plants were counted and diseases assessed.

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96/R/LP/4

GRAIN TONNES/HECTARE

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

SEED TR / INOC	-	IC	FEN	FLU	Mean
I-	0.99	1.04	1.14	0.81	0.99
IF	0.87	0.59	0.61	0.67	0.69
Mean	0.93	0.82	0.87	0.74	0.84

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

INOC	SEED TR	INOC SEED TR
0.107	0.151	0.214

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	21	0.302	36.0

GRAIN MEAN DM% 84.3

PLOT AREA HARVESTED 0.00227

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96/R/LP/6

LUPINS

SPRING HERBICIDES

Object: To test herbicides applied in the spring at various rates on the survival of weeds and autumn-sown lupins - Appletree.

Sponsor: I. Shield.

Design: 3 randomised blocks of (5 X 4) + 2 plots.

Plot dimensions: 3.0 x 9.0.

Treatments: All combinations of:-

1. **HERBCIDE** Herbicide, common name (product name):

BR	Aziprotryne (Brasoran 50WP)
RP	Diflufenican (EXP 30930A, not commercially available)
FO	Cyanazine (Fortrol)
AS	Simazine (Atlas Simazine)
LO	Triasulfurin (Lo-gran 20 WG)

2. **HERBRATE** Herbicide product rate, all applied in 220 l:

		Units	BR kg	RP l	FO l	AS l	LO g
1/2N	Half normal		2.0	0.5	1.0	1.2	19
1N	Normal		4.0	1.0	2.0	2.3	38
2N	Twice normal		8.0	2.0	4.0	4.6	75
4N	Four times normal		16.0	4.0	8.0	9.2	150

plus 2 extra plots

3. **EXTRA** Herbicide applied at normal rate:

KN	Metazachlor and quinmerac (Katamaran)
TX	MCPB (Tropotox)

For analysis tables only

	HERBCIDE	**HERBRATE**
LO 1/2N	LO	1/2N
LO 1N	LO	1N
LO 2N	LO	2N

LO 4N and TX failed and have been omitted from the analysis

Experimental diary:

26-Jul-95 : B : Straw removed.
04-Aug-95 : B : Ploughed and furrow pressed, rolled.
08-Sep-95 : B : Rotary harrowed, drilled CH304/70 at 40 seeds per m^2.

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Experimental diary:

14-Sep-95 : B : Stomp 400 at 5.0 l in 200 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
15-Mar-96 : **T** : **HERBCIDE** AS: Treatments applied.
29-Mar-96 : B : One-half of all the plots in one block were sprayed in error with Atlas Simazine at 2.3 l in 200 l.
25-Apr-96 : **T** : **EXTRA** KN: Katamaran at 2.5 l in 220 l.
: **T** : **EXTRA** TX: Tropotox at 5.6 l in 220 l.
: **T** : **HERBCIDE** BR, RP, FO: Treatments applied.
26-Apr-96 : **T** : **HERBCIDE** LO: Treatments applied.
10-Jul-96 : B : Mistral at 1.0 l in 260 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 with Pirimicarb 50 DG at 280 g and Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
11-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTE: Plants were counted in May and June, samples were taken in May for dry matter analysis.

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96/R/LP/6

GRAIN TONNES/HECTARE

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

HERBRATE / HERBCIDE	1/2N	1N	2N	4N	Mean
BR	1.22	1.27	0.39	0.98	0.96
RP	1.00	0.62	1.32	0.88	0.95
FO	0.92	0.82	0.99	0.79	0.88
AS	1.11	1.36	0.69	1.08	1.06
Mean	1.06	1.02	0.85	0.93	0.97

EXTRA	KN	LO 1/2N	LO 1N	LO 2N
	1.14	0.89	0.28	0.24

Grand mean 0.90

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

HERBCIDE	HERBRATE	HERBCIDE HERBRATE & EXTRA
0.210	0.210	0.420

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	38	0.514	57.2

GRAIN MEAN DM% 73.7

PLOT AREA HARVESTED 0.00161

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96/R/LP/7

WINTER LUPINS

GROWTH REGULATOR STUDY

Object: To assess the effectiveness of growth regulators in shortening and/or strengthening lupin plants at risk of lodging - Appletree.

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

Design: 3 randomised blocks of 6 plots.

Plot dimensions: 3.0 x 9.0.

Treatments:

GROW REG	Growth regulator, common name (product name):
-	None
TR	Triapenthenol
CU	Paclobutrazol (Cultar)
AD	Chlormequat (Adjust)
FO	Tebuconazole (Folicur)
AD+FO	Chlormequat and tebuconazole

Experimental diary:

26-Jul-95 : B : Straw removed.
04-Aug-95 : B : Ploughed and furrow pressed.
08-Sep-95 : B : Rotary harrowed twice, CH304/70 drilled at 40 seeds per m^2.
14-Sep-95 : B : Stomp 400 SC at 5.0 l in 200 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
25-Apr-96 : **T** : **GROW REG** AD: Adjust at 3.0 l in 220 l.
: **T** : **GROW REG** CU: Cultar at 0.75 l in 220 l.
: **T** : **GROW REG** AD+FO: Adjust at 1.5 l with Folicur at 1.0 l in 220 l.
: **T** : **GROW REG** FO: Folicur at 1.0 l in 220 l.
: **T** : **GROW REG** TR: Triapenthenol at 700 g in 220 l.
10-Jul-96 : B : Mistral at 1.0 l in 260 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 kg with Pirimicarb 50 DG at 280 g and Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
11-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTE: Plant density was assessed in April and at harvest. Plant height was measured regularly April to July. Stem diameters, dry matter and plant components were measured in July. Components of yield were assessed at harvest.

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96/R/LP/7

GRAIN TONNES/HECTARE

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

GROW REG	
-	1.00
TR	1.62
CU	1.33
AD	1.62
FO	1.55
AD+FO	1.87
Mean	1.50

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

GROW REG
0.329

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	10	0.402	26.8

GRAIN MEAN DM% 84.8

PLOT AREA HARVESTED 0.00161

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96/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 - Appletree.

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

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

Whole plot dimensions: 3.0 x 9.0.

Treatments: All combinations of :-

1. **GENOTYPE**

70	CH304/70
73	CH304/73
DA	Dwarf A
DB	Dwarf B

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

12
36

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

40
80

Experimental diary:

26-Jul-95 : B : Straw removed.
04-Aug-95 : B : Ploughed and furrow pressed.
11-Sep-95 : **T** : **ROW SPAC** 36: Rotary harrowed, genotypes drilled.
12-Sep-95 : **T** : **ROW SPAC** 12: Genotypes broadcast by hand, rotary harrowed.
14-Sep-95 : B : Stomp 400 SC at 5.0 l in 200 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
10-Jul-96 : B : Mistral at 1.0 l in 260 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 kg with Pirimicarb 50 DG at 280 g and Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
10-Sep-96 : **T** : **GENOTYPE** DA, DB: Combine harvested.
11-Sep-96 : **T** : **GENOTYPE** 70, 73: Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTE: Plant density was assessed October to April. Light interception was measured weekly April to harvest. Components of yield were assessed at harvest.

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96/R/LP/10

GRAIN TONNES/HECTARE

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

ROW SPAC	12	36	Mean
GENOTYPE			
70	1.46	0.92	1.19
73	1.57	0.70	1.13
DA	3.17	3.07	3.12
DB	2.46	2.31	2.39
Mean	2.16	1.75	1.96

SEED RAT	40	80	Mean
GENOTYPE			
70	1.22	1.17	1.19
73	1.24	1.03	1.13
DA	2.93	3.31	3.12
DB	2.57	2.20	2.39
Mean	1.99	1.93	1.96

SEED RAT	40	80	Mean
ROW SPAC			
12	2.18	2.15	2.16
36	1.80	1.70	1.75
Mean	1.99	1.93	1.96

ROW SPAC	12		36	
GENOTYPE SEED RAT	40	80	40	80
70	1.45	1.47	0.99	0.86
73	1.60	1.53	0.88	0.52
DA	3.02	3.31	2.85	3.30
DB	2.66	2.27	2.49	2.14

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

GENOTYPE	ROW SPAC	SEED RAT	GENOTYPE ROW SPAC
0.140	0.099	0.099	0.198

GENOTYPE SEED RAT	ROW SPAC SEED RAT	GENOTYPE ROW SPAC SEED RAT
0.198	0.140	0.281

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96/R/LP/10

GRAIN TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.344	17.5

GRAIN MEAN DM% 83.3

PLOT AREA HARVESTED **ROW SPAC** 12 0.00207
ROW SPAC 36 0.00227

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96/R/LP/11

WINTER LUPINS

FOLIAR DISEASES AND FUNGICIDES A

Object: To determine the importance of foliar diseases and to test the effects of fungicides on winter-sown lupins - Appletree.

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

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 2.88 x 9.0.

Treatments:

FUNGCIDE	Fungicide and timing:
-	None
C1	Iprodione and thiophanate-methyl, 26 Apr 1996
C2	Iprodione and thiophanate-methyl, 30 May
C3	Iprodione and thiophanate-methyl, 19 June
C12	Iprodione and thiophanate-methyl, 26 Apr and 30 May
C13	Iprodione and thiophanate-methyl, 26 Apr and 19 June
C23	Iprodione and thiophanate-methyl, 30 May and 19 June
C123	Iprodione and thiophanate-methyl, 26 Apr, 30 May and 19 June
F23	Tebuconazole, 30 May and 19 June
S23	Prochloraz, 30 May and 19 June

Experimental diary:

26-Jul-95 : B : Straw removed.
04-Aug-95 : B : Ploughed and furrow pressed.
08-Sep-95 : B : Rotary harrowed, CH304/70 drilled at 40 seeds per m².
14-Sep-95 : B : Stomp 400 SC at 5.0 l in 200 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
26-Apr-96 : T : **FUNGCIDE** C1, C12, C13, C123: Compass at 3.0 l in 220 l.
30-May-96 : T : **FUNGCIDE** C2, C12, C23, C123: Compass at 3.0 l in 220 l.
: T : **FUNGCIDE** F23: Folicur at 1.0 l in 220 l.
: T : **FUNGCIDE** S23: Barclay Eyetak at 1.0 l in 220 l.
19-Jun-96 : T : **FUNGCIDE** C3, C13, C23, C123: Compass at 3.0 l in 220 l.
: T : **FUNGCIDE** F23: Folicur at 1.0 l in 220 l.
: T : **FUNGCIDE** S23: Sportak 45 at 1.0 l in 220 l.
18-Jul-96 : B : Pirimicarb 50 DG at 280 g with Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
12-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

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96/R/LP/11

GRAIN TONNES/HECTARE

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

FUNGCIDE	
-	1.01
C1	0.80
C2	0.68
C3	1.08
C12	1.14
C13	0.92
C23	1.22
C123	0.70
F23	0.63
S23	0.55
Mean	0.87

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

FUNGCIDE
0.253

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.310	35.6

GRAIN MEAN DM% 82.8

PLOT AREA HARVESTED 0.00227

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96/R/LP/12

WINTER LUPINS

FOLIAR DISEASES AND FUNGICIDES B

Object: To determine the importance of foliar diseases and to test the effect of fungicides on winter-sown lupins - Appletree.

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

Design: 3 randomised blocks of 10 plots.

Whole plot dimensions: 2.88 x 9.0.

Treatments:

FUNGCIDE	Fungicide and timing:
-	None
C1	Iprodione and thiophanate-methyl, 26 Apr 1996
C2	Iprodione and thiophanate-methyl, 30 May
C3	Iprodione and thiophanate-methyl, 19 June
C12	Iprodione and thiophanate-methyl, 26 Apr and 30 May
C13	Iprodione and thiophanate-methyl, 26 Apr and 19 June
C23	Iprodione and thiophanate-methyl, 30 May and 19 June
C123	Iprodione and thiophanate-methyl, 26 Apr, 30 May and 19 June
F23	Tebuconazole, 30 May and 19 June
S23	Prochloraz, 30 May and 19 June

Experimental diary:

26-Jul-95 : B : Barley straw removed.
04-Aug-95 : B : Ploughed and furrow pressed.
08-Sep-95 : B : Rotary harrowed, CH304/70 drilled at 40 seeds per m^2.
14-Sep-95 : B : Stomp 400 SC at 5.0 l in 200 l.
18-Oct-95 : B : Laser at 0.75 l with Atlas Adjuvant Oil at 1.6 l in 200 l.
28-Mar-96 : B : Oat seed inoculum applied at 121 kg.
29-Mar-96 : B : Atlas Simazine at 2.3 l in 200 l.
26-Apr-96 : **T** : **FUNGCIDE** C1, C12, C13, C123: Compass at 3.0 l in 220 l.
30-May-96 : **T** : **FUNGCIDE** C2, C12, C23, C123: Compass at 3.0 l in 220 l.
: **T** : **FUNGCIDE** F23: Folicur at 1.0 l in 220 l.
: **T** : **FUNGCIDE** S23: Barclay Eyetak at 1.0 l in 220 l.
19-Jun-96 : **T** : **FUNGCIDE** C3, C13, C23, C123: Compass at 3.0 l in 220 l.
: **T** : **FUNGCIDE** F23: Folicur at 1.0 l in 220 l.
: **T** : **FUNGCIDE** S23: Sportak 45 at 1.0 l in 220 l.
18-Jul-96 : B : Pirimicarb 50 DG at 280 g with Vassgro Spreader at 78 ml in 260 l.
03-Sep-96 : B : Reglone at 3.0 l in 390 l.
12-Sep-96 : B : Combine harvested.

Previous crops: W. rape 1994, w. barley 1995.

NOTES: (1) Inoculum was *Pleiochaeta setosa* on oat seed.
(2) Disease caused by *P.setosa* was assessed in June.

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96/R/LP/12

GRAIN TONNES/HECTARE

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

FUNGCIDE	
-	1.10
C1	0.91
C2	1.02
C3	0.78
C12	0.68
C13	0.76
C23	0.83
C123	1.06
F23	0.75
S23	0.47
Mean	0.84

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

FUNGCIDE
0.189

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.231	27.6

GRAIN MEAN DM% 83.1

PLOT AREA HARVESTED 0.00227

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96/R/LP/13

LUPINS

SPRING-SOWN GENOTYPES AND SOWING DATES

Object: To measure the growth and yield of two winter lupin genotypes sown in spring - Long Hoos V 8.

Sponsors: I. Shield, G.F.J. Milford, H. Stevenson, J.E. Leach, T. Scott.

Design: 4 randomised blocks of 3 x 2 plots.

Whole plot dimensions: 3.0 x 9.0.

Treatments: All combinations of:-

1. **SOW DATE** Dates of sowing:

S1	14-Mar-96
S2	28-Mar-96
S3	10-Apr-96

3. **GENOTYPE**

70	CH304/70
73	CH304/73

Experimental diary:

17-Nov-95 : B : Ploughed.
13-Mar-96 : B : Heavy spring-tine cultivated.
14-Mar-96 : **T** : **SOW DATE** S1: Genotypes, dressed Germipro, drilled at 200 kg.
15-Mar-96 : **T** : **SOW DATE** S1: Stomp 400 SC at 5.0 l in 220 l.
28-Mar-96 : **T** : **SOW DATE** S2: Genotypes drilled at 200 kg.
02-Apr-96 : **T** : **SOW DATE** S2: Stomp 400 SC at 5.0 l in 220 l.
10-Apr-96 : **T** : **SOW DATE** S3: Genotypes drilled at 200 kg.
11-Apr-96 : **T** : **SOW DATE** S3: Stomp 400 SC at 5.0 l in 220 l:
05-Jun-96 : B : Lo-gran 20 WG at 18.8 g in 200 l.
26-Jul-96 : B : Pirimicarb 50 DG at 280 g with Vassgro Spreader at 120 ml in 400 l.
30-Jul-96 : B : Mistral at 1.0 l in 400 l.
17-Oct-96 : **T** : **SOW DATE** S1 **GENOTYPE** 70: Combine harvested.
06-Nov-96 : **T** : **SOW DATE** S1, S2, S3 **GENOTYPE** 73 and **SOW DATE** S2, **GENOTYPE** 70: Combine harvested.
02-Dec-96 : **T** : **SOW DATE** S3 **GENOTYPE** 70: Topped.

Previous crops: S. beans 1994, s. wheat and s. barley 1995

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96/R/LP/13

NOTES: (1) Plant density was assessed in autumn. Main stem leaf numbers and date of flowering was noted. Plant structure was assessed in July and heights measured in August. Components of yield were assessed at harvest.

(2) The treatment combination **SOW DATE** S3, **GENOTYPE** 70 was not harvested as it failed to mature. This has been omitted from the analysis.

GRAIN TONNES/HECTARE

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

GENOTYPE	70	73
SOW DATE		
S1	1.83	2.07
S2	1.79	1.99
S3	*	1.95

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

SOW DATE
GENOTYPE
0.155

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.219	11.4

GRAIN MEAN DM% 73.0

PLOT AREA HARVESTED 0.00207

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96/R/LP/14

SPRING LUPINS

DESICCATION, TIMING AND METHOD

Object: To test the effect of desiccation on harvest date and seed quality of s. lupins - Long Hoos VI/VII 1.

Sponsors: I. Shield, G.F.J. Milford, H.J. Stevenson, J.E. Leach and T. Scott.

Design: 5 randomised blocks of 3 plots.

Whole plot dimensions: 3.0 x 9.0.

Treatments:

TIMING	Timing of applying desiccant:
-	None
E	Early
L	Late

Experimental diary:

21-Nov-95 : B : Ploughed.
13-Mar-96 : B : Heavy spring-tine cultivated.
14-Mar-96 : B : CH304/73, dressed Germipro, drilled at 80 seeds per m^2.
15-Mar-96 : B : Stomp 400 SC at 5.0 l in 200 l.
30-May-96 : B : Lo-gran 20 WG at 18.8 g in 200 l.
19-Jun-96 : B : Lo-gran 20 WG at 18.8 g in 200 l.
09-Jul-96 : B : Wild oats pulled by hand.
26-Jul-96 : B : Pirimicarb 50 DG at 280 g with Vassgro Spreader at 120 ml in 400 l.
30-Jul-96 : B : Mistral at 1.0 l in 400 l.
06-Sep-96 : **T** : **TIMING** E: Stefes Glyphosate at 3.0 l in 220 l.
24-Sep-96 : **T** : **TIMING** L: Stefes Glyphosate at 3.0 l in 220 l.
17-Oct-96 : B : Combine harvested.

Previous crops: W. and s. rape 1994, set-aside 1995.

NOTE: A planned treatment of swathing early and late did not take place and yields from these plots have been ignored.

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96/R/LP/14

GRAIN TONNES/HECTARE

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

TIMING	
-	2.34
E	2.51
L	2.38
Mean	2.41

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

TIMING
0.143

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.226	9.4

GRAIN MEAN DM% 79.8

PLOT AREA HARVESTED 0.00207

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96/R/LP/15

LUPINS

NITROGEN AND RIPENING

Object: To study the effects of nitrogen supply and premature crop senescence by desiccation upon time of ripening, yield and quality - Sawyers I E.

Sponsors: I. Shield, D. Newton (Newcastle University).

Design: 4 randomised blocks of 3 x 2 plots.

Whole plot dimensions: 3.0 x 9.0.

Treatments: All combinations of:-

1. **NITROGEN**	Foliar N (kg):	
	N0	None
	N1	30 in one application
	N2	60 in two applications of 30, one week apart
2. **DESCCANT**	Desiccant:	
	-	None
	G	Glyphosate

NOTE: LP/15 was sited over a previous experiment testing chemicals for insect control, which was discontinued owing to a lack of insects. No residual effects were evident.

Experimental diary:

08-Sep-95 : B : Rotary harrowed, CH304/70, dressed Germipro and Promet, drilled at 40 seeds per m^2.
14-Sep-95 : B : Stomp 400 SC at 5.0 l in 200 l.
12-Oct-95 : B : Draza at 5.5 kg.
02-Apr-96 : B : Atlas Simazine at 2.3 l in 200 l.
20-Jun-96 : B : Mistral at 1.0 l in 200 l.
27-Jun-96 : **T** : **NITROGEN** N1, N2: 46% N at 65.2 kg in 400 l.
05-Jul-96 : **T** : **NITROGEN** N2: 46% N at 65.2 kg in 400 l.
18-Jul-96 : B : Benlate Fungicide at 1.1 kg with Pirimicarb 50 DG at 280 g and Vassgro Spreader at 80 ml in 260 l.
08-Aug-96 : **T** : **DESCCANT** G: Roundup at 3.0 l in 220 l.
02-Sep-96 : B : Combine harvested.

Previous crops: W. wheat 1994, fallow 1995.

NOTE: Components of yield were assessed at harvest. Nitrogen and oil content of grain was measured.

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96/R/LP/15

GRAIN TONNES/HECTARE

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

DESCCANT	-	G	Mean
NITROGEN			
N0	1.68	1.67	1.67
N1	1.77	1.68	1.73
N2	1.41	1.24	1.32
Mean	1.62	1.53	1.57

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

NITROGEN	DESCCANT	NITROGEN DESCCANT
0.108	0.088	0.152

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.215	13.7

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00197

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96/R/LN/3

LINSEED

LEAF BROWNING SYMPTOMS

Object: To identify pathogens responsible for leaf browning in linseed and to measure their response to fungicide - Hoosfield, Old Four-course.

Sponsors: B.D.L. Fitt, S. Mitchell.

Design: 3 randomised blocks of 5 plots.

Plot dimensions: 3.0 x 15.0.

Treatments:

FUNGCIDE	Fungicide:
-	None
A	Iprodione (duplicated)
B	Benomyl (duplicated)

Experimental diary:

02-Feb-96 : B : Gramoxone 100 at 4.0 l in 200 l.
16-Apr-96 : B : Heavy spring-tine cultivated twice. Rotary harrowed, Antares, dressed Prelude 20LF, drilled at 700 seeds per m^2.
08-May-96 : B : 34.5% N at 220 kg.
13-May-96 : B : Cyperkill 10 at 250 ml in 200 l.
04-Jun-96 : B : Ally at 30 g in 200 l.
05-Jul-96 : **T** : **FUNGCIDE** A: Rovral Flo at 2.0 l in 220 l.
: **T** : **FUNGCIDE** B: Benlate Fungicide at 1.1 kg in 220 l.
22-Jul-96 : **T** : **FUNGCIDE** A: Rovral Flo at 2.0 l in 220 l.
: **T** : **FUNGCIDE** B: Benlate Fungicide at 1.1 kg in 220 l.
: **T** : **FUNGCIDE** A, B: Clayton Turret at 2.0 l in 220 l.
02-Sep-96 : B : Roundup at 4.0 l in 260 l.
17-Sep-96 : B : Combine harvested.

Previous crops: W. wheat 1994, linseed 1995.

NOTE: Samples of plants were taken regularly to assess the incidence and severity of *Verticillium* and other diseases.

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96/R/LN/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

FUNGCIDE

-	0.91
A	0.93
B	0.88

Mean 0.91

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

FUNGCIDE

0.055 max-min
0.045 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%
BLOCK.WP	10	0.077	8.5

GRAIN MEAN DM% 92.0

PLOT AREA HARVESTED 0.00276

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96/R/MA/1

MAIZE

MAIZE AND NITROGEN

Object: To assess the yield response to nitrogen fertilizer and to assess harvest methods and removal of discards of a forage maize crop - Long Hoos III 4, 5 & 6.

Sponsors: G.N. Talbot, P.R. Poulton.

Design: 3 randomised blocks of 4 plots.

Whole plot dimensions: 6.0 x 25.0.

Treatments:

N	Nitrogen fertilizer (kg N):
N0	0
N1	70
N2	140
N3	210

Experimental diary:

08-Dec-95 : B : Ploughed.
01-May-96 : B : Heavy spring-tine cultivated.
02-May-96 : B : Spring-tine cultivated, rotary harrowed, Hudson, dressed thiram and methiocarb, drilled at 11 seeds per m^2, rolled.
26-May-96 : B : Gesaprim 500SC at 2.0 l with Stomp 400 SC at 3.7 l in 200 l.
11-Jun-96 : **T** : **N** N1, N2, N3: 34.5% N applied at 203, 406 and 609 kg respectively.
20-Sep-96 : B : Harvested by hand.

Previous crops: Set-aside 1994, s. wheat 1995

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

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96/R/MA/1

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

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

	N
N0	10.74
N1	11.66
N2	11.93
N3	12.74
Mean	11.77

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

N
0.463

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.567	4.8

GRAIN MEAN DM% 29.6

PLOT AREA HARVESTED 0.00036

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96/R/M/6

MIXED 6

SOWING DATES AND INSECTICIDE

Object: To compare the consequences for w. wheat and w. barley of sowing at different times in the autumn and treating or not with insecticide - Highfield V.

Sponsor: R.T. Plumb.

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

Whole plot dimensions: 3.0 x 21.0.

Treatments: All combinations of:-

1. **CROP**

WW	W. wheat. Mercia, dressed Sibutol, drilled at 380 seeds per m^2
BW	W. barley. Puffin, dressed Vitaflo Extra, drilled at 350 seeds per m^2

2. **SOW DATE**

E	Early 20-Sep-95
M	Middle 02-Oct-95
L	Late 16-Oct-95

3. **INSCTCDE** Insecticide:

-	None
C	Cypermethrin

Experimental diary:

24-Aug-95 : B : Ploughed and furrow pressed.
20-Sep-95 : **T** : **SOW DATE** E: Rotary harrowed, wheat and barley drilled.
02-Oct-95 : **T** : **SOW DATE** M: Rotary harrowed, wheat and barley drilled.
16-Oct-95 : **T** : **SOW DATE** L: Rotary harrowed twice, wheat and barley drilled.
06-Nov-95 : **T** : **INSCTCDE** C: Cyperkill 10 at 250 ml in 200 l.
14-Nov-95 : B : Panther at 2.0 l in 200 l.
07-Mar-96 : B : 34.5% N at 116 kg.
09-Apr-96 : B : 34.5% N at 348 kg.
27-Apr-96 : B : Starane 2 at 1.0 l with Punch C at 0.8 l in 200 l.
10-Jun-96 : B : Punch C at 0.6 l in 320 l.
02-Aug-96 : **T** : **CROP** BW: Combine harvested.
19-Aug-96 : **T** : **CROP** WW: Combine harvested.

Previous crops: Set-aside 1994, w. rape 1995.

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96/R/M/6

GRAIN TONNES/HECTARE

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

SOW DATE	E	M	L	Mean
CROP				
WW	10.29	10.64	9.86	10.26
BW	8.80	9.54	8.94	9.09
Mean	9.54	10.09	9.40	9.68

INSCTCDE	-	C	Mean
CROP			
WW	10.15	10.38	10.26
BW	9.11	9.08	9.09
Mean	9.63	9.73	9.68

INSCTCDE	-	C	Mean
SOW DATE			
E	9.49	9.59	9.54
M	10.05	10.13	10.09
L	9.34	9.46	9.40
Mean	9.63	9.73	9.68

INSCTCDE		-	C
CROP	SOW DATE		
WW	E	10.19	10.38
	M	10.56	10.73
	L	9.70	10.03
BW	E	8.79	8.81
	M	9.55	9.54
	L	8.98	8.89

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

CROP	SOW DATE	INSCTCDE	CROP SOW DATE
0.113	0.138	0.113	0.195

CROP INSCTCDE	SOW DATE INSCTCDE	CROP SOW DATE INSCTCDE
0.159	0.195	0.276

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.390	4.0

GRAIN MEAN DM% 88.0 PLOT AREA HARVESTED 0.00230

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METEOROLOGICAL RECORDS 1996 - 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	22 (-30)	3.9 (+0.8)	3.0	5.3	7.1
FEB	96 (+31)	2.0 (-1.3)	0.4	3.5	5.6
MAR	73 (-34)	3.9 (-1.4)	2.0	5.0	5.7
APR	150 (+11)	8.3 (+0.7)	6.5	7.8	6.9
MAY	179 (-8)	8.9 (-2.1)	5.6	10.0	8.9
JUN	270 (+78)	14.8 (+0.9)	8.9	14.8	11.7
JUL	231 (+43)	16.7 (+0.9)	11.4	16.1	13.7
AUG	209 (+30)	16.6 (+0.7)	12.0	16.6	15.1
SEP	136 (-4)	13.5 (-0.1)	9.9	14.2	14.3
OCT	143 (+42)	11.4 (+0.9)	8.7	12.0	12.7
NOV	105 (+40)	5.5 (-0.5)	3.3	8.0	10.5
DEC	61 (+15)	2.5 (-1.5)	1.0	4.9	7.4
YEAR*	1675 (+213)	9.0 (-0.2)	6.1	9.9	9.9

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	10	53 (-13)	15	51	9.6
FEB	23	71 (+23)	18	51	10.6
MAR	17	26 (-31)	14	6	8.8
APR	15	26 (-27)	9	1	6.3
MAY	14	31 (-22)	12	1	9.5
JUN	6	6 (-51)	3	0	5.4
JUL	0	47 (0)	12	0	5.3
AUG	0	49 (-4)	14	0	6.1
SEP	6	17 (-38)	11	0	8.2
OCT	7	47 (-19)	18	6	7.9
NOV	17	116 (+52)	20	90	10.2
DEC	19	26 (-43)	16	18	8.1
YEAR*	134	515 (-173)	162	224	8.0

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 1996 - 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	15 (-34)	3.7 (+0.3)	2.7	4.4	6.6	14	37 (-15)	10	7.3
FEB	78 (+19)	2.1 (-1.8)	0.0	3.0	5.1	23	59 (+19)	17	8.4
MAR	56 (-47)	4.2 (-1.6)	1.9	5.0	5.6	18	23 (-29)	14	5.8
APR	147 (+17)	8.3 (+0.7)	4.8	8.6	7.2	15	31 (-20)	8	5.7
MAY	172 (-8)	8.9 (-2.1)	4.9	10.9	9.2	15	24 (-29)	9	8.3
JUN	246 (+63)	14.5 (+0.6)	9.3	17.0	12.3	3	26 (-29)	5	5.4
JUL	231 (+51)	16.5 (+0.6)	11.3	17.9	14.4	0	42 (-7)	12	5.9
AUG	189 (+19)	16.6 (+0.9)	14.4	17.8	15.7	0	63 (+5)	13	5.6
SEP	126 (-9)	13.5 (-0.1)	9.4	14.7	14.7	4	15 (-37)	10	6.3
OCT	130 (+29)	11.4 (+0.9)	8.2	11.8	13.1	5	40 (-16)	16	8.6
NOV	93 (+32)	5.6 (-0.7)	3.0	7.0	10.8	17	82 (+26)	18	9.1
DEC	45 (+3)	2.3 (-2.0)	1.1	4.2	7.7	17	27 (-31)	15	5.5
YEAR*	1528(+135)	9.0 (-0.4)	5.9	10.2	10.2	131	469 (-163)	147	6.8

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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

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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

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