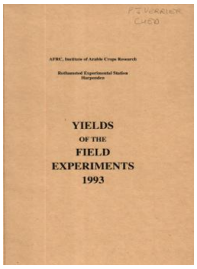
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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1993

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CUED

AFRC, Institute of Arable Crops Research

Rothamsted Experimental Station
Harpenden

YIELDS
OF THE
FIELD
EXPERIMENTS
1993

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YIELDS

of the

FIELD

EXPERIMENTS

1993

This report is produced by members of the Statistics and Crop Management Departments. It includes only experiments conducted 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 1994

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Park Grass corrections for 1978, 1984, 1989 and 1992 appear on pages 30-32

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CONVENTIONS 1993

For each experiment current treatments are shown, together 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.

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)
Sugar %:	Sugar percentage of washed roots

All crops

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

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% P205, 10% K20), granular unless otherwise stated.

Cereal straw is removed unless otherwise stated.

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Harvest areas for cereals

On most of those cereal experiments which are harvested by combine the 'blank-row' technique is used to distinguish the areas taken for yield from the discard areas. For example when seed is drilled in 3 m wide plots in rows 12 cm apart appropriate coulters are prevented from sowing and 17 central rows are left for yield between pairs of blank rows. If the row-spacing is other than 12 cm a similar arrangement is used but with a different number of rows.

The ends of plots are separated from each other or from headlands by 1m fallow paths made after the crop has established.

The 'Area harvested' in the 'Yields', when the blank-row technique is used, is the product:-

number of rows harvested x distance between rows x length of rows.

If no rows are left blank and the plot is wider than the combine harvester so that discards are left uncut, the 'Area harvested' is the product:-

width of cutter bar x length of rows.

If the plot is narrower than the combine so that the whole area between paths is cut, the 'Area harvested' is the product:-

number of rows x distance between rows x length of rows.

We do not apply the adjustment used by some workers who take the harvested areas as width x length where each is measured to the centre of 'paths' up to a maximum of about 50 cm.

Tables of means

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 Pesticide Guide, C.A.B. International and British Crop Protection Council. Published by University Press, Cambridge.

KEY TO ABBREVIATIONS

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

TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Ally	H	20% w/w metsulfuron-methyl
Alto 100 SL	F	100 g/l cyproconazole
Aphox	I	50% w/w pirimicarb
Arresin	H	200 g/l monolinuron
Ashlade Mancozeb FL	F	410 g/l mancozeb
Astix	H	600 g/l mecoprop-P
Avadex BW	H	400 g/l tri-allate
Avadex BW Granular	H	10% w/w tri-allate
Barclay Desiquat	H,D	200 g/l diquat
Bayleton	F	25% w/w triadimefon
Baytan	F	3:25% w/w fuberidazole + triadimenol
Benazalox	H	30:5% w/w benazolin + clopyralid
Benlate	F	50% benomyl
Bombardier	F	500 g/l chlorothalonil
Brestan 60	F	54:16% w/w fentin acetate + maneb
Butisan S	H	500 g/l metazachlor
Calirus	F	50% w/w benodanil
Calixin	F	750 g/l tridemorph
Carbetamex	H	70% w/w carbetamide
Ceresol	F	20 g/l phenylmercury acetate
Cerevax	F	378:23 g/l carboxin + thiabendazole
Cerevax Extra	F	300:20:25 g/l carboxin + imazalil + thiabendazole
Cheetah R	H	60 g/l fenoxaprop-ethyl
Chiltern Chlorothalonil 500	F	500 g/l chlorothalonil
Chiltern Manex	F	480:- g/l maneb + zinc
Chiltern Super-Tin 4L	F	480 g/l fentin hydroxide
Club	M,I	4% w/w methiocarb
Codacide Oil	AD	95% emulsifiable vegetable oil
Commando	H	200 g/l flamprop-M-isopropyl
Compass	F	167:167 g/l iprodione + thiophanate-methyl
Corbel	F	750 g/l fenpropimorph

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Cropspray 11E	AD	99% highly refined mineral oil
Decis	I	25 g/l deltamethrin
Deloxil	H	190:190 g/l bromoxynil + ioxynil
Derosal WDG	F	80% w/w carbendazim (MBC)
Dorin	F	125:375 g/l triadimenol + tridemorph
Dow Shield	H	200 g/l clopyralid
Draza	M,I	4% w/w methiocarb
Farmon Blue	AD	900 g/l alkyl phenol ethylene oxide
Fonofos Seed Treatment	I	433 g/l fonofos
Gramoxone 100	H	200 g/l paraquat
Halo	F	375:47 g/l chlorothalonil + flutriafol
High Trees Mixture B	AD	500 g/l nonyl phenol ethylene oxide condensate and 500 g/l primary alcohol ethylene oxide condensate
Hoegrass	H	378 g/l diclofop-methyl
Hytane 500 SC*	H	500 g/l isoproturon
Intracrop BLA	AD	52% synthetic latex and 20% alkyl phenol ethylene oxide condensate
Kerb Flo	H	400 g/l propyzamide
Kerb 50 W	H	50% w/w propyzamide
Laser	H	200 g/l cycloxydim
Lindex-Plus FS	F,I	43:545:73 g/l fenpropimorph + gamma-HCH + thiram
Mistral	F	750 g/l fenpropimorph
Multi-W FL	F	50:320 g/l carbendazim + maneb
New 5C Cycocel	GR	645:32 g/l chlormequat + choline chloride
Opogard 500FW	H	150:350 g/l terbuthylazine + terbutryn
Oxytril CM	H	200:200 g/l bromoxynil + ioxynil
Panther	H	50:500 g/l diflufenican + isoproturon
Pilot	H	500 g/l quizalofop-ethyl
Power Dimethoate	I	400 g/l dimethoate
Prebane 500 SC	H	500 g/l terbutryn
Pre-Empt	H	46:54:208 g/l linuron + trietazine + trifluralin
Prelude 20LF	F	500 g/l prochloraz
Radar	F	250 g/l propiconazole
Rapier	H	450 g/l propyzamide
Reglone	H,D	200 g/l diquat
Rizolex Flowable	F	500 g/l tolclofos-methyl
Rotalin	H	300 g/l linuron
Roundup	H	360 g/l glyphosate
Rovral Flo	F	250 g/l iprodione

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Scythe	H	200 g/l paraquat
Setter 33	H	50:237:43 g/l benazolin + 2,4-DB + MCPA
Sportak	F	400 g/l prochloraz
Sportak 45	F	450 g/l prochloraz
Starane 2	H	200 g/l fluroxypyr
Stefes Diquat	H,D	200 g/l diquat
Sting CT	H	120 g/l glyphosate
Stomp 400	H	400 g/l pendimethalin
Tigress	H	313:14 g/l diclofop-methyl + fenoxaprop-P-ethyl
Treflan	H	480 g/l trifluralin
Tripart Brevis	GR	700 g/l chlormequat
Tripart Defensor FL	F	500 g/l carbendazim (MBC)
Vassgro Spreader	AD	nonyl phenol-ethylene oxide condensates
Yaltox	I,N	5% w/w carbofuran

* Previously labelled Hytane 500 L

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93/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.

The 150th year, w. wheat, fallow, 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 74-92/R/BK/1.

Areas harvested:

	Section	
Wheat:	0	0.00311
	1	0.00572
	3,4,5 and 6	0.00473
	8 and 9	0.00497
Potatoes:	2	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
17N0+3FH	17	N2(A)	N2 1/2(P K (Na) Mg)	N0+3 1/2(PK Mg)+
18N1+3FH	18	P K Na Mg(A)	N2 1/2(P K (Na) Mg)	N1+3 1/2(PK Mg)+
19C	19	C	C	C
20N2KMG	20	N2 K Na Mg	N2 K (Na) Mg	N2 K Mg

(A) Alternating

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93/R/BK/1

\+ 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.

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 tonnes

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 on strips of sub plots. From 1968, ten sub plots were started with the following cropping:-

				70,71,72,															
				73,74,75,															
				&	&	&													
SECTION	Section	68	69	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
0/W42	0*	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1/W27	1	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
POTATOES	2	BE	W	P	BE	W	F	P	W	F	P	W	W	W	F	P	W	W	W	F	P
3/W1	3	W	W	F	W	W	F	W	W	W	W	W	W	F	P	W	W	W	F	P	W
4/W3	4	W	P	BE	W	P	P	W	F	P	W	F	P	W	W	W	F	P	W	W	W
5/W2	5	W	F	W	W	F	W	W	W	W	W	W	F	P	W	W	W	F	P	W	W
6/W16	6**	F	W	W	F	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
-	7	P	BE	W	P	BE	W	F	P	W	F	P	W	W	W	F	P	W	W	W	F
8/W5	8+	W	W	W	W	W	W	W	F	W	W	W	W	W	W	F	W	W	W	W	W
9/W35	9	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W

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

* Straw incorporated since 1987. ** No sprays except weedkillers since 1985. + No weedkillers.

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93/R/BK/1

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 in autumn 1992.

Experimental diary:

All sections:

08-Oct-92	T	P applied.
13-Oct-92	T	Mg, K and Na applied.
14-Oct-92	T	FYM applied.
15-Oct-92	B	Ploughed.
19-Oct-92	T	Rotary harrowed, plots 21 to 11.
04-Nov-92	T	Heavy spring-tine cultivated plots 01 & 12-20.

Cropped Sections:

W. wheat:

07-Aug-92	T	Straw chopped (section 0 only).
08-Oct-92	T	Autumn N treatments applied.
06-Nov-92	T	Rotary harrowed, Apollo, dressed Fonofos Seed Treatment, drilled at 380 seeds per square metre.
19-Mar-93	T	Rolled.
20-Apr-93	T	Spring N treatments applied.
22-Apr-93	T	Astix at 2.0 l and Oxytril CM at 1.5 l in 200 l (except section 8).
06-May-93	T	Mistral at 1.0 l, Sportak 45 at 0.90 l and Tripart Brevis at 2.25 l in 200 l (except section 6).
10-May-93	T	Cheetah R at 2.5 l in 200 l (except section 8).
04-Jun-93	T	Starane 2 at 1.5 l in 200 l (except section 8).
	T	Bombardier at 2.0 l and Mistral at 1.0 l in 200 l (except section 6).
22-Jun-93	T	Corbel at 1.0 l and Radar at 0.50 l in 200 l (except section 6).
04-Aug-93	T	Roundup at 6.0 l with High Trees Mixture B at 2.9 l in 150 l (except section 8).
17-Aug-93	B	Combine harvested.

Potatoes:

12-Feb-93	T	Chisel ploughed.
20-Apr-93	T	Spring N treatments applied.
28-Apr-93	T	Heavy spring-tine cultivated.
05-May-93	T	Rotary harrowed twice, planted Pentland Crown AA.
14-May-93	T	Rotary ridged.
19-May-93	T	Rotalin at 5.5 l in 200 l.
24-May-93	T	Cultivated by rotary grubber.
22-Jun-93	T	Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.
08-Jul-93	T	Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.
22-Jul-93	T	Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.

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93/R/BK/1

Experimental diary:
Cropped Sections:
Potatoes:
06-Aug-93 : **T** : Ashlade Mancozeb FL at 2.25 l with Intracrop BLA at 0.2 l in 200 l.
25-Aug-93 : **T** : Chiltern Super-Tin 4L at 0.56 l with Intracrop BLA at 0.20 l in 200 l.
15-Sep-93 : **T** : Stefes Diquat at 4.0 l in 200 l.
23-Sep-93 : **T** : Haulm mechanically destroyed.
18-Oct-93 : **T** : Lifted.
Fallow:
12-Feb-93 : **T** : Chisel ploughed.
24-Jun-93 : **T** : Cultivated by rotary grubber.

NOTE: Samples of grain and straw from sections 1 and 3 and samples of potato tubers from section 2 were taken for chemical anlysis.

W. WHEAT

GRAIN TONNES/HECTARE

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

SECTION / PLOT	3/W1	5/W2	4/W3	8/W5	6/W16	1/W27	9/W35	0/W42
01DN4PK	10.49	9.79	8.81	*	6.92	*	*	*
21DN2	10.22	8.32	7.41	3.98	6.76	8.99	9.33	8.33
22D	7.26	5.22	4.60	2.52	4.55	5.67	6.44	4.93
030	1.27	0.49	0.62	1.01	0.89	1.01	0.60	0.81
05F	1.26	0.60	0.34	2.31	1.08	1.15	0.85	0.84
06N1F	4.76	2.89	2.64	2.31	3.64	3.06	3.46	3.51
07N2F	6.56	4.84	4.42	3.16	4.24	4.80	4.53	4.60
08N3F	8.56	6.08	4.77	2.97	4.20	5.51	5.14	4.34
09N4F	8.97	7.87	5.62	3.26	5.38	5.99	6.97	5.65
10N2	6.16	2.52	3.26	0.98	1.87	1.92	2.11	1.54
11N2P	3.85	4.49	2.73	0.77	1.56	2.39	2.08	2.56
12N2PNA	3.88	3.61	1.74	0.86	1.85	2.48	2.22	2.86
13N2PK	5.96	4.09	3.59	1.67	3.39	4.05	3.53	4.44
14N2PKMG	5.57	4.24	4.18	1.18	3.71	4.85	3.90	4.76
15N5F	8.69	7.33	6.08	2.23	5.27	6.61	6.94	6.25
16N6F	9.22	7.49	7.15	2.64	5.80	7.38	8.21	6.71
17N0+3FN	8.27	6.74	4.75	1.96	4.98	5.96	6.51	5.58
18N1+3FN	8.72	7.10	5.28	2.52	5.35	6.37	6.73	5.86
19C	1.58	1.17	0.93	1.83	1.27	1.47	1.29	1.28
20N2KMG	*	*	*	*	*	1.80	*	2.65

GRAIN MEAN DM% 85.7

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93/R/BK/1 W. WHEAT

STRAW TONNES/HECTARE

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

SECTION / PLOT	3/W1	1/W27
01DN4PK	6.37	*
21DN2	4.82	4.56
22D	1.79	1.72
030	0.20	0.17
05F	0.10	0.25
06N1F	1.63	1.00
07N2F	2.26	1.83
08N3F	3.10	1.98
09N4F	3.26	2.32
10N2	2.18	0.91
11N2P	1.20	0.67
12N2PNA	1.20	0.75
13N2PK	2.25	1.84
14N2PKMG	1.54	1.99
15N5F	3.27	2.69
16N6F	3.36	3.00
17N0+3FN	3.12	2.33
18N1+3FN	3.72	2.47
19C	0.40	0.34
20N2KMG	*	0.84

STRAW MEAN DM% 88.8

CLEAN GRAIN TONNES/HECTARE, AFTER REMOVING WEED SEEDS

SECTION / PLOT	8/W5
01DN4PK	*
21DN2	3.75
22D	1.51
030	0.74
05F	1.41
06N1F	1.95
07N2F	2.80
08N3F	2.73
09N4F	3.20
10N2	0.95
11N2P	0.74
12N2PNA	0.84
13N2PK	1.38
14N2PKMG	0.87
15N5F	2.11
16N6F	2.41
17N0+3FN	1.68
18N1+3FN	2.02
19C	1.47
20N2KMG	*

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93/R/BK/1 POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	22.1	92.0
21DN2	37.2	92.6
22D	34.2	93.0
030	7.1	93.9
05F	13.2	91.9
06N1F	15.7	82.2
07N2F	19.5	84.8
08N3F	22.9	85.8
09N4F	25.8	90.9
10N2	6.4	89.7
11N2P	8.3	68.4
12N2PNA	9.2	75.2
13N2PK	10.2	74.4
14N2PKMG	22.7	94.5
15N5F	24.0	94.9
16N6F	27.6	96.0
17N3FH	14.2	89.2
18N3FH	20.7	96.3
19C	10.5	93.1

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93/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 142nd year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-92/R/HB/2.

Treatments: All combinations of:-

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

	Form of N 1852-1966	Additional treatments 1852-1979	Changes since 1980
---	None	-	-
-P-	None	P	-
--K	None	K(Na)Mg	-
-PK	None	PK(Na)Mg	-
A--	A	-	-
AP-	A	P	-
A-K	A	K(Na)Mg	-
APK	A	PK(Na)Mg	-
N----	N	-	-
NP---	N	P	-
N-K--	N	K(Na)Mg	-
NPK--	N	PK(Na)Mg	-
N--S-	N	Si	Si omitted
NP-S-	N	P Si	"
N-KS-	N	K(Na)MgSi	"
NPKS-	N	PK(Na)MgSi	"
N---S	N	-	Si added
NP--S	N	P	"
N-K-S	N	K(Na)Mg	"
NPK-S	N	PK(Na)Mg	"
N--SS	N	Si	-
NP-SS	N	P Si	-
N-KSS	N	K(Na)MgSi	-
NPKSS	N	PK(Na)MgSi	-
C(--)	C	-	PKMg omitted
C(P-)	C	P	"
C(-K)	C	K(Na)Mg	"
C(PK)	C	PK(Na)Mg	"
D	None	D	-
(D)	(D)	-	-
(A)	(Ashes)	-	-
-	None	-	-

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93/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 tonnes. (D): until 1871 only
(Ashes): Weed ash 1852-1916, furnace ash 1917-1932, none since

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

0
48
96
144

Plus extra plots testing all combinations of:-

1. **MANURE** Fertilizers other than magnesium:

551AN2PK	Plot 551 AN2PK
561--PK	Plot 561 --PK
571NN2--	Plot 571 NN2
581NN2--	Plot 581 NN2

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

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

0
35

NOTES: (1) For a fuller record see 'Details' etc.
(2) Erratum: Since 1989 some records of the type of superphosphate applied were incorrect. Given above is the correct record.

Experimental diary:

06-Jul-92	B	Straw baled.
21-Dec-92	**T**	Si and K applied.
22-Dec-92	**T**	P applied.
19-Jan-93	**T**	FYM applied.
20-Jan-93	B	Ploughed.
03-Mar-93	B	Heavy spring-tine cultivated, twice.
04-Mar-93	B	Rotary harrowed, Alexis, dressed Baytan, drilled at 350 seeds per square metre, rolled.

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93/R/HB/2

Experimental diary:

30-Apr-93 : **T** : N applied.
13-May-93 : B : Ally at 30 g and Starane 2 at 1.0 l in 200 l.
08-Jun-93 : B : Alto 100 SL at 0.80 l and Derosal WDG at 0.31 kg in 200 l.
14-Aug-93 : B : Combine harvested.

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

MAIN PLOTS

GRAIN TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.80	0.55	0.74	0.73	0.71
-P-	2.19	4.17	3.95	3.57	3.47
--K	1.72	1.53	2.79	1.90	1.98
-PK	2.47	3.92	5.32	5.84	4.39
A--	0.89	1.10	0.97	0.94	0.98
AP-	2.80	3.98	3.99	4.12	3.72
A-K	0.96	1.29	1.62	1.38	1.31
APK	2.57	4.38	5.54	6.10	4.65
N----	1.09	0.67	0.66	0.85	0.82
NP---	2.87	3.93	4.24	3.99	3.76
N-K--	0.74	0.90	1.68	1.15	1.12
NPK--	2.85	4.50	5.91	5.97	4.81
N--S-	0.31	2.14	1.32	3.05	1.70
NP-S-	2.92	3.85	4.03	4.24	3.76
N-KS-	1.80	3.32	2.24	2.26	2.40
NPKS-	3.03	4.84	6.13	6.90	5.22
N---S	1.02	1.75	1.58	1.13	1.37
NP--S	2.33	3.91	4.78	5.32	4.08
N-K-S	1.46	1.75	2.03	2.73	1.99
NPK-S	2.37	4.79	5.82	5.92	4.72
N--SS	0.67	1.91	1.76	1.39	1.43
NP-SS	2.51	4.17	4.10	4.77	3.89
N-KSS	1.77	2.75	1.95	2.35	2.20
NPKSS	2.68	4.99	5.49	6.35	4.88
C(--)	1.87	2.27	3.44	3.67	2.81
C(P-)	2.41	4.44	4.07	4.95	3.97
C(-K)	1.71	3.87	4.27	5.11	3.74
C(PK)	2.69	4.49	4.97	5.69	4.46
D	5.95	5.53	5.70	5.79	5.74
(D)	2.02	2.83	2.89	5.58	3.33
(A)	1.61	1.89	3.16	2.18	2.21
-	1.19	0.68	1.17	1.14	1.04
Mean	2.01	3.03	3.38	3.66	3.02

GRAIN MEAN DM% 81.0

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93/R/HB/2 MAIN PLOTS

STRAW TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.27	0.24	0.49	0.60	0.40
-P-	0.76	1.84	1.88	1.90	1.59
--K	0.56	0.58	1.13	0.66	0.73
-PK	0.72	1.41	2.07	3.18	1.85
A--	0.28	0.42	0.25	0.35	0.32
AP-	1.00	1.99	2.32	2.15	1.87
A-K	0.32	0.50	1.02	0.81	0.66
APK	0.81	1.57	2.59	2.86	1.96
D	3.63	3.46	4.09	3.61	3.70
(D)	0.55	1.40	1.34	2.41	1.42
(A)	0.63	0.88	1.32	0.83	0.91
-	0.40	0.33	0.38	0.32	0.36
Mean	0.83	1.22	1.57	1.64	1.31

STRAW MEAN DM% 69.0

PLOT AREA HARVESTED 0.00154

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

MANURE	551AN2PK	561--PK	571NN2--	581NN2--	Mean
MGNESIUM					
0	4.82	0.67	3.31	0.57	2.34
35	5.18	0.69	1.94	0.89	2.18
Mean	5.00	0.68	2.62	0.73	2.26

GRAIN MEAN DM% 81.0

PLOT AREA HARVESTED 0.00329

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93/R/WF/3

WHEAT AND FALLOW

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

The 138th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-92/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:
14-Oct-92 : **T** : Ploughed.
19-Oct-92 : **T** : Rotary harrowed twice, Apollo, dressed Fonofos Seed Treatment, drilled at 380 seeds per square metre.
17-Aug-93 : **T** : Combine harvested.
Fallow plot:
05-Oct-92 : **T** : Ploughed.
26-May-93 : **T** : Cultivated by rotary grubber.
24-Jun-93 : **T** : Cultivated by rotary grubber.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.65	1.09
MEAN DM%	73.9	77.5
PLOT AREA HARVESTED	0.04304	

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93/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 138th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-92/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 tonnes
	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**	Phosphate applied annually from 1986, as single superphosphate in 1986 and 1987, triple superphosphate from 1988 until 1992, none since:	
	O	None
	P1	44 kg P
	P2	87 kg P
	P3	131 kg P

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 tonnes
	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:

30-Sep-92 : **T** : Muriate of potash at 167 kg.

K test:

30-Sep-92 : **T** : Triple superphosphate at 638 kg.

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93/R/EX/4

Experimental diary:
All plots:
16-Sep-92 : B : Scythe at 2.0 l with Farmon Blue at 0.20 l in 200 l.
05-Oct-92 : B : Ploughed.
09-Oct-92 : B : Disced, spring-tine cultivated.
: B : Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
19-Apr-93 : B : 34.5% N at 560 kg.
13-May-93 : B : Ally at 30 g, Cheetah R at 2.5 l and Starane 2 at 1.0 l in 200 l.
04-Jun-93 : B : Halo at 2.0 l and Mistral at 0.50 l in 200 l.
16-Aug-93 : 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	O	P1	P2	P3	Mean
O	2.47	6.32	7.22	5.96	5.49
D	5.17	6.72	6.72	6.61	6.31
N	2.84	5.52	5.78	5.32	4.86
P	4.44	6.44	6.11	6.72	5.93
NPKNAMG	3.98	4.99	5.63	5.05	4.91
Mean	3.78	6.00	6.29	5.93	5.50

GRAIN MEAN DM% 87.9

STRAW TONNES/HECTARE

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

P RES / OLD RES	O	P1	P2	P3	Mean
O	1.46	3.56	4.06	3.52	3.15
D	2.78	3.55	3.73	3.21	3.32
N	1.64	2.93	3.06	2.95	2.65
P	2.01	3.23	3.80	3.46	3.12
NPKNAMG	2.19	2.71	3.19	2.91	2.75
Mean	2.01	3.20	3.57	3.21	3.00

STRAW MEAN DM% 89.3

PLOT AREA HARVESTED 0.00589

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93/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

OLD RES	
O	4.87
D	5.64
N*	5.01
PK	4.82
N*PK	4.67
Mean	5.00

GRAIN MEAN DM% 88.2

STRAW TONNES/HECTARE

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

OLD RES	
O	2.87
D	2.90
N*	2.80
PK	2.66
N*PK	2.67
Mean	2.78

STRAW MEAN DM% 91.7

PLOT AREA HARVESTED 0.00589

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93/R/PG/5

PARK GRASS

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

The 138th year, hay.

For previous years see 'Details' 1967 and 1973 and 74-92/R/PG/5.

Treatments: Combinations of:-

Whole plots

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

N1	Plot 1	N1
O(D)	Plot 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	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 tonnes every fourth year
F:	Fish meal every fourth year to supply 63 kg N
MN:	P K Na Mg

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93/R/PG/5

Sub plots

2. **LIME** Liming:

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 1990.

Additional sub plots (Plots 18, 19 and 20 only) (tonnes CaCO3 applied every fourth year 1920-1964):

N2KNAMG0	18-1	None
N2KNAMG2	18-2	13.5
N2KNAMG1	18-3	7.9
DO	19-1	None
D2	19-2	6.3
D1	19-3	1.1
D/N*PK0	20-1	None
D/N*PK2	20-2	5.6
D/N*PK1	20-3	1.1

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.

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

Experimental diary:

10-Feb-93	**T**	P applied.
11-Feb-93	**T**	Si applied.
12-Feb-93	**T**	K, Na and Mg applied.
16-Feb-93	**T**	FYM applied.
10-Mar-93	B	Flat rolled.
19-Apr-93	**T**	N as nitrate of soda applied.
	T	N as sulphate of ammonia applied.
25-Jun-93	B	First sample cut. Remaining area cut for hay.
	B	Spread grass for hay.
26-Jun-93	B	Hay turned.
27-Jun-93	B	Hay turned.
28-Jun-93	B	Hay turned, rowed up.
29-Jun-93	B	Hay rowed up and baled.
12-Nov-93	B	Second sample cut, herbage removed. Remaining area cut, herbage removed.

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93/R/PG/5

NOTES: (1) Herbage samples from selected plots were taken for chemical analysis.
(2) Comparison of hay and silage yields was made on selected plots.

1ST CUT (25/6/93) DRY MATTER TONNES/HECTARE

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

LIME MANURE	PLOT	A	B	C	D	MEAN
N1	1	3.89	3.61	3.36	1.84	3.17
O(D)	2	3.80	4.89	3.07	3.13	3.72
O	3	3.57	3.97	2.59	2.32	3.11
P	4/1	4.82	5.30	3.91	3.37	4.35
N2P	4/2	3.96	3.68	4.42	2.88	3.74
N1MN	6	5.38	6.36			5.87
MN	7	5.96	6.19	6.88	5.32	6.09
PNAMG	8	4.94	5.50	4.57	3.83	4.71
MN(N2)	9/1	5.35	4.54	4.35	5.05	4.82
N2MN	9/2	6.05	5.44	6.14	4.18	5.45
N2PNAMG	10	4.52	3.51	4.77	2.41	3.80
N3MN	11/1	6.74	6.27	5.68	4.42	5.78
N3MNSI	11/2	6.72	6.09	5.84	5.27	5.98
O	12	3.47	3.62	2.80	2.97	3.21
D/F	13	5.40	6.00	5.68	5.29	5.59
MN(N2*)	14/1	5.22	4.22	3.98	4.46	4.47
N2*MN	14/2	5.60	5.89	5.61	5.26	5.59
MN(N2*)	15	4.93	5.61	5.61	5.07	5.31
N1*MN	16	5.70	5.95	5.40	4.53	5.40
N1*	17	4.19	4.18	4.19	3.76	4.08
N2KNAMG0	18/1			4.18	1.55	2.87
N2KNAMG2	18/2					4.20
N2KNAMG1	18/3	4.31	3.74			4.02
D0	19/1					6.17
D2	19/2					5.90
D1	19/3					6.24
D/N*PK0	20/1					5.56
D/N*PK2	20/2					5.45
D/N*PK1	20/3					5.83

1ST CUT MEAN DM% 25.5

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93/R/PG/5

2ND CUT (12/11/93) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	PLOT	A	B	C	D	MEAN
N1	1	4.12	3.27	4.41	1.91	3.43
O(D)	2	3.51	3.27	3.67	3.58	3.51
O	3	2.90	2.67	2.95	3.51	3.01
P	4/1	2.38	2.80	3.02	3.25	2.86
N2P	4/2	3.21	3.32	2.77	1.75	2.76
N1MN	6	3.24	3.47			3.35
MN	7	3.03	3.70	4.61	3.51	3.71
PNAMG	8	2.52	2.76	3.16	3.35	2.95
MN(N2)	9/1	2.60	2.32	1.68	1.53	2.03
N2MN	9/2	3.27	2.78	2.89	2.55	2.87
N2PNAMG	10	3.01	2.98	3.31	2.23	2.88
N3MN	11/1	3.80	3.59	3.63	3.80	3.71
N3MNSI	11/2	4.19	3.48	2.94	3.69	3.57
O	12	2.05	2.10	2.56	2.69	2.35
D/F	13	3.30	3.16	3.39	4.18	3.51
MN(N2*)	14/1	3.14	2.12	1.83	2.85	2.49
N2*MN	14/2	3.30	2.92	2.39	2.28	2.72
MN(N2*)	15	2.71	3.44	3.59	3.97	3.43
N1*MN	16	3.35	3.02	3.22	3.05	3.16
N1*	17	2.38	2.84	3.51	3.54	3.07
N2KNAMG0	18/1			2.86	0.87	1.86
N2KNAMG2	18/2					3.33
N2KNAMG1	18/3	3.29	2.88			3.09
D0	19/1					4.41
D2	19/2					3.77
D1	19/3					3.82
D/N*PK0	20/1					3.86
D/N*PK2	20/2					3.49
D/N*PK1	20/3					4.27

2ND CUT MEAN DM% 22.4

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93/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME MANURE	PLOT	A	B	C	D	MEAN
N1	1	8.02	6.87	7.77	3.75	6.60
O(D)	2	7.31	8.16	6.74	6.71	7.23
O	3	6.48	6.64	5.54	5.83	6.12
P	4/1	7.20	8.10	6.93	6.62	7.21
N2P	4/2	7.17	6.99	7.19	4.63	6.50
N1MN	6	8.62	9.83			9.23
MN	7	8.99	9.89	11.49	8.82	9.80
PNAMG	8	7.46	8.25	7.72	7.17	7.65
MN(N2)	9/1	7.95	6.86	6.03	6.58	6.86
N2MN	9/2	9.32	8.22	9.03	6.73	8.32
N2PNAMG	10	7.53	6.49	8.08	4.64	6.69
N3MN	11/1	10.54	9.86	9.31	8.22	9.48
N3MNSI	11/2	10.91	9.57	8.77	8.96	9.56
O	12	5.52	5.72	5.36	5.65	5.56
D/F	13	8.70	9.16	9.08	9.46	9.10
MN(N2*)	14/1	8.37	6.35	5.81	7.30	6.96
N2*MN	14/2	8.90	8.81	8.00	7.54	8.31
MN(N2*)	15	7.64	9.05	9.20	9.04	8.74
N1*MN	16	9.05	8.97	8.61	7.58	8.55
N1*	17	6.56	7.03	7.71	7.31	7.15
N2KNAMG0	18/1			7.04	2.42	4.73
N2KNAMG2	18/2					7.53
N2KNAMG1	18/3	7.60	6.62			7.11
D0	19/1					10.58
D2	19/2					9.68
D1	19/3					10.07
D/N*PK0	20/1					9.43
D/N*PK2	20/2					8.94
D/N*PK1	20/3					10.09

TOTAL OF 2 CUTS MEAN DM% 24.0

PLOT AREA HARVESTED 0.00002

Some data from classical experiments are being entered into an electronic data base and some errors in tables of yields in earlier editions of this book have been found; the Park Grass corrections follow; they only affected second cut and the total of two cut tables. Only the changed parts of tables are presented.

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78/R/PG/5

2ND CUT (2/11/78) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	1.83	2.79	1.90	2.24	2.19
O(D)	1.93	1.83	1.99	2.18	1.98
O/PLOT3	1.59	1.73	1.56	2.32	1.80
P	2.12	2.35	2.44	2.71	2.40
N2P	1.94	2.04	2.57	2.69	2.31
N1MIN	2.41	2.53			2.47
MIN	3.09	3.81	2.43	2.05	2.84
PNAMG	2.66	2.29	2.32	2.42	2.42
N2MIN	2.93	3.44	2.49	2.44	2.83
N2PNAMG	1.78	2.09	1.72	2.50	2.02
N3MIN	2.98	3.28	2.30	4.30	3.22
N3MINSI	3.24	2.68	2.53	4.92	3.34
O/PLOT12	4.01	2.77	2.45	2.21	2.86
D/F	5.50	3.55	3.21	2.79	3.77
N2*MIN	1.69	2.31	2.24	1.64	1.97
MIN(N2*)	2.75	2.94	2.36	2.61	2.66
N1*MIN	2.36	2.41	2.51	2.22	2.38
N1*	2.27	2.20	2.36	2.03	2.22
N2KNAMG0			1.12	0.83	0.98
N2KNAMG2	2.60				2.60
N2KNAMG1	2.37	2.62			2.49
D0	2.93				2.93
D2	3.77				3.77
D1	3.35				3.35
D/N*PK0	4.63				4.63
D/N*PK2	4.16				4.16
D/N*PK1	3.92				3.92

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78/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N1	4.46	5.76	4.70	3.29	4.55
O(D)	4.43	4.57	3.90	3.99	4.22
O/PLOT3	4.26	4.53	3.12	4.02	3.98
P	5.44	6.18	5.13	5.39	5.53
N2P	5.73	6.23	7.00	6.43	6.35
N1MIN	7.69	7.66			7.67
MIN	8.11	8.91	6.42	5.48	7.23
PNAMG	5.70	5.54	5.27	5.29	5.45
N2MIN	8.41	9.05	8.71	7.41	8.39
N2PNAMG	5.95	6.89	6.33	6.32	6.37
N3MIN	8.63	8.67	7.87	8.26	8.36
N3MINSI	9.00	8.60	7.96	10.05	8.90
O/PLOT12	5.95	4.75	4.32	3.99	4.75
D/F	10.45	8.80	7.84	6.94	8.51
N2*MIN	6.38	8.02	8.03	6.51	7.23
MIN(N2*)	8.27	7.94	4.78	5.83	6.70
N1*MIN	7.63	7.67	7.49	6.25	7.26
N1*	5.48	5.72	5.46	4.28	5.23
N2KNAMG0			2.47	1.59	2.03
N2KNAMG2	5.58				5.58
N2KNAMG1	5.11	5.28			5.20
D0	7.40				7.40
D2	9.47				9.47
D1	8.54				8.54
D/N*PK0	10.12				10.12
D/N*PK2	9.35				9.35
D/N*PK1	9.14				9.14

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84/R/PG/5
2ND CUT (19/11/84) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N2KNAMG0			0.12	0.11	0.11
N2KNAMG2	0.85				0.85

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N2KNAMG0			0.53	0.32	0.43
N2KNAMG2	2.89				2.89

89/R/PG/5
2ND CUT (26/9/89) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N2P	0.88	1.02	0.67	0.83	0.85

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N2P	2.11	2.26	1.90	1.68	1.99

92/R/PG/5
2ND CUT (13/11/92) DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N2KNAMG0			4.73	2.58	3.66
N2KNAMG2	3.62				3.62

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE	A	B	C	D	MEAN
N2KNAMG0			6.72	4.00	5.36
N2KNAMG2	6.59				6.59

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93/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 the tenth year of grass/clover. The 19th year of grass on the rest of the experiment.

For previous years see 'Details' 1967 and 1973 and 74-92/R/BN/7.

Plot dimensions: 10.7 x 55.9.

Treatments to grass: All combinations of:-

Whole plots

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

D	D
DPK	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
Mg: 90 kg Mg as kieserite every fourth year since 1974 (sulphate of magnesia until 1973)
D: Farmyard manure at 35 tonnes (until 1975).

Quarter plots

2. **N PERCUT** Nitrogen fertilizer in 1993 (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

Castor meal last applied 1961, nitrate of soda and sulphate of ammonia until 1959.

Plus one plot **MANURE** KMG 100

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93/R/BN/7

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

MANURE Fertilizers and organic manures as for grass 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:
All sections:
09-Feb-93 : **T** : P applied.
11-Mar-93 : B : Flat rolled.
26-Mar-93 : **T** : K applied.
02-Jun-93 : B : First sample cut.
03-Jun-93 : B : Herbage removed from sample cut, cut and removed from remainder of plot.
15-Nov-93 : B : Second sample cut.
16-Nov-93 : B : Herbage removed from sample cut, cut and removed from remainder of plot.
Grass (Sections 3, 4, 5 and 6 only):
24-Mar-93 : **T** : N applied.
09-Jun-93 : **T** : N applied.

NOTE: Herbage samples were taken for chemical analysis.

GRASS

1ST CUT (2/6/93) DRY MATTER TONNES/HECTARE

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

N PERCUT / **MANURE**	75	100	125	150	Mean
D	6.67	6.96	7.18	7.24	7.01
DPK	6.85	6.80	5.61	6.71	6.49
PKMG	5.92	5.93	6.46	6.21	6.13
P	3.57	2.67	2.36	4.84	3.36
PK	5.82	6.21	6.58	6.19	6.20
PMG	4.08	2.43	2.26	2.68	2.86
0	4.42	3.35	3.05	2.82	3.41
Mean	5.33	4.91	4.79	5.24	5.07

MANURE KMG 100 6.22

Grand mean 5.11

1ST CUT MEAN DM% 21.5

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93/R/BN/7

GRASS

2ND CUT (15/11/93) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
D	3.48	4.68	5.93	4.71	4.70
DPK	3.94	4.92	4.26	4.63	4.44
PKMG	2.40	4.04	5.63	4.87	4.24
P	2.79	2.13	3.03	4.08	3.01
PK	3.15	3.97	5.14	3.71	3.99
PMG	2.44	1.87	2.90	3.50	2.68
0	1.76	2.17	3.28	3.73	2.73
Mean	2.85	3.40	4.31	4.18	3.68

MANURE KMG 100 3.75

Grand mean 3.69

2ND CUT MEAN DM% 30.5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
D	10.15	11.64	13.12	11.95	11.71
DPK	10.79	11.72	9.87	11.34	10.93
PKMG	8.32	9.97	12.09	11.08	10.36
P	6.36	4.79	5.39	8.92	6.37
PK	8.96	10.18	11.72	9.90	10.19
PMG	6.53	4.30	5.15	6.18	5.54
0	6.18	5.52	6.33	6.55	6.14
Mean	8.18	8.30	9.09	9.42	8.75

MANURE KMG 100 9.97

Grand mean 8.79

TOTAL OF 2 CUTS MEAN DM% 26.0

PLOT AREA HARVESTED 0.00155

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93/R/BM/7

GRASS/CLOVER

1ST CUT (2/6/93) DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	2.57	2.29	2.29	2.05	1.73	1.98	2.93	2.26

1ST CUT MEAN DM% 16.8

2ND CUT (15/11/93) DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	3.29	2.80	1.59	2.14	1.68	1.47	1.61	2.08

2ND CUT MEAN DM% 23.1

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

MANURE	D	DPK	PKMG	P	PK	PMG	0	Mean
	5.87	5.09	3.87	4.19	3.41	3.45	4.54	4.35

TOTAL OF 2 CUTS MEAN DM% 19.9

PLOT AREA HARVESTED 0.00155

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93/R/GC/8

GARDEN CLOVER

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

The 140th year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-92/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.

NOTE: Hungaropoly, sown at 30 kg in 1990.

Experimental diary:

29-Oct-92 : B : Hand weeded. Chalk at 1.25 t, PK as (0:18:36) at 420 kg and Epsom salts at 530 kg.
25-Jun-93 : B : First cut, hand weeded.
01-Jul-93 : **T** : **FUNG RES** NONE: Muriate of potash at 715 and 590 kg to first and second blocks respectively.
: **T** : **FUNG RES** BENOMYL: Muriate of potash at 500 and 550 kg.
04-Aug-93 : B : Second cut, hand weeded.
05-Aug-93 : **T** : **FUNG RES** NONE: Muriate of potash at 715 and 590 kg to first and second blocks respectively.
: **T** : **FUNG RES** BENOMYL: Muriate of potash at 500 and 550 kg.
02-Nov-93 : B : Third cut.

NOTE: Crop samples were taken for chemical analysis.

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93/R/GC/8

1ST CUT (25/6/93) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	8.18	7.05	7.61

1ST CUT MEAN DM% 19.1

2ND CUT (4/8/93) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	5.02	5.01	5.02

2ND CUT MEAN DM% 15.2

3RD CUT (2/11/93) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	1.63	1.36	1.49

3RD CUT MEAN DM% 21.5

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	14.83	13.41	14.12

TOTAL OF 3 CUTS MEAN DM% 18.6

PLOT AREA HARVESTED 0.00010

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93/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 56th year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-92/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) LN, LN, LN, W, R
LC 3	(Previous CLO) LC, LC, LC, 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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93/W/RN/3

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

LLN	LN, LN, LN, LN, LN, LN, LN, LN, W, R
LLC	LC, LC, LC, LC, LC, LC, LC, LC, W, R

LLN1 to LLN8 = eight year grass ley with N, first year to eighth year, similarly for LLC

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:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

1/2 plots

2. **FYMRES62** Farmyard manure residues, last applied 1962

NONE	None
FYM	38 tonnes on each occasion

1/8 plots

3. **N** Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

   0
   70
   140
   210

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93/W/RN/3

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

Whole plots

1. **ROTATION** Rotations:

   LN 8
   LN 3
   LC 8
   LC 3
   AF
   AB

1/2 plots

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

   NONE None
   FYM 38 tonnes on each occasion

1/8 plots

3. **N** Nitrogen fertilizer (kg N) as 'Nitro-Chalk':

   0
   30
   60
   90

Treatments to leys:

FYM RES Farmyard manure residues:

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

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: 21 Oct, 1992:

Continuous rotations	No FYM half plots	FYM half plots
LN	0	0
LC	0	0
AF	240	260
AB	275	245

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93/W/RN/3

Ex-alternating rotations

LN 8 ploughed for w. wheat	0	0
LN 8 not ploughed	0	0
LC 8 ploughed for w. wheat	0	0
LC 8 not ploughed	0	0

Experimental diary:

Treatment crops:

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

14-Sep-92 : **T** : Ploughed.
16-Sep-92 : **T** : LN1 and LLN1 only: 34.5% N at 220 kg. Rotary harrowed with crumbler attached, drilled Rossa meadow fescue at 15 kg and Erecta RVP timothy at 15 kg.
: **T** : LC1 and LLC1 only: 34.5% N at 145 kg. Rotary harrowed with crumbler attached, drilled Rossa meadow fescue at 12 kg, Erecta RVP timothy at 14 kg and Huia white clover at 4 kg.
03-Mar-93 : **T** : PK as (0:18:36) at 560 kg.
04-Mar-93 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 90 kg.
05-Mar-93 : **T** : Harrowed.
08-Jun-93 : **T** : 1st cut.
09-Jun-93 : **T** : Produce removed.
01-Jul-93 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 90 kg.
30-Jul-93 : **T** : Setter 33 at 5.0 l in 200 l.
15-Sep-93 : **T** : 2nd cut.
22-Sep-93 : **T** : Produce removed.

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

06-Oct-92 : **T** : LLN5 only: Dolomite at 5.0 t.
03-Mar-93 : **T** : PK as (0:18:36) at 560 kg.
04-Mar-93 : **T** : NK as (25:0:16) at 300 kg.
05-Mar-93 : **T** : Harrowed.
08-Jun-93 : **T** : 1st cut.
09-Jun-93 : **T** : Produce removed.
01-Jul-93 : **T** : NK as (25:0:16) at 300 kg.
30-Jul-93 : **T** : Setter 33 at 5.0 l in 200 l.
15-Sep-93 : **T** : 2nd cut.
22-Sep-93 : **T** : Produce removed.

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

06-Oct-92 : **T** : LLC5 only: Dolomite at 5.0 t.
03-Mar-93 : **T** : PK as (0:18:36) at 560 kg.
04-Mar-93 : **T** : Muriate of potash at 90 kg.
05-Mar-93 : **T** : Harrowed.
08-Jun-93 : **T** : 1st cut.
09-Jun-93 : **T** : Produce removed.
01-Jul-93 : **T** : Muriate of potash at 90 kg.
30-Jul-93 : **T** : Setter 33 at 5.0 l in 200 l.
15-Sep-93 : **T** : 2nd cut.
22-Sep-93 : **T** : Produce removed.

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93/W/RN/3

Experimental diary:

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

14-Sep_92 : **T** : Ploughed.
03-Mar-93 : **T** : NPK as (20:10:10) at 400 kg.
04-Mar-93 : **T** : Rotary harrowed with crumbler attached, Alexis, dressed Baytan, drilled at 160 kg, harrowed.
22-Jun-93 : **T** : Dorin at 1.0 l in 200 l.
16-Aug-93 : **T** : Combine harvested.

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

30-Oct-92 : **T** : PK as (0:24:24) at 168 kg, Punch broadcast at 180 kg, ploughed.
24-Feb-93 : **T** : Carbetamex at 3.0 kg in 200 l.
15-Jun-93 : **T** : Benlate at 1.0 kg with Chiltern Chorothalonil 500 at 2.0 l in 300 l.
01-Sep-93 : **T** : Combine harvested.

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

14-Sep-92 : **T** : Ploughed.
04-Mar-93 : **T** : Rotary cultivated with crumbler attached.
08-Jul-93 : **T** : Rotary cultivated.

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

29-Sep-92 : **T** : Roundup at 4.0 l in 200 l.
06-Oct-92 : **T** : PK as (0:24:24) at 260 kg, ploughed, Yaltox at 150 kg, spring-tine cultivated.
07-Oct-92 : **T** : Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
19-Oct-92 : **T** : Prebane 500 SC at 3.0 l in 200 l.
05-Apr-93 : **T** : **N** 70, 140 and 210: Applied as 27% N.
15-Apr-93 : **T** : New 5C Cycocel at 2.5 l with Ally at 0.03 kg in 200 l.
01-Jun-93 : **T** : Bayleton at 0.50 kg with Mistral at 0.50 l in 200 l.
22-Jun-93 : **T** : Dorin at 1.0 l in 200 l.
17-Aug-93 : **T** : Combine harvested.

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

14-Sep-92 : **T** : Ploughed.
06-Oct-92 : **T** : PK as (0:24:24) at 260 kg, Yaltox at 150 kg and dolomite at 5.0 t, spring-tine cultivated.
07-Oct-92 : **T** : Rotary harrowed, Amando, dressed Baytan, drilled at 350 seeds per square metre.
19-Oct-92 : **T** : Prebane 500 SC at 3.0 l in 200 l.
06-Apr-93 : **T** : **N** 30, 60 and 90: Applied as 27% N.
15-Apr-93 : **T** : New 5C Cycocel at 2.5 l with Ally at 0.03 kg in 200 l.
01-Jun-93 : **T** : Bayleton at 0.50 kg with Mistral at 0.50 l in 200 l.
22-Jun-93 : **T** : Dorin at 1.0 l in 200 l.
16-Aug-93 : **T** : Combine harvested.

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

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93/W/RN/3

LEYS

1ST CUTTING OCCASION (8/6/93) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	2.88	2.83	2.86
LC2	6.36	6.42	6.39
LC3	7.67	8.48	8.07
LN1	6.95	6.20	6.58
LN2	7.75	6.19	6.97
LN3	8.19	7.67	7.93
LLC1	2.21	2.91	2.56
LLC2	6.68	6.17	6.43
LLC3	6.60	6.87	6.73
LLC4	7.11	7.25	7.18
LLC5	4.49	3.95	4.22
LLC6	6.52	7.77	7.14
LLC7	6.91	7.52	7.21
LLC8	4.83	5.86	5.35
LLN1	6.59	6.20	6.40
LLN2	7.72	8.22	7.97
LLN3	7.23	6.90	7.07
LLN4	7.64	7.79	7.71
LLN5	4.55	6.20	5.38
LLN6	7.28	6.16	6.72
LLN7	6.54	7.45	7.00
LLN8	7.63	7.78	7.71
Mean	6.38	6.49	6.44

1ST CUT MEAN DM% 24.6

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93/W/RN/3

LEYS

2ND CUTTING OCCASION (15/9/93) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	1.56	1.71	1.63
LC2	0.75	1.05	0.90
LC3	0.92	1.03	0.97
LN1	3.36	3.25	3.30
LN2	1.88	1.81	1.85
LN3	2.33	2.72	2.53
LLC1	2.49	2.64	2.57
LLC2	0.69	0.82	0.76
LLC3	1.05	0.71	0.88
LLC4	2.22	2.53	2.38
LLC5	0.80	0.48	0.64
LLC6	0.59	1.07	0.83
LLC7	0.74	1.27	1.00
LLC8	0.82	1.07	0.94
LLN1	2.87	2.71	2.79
LLN2	2.20	2.22	2.21
LLN3	2.10	1.75	1.93
LLN4	3.18	3.26	3.22
LLN5	1.88	1.99	1.94
LLN6	2.36	2.59	2.47
LLN7	1.31	1.42	1.36
LLN8	2.17	2.89	2.53
Mean	1.74	1.86	1.80

2ND CUT MEAN DM% 29.1

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93/W/RN/3

LEYS

TOTAL OF 2 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	4.44	4.54	4.49
LC2	7.10	7.46	7.28
LC3	8.59	9.51	9.05
LN1	10.31	9.45	9.88
LN2	9.63	8.00	8.82
LN3	10.52	10.40	10.46
LLC1	4.70	5.55	5.13
LLC2	7.37	7.00	7.19
LLC3	7.64	7.58	7.61
LLC4	9.33	9.78	9.55
LLC5	5.29	4.43	4.86
LLC6	7.11	8.83	7.97
LLC7	7.65	8.79	8.22
LLC8	5.65	6.93	6.29
LLN1	9.46	8.92	9.19
LLN2	9.92	10.43	10.17
LLN3	9.34	8.65	8.99
LLN4	10.81	11.05	10.93
LLN5	6.43	8.19	7.31
LLN6	9.64	8.75	9.19
LLN7	7.85	8.87	8.36
LLN8	9.80	10.67	10.24
Mean	8.12	8.35	8.24

TOTAL OF 2 CUTS MEAN DM% 26.8

PLOT AREA HARVESTED 0.00204

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93/W/RN/3

W. WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES62	NONE	FYM	Mean
ROTATION			
LN 8	5.30	5.50	5.40
LN 3	5.48	5.34	5.41
LC 8	7.02	6.98	7.00
LC 3	7.09	7.00	7.05
AF	5.75	5.61	5.68
AB	5.46	5.32	5.39
Mean	6.02	5.96	5.99

N	0	70	140	210	Mean
ROTATION					
LN 8	3.42	5.16	6.47	6.55	5.40
LN 3	3.13	5.40	6.60	6.52	5.41
LC 8	6.08	7.03	7.20	7.69	7.00
LC 3	5.58	7.01	7.69	7.91	7.05
AF	2.86	5.79	6.72	7.37	5.68
AB	3.11	5.92	5.89	6.63	5.39
Mean	4.03	6.05	6.76	7.11	5.99

N	0	70	140	210	Mean
FYMRES62					
NONE	4.02	6.19	6.90	6.96	6.02
FYM	4.05	5.91	6.62	7.26	5.96
Mean	4.03	6.05	6.76	7.11	5.99

N		0	70	140	210
ROTATION	FYMRES62				
LN 8	NONE	3.27	5.22	6.32	6.38
	FYM	3.58	5.09	6.62	6.71
LN 3	NONE	3.04	5.65	6.70	6.56
	FYM	3.21	5.15	6.50	6.48
LC 8	NONE	5.83	7.35	7.40	7.51
	FYM	6.34	6.72	6.99	7.86
LC 3	NONE	6.02	7.04	7.52	7.77
	FYM	5.13	6.98	7.86	8.04
AF	NONE	2.71	5.77	7.20	7.33
	FYM	3.01	5.80	6.23	7.42
AB	NONE	3.22	6.11	6.28	6.23
	FYM	3.01	5.73	5.51	7.03

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00183

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93/W/RN/3

W. RYE 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES66	NONE	FYM	Mean
ROTATION			
LN 8	4.25	4.27	4.26
LN 3	4.04	4.20	4.12
LC 8	4.68	4.49	4.59
LC 3	3.92	4.03	3.98
AF	3.41	3.47	3.44
AB	3.37	3.51	3.44
Mean	3.94	4.00	3.97

N	0	30	60	90	Mean
ROTATION					
LN 8	2.76	4.02	5.08	5.19	4.26
LN 3	2.67	3.97	4.78	5.06	4.12
LC 8	2.97	4.92	5.14	5.32	4.59
LC 3	2.69	3.64	4.35	5.22	3.98
AF	1.62	2.96	4.36	4.80	3.44
AB	1.74	3.12	4.36	4.53	3.44
Mean	2.41	3.77	4.68	5.02	3.97

N	0	30	60	90	Mean
FYMRES66					
NONE	2.47	3.72	4.62	4.97	3.94
FYM	2.35	3.83	4.74	5.07	4.00
Mean	2.41	3.77	4.68	5.02	3.97

N		0	30	60	90
ROTATION	**FYMRES66**				
LN 8	NONE	3.09	3.71	4.97	5.24
	FYM	2.42	4.33	5.19	5.14
LN 3	NONE	2.58	3.89	4.69	4.98
	FYM	2.77	4.05	4.86	5.13
LC 8	NONE	3.02	5.15	5.03	5.53
	FYM	2.91	4.69	5.25	5.12
LC 3	NONE	2.64	3.48	4.57	4.99
	FYM	2.75	3.81	4.12	5.45
AF	NONE	1.65	3.04	4.30	4.63
	FYM	1.59	2.87	4.42	4.98
AB	NONE	1.82	3.04	4.16	4.46
	FYM	1.66	3.21	4.57	4.59

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00183

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93/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 29th year, w. wheat.

For previous years see 'Details' 1973 and 74-92/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. On the first pair leys were ploughed for 1st test crop in 1987, on the second pair for 1st test crop in 1988.

Whole blocks

1. **CROPSEQ**

WHEAT 2	2nd wheat, after w. wheat 1988, potatoes 1989, w. wheat 1990, w. beans 1991
WHEAT 3	3rd 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 2) or 1986 (WHEAT 3), 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 2) or 1986 (WHEAT 3), 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 2) or 1985 (WHEAT 3) 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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93/W/RN/12

Sub plots

3. **N** Nitrogen fertilizer (kg N):

0
50
100
150
200
250

Experimental diary:

11-Aug-92 : **T** : **CROPSEQ** WHEAT 3: Subsoiled to 45 cm with tines 1.5 m apart.
05-Oct-92 : B : Ploughed.
06-Oct-92 : B : PK as (0:18:36) at 560 kg.
07-Oct-92 : B : Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
13-Apr-93 : **T** : **N** 50, 100, 150, 200 and 250: Applied as 27% N.
15-Apr-93 : B : Ally at 30 g and New 5C Cycocel at 2.5 l in 200 l.
01-Jun-93 : B : Bayleton at 0.50 kg and Mistral at 0.50 l in 200 l.
19-Aug-93 : B : Roundup at 5.3 l in 200 l.
25-Aug-93 : B : Combine harvested.

NOTES: (1) Straw weights were recorded for **CROPSEQ** WHEAT 3.
(2) Grain and straw samples were taken for chemical analysis.

CROPSEQ WHEAT 2

GRAIN TONNES/HECTARE

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

N	0	50	100	150	200	250	Mean
TREATMNT							
LC 8 GM	1.17	2.78	2.87	4.17	4.36	4.91	3.38
LC 8 PT	0.83	2.36	4.01	4.37	4.95	4.80	3.55
LC 6 LC	0.96	3.22	4.41	4.63	5.58	5.64	4.07
LC 6 LN	0.78	2.87	4.32	3.73	4.68	3.96	3.39
FYM	1.12	2.70	3.58	3.86	3.70	3.64	3.10
STRAW	0.59	2.00	3.91	4.34	4.42	4.38	3.27
FERT-FYM	0.48	2.27	2.87	3.49	3.54	4.24	2.82
FERT-STR	0.40	2.25	3.05	4.09	4.81	3.62	3.04
Mean	0.79	2.56	3.63	4.09	4.51	4.40	3.33

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93/W/RN/12

CROPSEQ WHEAT 2

GRAIN TONNES/HECTARE

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

	TREATMNT	**N**	**TREATMNT N**
	0.683	0.267	0.971
Except when comparing means with the same level(s) of **TREATMNT**			0.755

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.683	20.5
BLOCK.WP.SP	40	0.755	22.7

GRAIN MEAN DM% 83.5

CROPSEQ WHEAT 3

GRAIN TONNES/HECTARE

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

N	0	50	100	150	200	250	Mean
TREATMNT							
LC 8 GM	1.32	3.09	4.00	3.67	3.77	3.84	3.28
LC 8 PT	1.95	3.25	3.26	4.33	4.29	4.22	3.55
LC 6 LC	1.30	3.11	3.77	3.79	4.61	4.98	3.60
LC 6 LN	1.77	2.91	3.65	4.48	4.13	4.05	3.50
FYM	1.77	3.89	5.38	6.38	6.74	6.54	5.12
STRAW	1.08	2.88	4.57	4.76	5.58	5.60	4.08
FERT-FYM	0.82	3.49	5.10	5.23	5.48	5.79	4.32
FERT-STR	1.00	3.22	4.51	5.08	5.50	5.53	4.14
Mean	1.38	3.23	4.28	4.71	5.01	5.07	3.95

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

	TREATMNT	**N**	**TREATMNT N**
	0.350	0.201	0.626
Except when comparing means with the same level(s) of **TREATMNT**			0.569

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93/W/RN/12

CROPSEQ WHEAT 3

GRAIN TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.350	8.9
BLOCK.WP.SP	40	0.569	14.4

GRAIN MEAN DM% 82.9

CROPSEQ WHEAT 3

STRAW TONNES/HECTARE

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

N TREATMNT	0	50	100	150	200	250	Mean
LC 8 GM	1.16	3.98	4.15	3.86	4.70	4.53	3.73
LC 8 PT	1.64	3.23	3.66	4.80	4.93	5.12	3.90
LC 6 LC	1.36	3.88	4.48	4.31	4.19	5.02	3.87
LC 6 LN	1.79	3.35	4.69	4.32	4.33	4.32	3.80
FYM	1.24	3.05	4.27	4.60	4.49	4.10	3.62
STRAW	0.76	3.17	3.74	3.99	5.07	3.85	3.43
FERT-FYM	0.81	2.68	3.13	3.39	3.56	3.30	2.81
FERT-STR	0.73	2.30	3.29	3.52	3.78	4.01	2.94
Mean	1.19	3.21	3.93	4.10	4.38	4.28	3.51

STRAW MEAN DM% 82.5

SUB PLOT AREA HARVESTED 0.00183

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93/R/CS/10 and 93/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.

Sponsors: S.P. McGrath, P.B. Barraclough, G.F.J. Milford, J.M. Day.

The 32nd year, w. lupins.

For previous years see 'Details' 1967, 1973 and 74-92/R&W/CS/10.

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

Whole plot dimensions: 5.8 x 16.1 (R), 5.6 x 16.1 (W).

Treatments: All combinations of:-

Whole plots

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

		Rothamsted total		Woburn total	
R	W	1962-78	1982-87	1962-78	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	1981	1982	1983		1988	
	R & W	R & W	R & W	R	W	R	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):

0
30

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).
(2) Test manganese was applied cumulatively, 1987-90.

https://doi.org/10.23637/ERADOC-1-48 *pp 55*

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93/R/CS/10 and 93/W/CS/10

Experimental diary:

Sawyers I (R):

29-Sep-92 : B : Ploughed.
07-Oct-92 : B : Rotary harrowed, CH 304/70, inoculated with rhizobium, drilled at 100 kg.
13-Oct-92 : B : Opogard 500 FW at 2.8 l in 200 l.
16-Apr-93 : **T** : **SULPHUR** 30: 30 kg S as gypsum.
22-Jun-93 : B : Power Dimethoate 40 at 1.7 l in 200 l.
02-Jul-93 : B : Mistral at 1.0 l in 200 l.
: B : Sportak 45 at 1.1 l in 200 l.
06-Sep-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.30 l in 260 l.
10-Oct-93 : B : Combine harvested.

Stackyard C (W):

02-Oct-92 : B : Rotary harrowed, CH 304/70, inoculated with rhizobium, drilled at 100 kg.
12-Oct-92 : B : Opogard 500 FW at 1.8 l and Scythe at 3.0 l in 200 l.
22-Mar-93 : B : Ploughed (crop failed).
08-Jul-93 : B : Rotary cultivated.

NOTES: (1) At Rothamsted plant samples were taken in early June from transects across plots for a detailed study of the relation between soil pH gradient and plant growth. Harvested grain samples were taken for sulphur analysis.
(2) At Woburn the crop failed and no yields were taken.
(3) At Rothamsted, most **CHALK** 0 plots failed. They have been omitted from the analysis.

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

GRAIN TONNES/HECTARE

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

P	0	P1	P2	P3	Mean
CHALK					
15	2.34	2.24	1.95	1.75	2.07
24.5	1.82	1.13	1.67	1.46	1.52
52.5	1.25	1.49	1.26	1.32	1.33
Mean	1.80	1.62	1.63	1.51	1.64

SULPHUR	0	30	Mean
CHALK			
15	1.90	2.23	2.07
24.5	1.44	1.60	1.52
52.5	1.19	1.47	1.33
Mean	1.51	1.77	1.64

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

GRAIN TONNES/HECTARE

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

SULPHUR	0	30	Mean
P			
O	1.63	1.97	1.80
P1	1.58	1.65	1.62
P2	1.40	1.86	1.63
P3	1.44	1.58	1.51
Mean	1.51	1.77	1.64

CHALK	P	SULPHUR	0	30
15	O		2.12	2.55
	P1		2.17	2.30
	P2		1.67	2.23
	P3		1.64	1.85
24.5	O		1.62	2.03
	P1		1.16	1.09
	P2		1.56	1.78
	P3		1.42	1.50
52.5	O		1.15	1.34
	P1		1.40	1.57
	P2		0.96	1.57
	P3		1.25	1.39

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

CHALK	P	SULPHUR	CHALK P
0.161	0.186	0.091	0.323

CHALK SULPHUR	P SULPHUR	CHALK P SULPHUR
0.196	0.226	0.392

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

CHALK	0.157
P	0.181
CHALK.P	0.314

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.323	19.7
BLOCK.WP.SP	12	0.314	19.2

GRAIN MEAN DM% 70.3

SUB PLOT AREA HARVESTED 0.00149

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93/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 20th year, s. barley.

For previous years see 74-92/R/CS/140.

Design: Single replicate of 32 plots.

Whole plot dimensions: 4.06 x 4.57.

Treatments, applied cumulatively every year except as stated:

All combinations of:-

1. **WEEDKLLR** — Weedkiller in autumn:

NONE	None
GLYPHOS	Glyphosate at 1.4 kg to barley stubble each autumn from 1979 to 1984, at 0.72 kg in 1985, at 0.54 kg in 1986, at 1.3 kg in 1987 and at 1.5 kg in 1988 to 1992.

2. **FUNGCIDE[1]** — Fungicide in autumn:

NONE	None
TRIADIM	Triadimefon at 0.25 kg in autumn 1981, 1982, 1984 to 1992, 0.28 kg in autumn 1983

3. **FUNGCIDE[2]** — Fungicide in spring:

NONE	None
BENOMYL	Benomyl at 4 kg to the seedbed

4. **INSCTCDE** — Insecticide:

NONE	None
CHLORFEN	Chlorfenvinphos at 2 kg to the seedbed

5. **NEMACIDE** — Nematicide:

NONE	None
ALDICARB	Aldicarb at 6 kg to the seedbed

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93/R/CS/140

Experimental diary:

28-Sep-92 : **T** : **WEEDKLLR** GLYPHOS: Glyphosate at 1.5 kg in 220 l.
: **T** : **FUNGCIDE[1]** TRIADIM: Triadimefon at 0.25 kg in 220 l.
08-Oct-92 : B : PK as (0:18:36) at 1390 kg.
21-Jan-93 : B : Ploughed.
08-Mar-93 : B : 34.5% N at 440 kg.
: B : Spring-tine cultivated.
09-Mar-93 : **T** : **FUNGCIDE[2]** BENOMYL: Benomyl at 4.0 kg in 5000 l, applied by watering can.
: **T** : **INSCTCDE** CHLORFEN: Chlorfenvinphos at 2.0 kg as granules, applied by hand.
: **T** : **NEMACIDE** ALDICARB: Aldicarb at 6.0 kg as granules, applied by hand.
11-Mar-93 : B : Heavy spring-tine cultivated, rotary harrowed twice, Alexis, undressed, drilled at 400 seeds per square metre.
28-May-93 : B : Ally at 30 g and Starane 2 at 0.50 l in 200 l.
13-Aug-93 : B : Combine harvested.

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93/R/CS/140

GRAIN TONNES/HECTARE

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

FUNGCIDE[1]	NONE	TRIADIM	Mean
WEEDKLLR			
NONE	3.99	4.17	4.08
GLYPHOS	4.31	4.32	4.31
Mean	4.15	4.24	4.20

FUNGCIDE[2]	NONE	BENOMYL	Mean
WEEDKLLR			
NONE	3.94	4.23	4.08
GLYPHOS	4.35	4.28	4.31
Mean	4.14	4.25	4.20

FUNGCIDE[2]	NONE	BENOMYL	Mean
FUNGCIDE[1]			
NONE	4.16	4.15	4.15
TRIADIM	4.13	4.36	4.24
Mean	4.14	4.25	4.20

INSCTCDE	NONE	CHLORFEN	Mean
WEEDKLLR			
NONE	4.07	4.10	4.08
GLYPHOS	4.31	4.32	4.31
Mean	4.19	4.21	4.20

INSCTCDE	NONE	CHLORFEN	Mean
FUNGCIDE[1]			
NONE	4.21	4.10	4.15
TRIADIM	4.17	4.32	4.24
Mean	4.19	4.21	4.20

INSCTCDE	NONE	CHLORFEN	Mean
FUNGCIDE[2]			
NONE	4.07	4.22	4.14
BENOMYL	4.31	4.19	4.25
Mean	4.19	4.21	4.20

NEMACIDE	NONE	ALDICARB	Mean
WEEDKLLR			
NONE	4.22	3.94	4.08
GLYPHOS	4.53	4.10	4.31
Mean	4.38	4.02	4.20

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93/R/CS/140

GRAIN TONNES/HECTARE

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

NEMACIDE / **FUNGCIDE[1]**	NONE	ALDICARB	Mean
NONE	4.30	4.01	4.15
TRIADIM	4.46	4.03	4.24
Mean	4.38	4.02	4.20

NEMACIDE / **FUNGCIDE[2]**	NONE	ALDICARB	Mean
NONE	4.39	3.90	4.14
BENOMYL	4.37	4.14	4.25
Mean	4.38	4.02	4.20

NEMACIDE / **INSCTCDE**	NONE	ALDICARB	Mean
NONE	4.33	4.05	4.19
CHLORFEN	4.42	3.99	4.21
Mean	4.38	4.02	4.20

	FUNGCIDE[1]	NONE		TRIADIM	
WEEDKLLR	**FUNGCIDE[2]**	NONE	BENOMYL	NONE	BENOMYL
NONE		3.92	4.06	3.95	4.39
GLYPHOS		4.39	4.24	4.31	4.32

	FUNGCIDE[1]	NONE		TRIADIM	
WEEDKLLR	**INSCTCDE**	NONE	CHLORFEN	NONE	CHLORFEN
NONE		4.00	3.99	4.14	4.20
GLYPHOS		4.42	4.21	4.20	4.43

	FUNGCIDE[2]	NONE		BENOMYL	
WEEDKLLR	**INSCTCDE**	NONE	CHLORFEN	NONE	CHLORFEN
NONE		3.86	4.02	4.28	4.17
GLYPHOS		4.28	4.42	4.35	4.21

	FUNGCIDE[2]	NONE		BENOMYL	
FUNGCIDE[1]	**INSCTCDE**	NONE	CHLORFEN	NONE	CHLORFEN
NONE		4.10	4.21	4.31	3.99
TRIADIM		4.03	4.23	4.32	4.40

	FUNGCIDE[1]	NONE		TRIADIM	
WEEDKLLR	**NEMACIDE**	NONE	ALDICARB	NONE	ALDICARB
NONE		4.02	3.96	4.42	3.92
GLYPHOS		4.57	4.06	4.50	4.13

	FUNGCIDE[2]	NONE		BENOMYL	
WEEDKLLR	**NEMACIDE**	NONE	ALDICARB	NONE	ALDICARB
NONE		4.10	3.78	4.35	4.11
GLYPHOS		4.68	4.02	4.39	4.17

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93/R/CS/140

GRAIN TONNES/HECTARE

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

FUNGCIDE[2]	NONE		BENOMYL	
FUNGCIDE[1] NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
NONE	4.35	3.96	4.24	4.06
TRIADIM	4.43	3.84	4.49	4.22

INSCTCDE	NONE		CHLORFEN	
WEEDKLLR NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
NONE	4.14	4.00	4.31	3.88
GLYPHOS	4.53	4.09	4.53	4.10

INSCTCDE	NONE		CHLORFEN	
FUNGCIDE[1] NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
NONE	4.39	4.03	4.20	3.99
TRIADIM	4.28	4.07	4.64	3.99

INSCTCDE	NONE		CHLORFEN	
FUNGCIDE[2] NEMACIDE	NONE	ALDICARB	NONE	ALDICARB
NONE	4.29	3.85	4.49	3.95
BENOMYL	4.38	4.25	4.35	4.03

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

Margins of two factor tables	0.073
Two factor tables	0.104
Three factor tables	0.146

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

Stratum	d.f.	s.e.	cv%
WP	6	0.207	4.9

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00069

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93/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 ninth year, w. wheat.

For previous years see 85-92/R/CS/302.

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

Whole plot dimensions: 12.0 x 24.0.

Treatments: All combinations of:-

Whole plots

1.	**FUNGCIDE**	Fungicides applied cumulatively 1985-93:
	NONE	None
	CARB	Carbendazim at 0.25 kg
	PRO	Prochloraz at 0.40 kg from 1985 to 1992, 0.50 kg in 1993
	CARB+PRO	Carbendazim at 0.25 kg + prochloraz at 0.40 kg from 1985 to 1992, 0.50 kg in 1993

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 eyespot inoculum was colonised on oat seed and this was broadcast in October, 1984.

Experimental diary:

13-Aug-92 : B : Deep-tine cultivated with vibrating tines 60 cm apart and 45 cm deep.
08-Sep-92 : B : Ploughed, furrow pressed.
29-Sep-92 : B : Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
08-Dec-92 : **T** : **FUNGCIDE** CARB: Tripart Defensor FL at 0.50 l in 200 l.
: **T** : **FUNGCIDE** PRO: Sportak 45 at 1.1 l in 200 l.
: **T** : **FUNGCIDE** CARB+PRO: Tripart Defensor FL at 0.50 l and Sportak 45 at 1.1 l in 200 l.

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93/R/CS/302

Experimental diary:

```
   10-Feb-93 : B : Panther at 2.0 l in 200 l.
   08-Mar-93 : B : 34.5% N at 120 kg.
   15-Apr-93 : T : FUNGCIDE CARB: Tripart Defensor FL at 0.50 l in 200 l.
             : T : FUNGCIDE PRO: Sportak 45 at 1.1 l in 200 l.
             : T : FUNGCIDE CARB+PRO: Tripart Defensor FL at 0.50 l and
                   Sportak 45 at 1.1 l in 200 l.
   21-Apr-93 : B : 34.5% N at 370 kg.
   13-May-93 : B : 34.5% N at 120 kg.
   18-May-93 : B : Starane 2 at 0.50 l with Codacide Oil at 2.5 l in 200 l.
   25-May-93 : B : Commando at 3.0 l in 70 l.
   16-Aug-93 : B : Combine harvested.
```

NOTE: Eyespot and sharp eyespot were assessed on plants sampled in early July. Isolates of the eyespot fungus were identified by type (W and R) and assessed for resistance to carbendazim.

GRAIN TONNES/HECTARE

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

EYE INOC / FUNGCIDE	NATURAL	W 19R 1S	W 1R 19S	R 19R 1S	R 1R 19S	Mean
NONE	7.54	7.78	7.74	7.09	7.28	7.50
CARB	7.20	7.49	7.11	7.40	7.58	7.33
PRO	6.90	7.29	7.44	7.61	7.71	7.31
CARB+PRO	7.82	7.39	7.61	8.03	7.95	7.77
Mean	7.36	7.49	7.48	7.53	7.63	7.48

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

EYE INOC	FUNGCIDE* EYE INOC	
0.230	0.460	min.rep
0.199	0.399	max-min

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

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

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	24	0.460	6.2

GRAIN MEAN DM% 86.2

SUB PLOT AREA HARVESTED 0.00137

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93/R/CS/309 and 93/W/CS/309

LONG-TERM STRAW INCORPORATION

Object: To study the effects of mixing and depths of incorporation of straw on straw decomposition, soil nitrogen content, soil physical condition, pests, diseases and on the establishment, growth and yield of w. wheat - Rothamsted (R) Great Knott III and Woburn (W) Far Field I.

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

Associate sponsor: D.S. Powlson.

The ninth year, w. wheat.

For previous years see 85-92/R&W/CS/309.

Design: 4 randomised blocks of 12 plots (R).
2 randomised blocks of 12 plots (W).

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

Treatments, applied cumulatively in successive years: All combinations of:-

1. **STRAW** Treatments to straw from previous wheat:

BURNT	Burnt
CHOPPED	Chopped and spread (duplicated)

2. **CULTIVTN** Cultivations:

TINE 10	Cultivated to 10 cm depth
TN10PL20	Cultivated to 10 cm depth, ploughed to 20 cm
TN10TN20	Cultivated to 10 cm depth and again to 20 cm
PLOUGH20	Ploughed to 20 cm depth

NOTE: In 1993 treatments were applied to straw from previous w. rape.

Experimental diary:
Great Knott III (R):

24-Jul-92	**T**	**STRAW** BURNT: Straw baled and removed.
	T	**STRAW** CHOPPED: Straw chopped and spread.
18-Aug-92	B	Gramoxone 100 at 2.0 l with Farmon Blue at 0.10 l in 200 l.
12-Oct-92	**T**	**CULTIVTN** TN10TN20: Heavy spring-tine cultivated to 10 cm and chisel ploughed to 20 cm.
	T	**CULTIVTN** TN10PL20: Heavy spring-tine cultivated to 10 cm and ploughed to 20 cm.
	T	**CULTIVTN** TINE 10: Heavy spring-tine cultivated to 10cm.
	T	**CULTIVTN** PLOUGH20: Ploughed to 20 cm.
16-Oct-92	B	Rotary harrowed, Soissons, dressed Cerevax, drilled at 400 seeds per square metre.

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93/R/CS/309 and 93/W/CS/309

Experimental diary:

Great Knott III (R):

22-Oct-92 : B : Draza at 5.5 kg.
13-Nov-92 : B : Avadex BW Granular at 22.5 kg.
24-Nov-92 : B : Draza at 5.5 kg.
24-Feb-93 : B : Panther at 2.0 l in 200 l.
08-Mar-93 : B : 34.5% N at 120 kg.
15-Apr-93 : B : Halo at 2.0 l and Tripart Brevis at 2.25 l in 200 l.
16-Apr-93 : B : 34.5% N at 460 kg.
22-Jun-93 : B : Corbel at 0.50 l and Radar at 0.50 l in 200 l.
19-Aug-93 : B : Combine harvested.

Far Field I (W):

27-Jul-92 : **T** : **STRAW** CHOPPED: Straw chopped and spread.
28-Jul-92 : **T** : **STRAW** BURNT: Straw baled and removed.
11-Aug-92 : B : Stubble topped, subsoiled to 45 cm with tines 1.5 m apart.
29-Sep-92 : B : Roundup at 4.0 l in 200 l.
05-Oct-92 : **T** : **CULTIVTN** TINE 10: Heavy spring-tine cultivated to 10 cm.
: **T** : **CULTIVTN** TN10TN20: Heavy spring-tine cultivated to 10 cm, deep-tine cultivated to 20 cm
07-Oct-92 : **T** : **CULTIVTN** TINE 10, TN10TN20: Disced twice to 10cm.
: **T** : **CULTIVTN** PLOUGH20: Ploughed to 20 cm.
09-Oct-92 : B : Rotary harrowed, Soissons, dressed Cerevax, drilled at 350 seeds per square metre.
: B : Avadex BW at 4.2 l in 200 l.
12-Oct-92 : B : Pre-Empt at 5.0 l and Scythe at 3.0 l in 200 l.
16-Oct-92 : B : Draza at 5.5 kg.
16-Mar-93 : B : 34.5% N at 120 kg.
15-Apr-93 : B : Starane 2 at 1.0 l with New 5C Cycocel at 2.5 l in 200 l.
30-Apr-93 : B : 34.5% N at 460 kg.
18-May-93 : B : Halo at 2.0 l and Mistral at 0.25 l in 200 l.
22-Jun-93 : B : Ashlade Mancozeb FL at 3.0 l and Corbel at 0.5 l in 200 l.
14-Aug-93 : B : Combine harvested.

NOTES: (1) At Rothamsted and Woburn on the **STRAW** BURNT plots previous w. rape straw proved difficult to burn and was subsequently removed.

(2) Because of excessive weeds the yield from one plot at Rothamsted was lost with treatment **STRAW** CHOPPED, **CULTIVTN** TINE 10. An estimated value was used in the analysis. Plot cut 17-May-93 and cuttings removed; topped 17-June-93 and roundup at 5.0 l in 200 l applied 02-Jul-93.

(3) Establishment counts were made in autumn and shoot numbers and total dry matter were measured in spring. Components of yield were measured and numbers of volunteer ears counted. Fungal diseases were measured at intervals during the season.

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

GRAIN TONNES/HECTARE

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

CULTIVTN	TINE 10	TN10PL20	TN10TN20	PLOUGH20	Mean
STRAW					
BURNT	9.54	9.65	10.04	9.64	9.72
CHOPPED	9.26	8.82	8.88	8.62	8.90
Mean	9.35	9.09	9.27	8.96	9.17

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

STRAW	CULTIVTN	STRAW CULTIVTN	
		0.918	min.rep
0.398	0.530	0.795	max-min
		0.649	max.rep

STRAW

min.rep BURNT only
max-min BURNT v CHOPPED
max.rep CHOPPED only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	36	1.298	14.2

GRAIN MEAN DM% 86.4

PLOT AREA HARVESTED 0.00588

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

GRAIN TONNES/HECTARE

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

CULTIVTN STRAW	TINE 10	TN10PL20	TN10TN20	PLOUGH20	Mean
BURNT	7.80	8.32	8.98	8.61	8.43
CHOPPED	5.82	8.96	5.67	8.98	7.36
Mean	6.48	8.75	6.77	8.85	7.71

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

STRAW	CULTIVTN	STRAW CULTIVTN	
		1.335	min.rep
0.578	0.771	1.156	max-min
		0.944	max.rep

STRAW

min.rep BURNT only
max-min BURNT v CHOPPED
max.rep CHOPPED only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	1.335	17.3

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00636

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93/R/CS/311

EFFECTS OF SHALLOW STRAW INCORPORATION

Object: To study the effects of shallow straw incorporation on pests and diseases and on the establishment, growth and yield of winter wheat - West Barnfield I.

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

The ninth year, s. wheat.

For previous years see 85-92/R/CS/311.

Design: Single replicate of 3 x 2 x 2 x 2 x 2.

Whole plot dimensions: 9.0 x 57.0.

Treatments: Combinations of:-

Whole plots

1. **STRAW**		Treatments to straw of previous wheat:
	BURNT	Burnt
	BALED	Baled and removed
	CHOPPED	Chopped
2. **CULTTIME[92]**		Residual effect of time of cultivation, to 10 cm depth:
	(EARLY)	As soon as possible after harvest
	(LATER)	At least 14 days after EARLY

Sub plots

3. **FUNGCIDE[92]**		Residual effect of fungicides:
	(0)	None
	(FULL)	Full programme:- Triadimefon and carbendazim in winter, prochloraz in spring plus propiconazole alone and with chlorothalonil in summer
4. **INSCTCDE[92]**		Residual effect of insecticides:
	(0)	None
	(CYP+PR)	Cypermethrin in autumn and pirimicarb in summer
5. **MOLLCIDE[92]**		Residual effect of molluscicide:
	(0)	None
	(METHCB)	Methiocarb after drilling

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93/R/CS/311

Experimental Diary:

18-Aug-92	: **T** :	**STRAW** BALED: Straw baled and removed.
	: **T** :	**STRAW** BURNT: Straw burnt and ash incorporated with discs.
	: **T** :	**STRAW** CHOPPED: Straw chopped with trailed straw chopper.
13-Oct-92	: B :	Gramoxone 100 at 2.0 l with Vassgro Spreader at 0.10 l in 200 l.
09-Mar-93	: B :	Cultivated by rotary grubber to 10 cm, spring-tine cultivated.
10-Mar-93	: B :	Rotary harrowed, Canon, dressed Cerevax, drilled at 400 seeds per square metre.
12-Mar-93	: B :	Rolled.
23-Apr-93	: B :	34.5% N at 290 kg.
18-May-93	: B :	Ally at 30 g and Starane 2 at 1.0 l in 200 l.
25-Aug-93	: B :	Combine harvested.

NOTES: (1) Owing to prolonged wet weather in the autumn winter wheat was not sown and was replaced by spring wheat.
(2) Foot and root rots were measured in July. Fertile ears were counted in June and thousand grain weights were measured at harvest.

GRAIN TONNES/HECTARE

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

CULTTIME[92]	(EARLY)	(LATER)	Mean
STRAW			
BURNT	6.47	6.58	6.53
BALED	6.02	6.38	6.20
CHOPPED	5.73	6.22	5.97
Mean	6.07	6.40	6.23

FUNGCIDE[92]	(0)	(FULL)	Mean
STRAW			
BURNT	6.37	6.69	6.53
BALED	5.97	6.43	6.20
CHOPPED	5.90	6.04	5.97
Mean	6.08	6.39	6.23

FUNGCIDE[92]	(0)	(FULL)	Mean
CULTTIME[92]			
(EARLY)	5.87	6.27	6.07
(LATER)	6.29	6.50	6.40
Mean	6.08	6.39	6.23

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93/R/CS/311

GRAIN TONNES/HECTARE

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

INSCTCDE[92]	(O)	(CYP+PR)	Mean
STRAW			
BURNT	6.54	6.51	6.53
BALED	6.10	6.30	6.20
CHOPPED	5.96	5.98	5.97
Mean	6.20	6.27	6.23

INSCTCDE[92]	(O)	(CYP+PR)	Mean
CULTTIME[92]			
(EARLY)	6.06	6.08	6.07
(LATER)	6.35	6.45	6.40
Mean	6.20	6.27	6.23

INSCTCDE[92]	(O)	(CYP+PR)	Mean
FUNGCIDE[92]			
(O)	6.00	6.16	6.08
(FULL)	6.40	6.37	6.39
Mean	6.20	6.27	6.23

MOLLCIDE[92]	(O)	(METHCB)	Mean
STRAW			
BURNT	6.50	6.56	6.53
BALED	6.36	6.04	6.20
CHOPPED	5.90	6.05	5.97
Mean	6.25	6.22	6.23

MOLLCIDE[92]	(O)	(METHCB)	Mean
CULTTIME[92]			
(EARLY)	6.08	6.07	6.07
(LATER)	6.43	6.37	6.40
Mean	6.25	6.22	6.23

MOLLCIDE[92]	(O)	(METHCB)	Mean
FUNGCIDE[92]			
(O)	6.04	6.13	6.08
(FULL)	6.47	6.31	6.39
Mean	6.25	6.22	6.23

MOLLCIDE[92]	(O)	(METHCB)	Mean
INSCTCDE[92]			
(O)	6.26	6.15	6.20
(CYP+PR)	6.25	6.28	6.27
Mean	6.25	6.22	6.23

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93/R/CS/311

GRAIN TONNES/HECTARE

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

FUNGCIDE[92]	INSCTCDE[92]	MOLLCIDE[92]	STRAW* FUNGCIDE[92]
0.077	0.077	0.077	0.134

CULTTIME[92]* FUNGCIDE[92]	STRAW* INSCTCDE[92]	CULTTIME[92]* INSCTCDE[92]	FUNGCIDE[92] INSCTCDE[92]
0.109	0.134	0.109	0.109

STRAW* MOLLCIDE[92]	CULTTIME[92]* MOLLCIDE[92]	FUNGCIDE[92] MOLLCIDE[92]	INSCTCDE[92] MOLLCIDE[92]
0.134	0.109	0.109	0.109

* Within the same level of **STRAW**, **CULTTIME[92]** or **STRAW.CULTTIME[92]** only

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

Stratum	d.f.	s.e.	cv%
WP.SP	27	0.268	4.3

GRAIN MEAN DM% 83.5

SUB PLOT AREA HARVESTED 0.00276

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93/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 cereal sequences - West Barnfield II.

Sponsors: R.J. Gutteridge, D. Hornby, R.D. Prew.

The sixth year, w. barley, w. oats, w. triticale, w. wheat.

For previous years see 88-92/R/CS/323

Design: 3 randomised blocks of 26 plots.

Whole plot dimensions: 3.0 x 10.0.

CROPSEQ Crop sequences (1988, 1989, 1990, 1991, 1992 and 1993 respectively):

TTTTTT
OTTTOT
TOTTTO
TTOTTT
TTTOTT
WWWWWW
OWWWOW
WOWWWO
WWOWWW
WWWOWW
BBBBBB
OBBBOB
BOBBBO
BBOBBB
BBBOBB
WTWTWT
WBWBWB
TBTBTB
SBSBSB
WWTTTW
WWBBBW
TTBBBT
TTWWWT
BBWWWB
BBTTTB
WWSSSW

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

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93/R/CS/323

Experimental Diary:

05-Sep-92	B		Scythe at 3.0 l in 200 l.
09-Sep-92	B		Ploughed, to finish.
16-Sep-92	B		Disced and rolled.
21-Sep-92	B		PK as (0:18:36) at 300 kg..
28-Sep-92	B		Sting CT at 2.0 l in 200 l.
01-Oct-92	B		Re-ploughed.
06-Oct-92	T		**CROPSEQ** Barley plots: Rotary harrowed, Magie, dressed Cerevax, drilled at 350 seeds per square metre.
	T		**CROPSEQ** Oat plots: Rotary harrowed, Image, dressed Ceresol, drilled at 350 seeds per square metre.
	T		**CROPSEQ** Triticale plots: Rotary harrowed, Lasko, dressed Cerevax, drilled at 400 seeds per square metre.
	T		**CROPSEQ** Wheat plots: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
04-Mar-93	B		34.5%N at 90 kg.
15-Mar-93	T		**CROPSEQ** Barley plots: Tigress at 2.5 l in 200 l.
15-Apr-93	T		**CROPSEQ** Oats and triticale plots: 34.5% N at 368 kg.
	T		**CROPSEQ** Barley plots: 34.5% N at 435 kg.
	T		**CROPSEQ** Wheat plots: 34.5% N at 493 kg.
	T		**CROPSEQ** Wheat plots: Cheetah R at 2.0 l in 220 l.
	T		**CROPSEQ** Triticale plots: Hoegrass at 3.0 l in 220 l.
21-Apr-93	B		Ally at 30 g and Starane 2 at 1.0 l in 200 l.
18-May-93	B		Calirus at 2.0 l and Corbel at 0.50 l in 200 l.
08-Jun-93	T		**CROPSEQ** Wheat plots: Halo at 2.0 l and Mistral at 0.50 l in 200 l.
09-Jun-93	T		**CROPSEQ** Oat plots: Mistral at 1.0 l in 200 l.
02-Aug-93	T		**CROPSEQ** Barley plots: Combine harvested.
10-Aug-93	B		**CROPSEQ** Wheat, oats, triticale plots: Combine harvested.

NOTE: Plant samples were taken in April, June and July for take-all and eyespot assessments. Soil cores were taken after harvest to assess take-all infectivity.

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93/R/CS/323

GRAIN TONNES/HECTARE

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

CROPSEQ	
TTTTTT	5.39
OTTTOT	5.77
TOTTTO	7.30
TTOTTT	4.99
TTTOTT	5.42
WWWWWW	5.90
OWWWOW	8.16
WOWWWO	6.60
WWOWWW	5.96
WWWOWW	7.78
BBBBBB	4.21
OBBBOB	6.63
BOBBBO	5.97
BBOBBB	4.02
BBBOBB	5.58
WTWTWT	5.18
WBWBWB	5.76
TBTBTB	5.38
SBSBSB	4.82
WWTTTW	6.25
WWBBBW	6.07
TTBBBT	4.26
TTWWWT	3.92
BBWWWB	5.76
BBTTTB	5.78
WWSSSW	5.91
Mean	5.72

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

CROPSEQ
0.661

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	50	0.810	14.2

GRAIN MEAN DM% 83.7

PLOT AREA HARVESTED 0.00228

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93/R/CS/326 and 93/W/CS/326

AMOUNTS OF STRAW

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

Sponsors: R.D. Prew, D.G. Christian, J.F. Jenkyn, E.T.G. Bacon.

The seventh year, w. wheat.

For previous years see 87-92/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 (rape straw in autumn 1992) incorporated into seedbed (t per ha 85% DM), cumulative to previous annual dressings:

		R	W
NONE	None	-	-
NORMAL	Normal	2.7	2.7
2 NORMAL	Twice normal	5.4	5.4
4 NORMAL	Four times normal	10.8	10.8

Experimental diary:

Great Knott III (R)

06-Aug-92 : **T** : **STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied.
07-Aug-92 : B : Straw and stubble chopped..
18-Aug-92 : B : Gramoxone 100 at 2.0 l with Farmon Blue at 0.1 l in 200 l.
14-Oct-92 : B : Ploughed.
16-Oct-92 : B : Rotary harrowed, Soissons, dressed Cerevax, drilled at 400 seeds per square metre.
22-Oct-92 : B : Draza at 5.5 kg.
13-Nov-92 : B : Avadex BW Granular at 22.5 kg.
24-Nov-92 : B : Draza at 5.5 kg.
24-Feb-93 : B : Panther at 2.0 l in 200 l.
08-Mar-93 : B : 34.5% N at 120 kg.
15-Apr-93 : B : Halo at 2.0 l with Tripart Brevis at 2.2 l in 200 l.
16-Apr-93 : B : 34.5% N at 460 kg.
22-Jun-93 : B : Corbel at 0.50 l and Radar at 0.50 l in 200 l.
19-Aug-93 : B : Combine harvested.

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93/R/CS/326 and 93/W/CS/326

Experimental diary:

Far Field I (W)

10-Aug-92	: **T**	:	**STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied.
	: B	:	Straw and stubble chopped.
11-Aug-92	: B	:	Subsoiled to 45 cm with tines 1.5 m apart.
29-Sep-92	: B	:	Roundup at 4.0 l in 200 l.
05-Oct-92	: B	:	Heavy spring-tine cultivated to 20 cm.
07-Oct-92	: B	:	Disced twice to 10 cm.
09-Oct-92	: B	:	Rotary harrowed, Soissons, dressed Cerevax, drilled at 350 seeds per square metre.
	: B	:	Avadex BW Granular at 4.2 l in 200 l.
12-Oct-92	: B	:	Pre-Empt at 5.0 l with Scythe at 3.0 l in 200 l.
16-Oct-92	: B	:	Draza at 5.5 kg.
16-Mar-93	: B	:	34.5% N at 120 kg.
15-Apr-93	: B	:	Starane 2 at 1.0 l with New 5C Cycocel at 2.5 l in 200 l.
30-Apr-93	: B	:	34.5% N at 460 kg.
18-May-93	: B	:	Halo at 2.0 l and Mistral at 0.25 l in 200 l.
22-Jun-93	: B	:	Ashlade Mancozeb FL at 3.0 l and Corbel at 0.50 l in 200 l.
14-Aug-93	: B	:	Combine harvested.

NOTES: (1) Establishment counts were made in autumn. Shoot numbers and dry weights in spring, fertile ear numbers at anthesis and harvest index were measured.

(2) Foot and root rots were assessed in summer.

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

GRAIN TONNES/HECTARE

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

	STRAW
NONE	10.01
NORMAL	9.94
2 NORMAL	10.09
4 NORMAL	10.20
Mean	10.06

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

STRAW
0.186

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.263	2.6

GRAIN MEAN DM% 84.8

PLOT AREA HARVESTED 0.00306

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

GRAIN TONNES/HECTARE

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

	STRAW
NONE	8.99
NORMAL	8.46
2 NORMAL	8.36
4 NORMAL	8.65
Mean	8.61

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

STRAW
0.685

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.839	9.7

GRAIN MEAN DM% 82.7

PLOT AREA HARVESTED 0.00316

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93/R/CS/331

TAKE-ALL INOCULATION

Object: To compare a range of methods of artificially inoculating take-all (*Gaeumannomyces graminis*) and seed treatments and to relate amounts of disease established to the yield and grain quality of w. wheat - Great Harpenden I.

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

The fifth year, w. wheat, w.oats.

For previous years see 89-92/R/CS/331

Design: 4 randomised blocks of 9 plots.

Whole plot dimensions: 3.0 x 22.0.

Treatments:

INOC+SDT	Methods of inoculating take-all to w. wheat in the first year (1989), none since, plus levels of seed treatment to control take-all:
NONE O W	None (w. oats 1993, alternating with w. wheat)
NONE W O	None (w. wheat 1993, alternating with w. oats)
NONE W W	None (continuous w. wheat)
I PRE PL	Infective inoculum applied to soil surface pre-ploughing
I PRE SO	Infective inoculum applied by fertilizer drill to 10 cm depth before rotary harrowing and sowing wheat
I CD	Infective inoculum drilled with the seed
SEEDTR 0	No seed treatment
SEEDTR 1	Seed treatment at 100 g a.i.
SEEDTR 2	Seed treatment at 150 g a.i.

NOTE: Experimental seed treatment was applied at a.i. rates per 100 kg w. wheat seed drilled.

Experimental diary:

21-Sep-92 : B : Ploughed and furrow pressed.
07-Oct-92 : B : Heavy spring-tine cultivated.
08-Oct-92 : **T** : **INOC+SDT**: SEEDTR 0, SEEDTR 1, SEEDTR 2: Rotary harrowed, Riband drilled at 380 seeds per square metre.
: **T** : **INOC+SDT** NONE O W: Rotary harrowed, Image, dressed Ceresol, drilled at 350 seeds per square metre.
: **T** : **INOC+SDT** NONE W O, NONE W W, I PRE PL, I PRE SO, I CD: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
05-Mar-93 : B : 34.5% N at 120 kg.
12-Mar-93 : B : Hytane 500 FW at 3.0 l and Stomp 400 at 2.5 l in 200 l.
16-Apr-93 : B : 34.5% N at 460 kg.
30-Apr-93 : B : Cheetah R at 2.5 l and Starane 2 at 1.0 l in 200 l.
04-Jun-93 : B : Mistral at 0.50 l in 200 l.
18-Aug-93 : B : Combine harvested.

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93/R/CS/331

NOTE: Plant samples were taken on five occasions from March to July for take-all assessment. Soil cores were taken after harvest to assess take-all infectivity.

GRAIN TONNES/HECTARE

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

INOC+SDT	
NONE W O	7.92
NONE W W	7.37
I PRE PL	7.53
I PRE SO	7.62
I CD	7.06
SEEDTR 0	8.93
SEEDTR 1	9.30
SEEDTR 2	9.52
Mean	8.15

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

INOC+SDT
0.264

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	21	0.374	4.6

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00501

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93/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: R.D. Prew, E.T.G. Bacon, M.V. Hewitt, D.P. Yeoman.

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

Whole plot dimensions: 6.5 x 26.0.

The fourth year, ryegrass, clover, tumbledown, w. and s. wheat.

For previous years see 90-92/W/CS/347.

Treatments:

Treatment phase

Whole plots

CROPS	Crops, cumulative since 1990:
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	W. wheat, in arable sequence w. wheat, w. wheat, w. oats, w. wheat

Test phase (1st year w. and s. wheat):

Whole plots (criss-cross)

1. **PREVCROP** Crops, cumulative 1990 to 1992 (as **CROPS**):

   RY LF
   RY+CL LF
   RY+CL RE
   RY+N RE
   TU LF
   ARABLE

2. **N** Nitrogen in spring:

NO	None
N OPT	Optimum

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93/W/CS/347

split

3. **WHEAT** Time of ploughing and drilling:

W	Winter
S	Spring

NOTES: (1) In 1993 three blocks were sown to winter- or spring-sown wheat and split to test for nitrogen. Remaining three blocks continued in treatment crops.
(2) Yields were taken from the w. and s. wheat and from the ley plots, from which cuttings were removed.
(3) Ryegrass and clover were sown in autumn 1989.

Experimental diary:

Treatment phase:

14-Oct-92 : **T** : **CROPS** ARABLE: Ploughed, rotary harrowed twice.
05-Nov-92 : **T** : **CROPS** ARABLE: Mercia, dressed Cerevax, broadcast by hand at 500 seeds per square metre.
05-Mar-93 : **T** : **CROPS** ARABLE: Rotary cultivated (w. wheat failed).
: **T** : **CROPS** RY LF, RY+CL LF, RY+CL RE, RY+N RE: Chain harrowed.
08-Mar-93 : **T** : **CROPS** ARABLE: Rotary harrowed, Cadenza, dressed Cerevax Extra, drilled at 500 seeds per square metre.
10-Mar-93 : **T** : **CROPS** ARABLE: Rolled.
18-Mar-93 : **T** : **CROPS** RY+N RE: 27% N applied at 370 kg.
: **T** : **CROPS** ARABLE: 27% N applied at 148 kg.
19-Mar-93 : **T** : **CROPS** RY+CL RE: Triple superphosphate at 75 kg and muriate of potash at 282 kg.
: **T** : **CROPS** RY+N RE: Triple superphosphate at 79 kg and muriate of potash at 317 kg.
14-Apr-93 : **T** : **CROPS** ARABLE: 34.5% N at 464 kg.
26-May-93 : **T** : **CROPS** RY LF, RY+L LF, RY+CL RE, RY+N RE, TU LF: Cut.
02-Jun-93 : **T** : **CROPS** RY+CL RE, RY+N RE: Cuttings removed.
30-Jun-93 : **T** : **CROPS** RY LF, RY+CL LF, RY+CL RE, RY+N RE, TU LF: Cut.
01-Jul-93 : **T** : **CROPS** RY+CL RE, RY+N RE: Cuttings removed.
27-Aug-93 : **T** : **CROPS** ARABLE: Combine harvested.
22-Sep-93 : **T** : **CROPS** RY LF, RY+CL LF, TU LF: Cut.
: **T** : **CROPS** RY+CL RE, RY+N RE: Cut and removed.

Test Phase:

17-Sep-92 : **T** : **WHEAT** W: Ploughed.
14-Oct-92 : **T** : **WHEAT** W: Rotary harrowed twice.
16-Oct-92 : **T** : **WHEAT** W: Cadenza, dressed Cerevax Extra, drilled at 400 seeds per square metre.
17-Oct-92 : **T** : **WHEAT** W: Club at 5.5 kg.
05-Mar-93 : **T** : **WHEAT** S: Ploughed.
08-Mar-93 : **T** : **WHEAT** S: Rotary harrowed, Cadenza, dressed Cerevax Extra, drilled at 500 seeds per square metre, harrowed.
10-Mar-93 : **T** : **WHEAT** W, S: Rolled.
17-Mar-93 : **T** : **WHEAT** W, S: N OPT: 27% N broadcast by hand at 148 kg.
29-Mar-93 : **T** : **WHEAT** S: **N** N OPT: **PREVCROP**: RY LF, RY+CL LF, RY+CL RE, RY+N RE, TU LF, ARABLE: 27% N broadcast by hand at 389, 222, 352, 444, 444, 333 kg respectively.

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93/W/CS/347

Experimental diary:
Test Phase:
14-Apr-93 : **T** : **WHEAT** W: **N** N OPT: **PREVCROP:** RY LF, RY+CL LF, RY+CL RE, RY+N RE, TU LF, ARABLE: 27% N broadcast by hand at 537, 370, 500, 593, 593, 481 kg respectively.
18-May-93 : **T** : **WHEAT** W: Cheetah R at 3.0 l, Halo at 2.0 l and Mistral at 0.25 l in 200 l.
27-Aug-93 : **T** : **WHEAT** W, S: Combine harvested.

NOTES: (1) Soil nitrogen was measured in autumn 1992 and spring 1993. Ground cover, plant numbers, plant height and growth stages were estimated in spring and autumn 1993.
(2) Samples were taken in spring and summer to assess foot and root rots.

TREATMENT PHASE

GRASS

1ST CUT (26/5/93) DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	3.24	4.09	3.67

1ST CUT MEAN DM% 19.2

2ND CUT (30/6/93) DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	1.30	0.46	0.88

2ND CUT MEAN DM% 26.7

3RD CUT (22/9/93) DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	2.65	1.03	1.84

3RD CUT MEAN DM% 20.9

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93/W/CS/347

GRASS

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	7.19	5.58	6.39

TOTAL OF 3 CUTS MEAN DM% 22.3

PLOT AREA HARVESTED 0.00264

W. WHEAT

GRAIN TONNES/HECTARE 6.36

GRAIN MEAN DM% 83.1

PLOT AREA HARVESTED 0.00572

TEST PHASE

GRAIN TONNES/HECTARE

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

N	NO	N OPT	Mean
PREVCROP			
RY LF	2.05	4.32	3.18
RY+CL LF	3.48	5.48	4.48
RY+CL RE	3.41	6.02	4.72
RY+N RE	2.54	5.62	4.08
TU LF	2.38	5.74	4.06
ARABLE	2.73	3.54	3.14
Mean	2.77	5.12	3.94

WHEAT	W	S	Mean
PREVCROP			
RY LF	3.81	2.56	3.18
RY+CL LF	4.69	4.28	4.48
RY+CL RE	5.51	3.93	4.72
RY+N RE	4.29	3.87	4.08
TU LF	4.30	3.82	4.06
ARABLE	3.45	2.83	3.14
Mean	4.34	3.55	3.94

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GRAIN TONNES/HECTARE

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

WHEAT / N	W	S	Mean
NO	2.52	3.01	2.77
N OPT	6.16	4.08	5.12
Mean	4.34	3.55	3.94

	WHEAT	W		S	
PREVCROP	N	NO	N OPT	NO	N OPT
RY LF		2.01	5.61	2.08	3.03
RY+CL LF		2.92	6.45	4.04	4.51
RY+CL RE		3.64	7.38	3.19	4.67
RY+N RE		1.99	6.58	3.08	4.65
TU LF		2.13	6.47	2.62	5.01
ARABLE		2.44	4.45	3.03	2.62

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

	PREVCROP	WHEAT	PREVCROP WHEAT
	0.564	0.144	0.617
Except when comparing means with the same level(s) of PREVCROP			0.353

	PREVCROP* N	WHEAT* N	PREVCROP* WHEAT N
	0.743	0.188	0.811
Except when comparing means with the same level(s) of PREVCROP	0.740		0.820
WHEAT		0.415	
PREVCROP.WHEAT			0.797
PREVCROP.N			0.461

* Within the same level of **N** only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	10	0.691	17.5
BLOCK.WP1.SP	12	0.432	11.0
BLOCK.WP1.WP2	10	0.837	21.2
BLOCK.WP1.SP.WP2	12	0.513	13.0

GRAIN MEAN DM% 83.2

SUB PLOT AREA HARVESTED 0.00220

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93/R/CS/354

SOWING DATES AND TAKE-ALL

Object: To study the effects of sequences of sowing dates and volunteers on take-all (*Gaeumannomyces graminis*) and yield of winter wheat - Little Knott I.

Sponsors: R.J. Gutteridge, D. Hornby.

The third year, w. wheat.

For previous years see 91-92/R/CS/354

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

SOW SEQ	Sequences of sowing date in 1991, 1992 and 1993 and level of volunteers in 1992 and 1993:
E E E	Early in 1991, 1992 and 1993
E L L	Early in 1991, late in 1992 and 1993
E L+ L+	Early in 1991, late in 1992 and 1993, volunteers encouraged in second and third years
L E E	Late in 1991, early in 1992 and 1993
L L* L*	Late in 1991, 1992 and 1993, volunteers controlled in second and third years

NOTE: On E L+ L+ volunteers simulated by sowing 50 kg wheat seed after cultivations on 15 Sept.

Experimental diary:

02-Sep-92 : B : Ploughed and furrow pressed.
15-Sep-92 : B : Rotary harrowed.
: **T** : **SOW SEQ** E E E, L E E: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
14-Oct-92 : **T** : **SOW SEQ** L L* L*: Rotary harrowed to control volunteers.
: **T** : **SOW SEQ:** E L L, E L+ L+, L L* L*: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
11-Mar-93 : B : Hytane 500 FW at 3.0 l and Stomp 400 at 2.5 l in 200 l.
15-Mar-93 : B : PK as (0:18:36) at 1250 kg.
20-Apr-93 : B : 34.5% N at 460 kg.
03-Jun-93 : B : Cheetah R at 2.5 l and Calixin at 0.70 l in 200 l.
08-Jun-93 : B : Halo at 2.0 l in 200 l.
17-Aug-93 : B : Combine harvested.

NOTE: Plant samples were taken in April and July for take-all assessment. Soil cores were taken after harvest to assess take-all infectivity.

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93/R/CS/354

GRAIN TONNES/HECTARE

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

SOW SEQ	E E E	E L L	E L+ L+	L E E	L L* L*	Mean
	7.93	7.54	7.05	7.49	7.75	7.55

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

SOW SEQ
0.335

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.474	6.3

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00228

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93/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 third year, w. wheat.

For previous years see 91-92/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:

15-Sep-92	B		Ploughed.
17-Sep-92	B		Disced.
17-Oct-92	B		Heavy spring-tine cultivated twice.
19-Oct-92	B		Rotary harrowed twice, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
20-Mar-93	B		Ally at 30 g and Cheetah R at 2.0 l in 200 l.
19-Apr-93	T		**N** 50: 34.5% N at 145 kg.
	T		**N** 100: 34.5% N at 290 kg.
	T		**N** 150: 34.5% N at 435 kg.
	T		**N** 200: 34.5% N at 580 kg.
	T		**N** 250: 34.5% N at 725 kg.
	T		**N** 300: 34.5% N at 870 kg.
28-May-93	B		Starane 2 at 0.75 l and Halo at 2.0 l in 200 l.
20-Aug-93	B		Combine harvested.

NOTES: Samples were taken before harvest to measure straw and stubble yields. Grain, straw and stubble samples were taken for chemical analysis.

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93/R/CS/355

GRAIN TONNES/HECTARE

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

N	
0	2.71
50	4.39
100	5.92
150	6.94
200	7.14
250	7.18
300	7.03
Mean	5.90

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

N
0.286

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.351	5.9

GRAIN MEAN DM% 87.7

PLOT AREA HARVESTED 0.00483

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93/W/CS/356

SET-ASIDE STUDY

Object: To compare different treatments of land temporarily withdrawn from arable cropping and to study their effects on nitrate leaching and on subsequent wheat crops - Woburn, Horsepool Lane Close I.

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

Associate sponsors: D.L.O. Smith, I. Shield.

The third year, w. wheat.

For previous years see 91-92/W/CS/356.

Design: 3 randomised blocks of 7 plots split into 8 sub plots.

Whole plot dimensions: 10.0 x 24.0.

Treatments: All combinations of:-

Whole plots

1. **LAND TRT[91]** Land treatment in 1991, after w. wheat 1990 (all treatments ploughed autumn 1991 before two w. wheat test crops):

(CA WW)	Cultivated in autumn, sown to w. wheat
(CA RA)	Cultivated in autumn, sown to ryegrass in autumn, topped in spring
(SA CA FA)	Straw chopped and spread in autumn, cultivated in autumn, sown to forage rape in autumn, topped in spring
(CA CS)	Cultivated in autumn, cultivated in spring
(SA CS)	Straw chopped and spread in autumn, cultivated in spring
(WT)	Weeds topped
(WT CS TS)	Weeds topped, cultivated in spring, trefoil sown in spring, topped

Sub plots

2. **N RES** Nitrogen fertilizer (kg N) applied spring 1992:

(0)
(80)
(120)
(160)
(200)
(240)
(280)

NOTE: An additional fallow sub plot was present, systematically arranged on one side of each whole plot.

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93/W/CS/356

Experimental diary:

W. wheat:

29-Sep-92 : B : Roundup at 4.0 l in 200 l.
08-Oct-92 : B : Ploughed.
13-Oct-92 : B : Rotary harrowed.
14-Oct-92 : B : Rotary harrowed, Mercia dressed Cerevax, drilled at 380 seeds per square metre.
26-Mar-93 : B : 34.5% N at 120 kg.
15-Apr-93 : B : Ally at 30 g and New 5C Cycocel at 2.5 l in 200 l.
06-May-93 : B : 34.5% N at 460 kg.
18-May-93 : B : Cheetah R at 3.0 l, Halo at 2.0 l and Mistral at 0.25 l in 200 l.
22-Jun-93 : B : Dorin at 1.0 l in 200 l.
02-Jul-93 : B : Starane 2 at 1.0 l in 300 l.
18-Aug-93 : B : Combine harvested.

Fallow:

29-Sep-92 : B : Roundup at 4.0 l in 200 l.
08-Oct-92 : B : Ploughed.
02-Apr-93 : B : Rotary cultivated.
08-Jul-93 : B : Rotary cultivated.

NOTE: Plant counts were made in winter and summer. Foliar diseases and foot and root rots were assesed.

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93/W/CS/356

GRAIN TONNES/HECTARE

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

N RES	(0)	(80)	(120)	(160)	(200)	(240)	(280)	Mean
LAND TRT[91]								
(CA WW)	4.49	5.06	5.44	5.30	5.30	4.76	4.73	5.01
(CA RA)	6.17	5.49	6.06	5.47	4.66	5.08	5.17	5.44
(SA CA FA)	5.74	6.31	7.54	6.80	7.47	7.11	7.46	6.92
(CA CS)	7.00	4.72	6.79	5.74	7.49	6.18	7.42	6.48
(SA CS)	4.08	4.30	5.01	4.48	3.71	4.37	5.45	4.48
(WT)	7.46	7.18	7.86	7.59	8.67	8.02	8.05	7.83
(WT CS TS)	4.82	7.27	7.45	6.12	5.39	6.45	5.36	6.12
Mean	5.68	5.76	6.59	5.93	6.10	6.00	6.23	6.04

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

LAND TRT[91]	N RES	LAND TRT[91] N RES
1.460	0.337	1.677

Except when comparing means with the same level(s) of
LAND TRT[91] 0.891

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	1.788	29.6
BLOCK.WP.SP	84	1.091	18.1

GRAIN MEAN DM% 86.6

SUB PLOT AREA HARVESTED 0.00199

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93/W/CS/375

TAKE-ALL EPIDEMICS

Object: To determine whether severe take-all (*Gaeumannomyces graminis*) can be caused by artificial inoculum in winter wheat and to determine the distribution of such infection within the crop - Woburn, Butt Close I.

Sponsors: G. L. Bateman, D. Hornby.

The second year, w. wheat

For previous year see 92/W/CS/375

Design: 3 randomised blocks of 6 x 2, plus 2 extra plots.

Whole plot dimensions: 2.5 x 6.0.

Treatments: All combinations of:-

1. **SOW DATE[92]** Date of sowing in autumn 1991:

(E)	Early
(L)	Late (4 weeks later)

2. **INOCULTN[92]** Weight (kg) of inoculated oat seed applied by combine drill in autumn 1991 and spring 1992:

	Autumn (E)	Autumn (L)	Spring
(0)	Nil	Nil	-
(1)	Nil	200	-
(2)	200	200	-
(3)	400	200	-
(30)	400	200	Nil
(3S)	400	200	500

plus 2 extra plots, systematically arranged with treatments 0 and 2.

NOTE: INOCULTN[92] (0), (1), (30): Nil occurs where empty drill was drawn across plots.

Experimental diary:

21-Sep-92 : B : Ploughed.
07-Oct-92 : B : Rotary harrowed, Mercia, undressed, drilled at 380 seeds per square metre.
15-Mar-93 : B : 34.5% N at 120 kg.
15-Apr-93 : B : Ally at 30 g and Deloxil at 1.0 l in 200 l.
29-Apr-93 : B : 34.5% N at 460 kg.
01-Jun-93 : B : Mistral at 0.50 l and Halo at 2.0 l in 200 l.
17-Aug-93 : B : Combine harvested.

NOTE: Plant samples were taken for take-all assessment in spring and summer.

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93/W/CS/375

GRAIN TONNES/HECTARE

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

INOCULTN	(0)	(1)	(2)	(3)	(30)	(3S)	Mean
SOW DATE							
(E)	2.97	2.61	3.41	3.21	4.11	3.69	3.33
(L)	4.33	3.95	4.24	3.40	4.30	4.68	4.15
Mean	3.65	3.28	3.83	3.30	4.20	4.19	3.74

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

SOW DATE	**INOCULTN**	**SOW DATE INOCULTN**
0.222	0.384	0.543

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	22	0.665	17.8

GRAIN MEAN DM% 86.3

PLOT AREA HARVESTED 0.00130

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93/R/CS/380

COVER CROPS AND 15N

Object: To assess how effectively cover crops take up nitrogen and to assess how much of that nitrogen is subsequently available to the following crop - Webbs.

Sponsors: P.R. Poulton, D.G. Christian, A.J. Macdonald.

The second year, w. barley.

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

Whole plot dimensions: 6.0 x 12.0.

Treatments: All combinations of:-

Whole plots

1. **LAND TRT[92]** Cover crops, tumbledown and fallow ploughed and sown to s. barley in 1992; w. barley in 1993:

FO RA SB	Forage rape
RYE SB	Rye
TUMDN SB	Tumbledown
FALLOWSB	Fallow

Sub plots

2. **N RES[92]** Nitrogen fertilizer (kg N) to s. barley in 1992:

(0)
(75)

plus one extra treatment

Whole plot

1. **EXTRA[92]**

W BARLEY	W. barley taken to maturity in 1992

Sub plot

2. **N EXTRA[92]** Nitrogen fertilizer (kg N) to w. barley in 1992:

(0)
(150)

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93/R/CS/380

Experimental diary:

```
   18-Aug-92 : B : Straw baled.
   16-Sep-92 : B : Ploughed, furrow pressed.
             : B : Scythe at 2.0 l with Farmon Blue at 0.20 l in 200 l.
   17-Sep-92 : B : Rotary harrowed, Puffin, dressed Cerevax, drilled at
                   380 seeds per square metre.
   15-Apr-93 : B : 34.5% N at 370 kg.
   10-May-93 : B : Ally at 30 g and Starane 2 at 1.0 l in 200 l.
   20-Jul-93 : B : Harvested by hand.
```

NOTES: (1) Plots were labelled with 15N in autumn 1991. Samples of soil, soil water and w. barley were taken to measure residual 15N.

(2) Yields were taken on **N RES[92]** (75) and **N EXTRA[92]** (150) plots only.

GRAIN TONNES/HECTARE

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

LAND TRT[92]	FO RA SB	RYE SB	TUMDN SB	FALLOWSB	Mean
	4.20	4.13	3.36	3.64	3.83

EXTRA[92] 5.05

GRAND MEAN 4.08

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

LAND TRT[92] **& EXTRA[92]**
0.718

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.879	21.6

GRAIN MEAN DM% 87.6

SUB PLOT AREA HARVESTED 0.00015

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93/W/CS/381

N UPTAKE AND COVER CROPS

Object: To assess how effectively cover crops take up nitrogen and to assess how much of that nitrogen is subsequently available to the following crop - Woburn, Road Piece.

Sponsor: D.G. Christian.

The second year, w. barley.

For previous year see 92/W/CS/381.

Design: 3 blocks of 5 plots plus a single replicate of 3 extra plots, split into 2.

Whole plot dimensions: 9.0 x 12.0.

Treatments: All combinations of:-

Whole plots

1. **LAND TRT[92]** Land treatments over winter, ploughed and conventionally drilled to linseed in spring 1992:

(FO RA LN)	Forage rape
(RYE LN)	Rye
(TUMDN LN)	Tumbledown plus w. barley
(FALLW LN)	Fallow
(STUBL LN)	Stubble

Sub plots

2. **N RES[92]** Nitrogen fertilizer (kg N) to linseed in spring 1992:

(0)
(75)

plus three extra unreplicated treatments, direct drilled to linseed in spring 1992 and split for N:

1. **EXTRA[92]**

(EX FR LN)	Forage rape
(EX RY LN)	Rye
(EX TD LN)	Tumbledown plus w. barley

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93/W/CS/381

Experimental diary:

06-Oct-92 : B : Ploughed.
12-Oct-92 : B : Rotary harrowed, Puffin, dressed Cerevax Extra, drilled at 380 seeds per square metre.
15-Mar-93 : B : 34.5% N at 120 kg.
15-Apr-93 : B : Ally at 30 g and Deloxil at 1.0 l in 200 l
30-Apr-93 : B : 34.5% N at 350 kg.
01-Jun-93 : B : Mistral at 0.5 l and Bayleton at 0.5 kg in 200 l.
03-Aug-93 : B : Combine harvested.

NOTE: Crop samples were taken at harvest to determine ear numbers, thousand grain weights and nitrogen content.

MAIN EXPERIMENT

GRAIN TONNES/HECTARE

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

N RES[92]	(0)	(75)	Mean
LAND TRT[92]			
FO RA LN	6.38	6.33	6.35
RYE LN	6.12	6.30	6.21
TUMDN LN	5.93	6.34	6.13
FLLOW LN	6.39	6.41	6.40
STUBL LN	6.54	6.00	6.27
Mean	6.27	6.27	6.27

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

LAND TRT	**N RES**	**LAND TRT N RES**
0.163	0.154	0.293

Except when comparing means with the same level(s) of **LAND TRT** 0.344

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.200	3.2
BLOCK.WP.SP	10	0.422	6.7

GRAIN MEAN DM% 86.8

SUB PLOT AREA HARVESTED 0.00121

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93/W/CS/381

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

N RES[92]	(0)	(75)	Mean
EXTRA[92]			
(EX FR LN)	6.69	6.71	6.70
(EX RY LN)	5.18	6.21	5.69
(EX RD LN)	6.17	6.39	6.28
Mean	6.01	6.43	6.22

GRAIN MEAN DM% 85.9

SUB PLOT AREA HARVESTED 0.00121

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93/W/CS/386

COVER CROPS AND NITROGEN

Object: To assess how effectively cover crops take up nitrogen and to assess how much of that nitrogen is subsequently available to the following crop - Woburn, Stackyard A I.

Sponsors: D.G. Christian, A.J. Macdonald, P.R. Poulton.

The first year, w. and s. barley, forage rape, phacelia, ryegrass, rye, white mustard.

Design: 3 blocks of 9 plots split into 2 sub plots.

Plot dimensions: 9.0 x 12.0.

Treatments: All combinations of:-

Whole plots

LANDTRT	Cover crops, sown in autumn, tumbledown and fallow. All plots ploughed in spring and sown to s. barley.
FALLOWSB	Fallow
FO RA SB	Forage rape
PHACL SB	Phacelia
RYGRS SB	Ryegrass
RYE SB	Rye
RY+MU SB	Rye and white mustard
TUMDN SB	Tumbledown
MUSTD SB	White mustard

Sub plots

2. **N** Nitrogen ferilizer (kg N) to s. barley:

0
75

plus one extra treatment

Whole plots

1. **EXTRA**

W BARLEY	W. barley sown in autumn, taken to maturity

Sub plots

2. **N EXTRA** Nitrogen fertilizer (kg N) to w. barley:

0
150

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93/W/CS/386

NOTE: The tumbledown fallow was given 50 kg of seed from the previous w. wheat crop to ensure volunteers.

Experimental diary:

19-Aug-92 : **T** : **LANDTRT** FO RA SB, PHACL SB, RYGRS SB, RYE SB, RY+MU SB, TUMDN SB: Cultivated twice to 5 cm with Bomford Dynadrive.
: **T** : **LANDTRT** FO RA SB: Ember broadcast at 30 kg.
: **T** : **LANDTRT** RYGRS SB: Perennial ryegrass broadcast at 25 kg.
: **T** : **LANDTRT** PHACL SB: Phacelia broadcast at 30 kg.
: **T** : **LANDTRT** RY+MU SB: Rye broadcast at 90 kg and w. mustard broadcast at 15 kg.
: **T** : **LANDTRT** RYE SB: Amando broadcast at 180 kg.
: **T** : **LANDTRT** TUMDN SB: Beaver broadcast at 50 kg.
: **T** : **LANDTRT** MUSTD SB: White mustard broadcast at 30 kg.
14-Sep-92 : **T** : **LANDTRT** FALLOWSB: Ploughed.
: **T** : **EXTRA** W BARLEY: Ploughed.
: **T** : **LANDTRT** FALLOWSB: Rotary harrowed.
16-Sep-92 : **T** : **EXTRA** W BARLEY: Rotary harrowed, Puffin, dressed Cerevax Extra, drilled at 340 seeds per square metre.
10-Mar-93 : **T** : **LANDTRT**: All plots ploughed, rolled.
12-Mar-93 : **T** : **LANDTRT**: All plots rotary harrowed, Alexis, dressed Cerevax Extra, drilled at 350 seeds per square metre.
06-Apr-93 : **T** : **N EXTRA** 150: 27.5% N applied at 545 kg.
08-Apr-93 : **T** : **N**: 75: 27.5% N applied at 273 kg.
22-Jun-93 : **T** : **LANDTRT**: All plots sprayed Dorin at 1.0 l in 200 l.
16-Aug-93 : B : Combine harvested.

Previous crops: Grass 1991, w. wheat 1992.

NOTES: (1) In November and March crop samples were taken to measure plant populations, dry weights and nitrogen content. At harvest ear numbers and thousand grain weights were assessed.
(2) In autumn, winter and spring soil and soil water samples were taken for N analysis.
(3) **EXTRA** W BARLEY plots were not harvested.

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93/W/CS/386

GRAIN TONNES/HECTARE

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

N	0	75	Mean
LANDTRT			
FALLOWSB	3.36	4.55	3.96
FO RA SB	3.08	4.26	3.67
PHACL SB	3.90	5.30	4.60
RYGRS SB	3.17	5.02	4.09
RYE SB	2.86	5.28	4.07
RY+MU SB	1.53	5.11	3.32
TUMDN SB	2.47	4.84	3.66
MUSTD SB	3.26	4.62	3.94
Mean	2.95	4.87	3.91

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

LANDTRT	**N**	**LANDTRT N**
0.384	0.156	0.495

Except when comparing means with the same level(s) of
LANDTRT 0.442

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.470	12.0
BLOCK.WP.SP	16	0.541	13.8

GRAIN MEAN DM% 85.6

SUB PLOT AREA HARVESTED 0.00082

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93/R/CS/399

COVER CROPS AND N CYCLING

Object: To assess how effectively cover crops take up nitrogen and to assess how much of that nitrogen is subsequently made available to the following crop - Webbs.

Sponsors: P.R. Poulton, D.G. Christian, A.J. Macdonald.

The first year, forage rape, rye, tumbledown, w. and s. barley.

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

Whole plot dimensions: 9.0 x 12.0.

Treatments:

Whole plots

1. **LAND TRT** Cover crops, sown in autumn, tumbledown and fallow. All plots ploughed in spring and sown to s. barley:

FALLOWSB	Fallow
FO RA SB	Forage rape
RYE SB	Rye
TUMBDN SB	Tumbledown

Sub plots

2. **N** Nitrogen fertilizer (kg N) to s. barley:

0
75

plus one extra treatment

Whole plot

1. **EXTRA**

W BARLEY	W. barley, sown in autumn, taken to maturity

Sub plot

2. **N EXTRA** Nitrogen fertilizer (kg N) to w. barley:

0
150

NOTE: **LAND TRT** TUMBDN SB was given 50 kg of seed from the previous s. barley crop to ensure volunteers.

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93/R/CS/399

Experimental diary:

20-Aug-92 : **T** : **LAND TRT** FO RA SB, RYE SB, TUMBDN SB: Shallow cultivated with Bomford Dynadrive.
21-Aug-92 : **T** : **LAND TRT** FO RA SB: Forage rape broadcast at 30 kg.
: **T** : **LAND TRT** RYE SB: Amando broadcast at 180 kg.
: **T** : **LAND TRT** TUMBDN SB: S. barley (cv Alexis) broadcast at 50 kg.
: **T** : **LAND TRT** FO RA SB, RYE SB, TUMBDN SB: Rolled.
10-Sep-92 : **T** : **LAND TRT** FALLOWSB: Ploughed.
: **T** : **EXTRA** W BARLEY: Ploughed.
11-Sep-92 : **T** : **EXTRA** W BARLEY: Disced, rotary harrowed twice, Puffin, dressed Cerevax, drilled at 380 seeds per square metre.
16-Sep-92 : **T** : **LAND TRT** FALLOWSB: Rolled.
: **T** : **EXTRA** W BARLEY: Rolled.
19-Oct-92 : **T** : **LAND TRT** FO RA SB: Pilot at 75 ml with Cropspray 11E at 2.0 l in 200 l.
05-Mar-93 : **T** : **LAND TRT** FALLOWSB, FO RA SB, RYE SB, TUMBDN SB: Ploughed.
08-Mar-93 : **T** : **LAND TRT** FALLOWSB, FO RA SB, RYE SB, TUMBDN SB: Rotary harrowed twice, Alexis, dressed Cerevax Extra, drilled at 350 seeds per square metre.
14-Apr-93 : **T** : **N EXTRA** 150: 27% N at 556 kg.
06-May-93 : **T** : **N** 75: 27% N at 278 kg.
10-May-93 : B : Ally at 30 g and Starane 2 at 1.0 l in 200 l.
13-Aug-93 : B : Combine harvested.

Previous crops: S. barley 1991 and 1992.

NOTE: Plots were labelled with 15N in autumn. Crop, soil and soil water samples were taken for N analysis at various times during the season.

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93/R/CS/399

GRAIN TONNES/HECTARE

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

SPRING BARLEY

N	NONE	APPLIED	Mean
LAND TRT			
FALLOWSB	2.49	3.65	3.07
FO RA SB	2.37	2.62	2.50
RYE SB	1.99	2.76	2.38
TUMBDN SB	2.74	3.21	2.98
Mean	2.40	3.06	2.73

WINTER BARLEY

N EXTRA	0	150	Mean
	1.61	3.24	2.42

GRAND MEAN 2.67

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

LAND TRT	**N**	**LAND TRT N & N EXTRA**
0.296	0.148	0.362

Except when comparing means with the same level(s) of **CROPS** 0.295

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.362	13.6
BLOCK.WP.SP	10	0.362	13.6

GRAIN MEAN DM% 84.7

SUB PLOT AREA HARVESTED 0.00082

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93/R/CS/401

NITROGEN INDICATORS

Object: To relate chlorophyll concentrations in individual leaves of w. wheat to nitrogen supply and crop yield - Long Hoos I/II.

Sponsors: P. B. Barraclough.

The first year, w. wheat.

Design: 3 blocks of 8 plots.

Plot dimensions: 3.0 x 15.0.

Treatments:

N	Spring nitrogen (kg N) at first node formation:
0	0
50	50
100	100
150	150
200	200
250	250
300	300
40X5	40 plus 40 at four subsequent weekly intervals (total 200)

Experimental diary:

11-Sep-92 : B : Disced.
16-Sep-92 : B : Disced.
17-Sep-92 : B : Rolled.
29-Sep-92 : B : Sting CT at 2.0 l in 200 l.
30-Sep-92 : B : Ploughed.
09-Oct-92 : B : Disced twice.
10-Oct-92 : B : Rotary harrowed, Hereward, dressed Cerevax, drilled at 400 seeds per square metre.
24-Nov-92 : B : Draza at 5.5 kg.
24-Feb-93 : B : Panther at 2.0 l in 200 l.
12-Mar-93 : B : PK as (0:18:36) at 1250 kg.
19-Apr-93 : **T** : **N** 50: 34.5% N at 145 kg.
: **T** : **N** 100: 34.5% N at 290 kg.
: **T** : **N** 150: 34.5% N at 435 kg.
: **T** : **N** 200: 34.5% N at 580 kg.
: **T** : **N** 250: 34.5% N at 725 kg.
: **T** : **N** 300: 34.5% N at 870 kg.
: **T** : **N** 40X5: 34.5% N at 116 kg.
06-May-93 : **T** : **N** 40X5: 34.5% N at 116 kg.
13-May-93 : **T** : **N** 40X5: 34.5% N at 116 kg.
20-May-93 : **T** : **N** 40X5: 34.5% N at 116 kg.
27-May-93 : **T** : **N** 40X5: 34.5% N at 116 kg.
03-Jun-93 : B : Cheetah R at 2.5 l and Calixin at 0.70 l in 200 l.
08-Jun-93 : B : Halo at 2.0 l in 200 l.
16-Aug-93 : B : Combine harvested.

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93/R/CS/401

Previous crops: W. wheat 1991, s. oats 1992.

NOTE: Leaf chlorophyll concentrations were measured weekly from the beginning of stem extension. Total N and nitrate concentrations were measured in individual plant parts during stem extension.

GRAIN TONNES/HECTARE

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

N RATE	
0	4.37
50	6.11
100	8.06
150	8.86
200	8.99
250	9.18
300	9.47
40X5	9.88
Mean	8.11

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

N RATE
0.242

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.297	3.7

GRAIN MEAN DM% 85.2

PLOT AREA HARVESTED 0.00230

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93/R/WW/1

WINTER WHEAT

APHID IMMIGRATION

Object: To determine the role of immigration of cereal aphids in relation to forecasting outbreaks in summer - Highfield VI.

Sponsors: J. Mann, N. Carter.

Design: 4 blocks of 4 plots with external dummy plots and arranged to allow estimation of the effects of neighbouring plots.

Plot dimensions: 9.0 x 9.0.

Treatments:

INSCTCDE	Time of insecticide application:
NONE	None
MAR	Late March or early April
MARIMME	Late March or early April and at 10 day intervals from start of immigration until early growth stage
MARIMML	Late March or early April and at 10 day intervals from start of immigration until late growth stage

Experimental diary:

14-Sep-92	B	Scythe at 3.0 l in 200 l.
16-Sep-92	B	Disced.
22-Sep-92	B	Ploughed.
07-Oct-92	B	Disced.
08-Oct-92	B	Disced.
09-Oct-92	B	Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
14-Apr-93	B	34.5% N at 370 kg.
	T	**INSCTCDE** MAR, MARIMME, MARIMML: Aphox at 280 g in 200 l.
30-Apr-93	B	Cheetah R at 1.0 l and Starane 2 at 1.0 l in 200 l.
13-May-93	**T**	**INSCTCDE** MARIMME, MARIMML: Aphox at 280 g in 200 l.
14-May-93	B	34.5% N at 120 kg.
28-May-93	**T**	**INSCTCDE** MARIMME, MARIMML: Aphox at 280 g in 200 l.
04-Jun-93	B	Halo at 2.0 l and Mistral at 0.50 l in 200 l.
	T	**INSCTCDE** MARIMME, MARIMML: Aphox at 280 g in 200 l.
22-Jun-93	**T**	**INSCTCDE** MARIMML: Aphox at 280 g in 200 l.
08-Jul-93	**T**	**INSCTCDE** MARIMML: Aphox at 280 g in 200 l.
18-Aug-93	**T**	Combine harvested.

Previous crops: S. beans 1991, w. oats 1992.

NOTE: Samples were taken between April and July to assess aphid populations. Ear numbers were estimated before harvest.

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93/R/WW/1

GRAIN TONNES/HECTARE

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

INSCTCDE	
NONE	7.86
MAR	8.10
MARIMME	8.39
MARIMML	7.97
Mean	8.08

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

INSCTCDE
0.353

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.499	6.2

GRAIN MEAN DM% 83.7

PLOT AREA HARVESTED 0.00207

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93/R/WW/3

WINTER WHEAT

SOWING DATE AND N

Object: To study the effects of a range of amounts of nitrogen fertilizer applied in different ways to w. wheat sown on different dates - Fosters Corner.

Sponsors: R.J. Darby.

Design: 3 blocks of 2 x 8 plots.

Plot dimensions: 3.0 x 18.0.

Treatments:

1. **SOW DATE**	Date of sowing:	
	EARLY	Second week in September
	LATE	Third week in October
2. **SPRING N**	Rate, form and timing of nitrogen fertilizer applied in spring to achieve different green area indices (GAI):	
	N0	None
	CONV S	GAI6. Solid conventional split application, 60 plus 160 kg N
	G3 S	GAI3. Solid multiple applications of 30 kg N from mid-March
	G5-S	GAI5. Solid multiple applications of 30 kg N from mid-March
	G5 F	GAI5. Foliar multiple applications of 30 kg N from mid-March
	G5 S2F3	GAI5. Multiple applications of solid and foliar, each 30 kg N
	G5 S3F2	GAI5. Multiple applications of solid and foliar, each 30 kg N
	G5 S1F2	GAI5. Single application of solid at stem elongation, 90 kg, foliar applications from mid May, each 30 kg N

NOTES: (1) Solid fertilizer applied as 'Nitro-Chalk' (27% N), foliar nitrogen as urea (46% N) in 450 l water.
(2) **SPRING N** codes refer to the N required to produce an equivalent green area index (e.g. G5 S3F2 to give GAI5, three from solid, two from foliar N).

Experimental diary:

02-Oct-92 : B : Ploughed.
07-Oct-92 : T : **SOW DATE** EARLY: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.
31-Oct-92 : T : **SOW DATE** LATE: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per square metre.

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93/R/WW/3

Experimental diary:

25-Mar-93 : **T** : **SPRING N**: CONV S, G3 S, G5 S, G5 F, G5 S2F3, G5 S3F2: N applied.
06-Apr-93 : **T** : **SPRING N**: G5 S, G5 F, G5 S2F3, G5 S3F2: N applied.
16-Apr-93 : B : Ally at 30 g and Starane 2 at 1.0 l in 300 l.
20-Apr-93 : **T** : **SPRING N**: CONV S, G5 S, G5 F, G5 S2F3, G5 S3F2, G5 S1F2: N applied.
05-May-93 : **T** : **SPRING N**: G3 S, G5 S, G5 F, G5 S2F3, G5 S3F2: N applied.
19-May-93 : **T** : **SPRING N**: G5 S, G5 F, G5 S2F3, G5 S3F2, G5 S1F2: N applied.
28-May-93 : B : Corbel at 1.0 l and Halo at 2.0 l in 300 l.
02-Jun-93 : **T** : **SPRING N** G5 S1F2: N applied.
02-Jul-93 : B : Bombardier at 2.0 l and Radar at 0.50 l in 300 l.
18-Aug-93 : B : Combine harvested.

Previous crops: S. beans 1991, linseed 1992.

NOTE: Soils were sampled to 90 cm depth for ammonium and nitrate contents on three occasions between early November and late February. Stem nitrate concentrations were measured at fortnightly intervals from early December until early July. Plants were sampled for growth and N content and soil samples taken at regular intervals between March and August. Components of yield were measured after hand harvesting in mid-August.

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93/R/WW/3

GRAIN TONNES/HECTARE

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

SOW DATE	EARLY	LATE	Mean
SPRING N			
N0	6.20	5.14	5.67
CONV S	10.17	10.32	10.24
G3 S	7.95	7.98	7.96
G5 S	9.80	10.07	9.94
G5 F	9.74	9.71	9.73
G5 S2F3	9.55	9.91	9.73
G5 S3F2	9.54	9.79	9.67
G5 S1F2	9.42	9.79	9.61
Mean	9.05	9.09	9.07

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

SOW DATE	**SPRING N**	**SOW DATE SPRING N**
0.099	0.198	0.281

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.344	3.8

GRAIN MEAN DM% 85.6

PLOT AREA HARVESTED 0.00230

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93/R/WW/5

WINTER WHEAT

SEED TREATMENT AND TAKE-ALL

Object: To test different rates of a seed treatment fungicide against take-all - Little Knott I.

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

Design: 4 blocks of 3 plots.

Whole Plot dimensions: 3.0 x 10.0.

Treatments:

SEED TRT	Rate of fungicidal seed treatment (g a.i. per 100 kg seed):
NONE	None applied
100	100
150	150

Experimental diary:

02-Sep-92 : B : Ploughed and furrow pressed.
01-Oct-92 : **T** : **SEED TRT** NONE, 100, 150: Rotary harrowed, Riband drilled at 380 seeds per square metre.
11-Mar-93 : B : Hytane 500 FW at 3.0 l and Stomp 400 at 2.6 l in 200 l.
15-Mar-93 : B : PK as (0:18:36) at 1250 kg.
20-Apr-93 : B : 34.5% N at 460 kg.
03-Jun-93 : B : Cheetah R at 2.5 l and Calixin at 0.70 l in 200 l.
08-Jun-93 : B : Halo at 2.0 l in 200 l.
17-Aug-93 : B : Combine harvested.

Previous crops: W. wheat 1991 and 1992.

NOTE: Plant samples were taken in November, April and July for take-all assessment.

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93/R/WW/5

GRAIN TONNES/HECTARE

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

SEED TRT	NONE	100	150	Mean
	6.59	7.26	7.60	7.15

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

SEED TRT
0.209

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.296	4.1

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00227

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93/R/WS/1

SPRING WHEAT

WEED SOWING DATE AND DENSITY

Object: To investigate the response of spring wheat to competition from white mustard (*Sinapsis alba*) sown on two different dates - Great Harpenden II.

Sponsors: P.J.W. Lutman.

Design: 3 randomised blocks of 2 x 5 plots.

Plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **WEED SD** Date of sowing weeds:

ASCROP	Same day as drilling wheat
CROP+10	10 days after drilling wheat

2. **WEED DEN** Density of sown white mustard (plants per square metre):

	ASCROP	CROP+10
D0	0	0
D1	19	110
D2	44	206
D4	98	387
D8	315	672

NOTES: (1) Target weed densities (plants per square metre):

WEED DEN		D0	D1	D2	D4	D8
WEED SD	ASCROP:	0,	25,	50,	100,	200
	CROP+10:	0,	50,	100,	200,	400

(2) Winter wheat, sown autumn 1992, failed and was replaced by spring wheat.

Experimental diary:

21-Jan-93 : B : Chisel ploughed.
15-Mar-93 : B : Heavy spring-tine cultivated, rotary harrowed.
16-Mar-93 : B : **WEED SD** ASCROP: White mustard broadcast by hand.
: B : Rotary harrowed, Canon, dressed Cerevax, drilled at 330 seeds per square metre.
29-Mar-93 : **T** : **WEED SD** CROP+10: White mustard broadcast by hand, raked in.
23-Apr-93 : B : 34.5% N at 290 kg.
02-Jul-93 : B : Radar at 0.50 l in 200 l.
26-Aug-93 : B : Combine harvested.

Previous crops: W. barley 1991, w. rape 1992.

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93/R/WS/1

NOTE: Emergence counts were made and samples of weed and crop taken on four occasions throughout the season for observations, counts and growth estimations.

GRAIN TONNES/HECTARE

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

WEED DEN / **WEED SD**	D0	D1	D2	D4	D8	Mean
ASCROP	6.06	4.29	2.16	1.60	0.78	2.98
CROP+10	6.32	2.09	0.73	0.43	0.44	2.00
Mean	6.19	3.19	1.44	1.01	0.61	2.49

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

WEED SD	**WEED DEN**	**WEED SD** **WEED DEN**
0.205	0.324	0.458

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.560	22.5

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00020

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93/R/BW/1

WINTER BARLEY

COMPANION CROPPING

Object: To measure the effect of companion cropping on pests, diseases, growth, yield and nutrient uptake of cereals - Great Harpenden I.

Sponsor: D.G. Christian.

Design: 3 blocks of 8 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments:

COMPCROP	Companion crops, broadcast before drilling w. barley:
NONE	None (quadruplicated)
MUST 1.5	White mustard at 1.5 kg
MUST 3.0	White mustard at 3.0 kg
MUST 6.0	White mustard at 6.0 kg
RADISH	Oil radish at 3.0 kg

Experimental diary:

29-Aug-92 : B : Straw baled.
16-Sep-92 : B : Scythe at 2.0 l with Farmon Blue at 0.20 l in 200 l.
21-Sep-92 : B : Ploughed, furrow pressed.
28-Sep-92 : B : Rotary harrowed.
01-Oct-92 : B : Puffin, dressed Cerevax, drilled at 350 seeds per square metre.
: **T** : **COMPCROP** MUST 1.5: White mustard (cv. Tilney) broadcast at 1.5 kg.
: **T** : **COMPCROP** MUST 3.0: White mustard (cv. Tilney) broadcast at 3.0 kg.
: **T** : **COMPCROP** MUST 6.0: White mustard (cv. Tilney) broadcast at 6.0 kg.
: **T** : **COMPCROP** RADISH: Oil radish (cv. Trick) broadcast at 3.0 kg.
08-Mar-93 : B : 34.5% N at 120 kg.
15-Apr-93 : B : Tigress at 2.5 l in 200 l.
21-Apr-93 : B : Ally at 30 g and Starane 2 at 1.0 l in 200 l.
18-May-93 : B : Calirus at 2.0 l and Corbel at 0.50 l in 200 l.
02-Aug-93 : B : Combine harvested.

Previous crops: Potatoes 1991, w. wheat 1992.

NOTE: Plant samples were taken in December and April for dry weight, plant population and nitrogen uptake measurements, and in July to measure ear numbers, dry weights, nitrogen uptake and thousand grain weights.

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93/R/BW/1

GRAIN TONNES/HECTARE

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

COMPCROP	
NONE	7.11
MUST 1.5	6.93
MUST 3.0	6.54
MUST 6.0	6.81
RADISH	7.26
Mean	6.99

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

COMPCROP	
0.322	min.rep
0.255	max-min

	COMPCROP
max-min	None 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	17	0.395	5.6

GRAIN MEAN DM% 85.2

PLOT AREA HARVESTED 0.00230

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93/R/BW/2

WINTER BARLEY

SOWING DATES, APHIDS AND BYDV

Object: To study the relationship of aphid numbers in suction trap samples to crop populations and the incidence of barley yellow dwarf virus (BYDV) on winter barley sown on a range of dates - Highfield IV.

Sponsors: G.M. Tatchell, R.T. Plumb.

Design: 4 randomised blocks of 10 plots.

Whole plot dimensions: 3.0 x 31.0.

Treatments: All combinations of:-

1. **SOWDATE** Dates of sowing:

ERLYSEPT	Early September
MIDSEPT	Mid September
LATESEPT	Late September
ERLYOCT	Early October
LATEOCT	Late October

2. **APHICIDE** Aphicide in autumn:

NONE	None
CYPERMET	Cypermethrin

Experimental diary:

28-Jul-92 : B : Disced.
19-Aug-92 : B : Sting CT at 1.5 l in 200 l.
02-Sep-92 : B : Ploughed.
07-Sep-92 : B : Rolled.
08-Sep-92 : **T** : **SOWDATE** ERLYSEPT: Rotary harrowed, Magie, dressed Cerevax, drilled at 350 seeds per square metre.
15-Sep-92 : **T** : **SOWDATE** MIDSEPT: Rotary harrowed, Magie, dressed Cerevax, drilled at 350 seeds per square metre.
28-Sep-92 : **T** : **SOWDATE** LATESEPT: Rotary harrowed twice, Magie, dressed Cerevax, drilled at 350 seeds per square metre.
12-Oct-92 : **T** : **SOWDATE** ERLYOCT: Rotary harrowed, Magie, dressed Cerevax, drilled at 350 seeds per square metre.
30-Oct-92 : **T** : **SOWDATE** LATEOCT: Spring-tine cultivated.
31-Oct-92 : **T** : **SOWDATE** LATEOCT: Rotary harrowed, Magie, dressed Cerevax, drilled at 350 seeds per square metre.
20-Nov-92 : **T** : **APHICIDE** CYPERMET (except **SOWDATE** LATEOCT plots): Ripcord at 250 ml in 220 l.
10-Dec-92 : **T** : **APHICIDE** CYPERMET (**SOWDATE** LATEOCT plots only): Ripcord at 250 ml in 220 l.
05-Mar-93 : B : 34.5% N at 120 kg.
11-Mar-93 : B : Tigress at 2.5 l in 200 l.

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93/R/BW/2

Experimental diary:
14-Apr-93 : B : 34.5% N at 370 kg.
21-Apr-93 : B : Ally at 30 g and Starane 2 at 1.0 l in 200 l.
18-May-93 : B : Calirus at 2.0 kg and Corbel at 0.50 l in 200 l.
02-Aug-93 : B : Combine harvested.

Previous crops: W. barley 1991 and 1992.

NOTE: Visual assessments were made for BYDV infection from late March to late May and leaf samples taken during March and April for subsequent enzyme-linked immunosorbent assay to determine levels of BYDV infection and isolates present. Numbers of ears, grains per ear and thousand grain weights were measured at harvest.

GRAIN TONNES/HECTARE

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

APHICIDE / **SOWDATE**	NONE	CYPERMET	Mean
ERLYSEPT	4.98	5.57	5.28
MIDSEPT	5.14	5.53	5.33
LATESEPT	5.90	6.05	5.97
ERLYOCT	5.87	5.82	5.85
LATEOCT	5.67	5.55	5.61
Mean	5.51	5.70	5.61

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

SOWDATE	**APHICIDE**	**SOWDATE APHICIDE**
0.239	0.151	0.338

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.479	8.5

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00204

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93/W/BS/1

SPRING BARLEY

SULPHUR AND SPRING BARLEY

Object: To measure the uptake of sulphur and effect of fertilizer sulphur on the yield of s. barley on light soil - Woburn, Lansome II.

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

Design: 5 blocks of 2 plots, systematically arranged.

Whole plot dimensions: 5.0 x 10.0.

Treatments:

SULPHUR	Rates of sulphur (kg S):
S0	0
S4	40

NOTE: Sulphur was applied as K_2SO_4, plots not given sulphur were given KCl to balance the potassium applied.

Experimental diary:

12-Mar-93	: B	:	Rotary harrowed.
	: B	:	Alexis dressed Cerevax Extra, drilled at 350 seeds per square metre, harrowed.
30-Mar-93	: **T**	:	**SULPHUR** S4: 40 kg S as K_2SO_4.
	: **T**	:	**SULPHUR** S0: 97.4 kg K as KCl.
	: B	:	34.5% N at 350 kg.
18-May-93	: B	:	Deloxil at 1.5 l and Astix at 2.0 l in 200 l.
22-Jun-93	: B	:	Dorin at 1.0 l in 200 l.
16-Aug-93	: B	:	Combine harvested.

NOTE: Soil samples were taken in autumn and spring for sulphate measurements, plant samples were taken throughout the season to monitor nitrogen and sulphur levels. Grain and straw samples were analysed for N and S concentrations.

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93/W/BS/1

GRAIN TONNES/HECTARE

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

SULPHUR	
S0	5.82
S4	5.85
Mean	5.83

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

SULPHUR
0.203

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.321	5.5

GRAIN MEAN DM% 88.9

STRAW TONNES/HECTARE

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

SULPHUR	
S0	5.23
S4	5.33
Mean	5.28

STRAW MEAN DM% 82.7

PLOT AREA HARVESTED 0.00040

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93/R/RAW/1

WINTER OILSEED RAPE

FUNGAL PATHOGENS AND GLUCOSINOLATES

Object: To monitor the accumulation of glucosinolates in pods and seeds following inoculation with a fungal pathogen - Little Knott I

Sponsors: K.J. Doughty, J.K. Fieldsend, R. Wallsgrove, G. Kiddle, R.N. Bennett.

Design: 2 randomised blocks of 4 plots (treatments duplicated).

Whole plot dimensions: 3.0 x 10.0.

Treatments:

FUNGCIDE	Fungicide applied in November and April, inoculation or fungicide in June:
N+A+INOC	Prochloraz November and April, inoculated June
N+A+IPRO	Prochloraz November and April, iprodione June

NOTE: **FUNGCIDE** N+A+INOC: During pod development, areas within plots were inoculated with a mycelial suspension of *Alternaria brassicae* and covered with plastic tents for two days to ensure infection.

Experimental diary:

10-Aug-92 : B : Shallow cultivated with Bomford Dynadrive.
02-Sep-92 : B : Ploughed, furrow pressed.
03-Sep-92 : B : Rotary harrowed, Bienvenu, undressed, drilled at 120 seeds per square metre.
14-Oct-92 : B : Decis at 250 ml in 200 l.
24-Nov-92 : **T** : **FUNGCIDE** N+A+INOC, N+A+IPRO: Sportak 45 at 1.1 l in 220 l.
29-Jan-93 : B : Dow Shield at 0.50 l and Rapier at 1.6 l in 200 l.
18-Feb-93 : B : 34.5% N at 170 kg.
15-Mar-93 : B : PK as (0:18:36) at 1250 kg.
23-Mar-93 : B : 34.5% N at 370 kg.
15-Apr-93 : **T** : **FUNGCIDE** N+A+INOC, N+A+IPRO: Sportak 45 at 1.1 l in 200 l.
13-Jun-93 : **T** : **FUNGCIDE** N+A+INOC: Inoculated.
28-Jun-93 : **T** : **FUNGCIDE** N+A+IPRO: Rovral Flo at 2.0 l in 200 l.
09-Aug-93 : B : Combine harvested.

Previous crops: W. wheat 1991 and 1992.

NOTE: Samples of pods were taken from the time of inoculation until harvest to measure the effect of inoculation on the content of glucosinolates and the activity of biosynthetic enzymes in pods and seeds.

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93/R/RAW/1

GRAIN (AT 90% DM) TONNES/HECTARE

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

FUNGCIDE	
N+A+INOC	2.96
N+A+IPRO	3.78
Mean	3.37

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

FUNGCIDE
0.195

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	5	0.275	8.2

GRAIN MEAN DM% 84.0

PLOT AREA HARVESTED 0.00230

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93/R/RAW/2

WINTER OILSEED RAPE

VARIETIES AND FUNGICIDES

Object: To investigate the effects of fungicides on a range of low glucosinolate varieties - Bones Close.

Sponsors: V.J. Church, B.D.L. Fitt.

Design: 4 randomised blocks of 2 x 6 plots.

Whole plot dimensions: 3.0 x 21.0.

Treatments: All combinations of:-

1. **VARIETY** Varieties:

CAPRCORN	Capricorn
ENVOL	Envol
FALCON	Falcon
LIBRAVO	Libravo
SAMOURAI	Samourai
ROCKET	Rocket

2. **FUNGCIDE** Fungicides:

NONE	None
PR+CA+IP	Prochloraz and carbendazim in autumn and spring, iprodione in summer

Experimental diary:

27-Jul-92 : B : Shallow cultivated with Bomford Dynadrive.
28-Jul-92 : B : Rolled.
18-Aug-92 : B : Sting CT at 2.0 l in 200 l.
20-Aug-92 : B : Ploughed, furrow pressed.
26-Aug-92 : **T** : **VARIETY** CAPRCORN, ENVOL, FALCON, LIBRAVO, SAMOURAI, ROCKET: Rotary harrowed. All varieties dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
22-Oct-92 : B : Benazalox at 0.75 l and Butisan S at 1.5 l in 200 l.
08-Dec-92 : **T** : **FUNGCIDE** PR+CA+IP: Sportak 45 at 1.1 l and Tripart Defensor FL at 0.50 l in 200 l.
18-Feb-93 : B : 34.5% N at 170 kg.
08-Mar-93 : **T** : **FUNGCIDE** PR+CA+IP: Sportak 45 at 1.1 l and Tripart Defensor FL at 0.50 l in 200 l.
23-Mar-93 : B : 34.5% N at 370 kg.
18-May-93 : **T** : **FUNGCIDE** PR+CA+IP: Rovral Flo at 2.0 l in 200 l.
19-Jul-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
26-Jul-93 : B : Combine harvested.

Previous crops: W. barley 1991 and 1992.

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93/R/RAW/2

NOTE: Samples were taken throughout the year for disease assessments on leaves, stems and pods. Oil content of seed was measured after harvest.

GRAIN (AT 90% DM) TONNES/HECTARE

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

FUNGCIDE / **VARIETY**	NONE	PR+CA+IP	Mean
CAPRCORN	4.17	4.68	4.42
ENVOL	4.59	5.08	4.84
FALCON	4.08	4.27	4.18
LIBRAVO	4.16	4.68	4.42
SAMOURAI	4.33	4.73	4.53
ROCKET	3.87	3.99	3.93
Mean	4.20	4.57	4.39

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

VARIETY	**FUNGCIDE**	**VARIETY FUNGCIDE**
0.090	0.052	0.127

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.180	4.1

GRAIN MEAN DM% 83.2

PLOT AREA HARVESTED 0.00483

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93/R/RAW/3

WINTER OILSEED RAPE

EFFECTS OF BEHAVIOUR MODIFYING CHEMICALS

Object: To study the effects of behaviour modifying chemicals in the field on the pests of w. oilseed rape - Bones Close.

Sponsors: L.E. Smart, M.M. Blight.

Design: 5 x 5 quasi-complete latin square.

Whole plot dimensions: 9.0 x 9.0.

Treatments:

CHEMICAL	Behaviour modifying chemicals:
BMC 0	None
BMC A	A
BMC B	B
BMC C	C
BMC D	D

NOTE: The behaviour modifying chemicals were mixtures of host plant volatiles in various combinations. They were released from point sources above the crop from October 1992 until mid-June 1993.

Experimental diary:

27-Jul-92 : B : Shallow cultivated with Bomford Dynadrive.
28-Jul-92 : B : Rolled.
18-Aug-92 : B : Sting CT at 2.0 l in 200 l.
20-Aug-92 : B : Ploughed, furrow pressed.
26-Aug-92 : B : Rotary harrowed, Libravo, undressed, drilled at 120 seeds per square.
22-Oct-92 : B : Benazalox at 0.75 l and Butisan S at 1.5 l in 200 l.
18-Feb-93 : B : 34.5% N at 170 kg.
23-Mar-93 : B : 34.5% N at 370 kg.
19-Jul-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
23-Jul-93 : B : Combine harvested.

Previous crops: W. barley 1991 and 1992.

NOTE: Plant samples were taken for cabbage stem flea beetle population assessments in December and February. Assessments of pollen beetle and seed weevil populations were made from April to June.

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93/R/RAW/3

GRAIN (AT 90% DM) TONNES/HECTARE

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

CHEMICAL

BMC O	4.08
BMC A	3.51
BMC B	3.72
BMC C	3.69
BMC D	4.09
Mean	3.82

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

CHEMICAL

0.255

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.403	10.5

GRAIN MEAN DM% 79.9

PLOT AREA HARVESTED 0.00207

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93/R/RAW/4

WINTER OILSEED RAPE

N, S AND GLUCOSINOLATES

Object: To study the separate and combined effects of rates of nitrogen and sulphur on the quality and yield of three varieties of w. oilseed rape - Bones Close.

Sponsors: J.Fieldsend, H. Hutchings.

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

Whole plot dimensions: 3.0 x 21.0.

Treatments: All combinations of:-

1. **VARIETY** Varieties:

ARIANA	Ariana
FALCON	Falcon
TAPIDOR	Tapidor

2. **N** Rates of nitrogen (kg N) in spring:

0
150
250

3. **S** Rates of sulphur (kg S) in spring:

0
50
100

NOTE: Sulphur was applied as gypsum (17.5% S).

Experimental diary:

27-Jul-92 : B : Shallow cultivated with Bomford Dynadrive.
28-Jul-92 : B : Rolled.
18-Aug-92 : B : Sting CT at 2.0 l in 200 l.
20-Aug-92 : B : Ploughed, furrow pressed.
29-Aug-92 : T : **VARIETY** ARIANA, FALCON, TAPIDOR: Rotary harrowed. All varieties, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
: B : Rolled.
22-Oct-92 : B : Benazalox at 0.75 l and Butisan S at 1.5 l in 200 l.
22-Feb-93 : T : **N** 150, 250: 34.5% N at 145 kg.
24-Feb-93 : T : **S** 50: Gypsum at 284 kg.
: T : **S** 100: Gypsum at 568 kg.
15-Mar-93 : T : **N** 150: 34.5% N at 290 kg.
: T : **N** 250: 34.5% N at 580 kg.
19-Jul-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
26-Jul-93 : B : Combine harvested.

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93/R/RAW/4

Previous crops: W. barley 1991 and 1992.

NOTE: Seed samples were analysed for glucosinolate content.

GRAIN (AT 90% DM) TONNES/HECTARE

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

N	0	150	250	Mean
VARIETY				
ARIANA	3.10	3.23	3.09	3.14
FALCON	3.43	3.66	3.78	3.62
TAPIDOR	3.15	3.48	3.40	3.34
Mean	3.23	3.46	3.42	3.37

S	0	50	100	Mean
VARIETY				
ARIANA	3.13	3.08	3.22	3.14
FALCON	3.52	3.67	3.68	3.62
TAPIDOR	3.24	3.43	3.37	3.34
Mean	3.30	3.39	3.42	3.37

S	0	50	100	Mean
N				
0	3.21	3.23	3.24	3.23
150	3.36	3.52	3.49	3.46
250	3.31	3.43	3.53	3.42
Mean	3.30	3.39	3.42	3.37

	S	0	50	100
VARIETY	**N**			
ARIANA	0	3.19	2.89	3.23
	150	3.17	3.34	3.19
	250	3.02	3.00	3.24
FALCON	0	3.34	3.42	3.52
	150	3.52	3.80	3.67
	250	3.69	3.79	3.85
TAPIDOR	0	3.11	3.37	2.97
	150	3.39	3.43	3.62
	250	3.23	3.48	3.50

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93/R/RAW/4

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

VARIETY	N	S	VARIETY N
0.065	0.065	0.065	0.113

VARIETY S	N S	VARIETY N S
0.113	0.113	0.196

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	78	0.277	8.2

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00483

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93/R/RAW/5

WINTER OILSEED RAPE

DISEASE FORECASTING AND YIELD LOSS

Object: To investigate the relationship between the timing and intensity of various diseases, crop development and yield loss - Fosters ex-Ley Arable.

Sponsors: H.A. McCartney, B.D.L. Fitt, M.E. Lacey, G. Murray.

Design: 3 randomised blocks of 25 plots.

Whole plot dimensions: 3.0 x 25.0.

Treatments:

FUNGFREQ Prochloraz, iprodione and thiophanate-methyl on the following dates:

TREATMENT NUMBER	14 OCT	04 NOV	07 DEC	08 JAN	29 JAN	23 FEB	24 MAR	19 APR	18 MAY	22 JUN	12 JUL
1	-	-	-	-	-	-	-	-	-	-	-
2	✓	-	-	-	-	-	-	-	-	-	-
3	✓	✓	-	-	-	-	-	-	-	-	-
4	✓	✓	✓	-	-	-	-	-	-	-	-
5	✓	✓	✓	✓	-	-	-	-	-	-	-
6	✓	✓	✓	✓	✓	-	-	-	-	-	-
7	✓	✓	✓	✓	✓	✓	-	-	-	-	-
8	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
9	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
10	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
13	-	-	-	-	-	-	-	-	-	-	✓
14	-	-	-	-	-	-	-	-	-	✓	✓
15	-	-	-	-	-	-	-	-	✓	✓	✓
16	-	-	-	-	-	-	-	✓	✓	✓	✓
17	-	-	-	-	-	-	✓	✓	✓	✓	✓
18	-	-	-	-	-	✓	✓	✓	✓	✓	✓
19	-	-	-	-	✓	✓	✓	✓	✓	✓	✓
20	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓
21	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	✓	✓	✓	✓	✓	-	-	-	✓	✓	✓
24	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
25	✓	✓	✓	✓	✓	-	-	-	-	-	-

NOTES: (1) Plots were inoculated by the application of rape straw from the 1992 harvest.

(2) All plots were inoculated in autumn on 16 October 1992. In addition, plots of treatments 23 and 25 were inoculated in spring on 9 March 1993 and plots of treatment 24 were inoculated in summer on 28 June.

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93/R/RAW/5

Experimental diary:

10-Aug-92 : B : Shallow cultivated with Bomford Dynadrive.
17-Aug-92 : B : Dolomite at 5.0 t.
21-Aug-92 : B : Ploughed, furrow pressed.
28-Aug-92 : B : Rotary harrowed, Envol, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
29-Aug-92 : B : Rolled.
07-Oct-92 : B : Draza at 5.5 kg.
14-Oct-92 : **T** : **FUNGFREQ** 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 23, 24, 25: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
19-Oct-92 : B : Pilot at 75 ml with Cropspray 11E at 2.0 l in 200 l.
04-Nov-92 : **T** : **FUNGFREQ** 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 22, 23, 24, 25: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
07-Dec-92 : **T** : **FUNGFREQ** 4, 5, 6, 7, 8, 9, 10, 11, 12, 21, 22, 23, 24, 25: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
08-Jan-93 : **T** : **FUNGFREQ** 5, 6, 7, 8, 9, 10, 11, 12, 20, 21, 22, 23, 24, 25: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
19-Jan-93 : B : Matrikerb at 1.6 kg in 400 l.
29-Jan-93 : **T** : **FUNGFREQ** 6, 7, 8, 9, 10, 11, 12, 19, 20, 21, 22, 23, 24, 25: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
17-Feb-93 : B : 34.5% N at 170 kg.
23-Feb-93 : **T** : **FUNGFREQ** 7, 8, 9, 10, 11, 12, 18, 19, 20, 21, 22, 24: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
23-Mar-93 : B : 34.5% N at 370 kg.
24-Mar-93 : **T** : **FUNGFREQ** 8, 9, 10, 11, 12, 17, 18, 19, 20, 21, 22, 24: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
19-Apr-93 : **T** : **FUNGFREQ** 9, 10, 11, 12, 16, 17, 18, 19, 20, 21, 22, 24: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
18-May-93 : **T** : **FUNGFREQ** 10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
22-Jun-93 : **T** : **FUNGFREQ** 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
12-Jul-93 : **T** : **FUNGFREQ** 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23: Compass at 1.5 l and Sportak 45 at 0.55 l in 200 l.
17-Jul-93 : B : Reglone at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
28-Jul-93 : B : Combine harvested.

Previous crops: W. wheat 1991 and 1992.

NOTE: Plants were sampled monthly, prior to spray treatment application, to monitor disease progress. Numbers of air-borne spores were counted and growth stage measurements made throughout the season. Seed and plant dry weights, seed oil analysis and stubble counts were made at harvest.

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93/R/RAW/5

GRAIN (AT 90% DM) TONNES/HECTARE

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

FUNGFREQ	
1	3.35
2	4.17
3	4.33
4	4.38
5	4.69
6	4.56
7	4.74
8	4.70
9	4.56
10	4.55
11	4.62
12	4.76
13	3.74
14	3.97
15	3.58
16	4.07
17	4.08
18	4.41
19	4.46
20	4.42
21	4.75
22	4.77
23	5.10
24	4.71
25	4.71
Mean	4.41

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

FUNGFREQ
0.207

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	48	0.254	5.8

GRAIN MEAN DM% 83.8

PLOT AREA HARVESTED 0.00575

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93/R/RAW/7

WINTER OILSEED RAPE

WEED COMPETITION - RAPE AND CHICKWEED

Object: To study the competitive effect of chickweed (*Stellaria media*) on the growth and yield of w. rape sown on three different dates - Summerdells II.

Sponsors: P.J.W. Lutman.

Design: 3 blocks of 3 plots split into 6 sub plots.

Whole plot dimensions: 14.0 x 21.0.

Treatments: All combinations of:-

Whole plots

1. **SOW DATE** Time of sowing w. rape:

EARLY	Early September
MID	Mid September
LATE	Late September

Sub plots

2. **WEED DEN** Density of chickweed (plants per square metre):

	SOW DATE		
	EARLY	MID	LATE
D0(US)	0	0	0
D1	44	54	84
D2	134	279	340
D3	475	1296	1169
D4	1299	2189	1983
D0(S)	0	0	0

NOTES: (1) Target **SOW DATE** EARLY: Late August, MID: Early September, LATE: Mid September.

(2) Target **WEED DEN** (plants per square metre) at each sowing date:

D0	D1	D2	D3	D4
0	50	200	600	1200

(3) Chickweed seeds were broadcast by hand in the central 2.5 m of the plot.

(4) Broad-leaved herbicides applied to **WEED DEN** D0(S) plots only.

Experimental diary:

28-Jul-92 : B : Shallow cultivated with Bomford Dynadrive.
18-Aug-92 : B : Sting CT at 1.5 l in 200 l.
26-Aug-92 : B : Ploughed and furrow pressed.
03-Sep-92 : **T** : **SOW DATE** EARLY: Rotary harrowed. Weed seeds broadcast. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.

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93/R/RAW/7

Experimental diary:

15-Sep-92 : **T** : **SOW DATE** MID: Rotary harrowed. Weed seeds broadcast. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
28-Sep-92 : **T** : **SOW DATE** LATE: Rotary harrowed.
29-Sep-92 : **T** : **SOW DATE** LATE: Rotary harrowed. Weed seeds broadcast. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
23-Oct-92 : B : Club at 5.5 kg.
04-Nov-92 : **T** : **SOW DATE** EARLY, MID: Pilot at 75 ml with Cropspray 11E at 2.0 l in 200 l.
10-Dec-92 : **T** : **SOW DATE** EARLY, MID, LATE: D0(S) plots only: Benazalox at 0.75 kg and Kerb 50 W at 1.0 kg in 220 l.
18-Feb-93 : B : 34.5% N at 170 kg.
23-Mar-93 : B : 34.5% N at 370 kg.
17-Jul-93 : B : Reglone at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
28-Jul-93 : B : Combine harvested.

Previous crops: W. wheat 1991, w. barley 1992.

NOTE: Emergence counts were made and samples of weed and crop taken on four occasions throughout the season for observations, counts and growth estimations.

GRAIN TONNES/HECTARE

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

WEED DEN / **SOW DATE**	D0(US)	D1	D2	D3	D4	D0(S)	Mean
EARLY	3.54	2.45	1.65	1.38	1.61	3.79	2.41
MID	3.66	3.12	2.33	2.33	2.31	3.78	2.92
LATE	3.73	2.56	2.10	1.95	1.43	3.19	2.49
Mean	3.64	2.71	2.03	1.89	1.78	3.59	2.61

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

SOW DATE	**WEED DEN**	**SOW DATE WEED DEN**
0.286	0.130	0.352

Except when comparing means with the same level(s) of
SOW DATE 0.225

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.350	13.4
BLOCK.WP.SP	30	0.276	10.6

GRAIN MEAN DM% 80.1 SUB PLOT AREA HARVESTED 0.00260

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93/R/RAW/8

WINTER OILSEED RAPE

WEED COMPETITION - RAPE AND CLEAVERS

Object: To study the competitive effect of cleavers (*Galium aparine*) on the growth and yield of w. rape sown on three different dates - Summerdells II.

Sponsors: P.J.W. Lutman.

Design: 3 blocks of 3 plots split into 6 sub plots.

Whole plot dimensions: 14.0 x 21.0.

Treatments: All combinations of:-

Whole plots

1. **SOW DATE** Time of sowing w. rape:

EARLY	Early September
MID	Mid September
LATE	Late September

Sub plots

2. **WEED DEN** Density of cleavers (plants per square metre):

	SOW DATE		
	EARLY	MID	LATE
D0(US)	0	0	0
D1	4	2	5
D2	18	7	14
D3	38	11	54
D4	77	26	112
D0(S)	0	0	0

NOTES: (1) Target **SOW DATE** EARLY: Late August, MID: Early September, LATE: Mid September.

(2) Target **WEED DEN** (plants per square metre) at each sowing date:

D0	D1	D2	D3	D4
0	4	16	32	64

(3) Cleaver seeds were broadcast by hand in the central 2.5 m of the plot.

(4) Broad-leaved herbicides applied to **WEED DEN** D0(S) plots only.

Experimental diary:

28-Jul-92 : B : Shallow cultivated with Bomford Dynadrive.
18-Aug-92 : B : Sting CT at 1.5 l in 200 l.
26-Aug-92 : B : Ploughed and furrow pressed.
03-Sep-92 : **T** : **SOW DATE** EARLY: Rotary harrowed. Weed seeds broadcast. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.

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93/R/RAW/8

Experimental diary:

15-Sep-92 : **T** : **SOW DATE** MID: Rotary harrowed. Weed seeds broadcast. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
28-Sep-92 : **T** : **SOW DATE** LATE: Rotary harrowed.
29-Sep-92 : **T** : **SOW DATE** LATE: Rotary harrowed. Weed seeds broadcast. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
23-Oct-92 : B : Club at 5.5 kg.
04-Nov-92 : **T** : **SOW DATE** EARLY, MID: Pilot at 75 ml with Cropspray 11E at 2.0 l in 200 l.
10-Dec-92 : **T** : **SOW DATE** EARLY, MID, LATE: D0(S) plots only: Benazalox at 0.75 kg and Kerb 50 W at 1.0 kg in 220 l.
18-Feb-93 : B : 34.5% N at 170 kg.
23-Mar-93 : B : 34.5% N at 370 kg.
17-Jul-93 : B : Reglone at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
28-Jul-93 : B : Combine harvested.

Previous crops: W. wheat 1991, w. barley 1992.

NOTE: Emergence counts were made and samples of Weed and crop taken on four occasions throughout the season for observations, counts and growth estimations.

GRAIN TONNES/HECTARE

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

WEED DEN	D0(US)	D1	D2	D3	D4	D0(S)	Mean
SOW DATE							
EARLY	3.51	3.07	2.13	1.87	1.23	3.81	2.60
MID	4.23	3.84	2.97	2.48	2.20	4.27	3.33
LATE	3.63	3.15	2.53	1.99	1.52	3.00	2.64
Mean	3.79	3.35	2.54	2.11	1.65	3.69	2.86

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

	SOW DATE	**WEED DEN**	**SOW DATE WEED DEN**
	0.155	0.138	0.268
Except when comparing means with the same level(s) of **SOW DATE**			0.240

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.190	6.7
BLOCK.WP.SP	30	0.293	10.3

GRAIN MEAN DM% 73.6 SUB PLOT AREA HARVESTED 0.00260

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93/R/RAW/9

WINTER OILSEED RAPE

WEED COMPETITION - RAPE AND MAYWEED

Object: To study the competitive effect of mayweed (*Matricaria perforata*) on the growth and yield of w. oilseed rape - Summerdells II.

Sponsors: P.J.W. Lutman.

Design: 4 blocks of 6 plots.

Whole plot dimensions: 3.0 x 14.0.

Treatments:

WEED DEN	Density of mayweed (plants per square metre):
D0	0
D1	20
D2	40
D3	86
D4	150
D5	400

NOTES: (1) Target **WEED DEN** (plants per square metre): D0 0, D1 12.5, D2 25, D3 50, D4 100, D5 200.
(2) Mayweed seeds were broadcast by hand in the central 2.5 m of the plot.

Experimental diary:

28-Jul-92 : B : Shallow cultivated with Bomford Dynadrive.
18-Aug-92 : B : Sting CT at 1.5 l in 200 l.
26-Aug-92 : B : Ploughed, furrow pressed.
15-Sep-92 : B : Rotary harrowed twice, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per square metre.
: **T** : **WEED DEN:** Weed seeds broadcast, raked in.
16-Sep-92 : B : Rolled.
22-Oct-92 : B : Draza at 5.5 kg.
18-Feb-93 : B : 34.5% N at 170 kg.
23-Mar-93 : B : 34.5% N at 370 kg.
17-Jul-93 : B : Reglone at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
28-Jul-93 : B : Combine harvested.

Previous crops: W. wheat 1991, w. barley 1992.

NOTE: Emergence counts were made and samples of weed and crop taken on four occasions throughout the season for observations, counts and growth estimations.

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93/R/RAW/9

GRAIN TONNES/HECTARE

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

WEED DEN

D0	3.33
D1	2.67
D2	1.89
D3	1.81
D4	1.65
D5	1.02
Mean	2.06

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

WEED DEN
0.194

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.274	13.3

GRAIN MEAN DM% 88.0

PLOT AREA HARVESTED 0.00253

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93/R/RAW/10

WINTER OILSEED RAPE

DISEASE PRESSURE AND GLUCOSINOLATES

Object: To study the effects on crop growth, yield and glucosinolate levels of winter oilseed rape grown under different disease pressures - Highfield ex - Ley Arable.

Sponsors: K.J. Doughty, H.A. McCartney, M.E. Lacey.

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

Whole plot dimensions: 6.0 x 10.0.

Treatments: All combinations of:-

1. **VARIETY** Varieties:

CAPRCORN	Capricorn
FALCON	Falcon

2. **FUNGINOC** Fungicide spray application and level of inoculation using infected straw:

NOFUNG	No fungicide spray
FUNGCIDE	Fungicide spray applied autumn, spring and summer
INOC 1	Inoculation level 1
INOC 2	Inoculation level 2

NOTE: Infected straw from a previous experiment was used for the inoculation. **FUNGINOC** INOC 1 received inoculum at one-quarter of the rate applied to INOC 2.

Experimental diary:

11-Aug-92 : B : Shallow cultivated with Bomford Dynadrive.
18-Aug-92 : B : Dolomite at 5.0 t.
19-Aug-92 : B : Gramoxone 100 at 2.0 l with Farmon Blue at 0.1 l in 200 l.
29-Aug-92 : B : Ploughed, furrow pressed.
01-Sep-92 : **T** : **VARIETY** CAPRCORN, FALCON: Rotary harrowed, varieties, dressed Lindex-Plus FS, drilled at 120 seeds per square metre, rolled.
20-Oct-92 : **T** : **FUNGINOC** INOC 1, INOC 2: Infected straw treatments applied.
24-Nov-92 : **T** : **FUNGINOC** FUNGCDE: Sportak 45 at 1.1 l in 220 l.
18-Jan-93 : B : Kerb 50W at 1.4 kg in 200 l.
17-Feb-93 : B : 34.5% N at 170 kg.
23-Mar-93 : B : 34.5% N at 370 kg.
15-Apr-93 : **T** : **FUNGINOC** FUNGCDE: Sportak 45 at 1.1 l in 200 l.
22-Jun-93 : **T** : **FUNGINOC** FUNGCDE: Rovral Flo at 2.0 l in 200 l.
21-Jul-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
28-Jul-93 : B : Combine harvested.

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93/R/RAW/10

Previous crops: W. wheat 1991, w. barley 1992.

NOTE: Assessments were made of disease progress, crop growth and canopy structure throughout the season. Samples were taken during vegetative growth and at harvest for estimation of glucosinolate concentrations.

GRAIN (AT 90% DM) TONNES/HECTARE

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

VARIETY / **FUNGINOC**	CAPRCORN	FALCON	Mean
NOFUNG	2.43	2.71	2.57
FUNGCDE	3.11	3.02	3.06
INOC 1	1.43	1.54	1.48
INOC 2	0.91	1.64	1.27
Mean	1.97	2.23	2.10

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

	FUNGINOC	**VARIETY**	**FUNGINOC VARIETY**
	0.177	0.126	0.251

Except when comparing means with the same level(s) of **FUNGINOC** 0.251

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.250	11.9
BLOCK.WP.SP	12	0.356	17.0

GRAIN MEAN DM% 79.4

SUB PLOT AREA HARVESTED 0.00230

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93/W/RAS/1

SPRING OILSEED RAPE

WEED COMPETITION AND N IN SPRING RAPE

Object: To investigate the effect of nitrogen fertilizer on the competitiveness of charlock and chickweed in spring rape - Woburn, Butt Furlong.

Sponsor: P.J.W. Lutman.

Design: 3 randomised blocks of 3 x 4 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **WEED SP** Weed species sown:

S ARVEN	*Sinapsis arvensis* (charlock)
S MEDIA	*Stellaria media* (chickweed)
NONE	None

2. **N** Rates of nitrogen (kg N):

50
100
150
200

Experimental diary:

04-Mar-93 : B : Ploughed
05-Mar-93 : B : Rolled.
29-Mar-93 : **T** : **N** 50, 100, 150, 200: Applied.
: **T** : **WEED SP** S ARVEN, S MEDIA: Weed seeds broadcast.
: B : Rotary harrowed.
: B : Starlight, dressed Lindex-Plus FS, drilled at 150 seeds per square metre.
04-Jun-93 : B : Decis at 0.50 l in 200 l.
13-Aug-93 : **T** : **N** 50, 100: Hand harvested.
19-Aug-93 : **T** : **N** 150, 200: Hand harvested.

NOTES: (1) Weed seeds were sown in the central 2m strip along the length of the plot.

(2) Target plant populations (plants per square metre) and sowing rates (g per square metre) were respectively S ARVEN 100, 4.0, S MEDIA 400, 0.8.

(3) Population counts of crop and weeds were made in May. Ground cover was assessed throughout the season and plant biomass samples were taken in June and August.

(4) The **WEED SP** S ARVEN plots were not harvested because the weed density was too high, no rape survived. One plot was severely grazed by rabbits. The yield of this plot with treatment combination **WEED SP** NONE **N** 50 was lost. An estimated value was used in the analysis.

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93/W/RAS/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

N	50	100	150	200	Mean
WEED SP					
S MEDIA	1.05	1.68	1.78	1.29	1.45
NONE	1.40	1.37	2.73	2.06	1.89
Mean	1.22	1.53	2.25	1.67	1.67

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

WEED SP	N	WEED SP N
0.244	0.345	0.488

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	13	0.598	35.8

GRAIN MEAN DM% 90.2

PLOT AREA HARVESTED 0.00010

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93/W/RAS/2

SPRING OILSEED RAPE

SULPHUR AND NITROGEN

Object: To determine the effects of different rates of sulphur and nitrogen fertilizer on the yield and sulphur content of s. rape - Woburn, School Field.

Sponsors: S.P. McGrath, F. Zhao, G.F.J. Milford, J. Fieldsend.

Design: 4 randomised blocks of 12.

Whole plot dimensions: 4.0 x 10.0.

Treatments: All combinations of:-

1. **N** Rates of nitrogen (kg N):

   50
   100
   150

2. **SULPHUR** Rates of sulphur (kg S):

   0
   10
   20
   40

Experimental diary:

17-Mar-93 : B : Ploughed.
24-Mar-93 : B : Treflan at 2.3 l in 200 l, rotary cultivated with crumbler attached, Starlight, dressed Lindex-Plus FS, drilled at 8 kg.
25-Mar-93 : **T** : **N** 50, 100, 150: Applied as 27% N.
15-Apr-93 : **T** : **SULPHUR** 10, 20, 40: Applied as gypsum (17.5% S).
04-Jun-93 : B : Decis at 0.50 l in 200 l.
04-Sep-93 : B : Combine harvested.

NOTE: Previous w. rape crop failed, experiment was resown to s. rape.

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93/W/RAS/2

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SULPHUR / N	0	10	20	40	Mean
50	3.94	3.70	3.68	3.78	3.78
100	4.39	4.23	4.19	4.03	4.21
150	4.14	4.23	3.95	4.40	4.18
Mean	4.16	4.06	3.94	4.07	4.05

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

N	SULPHUR	N SULPHUR
0.117	0.135	0.234

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.332	8.2

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00176

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93/R/BEW/2

WINTER BEANS

WEED COMPETITION - BEANS AND WEEDS

Object: To investigate the effects of two weed species on each other and on the growth and yield of winter beans - Bylands.

Sponsors: P.J.W. Lutman, R.C. Van Acker.

Design: 3 blocks of 5 x 5 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments:

1. **BRLY DEN** Barley density (established plants per square metre):

B0	0
B1	13
B2	30
B3	72
B4	154

2. **CHCK DEN** Chickweed density (established plants per square metre):

C0	0
C1	9
C2	40
C3	186
C4	307

NOTES: (1) Target weed densities (established plants per square metre):
BRLY DEN: 0, 50, 100, 200, 400
CHCK DEN: 0, 50, 200, 600, 1200
(2) Barley and chickweed seeds were sown on restricted areas of each plot as follows:
BRLY DEN central 2m, **CHCK DEN** central 2.5m.

Experimental diary:

29-Sep-92 : B : Ploughed.
30-Oct-92 : B : Spring-tine cultivated.
: **T** : **BRLY DEN:** B1, B2, B3, B4: Puffin, dressed Cerevax, broadcast by machine.
: **T** : **CHCK DEN** C1, C2, C3, C4: Chickweed broadcast by hand.
31-Oct-92 : B : Rotary harrowed, Punch, undressed, drilled at 25 seeds per square metre.
17-Dec-92 : B : Draza at 5.5 kg.
10-Jun-93 : B : Bombardier at 2.0 l and Derosal WDG at 0.62 g in 300 l.
01-Sep-93 : B : Harvested by hand.

Previous crops: W. wheat 1991 and 1992.

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93/R/BEW/2

NOTE: Leaf area was measured and ground cover assessed for each species on two occasions. Dry weights of all species and number of bean stems per square metre were determined on four occasions. On the fourth occasion components of yield of both barley and beans were measured.

GRAIN TONNES/HECTARE

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

CHCK DEN / BRLY DEN	C0	C1	C2	C3	C4	Mean
B0	5.38	4.92	5.07	5.35	5.19	5.18
B1	5.08	5.08	4.41	5.28	5.13	5.00
B2	4.45	5.30	4.49	4.58	4.39	4.64
B3	4.58	4.95	5.43	4.57	4.91	4.89
B4	4.95	4.95	5.09	4.62	3.68	4.66
Mean	4.89	5.04	4.90	4.88	4.66	4.87

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

BRLY DEN	CHCK DEN	BRLY DEN CHCK DEN
0.169	0.169	0.379

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	48	0.464	9.5

GRAIN MEAN DM% *

PLOT AREA HARVESTED 0.00010

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93/R/BES/2

SPRING BEANS

WEEVILS AND INSECTICIDE

Object: To relate numbers of overwintering *Sitona lineatus* to the most effective timing of application of insecticide to spring beans - White Horse II.

Sponsors: L.E. Smart, M.M. Blight, R.T. Glinwood.

Design: 5 x 5 quasi-complete latin square.

Whole plot dimensions: 6.0 x 6.0.

Treatments:

DELT TIM	Timing of deltamethrin spray application:
NONE	None
EARLY	Early
MID	Mid
LATE	Late
EAR+LAT	Early and Late

Experimental diary:

10-Feb-93 : B : Ploughed.
23-Mar-93 : B : Rotary harrowed.
24-Mar-93 : B : Rotary harrowed, Alfred, undressed, drilled at 60 seeds per square metre.
25-Mar-93 : B : Opogard 500 FW at 3.4 l in 200 l.
30-Apr-93 : **T** : **DELT TIM** EARLY, EAR+LAT: Deltamethrin at 7.5 g in 200 l.
10-May-93 : **T** : **DELT TIM** MID: Deltamethrin at 7.5 g in 200 l.
18-May-93 : **T** : **DELT TIM** LATE, EAR+LAT: Deltamethrin at 7.5 g in 200 l.
06-Sep-93 : B : Combine harvested.

Previous crops: Linseed 1991 and 1992.

NOTE: Assessments of adult and larval *Sitona lineatus* population size and feeding damage were made between April and June.

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93/R/BES/2

GRAIN TONNES/HECTARE

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

DELT TIM	NONE	EARLY	MID	LATE	EAR+LAT	Mean
	5.12	5.23	5.25	5.45	5.41	5.29

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

DELT TIM
0.172

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.272	5.1

GRAIN MEAN DM% 83.3

SUB PLOT AREA HARVESTED 0.00138

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93/R/BES/3

SPRING BEANS

PHEROMONE, FUNGAL PATHOGENS AND INSECTICIDE

Object: To test the most effective timing of application of insecticide and fungal pathogen to plots treated with *Sitona lineatus* aggregation pheromone - White Horse II.

Sponsors: L.E. Smart, M.M. Blight, R.T. Glinwood.

Design: 5 x 5 quasi-complete latin square.

Whole plot dimensions: 6.0 x 6.0.

Treatments:

CHEMPATH	Pheromone and time of application of fungal pathogen and insecticide:
NONE	None
PHER+BEA	Pheromone plus fungal pathogen early and late
P+D E	Pheromone plus deltamethrin early
P+D E+L	Pheromone plus deltamethrin early and late
PHER	Pheromone alone

NOTES: (1) The pheromone was 4-methyl-3,5-heptanedione and was released slowly from a point source at the centre of the plot at approximately 100 µg per day per plot.

(2) The fungal pathogen was spores of *Beauveria bassoiana* in surfactant solution. 6 x 10^{10} spores in 200 ml were applied to the centre square metre of each plot.

Experimental diary:

10-Feb-93 : B : Ploughed.
22-Feb-93 : B : Rotary harrowed.
23-Feb-93 : B : Rotary harrowed, Alfred, undressed, drilled at 60 seeds per square metre.
22-Mar-93 : **T** : **CHEMPATH**: PHER+BEA, P+D E, P+D E+L, PHER: Pheromone source applied.
08-Apr-93 : **T** : **CHEMPATH**: P+D E, P+D E+L: Deltamethrin (as Decis) at 7.5 g in 200 l.
14-Apr-93 : **T** : **CHEMPATH**: PHER+BEA: *Beauveria sp.* spores applied.
30-Apr-93 : **T** : **CHEMPATH**: P+D E+L: Deltamethrin (as Decis) at 7.5 g in 200 l.
18-May-93 : **T** : **CHEMPATH**: PHER+BEA: *Beauveria sp.* spores applied.
03-Sep-93 : **T** : Combine harvested.

Previous crops: Linseed 1991 and 1992.

NOTE: Assessments of adult and larval *Sitona lineatus* population size and feeding damage were made between April and June.

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93/R/BES/3

GRAIN TONNES/HECTARE

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

CHEMPATH	NONE	PHER+BEA	P+D E	P+D E+L	PHER	Mean
	4.83	4.74	4.64	4.47	4.83	4.70

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

CHEMPATH
0.140

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.221	4.7

GRAIN MEAN DM% 83.3

PLOT AREA HARVESTED 0.00138

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93/R/LP/1

WINTER LUPINS

LUPIN VARIETIES

Object: To assess crop structure, yield and maturity date of a number of lines of winter lupins - Long Hoos IV South.

Sponsors: G.F.J. Milford, H.J. Stevenson, J.E. Leach, J.M. Day, T. Scott.

Design: 3 blocks of 15 plots.

Whole plot dimensions: 2.0 x 3.0.

Treatments:

GENOTYPE	Genotypes:
L1	CH304/70
L2	CH304/71
L3	CH304/73
L4	XA 100
L5	RES 1
L6	LUS 5
L7	LUS 21
L8	LUS 24
L9	LUS 26
L10	LUS 54
L11	LUS 60
L12	LUS 64
L13	LUS 118
L14	LUS 131
L15	LUS 139

Experimental Diary:

06-Oct-92 : B : Ploughed.
09-Oct-92 : B : Rotary harrowed.
: **T** : **GENOTYPE:** All genotypes, inoculated with rhizobium, hand sown at 42 seeds per square metre.
: B : Yaltox at 35 kg, by hand.
13-Oct-92 : B : Opogard 500 FW at 2.8 l in 200 l.
22-Jun-93 : B : Power Dimethoate at 1.7 kg in 200 l.
02-Jul-93 : B : Mistral at 1.0 l in 200 l.
: B : Sportak 45 at 1.1 l in 200 l.
01-Sep-92 : **T** : **GENOTYPE** L2, L3: Hand harvested.
07-Sep-92 : **T** : **GENOTYPE** L5, L8, L12 excluding one replicate of L12: Hand harvested.
29-Sep-92 : **T** : **GENOTYPE** L1, L6, L11, L13, L14: Hand harvested.
07-Oct-92 : **T** : **GENOTYPE** L15 plus one replicate of L10 and L12: Hand harvested.
26-Oct-92 : **T** : **GENOTYPE** L4, L7, L9, L10 excluding one replicate of L10: Hand harvested.

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93/R/LP/1

Previous crops: S. barley 1991, fallow 1992.

NOTES: (1) Hand harvesting period was extended because of wet weather.
(2) Plant counts were made throughout the season and measurements of plant height, structure, time of flowering, flower colour and floret numbers taken. Pod, seed and branch numbers and seed dry weights were measured at harvest.
(3) Because of rodent damage the yield of one plot was lost with treatment **GENOTYPE** L15. An estimated value was used in the analysis.

GRAIN TONNES/HECTARE

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

GENOTYPE	
L1	6.28
L2	0.66
L3	1.71
L4	2.44
L5	0.45
L6	3.61
L7	2.88
L8	1.38
L9	2.89
L10	0.52
L11	2.33
L12	2.25
L13	2.48
L14	2.51
L15	0.73
Mean	2.21

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

GENOTYPE
0.623

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.763	34.5

MEAN DM% *

PLOT AREA HARVESTED 0.00049

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93/R/LP/2

WINTER LUPINS

SOWING DATE, POPULATION AND DISEASE

Object: To establish the effect of sowing date and plant density on plant structure, yield and harvest date and to investigate the occurrence and significance of root-infecting pathogens - Long Hoos III 2, 4, 5 and 6.

Sponsors: J.M. Day, G.F.J. Milford, J.E. Leach, J.F. Jenkyn, G.L. Bateman, H.J. Stevenson, T. Scott, D.P. Yeoman.

Design: 4 blocks of 4 plots split into 5 sub plots.

Whole plot dimensions: 2.88 x 6.0.

Treatments:

Whole plots

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

EAR SEP	Early September
MID SEP	Mid September
EAR OCT	Early October
MID OCT	Mid October

Sub plots

2. **POPULATN** Plant population at establishment (plants per square metre):

P1	13
P2	17
P3	21
P4	28

NOTES: (1) Sowing rates used to achieve the required plant populations were 28, 42, 56 and 70 seeds per square metre respectively.
(2) **POPULATN** P2 was duplicated to allow additional sampling.

Experimental Diary:

07-Sep-92 : B : Ploughed.
08-Sep-92 : B : Rolled.
: **T** : **SOW DATE** EAR SEP: Rotary harrowed twice.
09-Sep-92 : **T** : **SOW DATE** EAR SEP: CH304/70, inoculated rhizobium, drilled.
10-Sep-92 : **T** : **SOW DATE** EAR SEP: Opogard 500 FW at 2.8 l in 220 l.
21-Sep-92 : **T** : **SOW DATE** MID SEP: Heavy spring-tine cultivated.
06-Oct-92 : **T** : **SOW DATE** MID SEP: Rotary harrowed, CH304/70, inoculated rhizobium, drilled.
08-Oct-92 : **T** : **SOW DATE** MID SEP: Opogard 500 FW at 2.8 l in 220 l.

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93/R/LP/2

Experimental diary:

19-Oct-92 : **T** : **SOW DATE** EAR OCT: Rotary harrowed, CH304/70, inoculated rhizobium, drilled.
: **T** : **SOW DATE** EAR OCT: Opogard 500 FW at 2.8 l in 220 l.
04-Nov-92 : **T** : **SOW DATE** MID OCT: Heavy spring-tine cultivated.
05-Nov-92 : **T** : **SOW DATE** MID OCT: Rotary harrowed CH304/70 inoculated rhizobium, drilled.
22-Jun-93 : B : Power Dimethoate at 1.7 kg in 200 l.
02-Jul-93 : B : Sportak at 1.1 l in 200 l.
06-Sep-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.3 l in 260 l.
13-Sep-93 : **T** : **SOW DATE** EAR SEP: Hand harvested.
14-Sep-93 : **T** : **SOW DATE** MID SEP, EAR OCT, MID OCT: Hand harvested.

Previous crops: Long Hoos III 2 Lupins 1991, fallow 1992.
Long Hoos III 4 Lupins 1991, s.wheat 1992.
Long Hoos III 5 Fallow 1991, s. wheat 1992.

NOTE: (1) Plant counts were made throughout the season and measurements of plant height, structure, time of flowering and maximum floret numbers were recorded.
(2) Owing to waterlogging during the winter one of the four blocks failed and was abandoned. Yields were, therefore, measured on only three blocks.
(3) The yield of one plot was lost with treatment combination **SOW DATE** EAR SEP, **POPULATN** P2. An estimated value was used in the analysis.

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93/R/LP/2

GRAIN TONNES/HECTARE

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

SOW DATE / **POPULATN**	EAR SEP	MID SEP	EAR OCT	MID OCT	Mean
P1	1.26	0.58	0.28	0.74	0.71
P2	2.59	0.53	0.18	0.68	1.00
P3	2.15	0.97	0.42	0.98	1.13
P4	2.63	0.91	0.91	1.20	1.41
Mean	2.24	0.70	0.39	0.86	1.05

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

Table	**POPULATN**	**SOW DATE**	**POPULATN** **SOW DATE**	
s.e.d.	0.167		0.395	min.rep
	0.145	0.257	0.358	max-min
			0.316	max.rep
Except when comparing means with the same level(s) of **SOW DATE**			0.335	min.rep
			0.290	max-min

	POPULATN
max.rep	P2
max-min	P2 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	6	0.315	30.1
BLOCK.WP.SP	35	0.410	39.1

MEAN DM% *

PLOT AREA HARVESTED 0.00102

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93/R/SU/1

SUNFLOWERS

VARIETIES & DISEASE

Object: To assess early maturing varieties of sunflowers and their susceptibility to *Botrytis cinerea* and other fungal diseases - Great Field I/II.

Sponsors: V.J. Church, H.A. McCartney.

Design: 6 blocks of 4 plots.

Whole plot dimensions: 3.5 x 10.0.

Treatments:

1. **VARIETY** Varieties:

AVANTE	Avante
ALLEGRO	Allegro
FIN 1651A	Finnish variety 1651A
FIN 400A	Finnish variety 400A

NOTES: (1) Sunflowers failed on original site. Experiment was re-sited following immature linseed, cultivated in.
(2) Experiment was netted from pre-emergence until harvest.

Experimental diary:

06-May-93	B	34.5% N at 220 kg.
13-May-93	B	Decis at 0.30 l in 200 l.
01-Jun-93	B	Cultivated by rotary grubber.
	T	**VARIETY** AVANTE, ALLEGRO, FIN 1651A, FIN 400A: Rotary harrowed, varieties drilled at 14 seeds per square metre.
	B	Stomp 400 at 5.0 l in 200 l.
09-Jun-93	B	Draza at 5.5 kg.
30-Jun-93	B	Laser at 2.25 l in 220 l.
22-Sep-93	**T**	**VARIETY** AVANTE, ALLEGRO: Reglone at 3.0 l with Vassgro Spreader at 0.40 l in 400 l.
06-Oct-93	**T**	**VARIETY** AVANTE, ALLEGRO: Cut by hand, subsequently threshed by stationary combine harvester.
12-Oct-93	**T**	**VARIETY** FIN 400A: Cut by hand, subsequently threshed by stationary combine harvester.

Previous crops: W. rape 1991, linseed 1992.

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93/R/SU/1

NOTES: (1) **VARIETY** FIN 1651A plots were not harvested owing to adverse weather conditions.
(2) Growth stage assessments were made from emergence to desiccation. Incidence of *Botrytis cinerea* and other diseases were assessed from end of July until desiccation. Airborne spores were monitored throughout the season, seed moisture was assessed during seed development and oil content measured at harvest.

GRAIN TONNES/HECTARE

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

VARIETY	
AVANTE	2.39
ALLEGRO	2.32
FIN 400A	2.47
Mean	2.39

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

VARIETY
0.099

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	10	0.171	7.1

GRAIN MEAN DM% 80.8

PLOT AREA HARVESTED 0.00150

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93/R/LN/1

LINSEED

VARIETIES AND DISEASE

Object: To investigate the effects of pathogens on varieties of linseed - Sawyers II.

Sponsors: B.D.L. Fitt, J. Harold.

Design: 4 randomised blocks of 2 X 5 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments: All combinations of:-

1. **VARIETY** Varieties:

   ANTARES
   BARBARA
   MCGREGOR
   NORLIN
   CD 1747

2. **FUNGCIDE** Fungicidal sprays:

   NONE — None
   APPLIED — Iprodione during flowering, prochloraz and carbendazim plus maneb post-flowering

NOTE: Basal fungicidal seed dressing (prochloraz) was applied.

Experimental diary:

22-Jan-93 : B : Ploughed.
19-Apr-93 : B : Heavy spring-tine cultivated.
20-Apr-93 : **T** : **VARIETY** ANTARES, BARBARA, MCGREGOR, NORLIN, CD 1747: Rotary harrowed, varieties, dressed Prelude 20LF, drilled at 700 seeds per square metre.
12-May-93 : B : 34.5% N at 220 kg.
13-May-93 : B : Decis at 0.30 l in 200 l.
01-Jun-93 : B : Ally at 30 g in 200 l.
28-Jun-93 : **T** : **FUNGCIDE** APPLIED: Rovral Flo at 2.0 l in 200 l.
22-Jul-93 : **T** : **FUNGCIDE** APPLIED: Sportak 45 at 0.90 l in 200 l.
: **T** : **FUNGCIDE** APPLIED: Tripart Defensor FL at 1.0 l in 200 l.
04-Aug-93 : **T** : **FUNGCIDE** APPLIED: Multi-W FL at 5.0 l in 200 l.
06-Sep-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.30 l in 260 l.
23-Oct-93 : **T** : Combine harvested.

Previous crops: W. wheat 1991, s. wheat 1992.

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93/R/LN/1

NOTE: Emergence counts were made. Samples taken fortnightly between June and October for visual assessment of disease and assessment of pathogenic fungi by isolation on agar. Plant populations prior to harvest and oil content of seed were measured.

GRAIN (AT 90% DM) TONNES/HECTARE

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

FUNGCIDE / **VARIETY**	NONE	APPLIED	Mean
ANTARES	2.03	2.16	2.10
BARBARA	2.41	2.86	2.63
MCGREGOR	2.71	2.80	2.76
NORLIN	2.30	2.34	2.32
CD 1747	2.38	2.75	2.56
Mean	2.37	2.58	2.47

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

FUNGCIDE	**VARIETY**	**FUNGCIDE VARIETY**
0.070	0.111	0.157

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	27	0.222	9.0

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00276

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93/R/LN/2

LINSEED

WEED COMPETITION IN LINSEED

Object: To investigate the effects of two weed species on each other and on the growth and yield of linseed - Delafield.

Sponsor: R.C. Van Acker, P.J.W. Lutman.

Design: 2 blocks of 5 x 5 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **BRLY DEN** Barley density (established plants per square metre):

B0	0
B1	12
B2	22
B3	39
B4	61

2. **CHCK DEN** Chickweed density (established plants per square metre):

C0	0
C1	50
C2	112
C3	192
C4	381

NOTES: (1) Target plant populations (established plants per square metre):
BRLY DEN 0, 25, 50, 100, 200
CHCK DEN 0, 100, 200, 400, 800
(2) Barley and chickweed seeds were sown on restricted areas of each plot as follows:
BRLY DEN central 2m, **CHCK DEN** central 2.5m.

Experimental diary:

13-Nov-92 : B : FYM at 25 tonnes.
20-Jan-93 : B : Ploughed.
29-Apr-93 : B : Rotary harrowed.
30-Apr-93 : **T** : **CHCK DEN** C1, C2, C3, C4: Broadcast by hand.
: **T** : **BRLY DEN** B1, B2, B3, B4: Alexis, dressed Cerevax Extra, drilled.
: B : Rotary harrowed, Antares, dressed Prelude 20 LF, drilled at 700 seeds per square metre.
05-May-93 : B : Rolled.
12-May-93 : B : 34.5% N at 220 kg.

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93/R/LN/2

Experimental diary:
13-May-93 : B : Decis at 0.30 l in 200 l.
06-Sep-93 : B : Stefes Diquat at 3.0 l with Vassgro Spreader at 0.30 l in 260 l.
17-Sep-93 : B : Harvested by hand.

Previous crops: W. wheat 1992, s. beans 1992.

NOTE: Leaf area was measured and ground cover assessed for each species on two occasions. Dry weights of all species were determined on four occasions. On the fourth occasion components of yield of barley and number of chickweed capsules per square metre were measured. Components of yield of linseed were measured at harvest.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

CHCK DEN / BRLY DEN	C0	C1	C2	C3	C4	Mean
B0	2.07	2.03	1.93	2.14	2.19	2.07
B1	2.01	1.91	2.13	1.56	1.51	1.82
B2	2.14	1.73	1.65	1.81	1.63	1.79
B3	1.73	1.49	1.47	1.37	1.47	1.51
B4	1.57	1.34	1.31	1.22	1.16	1.32
Mean	1.91	1.70	1.70	1.62	1.59	1.70

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

BRLY DEN	CHCK DEN	BRLY DEN CHCK DEN
0.068	0.068	0.152

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	24	0.152	8.9

GRAIN MEAN DM% *

PLOT AREA HARVESTED 0.00010

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93/R/LN/3

LINSEED

BOTRYTIS AND SEED INFECTION

Object: To determine the effect of *Botrytis cinerea* on the growth and yield of linseed, and to determine the route of infection to the seed - Sawyers II.

Sponsors: J. Harold, B.D.L. Fitt.

Design: 3 blocks of 6 plots.

Whole plot dimensions: 3.0 x 20.0.

Treatments:

FUNGCIDE	Fungicidal sprays applied consecutively during flowering:
NONE	None
CA+PR+CA	Carbendazim, prochloraz and carbendazim
IP+PR+IP	Iprodione, prochloraz and iprodione

Experimental diary:

22-Jan-93 : B : Ploughed.
19-Apr-93 : B : Heavy spring-tine cultivated.
20-Apr-93 : B : Rotary harrowed, Antares, dressed Prelude 20 LF, drilled at 700 seeds per square metre.
28-Jun-93 : **T** : **FUNGCIDE** CA+PR+CA: Tripart Defensor FL at 1.0 l in 200 l.
: **T** : **FUNGCIDE** IP+PR+IP: Rovral Flo at 2.0 l in 200 l.
22-Jul-93 : **T** : **FUNGCIDE** CA+PR+CA, IP+PR+IP: Sportak 45 at 0.90 l in 200 l.
04-Aug-93 : **T** : **FUNGCIDE** CA+PR+CA: Tripart Defensor FL at 1.0 l in 200 l.
: **T** : **FUNGCIDE** IP+PR+IP: Rovral Flo at 2.0 l in 200 l.
23-Oct-93 : B : Combine harvested.

Previous crops: W. wheat 1991, s. wheat 1992.

NOTE: Emergence counts were made. Samples were taken fortnightly from mid-June until September for assessment of growth stages and disease symptoms. Incidence of pathogenic fungi on various plant components was assessed by isolation on agar.

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93/R/LN/3

GRAIN (AT 90% DM) TONNES/HECTARE

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

FUNGCIDE	
NONE	1.82
CA+PR+CA	2.25
IR+PR+IP	2.10
Mean	2.06

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

FUNGCIDE
0.067

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	13	0.116	5.6

GRAIN MEAN DM% 87.5

PLOT AREA HARVESTED 0.00460

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93/R/LN/6

LINSEED

WEED TYPES IN LINSEED

Object: To study the effects of three contrasting weed species on the growth and yield of linseed - Delafield.

Sponsors: P.J.W. Lutman.

Design: 3 blocks of (3 x 5) + 2 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **SPECIES** Weed species:

CULT OAT	Cultivated oats (*Avena sativa*)
FAT HEN	Fat hen (*Chenopodium album*)
KNOT GR	Knotgrass (*Polygonum aviculare*)

2. **SOW DEN** Density of established plants (plants per square metre):

	Cultivated oats	Fat hen	Knotgrass
D0	0	0	0
D1	6	2	2
D2	21	9	6
D3	36	18	11
D4	66	32	18

plus two extra plots

WILD OAT Density of established wild oats (plants per square metre):

W1	10
W2	38

NOTES: (1) Target seed densities (seeds sown per square metre):

SPECIES	D0	D1	D2	D3	D4
Cultivated oats	0	12.5	50	100	200
Fat hen	0	100	400	800	1600
Knotgrass	0	120	480	960	1920

WILD OAT	W1	W2
	50	200

(2) Weed species were sown in the central 2.5 m of each plot.

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93/R/LN/6

Experimental diary:

```
   13-Nov-92 : B : Farmyard manure at 25 tonnes.
   20-Jan-93 : B : Ploughed.
   29-Apr-93 : B : Rotary harrowed.
             : T : SPECIES CULT OAT, FAT HEN, KNOT GRASS: Seed broadcast by
                   hand.
             : T : WILD OAT W1, W2: Seed broadcast by hand.
             : B : Rotary harrowed, Antares, dressed Prelude 20 LF, drilled
                   at 700 seeds per square metre.
   05-May-93 : B : Rolled.
   12-May-93 : B : 34.5% N at 220 kg.
   13-May-93 : B : Decis at 0.30 l in 200 l.
   06-Sep-93 : B : Stefes Diquat at 1.0 l with Vassgro Spreader at 0.30 l
                   in 260 l.
   12-Sep-93 : B : Harvested by hand.
```

Previous crops: W. wheat 1991, s. beans 1992.

NOTE: Emergence counts were made. Samples were taken for measurement of dry weight, height and boll numbers. Crop and weed plant numbers were counted throughout the season.

GRAIN TONNES/HECTARE

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

SOW DEN / SPECIES	D0	D1	D2	D3	D4	Mean
CULT OAT	2.37	2.43	2.12	1.81	1.36	2.02
FAT HEN	2.41	2.09	2.13	1.93	1.77	2.07
KNOT GR	2.38	2.41	2.29	2.10	1.96	2.23
Mean	2.39	2.31	2.18	1.94	1.70	2.10

WILD OAT	W1	W2	Mean
	2.32	2.06	2.19

GRAND MEAN 2.11

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

SPECIES	SOW DEN	SPECIES SOW DEN &WILD OAT
0.090	0.116	0.201

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	32	0.246	11.6

GRAIN MEAN DM% 81.0 PLOT AREA HARVESTED 0.00010

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93/W/P/1

POTATOES

DOUBLE CROPPING

Object: To study the effects of growing two crops of potatoes in one season on the population dynamics of *Globodera pallida* - Woburn, Mill Dam Close III.

Sponsors: K. Evans, P.D. Halford.

Design: 3 blocks of 2 x 2 plots with external dummy plots.

Whole plot dimensions: 3.0 x 6.0.

Treatments: All combinations of:-

1. **CROPPING** Cropping:

   DOUBLE Double crop: Pentland Javelin, then Costella
   MAIN Main crop: Costella

2. **NEMACIDE** Nematicide applied:

   NONE None
   OXAMYL Oxamyl at 4.0 kg

Experimental diary:

10-Aug-92 : B : Subsoiled to 45 cm with tines 1.5 m apart
21-Jan-93 : B : Ploughed.
25-Jan-93 : B : Covered with polythene sheeting.
24-Feb-93 : T : **CROPPING** DOUBLE: Spike rotavated, PK as (0:24:24) at 1265 kg, 27% N at 666 kg.
: T : **CROPPING** DOUBLE, **NEMACIDE** OXAMYL: Oxamyl at 4.0 kg.
: T : **CROPPING** DOUBLE: Spike rotavated, Pentland Javelin, dressed Rizolex Flowable, planted. Rotalin at 3.5 l in 250 l.
: B : Re-covered with polythene sheeting.
20-Apr-93 : T : **CROPPING** MAIN: PK as (0:24:24) at 1265 kg 27% N at 666 kg.
: T : **CROPPING** MAIN, **NEMACIDE** OXAMYL: Oxamyl at 4.0 kg.
: T : **CROPPING** MAIN: Spike rotavated, Costella planted.
22-Apr-93 : T : **CROPPING** DOUBLE: Re-covered with polythene sheeting.
12-May-93 : T : **CROPPING** MAIN: Arresin at 5.0 l in 250 l.
14-May-93 : T : **CROPPING** DOUBLE: Removed polythene sheeting.
18-May-93 : T : **CROPPING** MAIN: Gramoxone 100 at 3.0 l in 250 l.
17-Jun-93 : B : Chiltern Manex at 2.5 l with Intracrop BLA at 0.30 l in 300 l.
24-Jun-93 : T : **CROPPING** DOUBLE: Pentland Javelin lifted.
25-Jun-93 : T : **CROPPING** DOUBLE: Haulm raked off, rotary cultivated, PK as (0:24:24) at 1265 kg, 27% N at 666 kg. Rotary cultivated, ridged up, Costella planted.
08-Jul-93 : B : Irrigated 12.5 mm.
13-Jul-93 : B : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.30 l in 300 l.

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93/W/P/1

Experimental diary:

30-Jul-93 : B : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.30 l and Polyverdol at 3.0 l in 300 l.
09-Aug-93 : **T** : **CROPPING** DOUBLE: Hand hoed.
13-Aug-93 : B : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.30 l in 300 l.
24-Aug-93 : B : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.30 l in 300 l.
01-Sep-93 : **T** : **CROPPING** MAIN: Costella lifted.
04-Sep-93 : **T** : **CROPPING** DOUBLE: Brestan 60 at 0.5 kg in 300 l.
17-Sep-93 : **T** : **CROPPING** DOUBLE: Brestan 60 at 0.5 kg in 300 l.
21-Oct-93 : **T** : **CROPPING** DOUBLE: Costella lifted.

NOTES: (1) Potatoes were planted at 75 cm spacing between rows, 30 cm within rows.
(2) Polyverdol is a foliar nutrient solution (8:8:6) containing chelated trace elements, vitamin B, and plant growth hormones.
(3) Soil samples were taken before planting and after each crop for nematode counts. Root samples were taken six and ten weeks after planting each crop for assessment of nematode population densities. Disease assessments were made in spring and tubers were assessed for disease after each harvest.

TOTAL TUBERS TONNES/HECTARE

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

NEMACIDE	NONE	OXAMYL	Mean
CROPPING			
DOUBLE	17.7	18.6	18.1
MAIN	10.6	20.9	15.8
Mean	14.2	19.7	17.0

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

CROPPING	**NEMACIDE**	**CROPPING NEMACIDE**
0.873	0.873	1.234

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	1.511	8.9

PLOT AREA HARVESTED *

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93/R/P/4

POTATOES

EFFECTS OF SILVER SCURF AND BLACK DOT

Object: To investigate the effect of planting seed with and without silver scurf into soil with or without black dot inoculum on disease in the subsequent crop at two harvest dates and after storage - Long Hoos V 2.

Sponsors: P.J. Read.

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

Whole plot dimensions: 1.5 x 5.7.

Treatments: All combinations of:-

1. **VARIETY**		Varieties:
	ESTIMA	Estima
	K EDWARD	King Edward
2. **SIL SCRF**		Infection with silver scurf (*Helminthosporium solani*):
	SS NONE	None
	SS INF	Infected
3. **BLK DOT**		Infection with black dot (*Colletotrichum coccodes*):
	BD NONE	None
	BD INF	Infected
4. **HARVEST**		Time of harvesting:
	SEP	September
	OCT	October

NOTES: (1) **SIL SCRF** SS NONE: Tubers treated with imazalil to guarantee no infection.
(2) **SIL SCRF** SS INF: Tubers naturally infected with silver scurf.
(3) **BLK DOT** BD INF: Vermiculite, infected with black dot, scattered on tubers at planting.

Experimental diary:

```
08-Oct-92 : B : PK as (0:18:36) at 1390 kg.
22-Jan-93 : B : Ploughed.
25-Mar-93 : B : NPK as (12:12:20) at 1250 kg.
20-Apr-93 : B : 34.5% N at 220 kg.
05-May-93 : B : Heavy spring-tine cultivated.
          : B : Rotary harrowed.
06-May-93 : B : Rotary ridged.
11-May-93 : T : VARIETY ESTIMA, K EDWARD: Varieties hand planted, ridges
                split back.
13-May-93 : B : Rotary ridged.
```


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93/R/P/4

Experimental diary:

19-May-93 : B : Rotalin at 5.5 l in 200 l.
22-Jun-93 : B : Ashlade Mancozeb FL at 2.2 l with Intracrop BLA at 0.20 l in 200 l.
08-Jul-93 : B : Ashlade Mancozeb FL at 2.2 l in 200 l.
22-Jul-93 : B : Ashlade Mancozeb FL at 2.2 l with Intracrop BLA at 0.20 l in 200 l.
06-Aug-93 : B : Ashlade Mancozeb FL at 2.2 l with Intracrop BLA at 0.20 l in 200 l.
25-Aug-93 : B : Chiltern Super-Tin 4L at 0.56 l with Intracrop BLA at 0.20 l in 200 l.
18-Sep-93 : B : Haulm mechanically destroyed.
22-Sep-93 : T : **HARVEST** SEP: Dug by hand.
26-Oct-93 : T : **HARVEST** OCT: Lifted by machine, hand picked.

Previous crops: Lupins 1991, mustard 1992.

NOTE: Black dot and silver scurf were assessed on tubers after harvest and after six months storage.

TOTAL TUBERS TONNES/HECTARE

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

SIL SCRF	SS NONE	SS INF	Mean
VARIETY			
ESTIMA	48.4	52.4	50.4
K EDWARD	55.6	58.4	57.0
Mean	52.0	55.4	53.7

BLK DOT	BD NONE	BD INF	Mean
VARIETY			
ESTIMA	50.1	50.7	50.4
K EDWARD	59.3	54.7	57.0
Mean	54.7	52.7	53.7

BLK DOT	BD NONE	BD INF	Mean
SIL SCRF			
SS NONE	53.5	50.5	52.0
SS INF	55.9	54.9	55.4
Mean	54.7	52.7	53.7

HARVEST	SEP	OCT	Mean
VARIETY			
ESTIMA	51.3	49.5	50.4
K EDWARD	58.3	55.7	57.0
Mean	54.8	52.6	53.7

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TOTAL TUBERS TONNES/HECTARE

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

HARVEST	SEP	OCT	Mean
SIL SCRF			
SS NONE	53.4	50.6	52.0
SS INF	56.2	54.5	55.4
Mean	54.8	52.6	53.7

HARVEST	SEP	OCT	Mean
BLK DOT			
BD NONE	57.0	52.4	54.7
BD INF	52.6	52.8	52.7
Mean	54.8	52.6	53.7

	BLK DOT	BD NONE	BD INF
VARIETY	SIL SCRF		
ESTIMA	SS NONE	48.6	48.2
	SS INF	51.6	53.1
K EDWARD	SS NONE	58.4	52.9
	SS INF	60.1	56.6

	HARVEST	SEP	OCT
VARIETY	SIL SCRF		
ESTIMA	SS NONE	49.6	47.2
	SS INF	53.1	51.7
K EDWARD	SS NONE	57.2	54.0
	SS INF	59.3	57.4

	HARVEST	SEP	OCT
VARIETY	BLK DOT		
ESTIMA	BD NONE	52.7	47.5
	BD INF	49.9	51.4
K EDWARD	BD NONE	61.3	57.3
	BD INF	55.3	54.2

	HARVEST	SEP	OCT
SIL SCRF	BLK DOT		
SS NONE	BD NONE	56.4	50.6
	BD INF	50.4	50.7
SS INF	BD NONE	57.6	54.1
	BD INF	54.8	54.9

	BLK DOT	BD NONE		BD INF	
VARIETY SIL SCRF	HARVEST	SEP	OCT	SEP	OCT
ESTIMA SS NONE		51.1	46.1	48.1	48.4
SS INF		54.4	48.8	51.8	54.5
K EDWARD SS NONE		61.7	55.1	52.8	52.9
SS INF		60.9	59.4	57.7	55.4

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93/R/P/4

TOTAL TUBERS TONNES/HECTARE

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

VARIETY	SIL SCRF	BLK DOT	HARVEST
1.29	1.29	1.29	1.29

VARIETY SIL SCRF	VARIETY BLK DOT	SIL SCRF BLK DOT	VARIETY HARVEST
1.83	1.83	1.83	1.83

SIL SCRF HARVEST	BLK DOT HARVEST	VARIETY SIL SCRF BLK DOT	VARIETY SIL SCRF HARVEST
1.83	1.83	2.59	2.59

VARIETY BLK DOT HARVEST	SIL SCRF BLK DOT HARVEST	VARIETY SIL SCRF BLK DOT HARVEST
2.59	2.59	3.66

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	4.48	8.3
PLOT AREA HARVESTED	0.00086		

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93/W/M/1

MIXED 1

METHODS OF COVER CROP ESTABLISHMENT

Object: To examine the effectiveness of a range of methods of establishing cover crops and their effect on a following crop of linseed - Woburn, Far Field II.

Sponsor: D.G. Christian.

W. barley, forage rape, then linseed.

Design: 3 blocks of 15 plots split into 2 sub plots.

Whole plot dimensions: 6.0 x 12.0

Treatments:

Whole plots

1.	**CROP**	Crop:
	W BARLEY	Winter barley
	F RAPE	Forage rape
2.	**SOW METH**	Method of sowing:
	DISC	Disced, broadcast
	DYNADRIV	Rotary cultivated with Bomford Dynadrive, broadcast
	DR DRILL	Direct drilled
3.	**SOW DATE**	Date of sowing:
	HARV+2	Two days after harvest of previous crop
	END SEPT	Last week of September

Sub plots

4.	**SPRING N**	Nitrogen fertilizer (kg N) in spring to linseed:
	0	
	75	

plus 2 extra treatments

Whole plots

1.	**CROP BC**	Crop broadcast into previous standing crop five days before harvest:
	W BARLEY	Winter barley
	F RAPE	Forage rape

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Sub plots

2. **SPR N BC** Nitrogen fertilizer (kg N) in spring to linseed:

0
75

plus one extra plot

1. **CROP ST** Stubble from previous crop:

STUBBLE

Sub plot

2. **SPR N ST** Nitrogen fertilizer (kg N) in spring to linseed:

0
75

Experimental diary:

11-Aug-92 : **T** : **CROP BC** W BARLEY: Puffin, dressed Cerevax Extra, broadcast at 180 kg.
: **T** : **CROP BC** F RAPE: Ember broadcast at 30 kg.
18-Aug-92 : B : Combine harvested previous w. wheat.
21-Aug-92 : **T** : **SOW DATE** HARV+2, **SOW METH** DISC: Disced, harrowed.
: **T** : **SOW DATE** HARV+2, **SOW METH** DYNADRIV: Rotary cultivated with Bomford Dynadrive.
: **T** : **SOW DATE** HARV+2, **SOW METH** DISC, DYNADRIV: Puffin, dressed Cerevax Extra, sown at 180 kg, Ember, undressed, sown at 30 kg.
: **T** : **SOW DATE** HARV+2, **SOW METH** DR DRILL: Puffin, dressed Cerevax Extra, direct drilled at 180 kg, Ember, undressed, direct drilled at 30 kg.
30-Sep-92 : **T** : **SOW DATE** END SEPT, **SOW METH** DR DRILL: Puffin, dressed Cerevax Extra, drilled at 180 kg, Ember, undressed, drilled at 30 kg.
01-Oct-92 : **T** : **SOW DATE** END SEPT, **SOW METH** DISC: Disced, harrowed.
: **T** : **SOW DATE** END SEPT, **SOW METH** DYNADRIV: Rotary cultivated with Bomford Dynadrive, harrowed.
: **T** : **SOW DATE** END SEPT, **SOW METH** DISC, DYNADRIV: Puffin, dressed Cerevax Extra, broadcast at 180 kg, Ember, undressed, broadcast at 30 kg. Harrowed.
23-Apr-93 : B : Ploughed.
05-May-93 : B : Rotary harrowed, Antares, dressed Prelude 20LF, drilled at 650 seeds per square metre.
07-May-93 : **T** : **SPRING N** 75, **SPR N BC** 75, **SPR N ST** 75: 27% N applied at 278 kg.
15-Jun-93 : B : Ally at 30 g in 200 l.
02-Sep-93 : B : Barclay Desiquat at 3.0 l with Vassgro Spreader at 0.30 l in 300 l.
18-Oct-93 : B : Combine harvested.

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NOTE: Plant populations, nitrogen content and dry weights were measured in October, December, April and at harvest. Capsules were counted and thousand-grain weights were measured at harvest.

GRAIN TONNES/HECTARE

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

SOW METH	DISC	DYNADRIV	DR DRILL	Mean
CROP				
W BARLEY	1.05	0.99	1.10	1.05
F RAPE	1.07	1.03	0.98	1.03
Mean	1.06	1.01	1.04	1.04

SOW DATE	HARV+2	END SEPT	Mean
CROP			
W BARLEY	1.08	1.01	1.05
F RAPE	0.95	1.10	1.03
Mean	1.02	1.05	1.04

SOW DATE	HARV+2	END SEPT	Mean
SOW METH			
DISC	1.11	1.01	1.06
DYNADRIV	0.94	1.08	1.01
DR DRILL	1.00	1.08	1.04
Mean	1.02	1.05	1.04

SPRING N	0	75	Mean
CROP			
W BARLEY	0.83	1.26	1.05
F RAPE	0.86	1.20	1.03
Mean	0.85	1.23	1.04

SPRING N	0	75	Mean
SOW METH			
DISC	0.80	1.32	1.06
DYNADRIV	0.91	1.11	1.01
DR DRILL	0.83	1.25	1.04
Mean	0.85	1.23	1.04

SPRING N	0	75	Mean
SOW DATE			
HARV+2	0.82	1.22	1.02
END SEPT	0.87	1.24	1.05
Mean	0.85	1.23	1.04

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93/W/M/1

GRAIN TONNES/HECTARE

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

	SOW METH	DISC		DYNADRIV		DR DRILL	
CROP	SOW DATE	HARV+2	END SEPT	HARV+2	END SEPT	HARV+2	END SEPT
W BARLEY		1.21	0.89	0.94	1.04	1.10	1.10
F RAPE		1.02	1.12	0.95	1.11	0.89	1.06

	SOW METH	DISC		DYNADRIV		DR DRILL	
CROP	SPRING N	0	75	0	75	0	75
W BARLEY		0.75	1.35	0.90	1.07	0.86	1.35
F RAPE		0.85	1.29	0.91	1.15	0.80	1.15

	SOW DATE	HARV+2		END SEPT	
CROP	SPRING N	0	75	0	75
W BARLEY		0.85	1.32	0.82	1.20
F RAPE		0.79	1.12	0.92	1.28

	SOW DATE	HARV+2		END SEPT	
SOW METH	SPRING N	0	75	0	75
DISC		0.82	1.41	0.77	1.24
DYNADRIV		0.82	1.07	1.00	1.15
DR DRILL		0.82	1.18	0.84	1.32

		SOW DATE	HARV+2		END SEPT	
CROP	SOW METH	SPRING N	0	75	0	75
W BARLEY	DISC		0.84	1.58	0.65	1.12
	DYNADRIV		0.87	1.01	0.93	1.14
	DR DRILL		0.84	1.36	0.87	1.33
F RAPE	DISC		0.80	1.23	0.90	1.35
	DYNADRIV		0.77	1.13	1.06	1.17
	DR DRILL		0.80	0.99	0.81	1.31

SPR N BC	0	75	Mean
CROP BC			
W BARLEY	0.75	0.96	0.85
F RAPE	0.87	1.17	1.02
Mean	0.81	1.06	0.94

SPR N ST	0	75	Mean
	0.62	1.06	0.84

GRAND MEAN 1.01

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GRAIN TONNES/HECTARE

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

CROP	CROP BC	SPR N BC	SPR N ST
0.064	0.157	0.052	0.129

SOW METH	SOW DATE	SPRING N	CROP BC SPR N BC
0.078	0.064	0.037	0.181

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

CROP BC	0.129

CROP SOW METH	CROP SOW DATE	SOW METH SOW DATE	CROP SPRING N
0.111	0.091	0.111	0.074

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

CROP	0.053

SOW METH SPRING N	SOW DATE SPRING N	CROP SOW METH SOW DATE	CROP SOW METH SPRING N
0.091	0.074	0.157	0.128

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

SOW METH	0.065
SOW DATE	0.053
CROP.SOW METH	0.091

CROP SOW DATE SPRING N	SOW METH SOW DATE SPRING N	CROP SOW METH SOW DATE SPRING N
0.105	0.128	0.181

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

CROP.SOW DATE	0.074
SOW METH.SOW DATE	0.091
CROP.SOW METH.SOW DATE	0.129

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.192	19.0
BLOCK.WP.SP	30	0.158	15.7

MEAN DM% 85.2

SUB PLOT AREA HARVESTED 0.00099

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93/R/M/5

MIXED 5

WEED SEED PRODUCTION IN SPRING CROPS

Object: To investigate the effects of competition of three different crops on the seed production of three contrasting weed species at two densities and the effects of these weeds on each crop - Great Knott II.

Sponsor: P.J.W. Lutman.

S. wheat, S. beans and linseed.

Design: 3 blocks of 3 plots split into 7 sub plots.

Whole plot dimensions: 5.0 x 21.0.

Treatments:

Whole plots

1. **CROP** Crops:

S WHEAT	Spring Wheat
S BEANS	Spring Beans
LINSEED	Linseed

Sub plots

2. **WEED DEN** Density of weed species:

CHAR L	Charlock (*Sinapsis arvensis*), low density
CHAR H	Charlock, high density
CHICK L	Chickweed (*Stellaria media*), low density
CHICK H	Chickweed, high density
MAYWEED	Mayweed (*Matricaria perforata*)
ORACHE	Orache (*Atriplex patula*)
NONE	None

NOTES: (1) Weeds were broadcast at drilling or shortly afterwards.
(2) Planned low density mayweed failed to establish and was replaced by naturally occuring orache.
(3) Density of sown weeds established (plants per square metre):

	CHAR L	CHAR H	CHICK L	CHICK H	MAYWEED
S WHEAT	11	553	5	54	19
S BEANS	12	647	3	41	3
LINSEED	12	708	2	46	27

Experimental Diary:

25-Jan-93 : B : Ploughed.
29-Mar-93 : B : Rotary harrowed, twice.
: **T** : **CROP** LINSEED: Rotary harrowed, Antares, dressed Prelude 20LF, drilled at 700 seeds per square metre.
: **T** : **CROP** S BEANS: Rotary harrowed, Alfred drilled at 60 seeds per square metre.

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93/R/M/5

Experimental Diary:

30-Mar-93 : **T** : **CROP** S WHEAT: Rotary harrowed, Canon, dressed Cerevax, drilled at 400 seeds per square metre.
07-May-93 : **T** : **CROP** LINSEED: 34.5% N at 217 kg.
: **T** : **CROP** S WHEAT: 34.5% N at 290 kg.
20-May-93 : **T** : **CROP** LINSEED: Decis at 0.30 l in 200 l.
27-Aug-93 : B : Harvested by hand (started).
02-Sep-93 : B : Harvested by hand (finished).

Previous crops: W. oats 1991, w. wheat 1992.

NOTES: (1) Emergence counts were made. Height and dry weight measurements and crop and weed numbers were noted throughout the season. Samples were taken in July and August to count numbers of ears, beans and bolls on the respective crops.
(2) Seed production by mayweed, chickweed amd charlock was estimated from selected plants in each of the three crops.
(3) One whole plot of linseed was lost due to poor establishment. Means were estimated from the other two plots.

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93/R/M/5

SPRING WHEAT

GRAIN TONNES/HECTARE

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

WEED DEN	
CHAR L	3.23
CHAR H	0.19
CHICK L	5.11
CHICK H	4.57
MAYWEED	4.58
ORACHE	5.47
NONE	4.71
Mean	3.98

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

WEED DEN
0.623

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	12	0.76	19.2

GRAIN MEAN DM% 85.5

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93/R/M/5

SPRING BEANS

GRAIN TONNES/HECTARE

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

WEED DEN	
CHAR L	3.76
CHAR H	4.26
CHICK L	4.12
CHICK H	4.62
MAYWEED	4.70
ORACHE	4.69
NONE	4.46
Mean	4.37

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

WEED DEN
0.529

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	12	0.65	14.8

GRAIN MEAN DM% 85.1

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93/R/M/5

LINSEED

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

WEED DEN	
CHAR L	0.37
CHAR H	0.06
CHICK L	1.34
CHICK H	0.68
MAYWEED	0.85
ORACHE	1.12
NONE	1.33
Mean	0.82

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

WEED DEN
0.145

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.WP	6	0.178	21.6

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00010

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METEOROLOGICAL RECORDS 1993 - 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	36 (-16)	5.8 (+2.7)	3.5	5.5	6.7
FEB	46 (-19)	3.9 (+0.7)	1.7	5.9	6.8
MAR	128 (+22)	6.3 (+1.0)	3.1	6.2	6.7
APR	115 (-24)	9.4 (+1.9)	6.8	8.9	7.9
MAY	196 (+9)	11.7 (+0.8)	7.7	11.7	10.1
JUNE	223 (+32)	15.1 (+1.2)	11.3	15.2	12.6
JULY	185 (-4)	15.3 (-0.6)	11.9	16.0	14.3
AUG	222 (+44)	14.8 (-1.1)	10.9	15.8	14.7
SEPT	103 (-37)	12.4 (-1.2)	10.6	14.0	14.0
OCT	121 (+17)	8.9 (-1.5)	6.5	11.0	12.3
NOV	70 (+5)	4.6 (-1.4)	3.1	7.6	9.9
DEC	55 (+8)	5.3 (+1.2)	3.4	5.9	7.7
YEAR*	1500 (+37)	9.4 (+0.3)	6.7	10.3	10.3

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	16	90 (+24)	25	73	12.1
FEB	15	8 (-40)	7	3	7.8
MAR	19	23 (-34)	4	0	8.4
APR	9	90 (+36)	16	59	9.2
MAY	7	45 (-8)	12	8	9.7
JUNE	0	131 (+74)	12	88	5.3
JULY	3	59 (+12)	18	1	6.3
AUG	2	39 (-14)	9	5	5.7
SEPT	7	115 (+60)	18	66	5.4
OCT	7	124 (+58)	18	100	6.9
NOV	19	56 (-8)	11	36	6.2
DEC	15	110 (+41)	21	92	12.9
YEAR*	119	888 (+200)	171	530	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 1993 - WOBURN

(Departure from 30-year means in brackets)

Mean temperature: °C

MONTH	Total sunshine: hours		Air(1)		In ground under grass: Dew point	30 cm	100 cm	Ground frosts (2)	Total rainfall: mm 12.7 cm (5in)		Rain days (3)	Wind km per hour (4)
JAN	26	(-23)	5.9	(+2.5)	3.5	5.1	6.5	11	82	(+30)	24	13.5
FEB	40	(-20)	4.3	(+0.8)	2.1	5.6	6.8	11	9	(-31)	8	7.0
MAR	133	(+30)	6.6	(+1.0)	2.8	6.3	6.7	17	23	(-29)	6	8.2
APR	104	(-25)	9.4	(+1.7)	6.5	9.1	8.0	3	96	(+46)	15	9.0
MAY	191	(+11)	11.7	(+0.8)	7.5	12.4	10.3	5	65	(+11)	11	8.7
JUNE	214	(+31)	14.8	(+0.9)	11.6	16.4	13.2	0	79	(+24)	12	5.1
JULY	182	(+1)	15.6	(-0.4)	11.6	17.4	15.1	0	51	(+2)	16	8.0
AUG	217	(+48)	15.0	(-0.8)	10.7	17.0	15.5	0	40	(-18)	7	6.5
SEPT	99	(-37)	12.4	(-1.2)	10.3	14.4	14.8	2	85	(+33)	20	5.2
OCT	108	(+7)	8.4	(-2.0)	6.5	10.4	12.4	7	103	(+47)	17	5.8
NOV	61	(+0)	4.6	(-1.7)	3.2	6.9	9.9	17	63	(+7)	10	5.5
DEC	47	(+5)	5.4	(+1.2)	3.3	5.6	7.7	14	98	(+40)	23	13.8
YEAR*	1421	(+28)	9.5	(+0.2)	6.6	10.5	10.6	87	795	(+163)	169	8.0

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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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