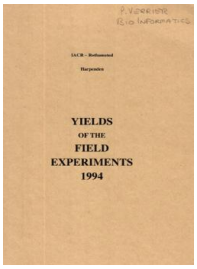
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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1994

Full Table of Content



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P. VERRIER
BIO INFORMATICS

IACR – Rothamsted

Harpenden

YIELDS
OF THE
FIELD
EXPERIMENTS
1994

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IACR - Rothamsted

Harpenden

YIELDS

of the

FIELD

EXPERIMENTS

1994

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 1995

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CONVERSION FACTORS

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CONVENTIONS 1994

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% P_2O_5, 10% K_2O), 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 Pesticides 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
A	Acaricide		

TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Adder	AD	Adjuvant oil containing 97% refined mineral oil
Agrichem Flowable Thiram	F	600 g/l thiram
Ally	H	20% w/w metsulfuron-methyl
Aphox	I	50% w/w pirimicarb
Ashlade Mancozeb FL	F	410 g/l mancozeb
Atlas Dimethoate 40	I,A	400 g/l dimethoate
Atlas Simazine	H	500 g/l simazine
Barclay Gallup	H	360 g/l glyphosate
Basagran	H	480 g/l bentazone
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
Bravo 500	F	500 g/l chlorothalonil
Briotril Plus 19/19	H	190:190 g/l bromoxynil + ioxynil
Butisan S	H	500 g/l metazachlor
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 Super	H	55 g/l fenoxaprop-P-ethyl
Chiltern Super-Tin 4L	F	480 g/l fentin hydroxide
Compass	F	167:167 g/l iprodione + thiophanate-methyl
Cyclone	F	94:300 g/l flutriafol + iprodione
Decis	I	25 g/l deltamethrin
Delsene M Powder	F	10:64% w/w carbendazim + maneb
Derosal WDG	F	80% w/w carbendazim (MBC)
Dithane 945	F	80% w/w mancozeb
Dorin	F	125:375 g/l triadimenol + tridemorph

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Dow Shield	H	200 g/l clopyralid
Draza	M,I	4% w/w methiocarb
Duplosan New System CMPP	H	600 g/l mecoprop-P
Dursban 48E	I,A	480 g/l chlorpyrifos
Farmon PDQ	H,D	80:120 g/l diquat + paraquat
Fastac	I	100 g/l alpha-cypermethrin
Fonofos Seed Treatment	I	433 g/l fonofos
Fungazil 100 SL	F	100 g/l imazalil
Gesaprim 500SC	H	500 g/l atrazine
Glyphogan	H	360 g/l glyphosate
Glytex	H	3.4:70% w/w isoxaben + methabenzthiazuron
Goltix WG	H	70% w/w metamitron
Gramoxone 100	H	200 g/l paraquat
Halo	F	375:47 g/l chlorothalonil + flutriafol
Hoegrass	H	378 g/l diclofop-methyl
Hostathion	I	420 g/l triazophos
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
Landgold Diquat	H,D	200 g/l diquat
Laser	H	200 g/l cycloxydim
Lindex-Plus FS	F,I	43:545:73 g/l fenpropimorph + gamma-HCH + thiram
Lo-gran 20 WG	H	20% w/w triasulfuron
Mallard 750 EC	F	750 g/l fenpropidin
Mistral	F	750 g/l fenpropimorph
New 5C Cycocel	GR	645:32 g/l chlormequat + choline chloride
Opogard 500 SC**	H	150:350 g/l terbuthy-lazine + terbutryn
Optimol	M	4% w/w metaldehyde
Oxytril CM	H	200:200 g/l bromoxynil + ioxynil
Panoctine	F	300 g/l guazatine
Panoctine Plus	F	300:25 g/l guazatine+ imazalil
Pirimicarb 50 DG	I	50% w/w pirimicarb
Prelude 20LF	F	500 g/l prochloraz
Punch C	F	125:250 g/l carbendazim + flusilazole
Radar	F	250 g/l propiconazole
Rappor	F	300 g/l guazatine
Rappor Plus	F	300:25 g/l guazatine + imazalil
Reglone	H,D	200 g/l diquat
Ripcord	I	100 g/l cypermethrin
Ronilan FL	F	500 g/l vinclozolin
Rotalin	H	300 g/l linuron
Roundup	H	360 g/l glyphosate

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TRADE NAME	FUNCTION	ACTIVE INGREDIENT
Rovral Flo	F	250 g/l iprodione
Scythe	H	200 g/l paraquat
Sportak 45	F	450 g/l prochloraz
Standon Tridemorph 750	F	750 g/l tridemorph
Starane 2	H	200 g/l fluroxypyr
Sting CT	H	120 g/l glyphosate
Synchemicals Dalapon	H	85% w/w dalapon
Stomp 400	H	400 g/l pendimethalin
Swipe 560 EC	H	56:56:448 g/l bromoxynil + ioxynil + mecoprop
Tigress	H	313:14 g/l diclofop-methyl + fenoxaprop-P-ethyl
Tilt 250 EC	F	250 g/l propiconazole
Tripart Brevis	GR	700 g/l chlormequat
Vassgro Spreader	AD	nonyl phenol-ethylene oxide condensates
Vindex	H	240:50 g/l bromoxynil + clopyralid
Wildcat	H	55 g/l fenoxaprop-P-ethyl
Yaltox	I,N	5% w/w carbofuran

* Previously labelled Hytane 500 L
** Previously labelled Opogard 500 FW

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94/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 151st 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 74-93/R/BK/1.

Areas harvested:

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

Treatments:

Whole plots

PLOT Fertilizers and organic manures:-

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

(A) Alternating

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94/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. From 1968, ten strips of sub-plots (sections) were started with the following cropping:-

SECTION	1/W28	9/W36	0/W43	8/F	6/W17	5/W3	3/W2	7/POTS	4/F	2/W1
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1968	W	W	W	W	F	W	W	P	W	BE
1969	W	W	W	W	W	F	W	BE	P	W
1970	W	W	W	W	W	W	F	W	BE	P
1971	W	W	W	W	F	W	W	P	W	BE
1972	W	W	W	W	W	F	W	BE	P	W
1973	W	W	W	W	W	W	F	W	BE	P
1974	W	W	W	W	F	W	W	P	W	BE
1975	W	W	W	W	W	F	W	BE	P	W
1976	W	W	W	W	W	W	F	W	BE	P
1977	W	W	W	W	F	W	W	P	W	BE
1978	W	W	W	W	W	F	W	BE	P	W
1979	W	W	W	W	W	W	F	W	P	F
1980	W	W	W	W	W	W	W	F	W	P
1981	W	W	W	F	W	W	W	P	F	W
1982	W	W	W	W	W	W	W	W	P	F
1983	W	W	W	W	W	W	W	F	W	P
1984	W	W	W	W	W	W	W	P	F	W
1985	W	W	W	W	W	F	W	W	P	W
1986	W	W	W	W	W	P	F	W	W	W
1987	W	W	W	W	W	W	P	W	W	F
1988	W	W	W	F	W	W	W	F	W	P
1989	W	W	W	W	W	W	W	P	F	W
1990	W	W	W	W	W	F	W	W	P	W

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94/R/BK/1

SECTION	1/W28	9/W36	0/W43	8/F	6/W17	5/W3	3/W2	7/POTS	4/F	2/W1
Section	1	9	0*	8+	6**	5	3	7	4	2
Year										
1991	W	W	W	W	W	P	F	W	W	W
1992	W	W	W	W	W	W	P	W	W	F
1993	W	W	W	W	W	W	W	F	W	P
1994	W	W	W	F	W	W	W	P	F	W

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

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

NOTES: (1) For a fuller record of treatments see 'Details' etc.
(2) From autumn 1975 to autumn 1986, chalk was applied at 2.9 t each autumn to all plots in sets of Sections on a three-year cycle. Year 1: Sections 1,2,3. Year 2: Sections 6,7,8,9. Year 3: Sections 0,4,5. From autumn 1988 until autumn 1992 a five-year cycle was used. Year 1: Sections 1,3. Year 2: Sections 2,8. Year 3: Sections 7,9. Year 4: Sections 4,6. Year 5: Sections 0,5. None applied in autumn 1992 or autumn 1993.

Experimental diary:

All sections:
21-Oct-93 : **T** : P applied.
25-Oct-93 : **T** : K, Na and Mg applied.
26-Oct-93 : **T** : FYM applied.
28-Oct-93 : B : Ploughed.
02-Nov-93 : B : Rotary harrowed, twice.

Cropped Sections:

W. wheat:
19-Aug-93 : **T** : Straw chopped (section 0 only).
21-Oct-93 : **T** : Autumn N treatments applied.
03-Nov-93 : **T** : Rotary harrowed, Apollo, dressed Fonofos Seed Treatment, drilled at 380 seeds per m^2.
21-Dec-93 : **T** : Draza at 5.5 kg, (except section 6).
18-Apr-94 : **T** : Spring N treatments applied.
09-May-94 : **T** : Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
: **T** : Sportak 45 at 0.7 l with Standen Tridemorph at 0.5 l and New 5C Cycocel at 2.5 l in 200 l, (except section 6).
13-Jun-94 : **T** : Starane 2 at 1.5 l in 200 l.
: **T** : Halo at 2.0 l with Mallard 750 EC at 1.0 l in 200 l (except section 6).
15-Jun-94 : **T** : Hostathion at 840 ml in 200 l (except section 6).
28-Jun-94 : **T** : Delsene M Powder at 2.5 kg with Mistral at 0.5 l in 200 l (except section 6).
22-Aug-94 : **T** : Combine harvested.

Potatoes:
18-Apr-94 : **T** : Spring N treatments applied.
28-Apr-94 : **T** : Heavy spring-tine cultivated twice, rotary harrowed, planted Estima, dressed Fungazil 100 SL.
16-May-94 : **T** : Rotary ridged.

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94/R/BK/1

Experimental diary:

Cropped Sections:

Potatoes:

23-May-94 : **T** : Farmon PDQ at 2.0 l with Rotalin at 5.0 l in 200 l.
23-Jun-94 : **T** : Dithane 945 at 1.7 kg with Intracrop BLA at 0.2 l in 200 l.
07-Jul-94 : **T** : Dithane 945 at 1.7 kg with Pirimicarb 50 DG at 0.28 kg and Intracrop BLA at 0.2 l in 200 l.
25-Jul-94 : **T** : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
15-Aug-94 : **T** : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
30-Aug-94 : **T** : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
26-Sep-94 : **T** : Chiltern Super-Tin 4L at 560 ml with Reglone at 4.0 l in 200 l.
06-Oct-94 : **T** : Lifted.

Fallow:

28-Apr-94 : **T** : Heavy spring-tine cultivated, twice.
16-Jun-94 : **T** : Cultivated by rotary grubber.
07-Jul-94 : **T** : Cultivated by rotary grubber.

NOTES: (1) Correction: Areas of wheat harvested in 1991, 1992 and 1993 should be corrected to read the same as the areas of wheat harvested in 1994. When cropped with wheat, the harvested areas on sections 4 and 7 were 0.00533 ha. and the harvested areas on section 8 were 0.00561 ha. Harvested areas of potatoes remained unchanged.

(2) Section 9 was drained between 31 August and 4 September, 1993. An interceptor drain of perforated plastic (260 mm diameter) was laid at 1 m depth between sections 8 and 9. Drains of perforated plastic (80 mm diameter) were laid at 0.75 m depth in the centre of each plot of section 9; these drains discharged into the open drain to the east of section 9. All the drains were laid by a track-laying trenching machine, which delivered gravel backfill to within 0.3 m of the soil surface.

(3) Samples of grain and straw from sections 1 and 2 and samples of potato tubers from section 7 were taken for chemical analysis.

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94/R/BK/1 W. WHEAT

GRAIN TONNES/HECTARE

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

SECTION PLOT	2/W1	3/W2	5/W3	6/W17	1/W28	9/W36	0/W43
01DN4PK	10.64	9.47	8.66	7.84	*	*	*
21DN2	9.58	7.93	7.65	6.86	7.22	7.07	5.94
22D	7.88	4.75	4.38	5.03	5.92	4.22	5.01
030	1.71	0.40	0.23	0.90	0.68	0.27	0.86
05F	1.87	0.51	0.29	0.96	0.75	0.53	0.69
06N1F	4.58	3.53	2.30	2.88	2.89	3.05	2.79
07N2F	6.82	5.11	4.11	4.60	5.14	4.39	5.01
08N3F	8.50	6.62	4.34	5.33	6.32	5.62	6.40
09N4F	8.25	7.42	6.06	5.76	5.93	5.79	6.56
10N2	5.43	3.24	2.26	2.35	2.38	1.95	2.30
11N2P	5.31	4.58	3.67	3.24	3.43	2.79	3.47
12N2PNA	5.48	4.79	4.39	3.67	3.42	4.19	4.03
13N2PK	6.69	5.13	3.57	4.55	4.70	5.28	4.99
14N2PKMG	6.08	4.92	3.73	4.50	5.22	5.45	5.22
15N5F	8.04	7.78	7.05	5.98	7.33	7.36	7.12
16N6F	7.55	7.99	7.42	6.38	7.08	7.62	7.21
17N1+3FN	7.55	6.82	6.69	5.92	6.35	6.11	6.21
18N0+3FN	7.31	6.51	6.18	5.98	5.37	6.62	5.54
19C	1.68	0.82	1.26	1.69	1.12	1.45	0.96
20NKMG	*	*	*	*	2.82	*	2.91

GRAIN MEAN DM% 86.4

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94/R/BK/1 W. WHEAT

STRAW TONNES/HECTARE

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

SECTION / PLOT	2/W1	1/W28
01DN4PK	7.68	*
21DN2	5.80	4.58
22D	3.54	3.05
030	0.55	0.10
05F	0.45	0.13
06N1F	2.12	1.38
07N2F	3.59	2.56
08N3F	4.91	3.47
09N4F	5.24	3.36
10N2	2.89	1.89
11N2P	2.52	2.04
12N2PNA	2.75	2.24
13N2PK	3.67	2.74
14N2PKMG	2.36	2.45
15N5F	5.28	4.31
16N6F	4.88	4.17
17N1+3FN	4.18	3.38
18N0+3FN	4.27	2.66
19C	0.21	0.18
20NKMG	*	1.68

STRAW MEAN DM% 90.4

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94/R/BK/1 POTATOES

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

PLOT	TOTAL TUBERS TONNES/ HECTARE	% WARE 3.81 CM (1.5 INCH) RIDDLE
01DN4PK	15.6	83.1
21DN2	17.0	79.8
22D	17.6	80.2
030	4.2	56.2
05F	6.1	63.8
06N1F	9.2	72.6
07N2F	13.0	76.9
08N3F	16.9	83.3
09N4F	22.8	90.5
10N2	3.7	55.8
11N2P	3.2	34.2
12N2PNA	4.6	49.1
13N2PK	8.7	71.9
14N2PKMG	29.4	91.0
15N5F	25.4	90.3
16N6F	23.7	87.8
17N3FH	16.3	84.5
18N3FH	17.2	80.9
19C	5.3	50.8

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94/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 143rd year, s. barley.

For previous years see 'Details' 1967 and 1973, Station Report for 1966 and 74-93/R/HB/2.

Treatments: All combinations of:-

Whole plots

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

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

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94/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

Sub plots

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

0
48
96
144

Plus extra plots testing all combinations of:-

Whole plots

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

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

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

Sub plots

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

0
35

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

Experimental diary:

19-Nov-93 : **T** : P applied.
22-Nov-93 : **T** : Si and K applied.
15-Dec-93 : **T** : FYM applied.
16-Dec-93 : B : Ploughed.
14-Mar-94 : B : Spring-tine cultivated twice, rotary harrowed, Alexis, dressed Baytan, drilled at 350 seeds per m^2, rolled.

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94/R/HB/2

Experimental diary:

27-Apr-94 : **T** : N applied.
27-May-94 : B : Duplosan New System CMPP at 2.0 l with Vindex at 1.4 l in 200 l.
23-Jun-94 : B : Derosal WDG at 312 g with Dorin at 1.0 l in 260 l.
09-Aug-94 : B : Combine harvested.

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

MAIN PLOTS

GRAIN TONNES/HECTARE

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

N / **MANURE**	0	48	96	144	Mean
---	0.25	0.28	0.92	0.75	0.55
-P-	1.90	3.29	3.75	2.98	2.98
--K	0.07	1.01	0.75	2.05	0.97
-PK	0.57	3.08	5.10	6.10	3.71
A--	0.57	0.79	1.18	1.08	0.91
AP-	2.04	3.02	3.81	3.62	3.12
A-K	0.43	1.11	0.95	1.53	1.01
APK	0.75	2.94	3.96	5.14	3.20
N----	0.20	1.04	1.89	1.62	1.19
NP---	1.64	3.61	4.09	3.75	3.28
N-K--	0.50	1.56	1.66	1.75	1.37
NPK--	1.12	3.04	4.83	5.49	3.62
N--S-	0.85	1.11	2.77	1.39	1.53
NP-S-	0.86	4.04	3.85	3.66	3.10
N-KS-	1.70	1.82	1.91	3.05	2.12
NPKS-	0.60	3.59	5.60	5.22	3.75
N---S	1.04	1.71	1.76	2.23	1.68
NP--S	2.15	3.62	4.76	4.21	3.68
N-K-S	0.70	1.70	2.05	2.51	1.74
NPK-S	0.79	3.50	4.36	5.11	3.44
N--SS	1.12	1.44	1.83	1.99	1.59
NP-SS	2.02	3.35	4.20	4.78	3.59
N-KSS	0.26	1.77	2.24	2.79	1.77
NPKSS	0.59	3.78	4.39	6.40	3.79
C(--)	1.08	2.54	3.08	3.37	2.52
C(P-)	1.33	3.23	3.66	4.03	3.06
C(-K)	0.99	1.96	3.50	3.84	2.57
C(PK)	0.96	2.34	4.24	4.82	3.09
D	3.75	5.52	5.42	5.52	5.05
(D)	0.52	1.97	3.71	2.19	2.10
(A)	0.48	1.97	1.63	1.59	1.42
-	0.61	0.95	0.33	1.54	0.86
Mean	1.01	2.40	3.07	3.32	2.45

GRAIN MEAN DM% 86.0

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94/R/HB/2 MAIN PLOTS

STRAW TONNES/HECTARE

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

N	0	48	96	144	Mean
MANURE					
---	0.07	0.19	0.24	0.24	0.18
-P-	0.50	1.24	1.45	1.45	1.16
--K	0.04	0.29	0.20	0.59	0.28
-PK	0.21	1.00	1.89	2.46	1.39
A--	0.17	0.23	0.29	0.23	0.23
AP-	0.49	1.07	1.78	1.40	1.19
A-K	0.17	0.26	0.27	0.40	0.27
APK	0.21	1.04	1.88	2.89	1.50
D	1.26	3.00	3.06	3.70	2.76
(D)	0.26	0.69	1.20	0.66	0.70
(A)	0.13	0.38	0.43	0.37	0.33
-	0.23	0.27	0.21	0.47	0.30
Mean	0.31	0.80	1.07	1.24	0.86

STRAW MEAN DM% 77.8

PLOT AREA HARVESTED 0.00154

EXTRA PLOTS

GRAIN TONNES/HECTARE

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

MANURE	55AN2PK	56--PK	57NN2--	58NN2--	Mean
MGNESIUM					
0	3.77	0.15	2.58	0.53	1.76
35	4.65	0.19	2.54	0.98	2.09
Mean	4.21	0.17	2.56	0.75	1.92

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00329

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94/R/WF/3

WHEAT AND FALLOW

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

The 139th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-93/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:
20-Oct-93 : T : Ploughed.
28-Oct-93 : T : Spring-tine cultivated, rotary harrowed, Apollo, dressed Fonofos Seed Treatment, drilled at 380 seeds per m^2.
09-May-94 : T : Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
: T : Halo at 2.0 l with New 5C Cycocel at 2.5 l in 200 l.
13-Jun-94 : T : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 200 l.
17-Jun-94 : T : Hostathion at 840 ml in 200 l.
22-Aug-94 : T : Combine harvested.
Fallow plot:
20-Oct-93 : T : Ploughed.
16-Jun-94 : T : Cultivated by rotary grubber.
08-Jul-94 : T : Cultivated by rotary grubber.

GRAIN AND STRAW TONNES/HECTARE

	GRAIN	STRAW
YIELD	1.12	0.39
MEAN DM%	84.1	76.9
PLOT AREA HARVESTED	0.023232	

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94/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 139th year, w. wheat.

For previous years see 'Details' 1967, 1973 and 74-93/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**	Residues of phosphate (kg P) applied annually from 1986, as single superphosphate in 1986 and 1987, triple superphosphate from 1988 until 1992, none since:
	O	None
	P1	44
	P2	87
	P3	131

plus

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

	OLD RES	Residues of manures applied annually 1876-1901:
	O	None
	D	Farmyard manure at 35 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:

15-Oct-93 : **T** : Muriate of potash at 167 kg.

K test:

15-Oct-93 : **T** : Triple superphosphate at 319 kg.

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94/R/EX/4

Experimental diary:
All plots:
20-Oct-93 : B : Ploughed.
22-Oct-93 : B : Spring-tine cultivated twice, rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
12-Apr-94 : B : 34.5% N at 568 kg.
09-May-94 : B : Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
: B : Halo at 2.0 l with New 5C Cycocel at 2.5 l in 200 l.
13-Jun-94 : B : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 200 l.
17-Jun-94 : B : Hostathion at 840 ml in 200 l.
16-Aug-94 : B : Combine harvested..

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

P TEST

GRAIN TONNES/HECTARE

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

P RES / OLD RES	0	P1	P2	P3	Mean
0	2.42	7.29	7.62	7.88	6.30
D	6.45	8.07	8.07	7.53	7.53
N	2.32	7.41	7.75	7.54	6.26
P	6.34	8.09	8.69	8.07	7.80
NPKNAMG	5.75	7.60	7.87	7.87	7.27
Mean	4.66	7.69	8.00	7.78	7.03

GRAIN MEAN DM% 86.0

STRAW TONNES/HECTARE

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

P RES / OLD RES	0	P1	P2	P3	Mean
0	1.35	4.44	4.58	4.74	3.78
D	3.59	4.80	4.68	4.50	4.39
N	1.08	4.42	4.45	4.18	3.53
P	3.79	4.97	5.35	4.86	4.74
NPKNAMG	3.22	4.74	4.54	4.36	4.22
Mean	2.61	4.68	4.72	4.53	4.13

STRAW MEAN DM% 91.1

PLOT AREA HARVESTED 0.00589

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94/R/EX/4

K TEST

GRAIN TONNES/HECTARE

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

OLD RES	
O	7.08
D	6.84
N*	6.90
PK	6.86
N*PK	6.54
Mean	6.84

GRAIN MEAN DM% 86.0

STRAW TONNES/HECTARE

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

OLD RES	
O	3.65
D	3.36
N*	3.09
PK	3.32
N*PK	3.03
Mean	3.29

STRAW MEAN DM% 90.4

PLOT AREA HARVESTED 0.00589

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94/R/PG/5

PARK GRASS

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

The 139th year, hay.

For previous years see 'Details' 1967 and 1973 and 74-93/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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94/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 1994.

Chalk applied 1994 (tonnes $CaCO_3$):

Plot	a	b	c
1	7.0	1.5	0.8
2	7.0	-	0.3
3	7.0	-	0.3
4/1	7.0	-	0.3
4/2	12.1	8.6	3.6
6	7.0	1.5	-
7	7.0	-	0.3
8	7.0	-	0.3
9/1	21.0	11.5	8.8
9/2	15.1	8.6	5.1
10	12.1	8.6	5.1
11/1	22.0	10.5	9.0
11/2	14.0	10.5	9.0
12	3.0	0.8	0.3
13	5.0	-	0.3
14/1	7.0	-	-
14/2	2.2	-	-
15	3.0	0.8	1.3
16	2.2	-	-
17	2.2	-	-
18	12.1	6.6	8.1

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

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94/R/PG/5

Additional sub-plots (Plots 18, 19 and 20 only) (tonnes $CaCO_3$ 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:

19-Nov-93 : **T** : P applied.
24-Nov-93 : **T** : K, Na, Mg and Si applied.
21-Jan-94 : **T** : Chalk application started.
08-Feb-94 : **T** : Chalk application finished.
21-Apr-94 : **T** : N applied.
27-Jun-94 : B : First sample cut. Remaining area cut for hay (started).
28-Jun-94 : B : Remaining area cut for hay (finished). Hay turned.
29-Jun-94 : B : Hay turned.
30-Jun-94 : B : Hay turned and rowed up.
01-Jul-94 : B : Hay baled.
29-Nov-94 : B : Second sample cut, herbage removed (started).
30-Nov-94 : B : Second sample cut, herbage removed (finished). Remaining area cut, herbage removed.

NOTES: (1) Herbage samples from selected plots were taken for chemical analysis.
(2) A comparison of hay and silage yields was made on selected plots.
(3) Number and biomass of individual plant species were measured on all plots.

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94/R/PG/5

1ST CUT (27/6/94) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	3.23	3.26	3.57	2.22	3.07
O(D)	2	2.82	3.84	2.44	2.22	2.83
O	3	2.90	3.39	1.95	2.17	2.60
P	4/1	3.88	4.74	3.28	3.22	3.78
N2P	4/2	4.33	3.68	4.00	2.48	3.62
N1MN	6	5.92	5.74			5.83
MN	7	5.39	5.62	5.80	4.56	5.34
PNAMG	8	3.93	4.76	3.80	3.55	4.01
MN(N2)	9/1	5.12	3.67	1.87	2.70	3.34
N2MN	9/2	6.45	6.50	5.70	6.19	6.21
N2PNAMG	10	4.92	4.24	4.15	3.13	4.11
N3MN	11/1	6.52	7.53	6.33	4.83	6.30
N3MNSI	11/2	6.57	6.56	6.60	5.73	6.36
O	12	3.09	3.04	1.88	1.95	2.49
D/F	13	4.58	5.53	5.19	5.13	5.11
MN(N2*)	14/1	5.02	4.57	4.00	3.37	4.24
N2*MN	14/2	2.82	6.66	5.31	4.88	4.92
MN(N2*)	15	4.47	5.44	5.29	4.71	4.98
N1*MN	16	5.12	5.61	4.85	4.82	5.10
N1*	17	3.85	3.56	3.19	3.04	3.41
N2KNAMG0	18/1			4.94	2.77	3.86
N2KNAMG2	18/2					4.32
N2KNAMG1	18/3	4.54	3.82			4.18
D0	19/1					5.76
D2	19/2					5.56
D1	19/3					5.99
D/N*PK0	20/1					5.63
D/N*PK2	20/2					5.82
D/N*PK1	20/3					5.48

1ST CUT MEAN DM% 28.1

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94/R/PG/5

2ND CUT (30/11/94) DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	2.36	1.17	0.86	0.20	1.15
O(D)	2	0.80	0.98	0.88	0.80	0.87
O	3	0.67	0.87	0.81	0.91	0.82
P	4/1	0.91	0.72	0.92	0.73	0.82
N2P	4/2	1.18	1.25	0.55	0.26	0.81
N1MN	6	0.80	0.84	.		0.82
MN	7	0.77	1.06	1.13	0.58	0.88
PNAMG	8	0.62	0.72	0.84	0.91	0.77
MN(N2)	9/1	0.56	0.55	0.19	0.02	0.33
N2MN	9/2	0.83	0.99	0.44	0.42	0.67
N2PNAMG	10	0.75	0.97	0.74	0.77	0.81
N3MN	11/1	1.17	0.86	0.82	0.55	0.85
N3MNSI	11/2	1.48	1.30	0.78	0.76	1.08
O	12	0.33	0.53	0.68	0.51	0.51
D/F	13	1.39	1.31	0.88	1.09	1.17
MN(N2*)	14/1	1.67	1.11	0.83	0.74	1.09
N2*MN	14/2	1.97	2.07	1.25	1.09	1.60
MN(N2*)	15	1.00	1.37	0.97	0.75	1.02
N1*MN	16	1.40	1.52	0.92	0.86	1.17
N1*	17	0.57	0.54	0.78	1.09	0.75
N2KNAMG0	18/1			0.67	0.18	0.42
N2KNAMG2	18/2					1.07
N2KNAMG1	18/3	0.79	0.79			0.79
D0	19/1					1.43
D2	19/2					3.29
D1	19/3					1.38
D/N*PK0	20/1					1.64
D/N*PK2	20/2					1.93
D/N*PK1	20/3					2.16

2ND CUT MEAN DM% 32.8

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94/R/PG/5

TOTAL OF 2 CUTS DRY MATTER TONNES/HECTARE

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

LIME / MANURE		A	B	C	D	MEAN
N1	1	5.59	4.43	4.43	2.42	4.22
O(D)	2	3.62	4.83	3.32	3.02	3.70
O	3	3.57	4.26	2.76	3.08	3.42
P	4/1	4.79	5.46	4.20	3.94	4.60
N2P	4/2	5.50	4.93	4.55	2.74	4.43
N1MN	6	6.72	6.58			6.65
MN	7	6.16	6.68	6.93	5.14	6.23
PNAMG	8	4.55	5.47	4.65	4.46	4.78
MN(N2)	9/1	5.68	4.21	2.06	2.72	3.67
N2MN	9/2	7.28	7.49	6.15	6.61	6.88
N2PNAMG	10	5.68	5.21	4.89	3.91	4.92
N3MN	11/1	7.69	8.38	7.15	5.37	7.15
N3MNSI	11/2	8.04	7.86	7.38	6.49	7.44
O	12	3.41	3.58	2.56	2.46	3.00
D/F	13	5.98	6.84	6.07	6.22	6.28
MN(N2*)	14/1	6.69	5.68	4.83	4.12	5.33
N2*MN	14/2	4.79	8.73	6.56	5.97	6.51
MN(N2*)	15	5.47	6.81	6.25	5.46	6.00
N1*MN	16	6.52	7.13	5.77	5.67	6.27
N1*	17	4.42	4.09	3.97	4.14	4.15
N2KNAMG0	18/1			5.62	2.95	4.28
N2KNAMG2	18/2					5.39
N2KNAMG1	18/3	5.33	4.61			4.97
D0	19/1					7.18
D2	19/2					8.85
D1	19/3					7.38
D/N*PK0	20/1					7.28
D/N*PK2	20/2					7.75
D/N*PK1	20/3					7.64

TOTAL OF 2 CUTS MEAN DM% 30.4

PLOT AREA HARVESTED 0.00002

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94/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 11th year of grass/clover. The 20th year of grass on the rest of the experiment.

For previous years see 'Details' 1967 and 1973 and 74-93/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)
	(D)PK	(D) P K
	PKMG	P K (Na) Mg
	P	P
	PK	P K
	PMG	P (Na) Mg
	0	0

P: 35 kg P as triple superphosphate in 1974 and since 1987, single superphosphate in other years
K: 225 kg K as sulphate of potash
(Na): 90 kg Na as sodium chloride until 1973
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 1994 (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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94/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.
(3) Only one cut was taken for yield as there was insufficient growth to justify a second cut.

Experimental diary:

19-Nov-93	**T**	P applied.
23-Nov-93	**T**	K applied.
25-Nov-93	**T**	Mg applied.
18-Mar-94	**T**	N applied to sections 3, 4, 5 and 6.
30-Mar-94	B	Flat rolled.
10-Jun-94	B	Cut.
11-Jun-94	B	Herbage cut on remainder of plot. Herbage removed.
14-Jun-94	**T**	N applied to sections 3, 4, 5 and 6.
19-Oct-94	B	Topped. No yields taken.

NOTE: Herbage samples were taken for chemical analysis.

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94/R/BN/7

GRASS

1ST CUT (10/6/94) DRY MATTER TONNES/HECTARE

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

N PERCUT / MANURE	75	100	125	150	Mean
(D)	7.35	8.72	6.59	7.06	7.43
(D)PK	7.04	6.63	7.32	7.29	7.07
PKMG	6.66	7.64	7.61	7.68	7.40
P	3.85	3.84	3.95	5.27	4.23
PK	6.44	7.51	7.61	5.71	6.81
PMG	3.61	3.66	4.01	2.61	3.47
0	3.22	3.40	2.70	2.07	2.85
Mean	5.45	5.91	5.68	5.38	5.61

MANURE KMG 100 6.66

Grand mean 5.64

1ST CUT MEAN DM% 23.3

PLOT AREA HARVESTED 0.00568

GRASS/CLOVER

1ST CUT (10/6/94) DRY MATTER TONNES/HECTARE

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

MANURE	(D)	(D)PK	PKMG	P	PK	PMG	0	Mean
	5.70	5.79	4.21	3.83	4.11	5.11	4.21	4.71

1ST CUT MEAN DM% 20.0

PLOT AREA HARVESTED 0.00155

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94/R/GC/8

GARDEN CLOVER

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

The 141st year, red clover.

For previous years see 'Details' 1967 and 1973, and 74-93/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:

03-Nov-93 : B : Chalk at 1.25 t, PK as (0:18:36) at 420 kg and Epsom salts at 530 kg.
07-Jun-94 : B : First cut, hand weeded.
02-Aug-94 : B : Second cut, hand weeded.
18-Aug-94 : **T** : **FUNG RES** NONE: Muriate of potash at 3970 and 2740 kg to first and second blocks respectively.
: **T** : **FUNG RES** BENOMYL: Muriate of potash at 2830 and 3010 kg.
02-Nov-94 : B : Third cut.

NOTE: Crop samples were taken for chemical analysis.

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94/R/GC/8

1ST CUT (7/6/94) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	5.26	5.10	5.18

1ST CUT MEAN DM% 15.4

2ND CUT (2/8/94) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	6.52	6.01	6.27

2ND CUT MEAN DM% 25.3

3RD CUT (2/11/94) DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	1.14	1.10	1.12

3RD CUT MEAN DM% 19.1

TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

FUNG RES	NONE	BENOMYL	Mean
	12.92	12.21	12.57

TOTAL OF 3 CUTS MEAN DM% 19.9

PLOT AREA HARVESTED 0.00010

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94/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 57th year, leys, w. beans, w. wheat, w. rye, s. barley.

For previous years see 'Details' 1967 & 1973 and 74-93/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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94/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. **FYMRES63** Farmyard manure residues, last applied 1963:

   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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94/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. **FYMRES62** Farmyard manure residues, last applied 1962:

   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
FYM 38 tonnes on each occasion, last applied 1966 to 1st and 6th year leys, 1965 to 2nd and 7th year leys, 1964 to 3rd and 8th year leys, 1963 to 4th year leys, 1962 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, 1993:

Continuous rotations	No FYM half plots	FYM half plots
LN	0	0
LC	0	0
AF	315	280
AB	325	290

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94/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):

19-Aug-93 : **T** : Roundup at 5.33 l in 200 l.
10-Sep-93 : **T** : Ploughed.
17-Sep-93 : **T** : LN1 and LLN1 only: 27% N at 280 kg.
: **T** : LC1 and LLC1 only: 27% N at 186 kg.
24-Sep-93 : **T** : Rotary harrowed.
: **T** : LN1 and LLN1 only: 50% Bundy meadow fescue and 50% Erecta timothy mixture drilled at 30 kg.
: **T** : LC1 and LLC1 only: 45% Bundy meadow fescue, 45% Erecta timothy and 10% Huia white clover mixture drilled at 30 kg.
18-Apr-94 : **T** : PK as (0:18:36) at 417 kg.
: **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
08-Jun-94 : **T** : First cut.
10-Jun-94 : **T** : Produce removed.
14-Jun-94 : **T** : LN1 and LLN1 only: NK as (25:0:16) at 300 kg.
: **T** : LC1 and LLC1 only: Muriate of potash at 80 kg.
15-Jun-94 : **T** : Chain harrowed.
02-Sep-94 : **T** : Second cut.
03-Oct-94 : **T** : Remainder of plot cut.
04 Oct-94 : **T** : Produce removed.

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

21-Oct-93 : **T** : LLN5 only: Dolomite at 5.0 t.
18-Apr-94 : **T** : PK as (0:18:36) at 417 kg, NK as (25:0:16) at 300 kg.
08-Jun-94 : **T** : First cut.
10-Jun-94 : **T** : Produce removed.
14-Jun-94 : **T** : NK as (25:0:16) at 300 kg.
15-Jun-94 : **T** : Chain harrowed.
02-Sep-94 : **T** : Second cut.
03-Oct-94 : **T** : Remainder of plot cut.
04-Oct-94 : **T** : Produce removed.

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

21-Oct-93 : **T** : LLC5 only: Dolomite at 5.0 t.
18-Apr-94 : **T** : PK as (0:18:36) at 417 kg, muriate of potash at 80 kg.
08-Jun-94 : **T** : First cut.
10-Jun-94 : **T** : Produce removed.
14-Jun-94 : **T** : Muriate of potash at 80 kg.
15-Jun-94 : **T** : Chain harrowed.
02-Sep-94 : **T** : Second cut.
03-Oct-94 : **T** : Remainder of plot cut.
04-Oct-94 : **T** : Produce removed.

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94/W/RN/3

Experimental diary:

S. barley, 1st and 2nd treatment crops (**ROTATION** AB):
- 15-Mar-94 : **T** : Ploughed.
- 18-Mar-94 : **T** : NPK as (20:10:10) at 400 kg.
- 21-Mar-94 : **T** : Rotary harrowed, Alexis dressed Panoctine Plus drilled at 325 seeds per m^2.
- 19-May-94 : **T** : Vindex at 1.1 l with Duplosan New System CMPP at 2.0 l in 200 l.
- 12-Jun-94 : **T** : Radar at 0.5 l in 200 l.
- 21-Aug-94 : **T** : Combine harvested.

W. beans, 3rd treatment crop (**ROTATION** AF and AB):
- 19-Aug-93 : **T** : AB only: Roundup at 5.33 l in 200 l.
- 21-Oct-93 : **T** : PK as (0:24:24) at 168 kg. Punch broadcast at 24 seeds per m^2, ploughed.
- 10-Feb-94 : **T** : Carbetamex at 3.0 kg in 200 l.
- 09-May-94 : **T** : Rovral Flo at 1.5 l with Bravo at 1.0 l in 200 l.
- 12-Jun-94 : **T** : Rovral Flo at 1.5 l with Bravo at 1.0 l in 300 l.
- 19-Aug-94 : **T** : Combine harvested.

Fallow, 1st and 2nd treatment years (**ROTATION** AF):
- 19-Aug-93 : **T** : After rye only: Roundup at 5.33 l in 200 l.
- 10-Sep-93 : **T** : After rye only: Ploughed.
- 24-Sep-93 : **T** : After rye only: Rotary harrowed with crumbler attached.
- 19-Apr-94 : **T** : Heavy spring-tine cultivated.
- 27-Jun-94 : **T** : Rotary cultivated.

W. wheat, 1st test crop (W):
- 21-Oct-93 : **T** : Ploughed.
- 22-Oct-93 : **T** : PK as (0:24:24) at 260 kg. Yaltox at 150 kg. Rotary harrowed, Mercia, dressed Panoctine, drilled at 325 seeds per m^2.
- 19-Apr-94 : **T** : **N** 70, 140 and 210: Applied as 27% N.
- 01-May-94 : **T** : Oxytril CM at 1.5 l with Duplosan New System CMPP at 2.0 l and Halo at 1.5 l in 200 l.
- 30-May-93 : **T** : Cyclone at 1.0 l with Mistral at 0.5 l in 200 l.
- 14-Jun-94 : **T** : Hostathion at 0.84 l in 200 l.
- 15-Aug-94 : **T** : Combine harvested.

W. rye, 2nd test crop (R):
- 19-Aug-93 : **T** : Roundup at 5.33 l in 200 l.
- 21-Oct-93 : **T** : Dolomite at 5 t. Ploughed.
- 22-Oct-93 : **T** : PK as (0:24:24) at 260 kg. Yaltox at 150 kg. Rotary harrowed, Amando, dressed Baytan, drilled at 350 seeds per m^2.
- 20-Apr-94 : **T** : **N** 30, 60 and 90: Applied as 27% N.
- 01-May-94 : **T** : Vindex at 1.4 l with Starane 2 at 0.5 l and New 5C Cycocel at 2.5 l in 200 l.
- 29-May-94 : **T** : Radar at 0.5 l in 200 l.
- 09-Aug-94 : **T** : Combine harvested.

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

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94/W/RN/3

LEYS

1ST CUTTING OCCASION (8/6/94) DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	1.85	2.75	2.30
LC2	4.33	4.28	4.30
LC3	4.34	5.34	4.84
LN1	4.67	4.45	4.56
LN2	6.04	6.08	6.06
LN3	5.97	6.09	6.03
LLC1	2.12	2.54	2.33
LLC2	5.17	5.18	5.17
LLC3	5.29	4.93	5.11
LLC4	5.40	4.96	5.18
LLC5	5.50	5.71	5.60
LLC6	4.47	4.67	4.57
LLC7	4.46	4.33	4.40
LLC8	3.46	4.15	3.81
LLN1	4.80	4.77	4.79
LLN2	6.31	6.15	6.23
LLN3	6.25	6.31	6.28
LLN4	5.77	6.60	6.19
LLN5	5.70	5.92	5.81
LLN6	3.24	4.51	3.88
LLN7	5.12	4.68	4.90
LLN8	5.24	5.30	5.27
Mean	4.80	4.99	4.89

1ST CUT MEAN DM% 20.6

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94/W/RN/3

LEYS

2ND CUTTING OCCASION (2/9/94) DRY MATTER TONNES/HECTARE

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

FYM RES	NONE	FYM	Mean
LEY			
LC1	1.87	2.41	2.14
LC2	0.60	0.77	0.68
LC3	0.69	0.68	0.68
LN1	3.94	3.12	3.53
LN2	1.54	2.09	1.82
LN3	0.74	0.71	0.72
LLC1	2.24	1.90	2.07
LLC2	0.74	1.04	0.89
LLC3	0.57	0.60	0.58
LLC4	0.72	0.69	0.71
LLC5	1.11	1.09	1.10
LLC6	0.68	0.39	0.53
LLC7	0.37	0.62	0.49
LLC8	0.65	0.70	0.67
LLN1	3.65	3.88	3.76
LLN2	1.18	1.27	1.22
LLN3	0.82	0.95	0.88
LLN4	1.28	1.06	1.17
LLN5	1.41	1.54	1.47
LLN6	1.05	1.32	1.18
LLN7	0.84	0.79	0.81
LLN8	1.10	1.03	1.06
Mean	1.26	1.30	1.28

2ND CUT MEAN DM% 33.3

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94/W/RN/3

LEYS

TOTAL OF 2 CUTTING OCCASIONS DRY MATTER TONNES/HECTARE

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

FYM RES LEY	NONE	FYM	Mean
LC1	3.73	5.16	4.44
LC2	4.92	5.05	4.99
LC3	5.03	6.02	5.53
LN1	8.61	7.56	8.09
LN2	7.58	8.17	7.88
LN3	6.71	6.80	6.76
LLC1	4.36	4.44	4.40
LLC2	5.91	6.21	6.06
LLC3	5.85	5.53	5.69
LLC4	6.12	5.65	5.88
LLC5	6.61	6.80	6.70
LLC6	5.15	5.06	5.10
LLC7	4.83	4.95	4.89
LLC8	4.11	4.85	4.48
LLN1	8.45	8.65	8.55
LLN2	7.48	7.42	7.45
LLN3	7.07	7.26	7.17
LLN4	7.05	7.66	7.35
LLN5	7.11	7.46	7.28
LLN6	4.29	5.83	5.06
LLN7	5.95	5.47	5.71
LLN8	6.34	6.33	6.34
Mean	6.06	6.29	6.17

TOTAL OF 2 CUTS MEAN DM% 26.9

PLOT AREA HARVESTED 0.00200

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94/W/RN/3

W. WHEAT 1ST TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES63	NONE	FYM	Mean
ROTATION			
LN 8	5.51	4.92	5.21
LN 3	5.93	5.62	5.78
LC 8	5.59	5.11	5.35
LC 3	5.56	5.74	5.65
AF	5.28	5.51	5.40
AB	2.54	3.11	2.82
Mean	5.07	5.00	5.03

N	0	70	140	210	Mean
ROTATION					
LN 8	3.31	4.68	6.36	6.51	5.21
LN 3	4.33	5.60	6.68	6.49	5.78
LC 8	3.15	5.89	5.52	6.84	5.35
LC 3	4.60	5.46	5.71	6.82	5.65
AF	1.63	4.83	7.35	7.77	5.40
AB	0.84	3.59	3.67	3.19	2.82
Mean	2.98	5.01	5.88	6.27	5.03

N	0	70	140	210	Mean
FYMRES63					
NONE	3.11	5.27	5.91	5.99	5.07
FYM	2.85	4.75	5.85	6.55	5.00
Mean	2.98	5.01	5.88	6.27	5.03

N		0	70	140	210
ROTATION	FYMRES63				
LN 8	NONE	3.32	4.87	7.51	6.33
	FYM	3.30	4.48	5.21	6.69
LN 3	NONE	4.38	6.05	7.27	6.04
	FYM	4.28	5.15	6.09	6.95
LC 8	NONE	3.85	6.22	5.65	6.64
	FYM	2.45	5.56	5.38	7.05
LC 3	NONE	4.59	5.37	5.64	6.64
	FYM	4.62	5.54	5.77	7.00
AF	NONE	1.87	4.87	7.16	7.23
	FYM	1.39	4.79	7.53	8.31
AB	NONE	0.65	4.22	2.22	3.07
	FYM	1.04	2.95	5.12	3.32

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00201

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94/W/RN/3

W. RYE 2ND TEST CROP

GRAIN TONNES/HECTARE

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

FYMRES62	NONE	FYM	Mean
ROTATION			
LN 8	5.84	5.94	5.89
LN 3	6.38	6.08	6.23
LC 8	5.95	6.04	5.99
LC 3	6.50	6.40	6.45
AF	3.83	3.76	3.80
AB	5.15	4.94	5.05
Mean	5.61	5.52	5.57

N	0	30	60	90	Mean
ROTATION					
LN 8	3.52	5.53	6.73	7.77	5.89
LN 3	3.58	5.63	7.32	8.37	6.23
LC 8	3.56	5.08	7.37	7.96	5.99
LC 3	3.87	6.03	7.67	8.23	6.45
AF	1.23	2.99	4.82	6.14	3.80
AB	2.51	4.49	5.95	7.23	5.05
Mean	3.05	4.96	6.64	7.62	5.57

N	0	30	60	90	Mean
FYMRES62					
NONE	3.08	4.95	6.69	7.71	5.61
FYM	3.01	4.97	6.60	7.52	5.52
Mean	3.05	4.96	6.64	7.62	5.57

	N	0	30	60	90
ROTATION	**FYMRES62**				
LN 8	NONE	3.51	5.28	6.51	8.07
	FYM	3.54	5.79	6.95	7.47
LN 3	NONE	3.30	5.99	7.63	8.59
	FYM	3.87	5.28	7.01	8.15
LC 8	NONE	3.46	5.13	7.28	7.91
	FYM	3.66	5.02	7.46	8.00
LC 3	NONE	4.21	6.13	7.39	8.29
	FYM	3.52	5.94	7.94	8.18
AF	NONE	1.41	2.72	5.35	5.87
	FYM	1.06	3.27	4.30	6.41
AB	NONE	2.61	4.48	5.95	7.55
	FYM	2.41	4.50	5.95	6.91

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00201

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94/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 30th year, w. wheat.

For previous years see 'Details' 1973 and 74-93/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 3	3rd wheat, after w. wheat 1988, potatoes 1989, w. wheat 1990, w. beans 1991
WHEAT 4	4th 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 3) or 1986 (WHEAT 4), 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 3) or 1986 (WHEAT 4), 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 3) or 1985 (WHEAT 4) 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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94/W/RN/12

Sub-plots

3. **N** Nitrogen fertilizer in 1994 (kg N) as 'Nitro-Chalk':

0
50
100
150
200
250

Experimental diary:

10-Sep-93 : B : Ploughed.
16-Oct-93 : B : Rotary harrowed, Mercia, dressed Panoctine, drilled at 325 seeds per m^2.
11-Apr-94 : **T** : **N** 50, 100, 150, 200, 250: Applied as 27% N.
01-May-94 : B : Oxytril CM at 1.5 l with Duplosan New System CMPP at 2.0 l and Halo at 1.5 l in 200 l.
24-May-94 : B : Vytel Liquid Chelated Manganese (chelated Mn as Mn EDTA in solution equivalent to 6.4% w/v Mn) at 1.5 l in 200 l.
30-May-94 : B : Cyclone at 1.0 l with Mistral at 0.5 l in 200 l.
14-Jun-94 : B : Hostathion at 0.84 l in 200 l.
21-Aug-94 : **T** : **CROPSEQ** WHEAT 4: Combine harvested.
22-Aug-94 : **T** : **CROPSEQ** WHEAT 3: Combine harvested.

NOTE: Straw yields were recorded on the **CROPSEQ** WHEAT 4 plots. Grain and straw samples were taken for chemical analysis.

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94/W/RN/12

CROPSEQ WHEAT 3

GRAIN TONNES/HECTARE

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

N / TREATMNT	0	50	100	150	200	250	Mean
LC 8 GM	0.56	1.89	3.00	3.30	4.60	3.99	2.89
LC 8 PT	0.78	2.09	3.50	3.86	4.70	3.99	3.15
LC 6 LC	0.76	2.02	3.57	4.41	4.16	4.76	3.28
LC 6 LN	0.83	2.27	4.14	4.49	4.06	4.19	3.33
FYM	1.23	2.92	4.24	5.69	5.38	4.71	4.03
STRAW	0.46	1.87	3.99	5.26	5.31	5.85	3.79
FERT-FYM	0.53	2.14	4.22	4.52	4.54	5.05	3.50
FERT-STR	0.53	2.37	3.41	4.10	4.63	4.60	3.28
Mean	0.71	2.20	3.76	4.45	4.67	4.64	3.41

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

TREATMNT	N	TREATMNT N
0.471	0.249	0.797

Except when comparing means with the same level(s) of TREATMNT 0.704

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.471	13.8
BLOCK.WP.SP	40	0.704	20.7

GRAIN MEAN DM% 86.8

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94/W/RN/12

CROPSEQ WHEAT 4

GRAIN TONNES/HECTARE

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

N	0	50	100	150	200	250	Mean
TREATMNT							
LC 8 GM	1.25	3.49	5.75	6.53	6.52	6.51	5.01
LC 8 PT	1.03	3.19	5.45	6.17	6.55	6.51	4.81
LC 6 LC	1.40	3.20	5.57	7.17	6.67	6.12	5.02
LC 6 LN	1.55	3.84	6.20	6.52	7.52	7.27	5.48
FYM	1.65	3.28	5.22	5.93	5.63	6.27	4.66
STRAW	1.00	2.67	5.18	5.72	6.30	6.09	4.49
FERT-FYM	0.80	3.15	5.43	5.34	6.03	5.66	4.40
FERT-STR	0.55	2.45	4.39	5.09	5.34	5.93	3.96
Mean	1.16	3.16	5.40	6.06	6.32	6.30	4.73

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

TREATMNT	**N**	**TREATMNT N**
0.489	0.206	0.723

Except when comparing means with the same level(s) of **TREATMNT** 0.584

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.489	10.3
BLOCK.WP.SP	40	0.584	12.3

GRAIN MEAN DM% 86.1

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94/W/RN/12

CROPSEQ WHEAT 4

STRAW TONNES/HECTARE

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

N	0	50	100	150	200	250	Mean
TREATMNT							
LC 8 GM	0.47	1.73	3.10	4.25	4.21	4.39	3.03
LC 8 PT	0.44	1.86	3.20	4.01	4.32	4.30	3.02
LC 6 LC	0.73	1.38	2.86	4.28	3.78	3.52	2.76
LC 6 LN	0.73	2.34	3.85	3.75	4.98	5.58	3.54
FYM	0.65	2.02	3.22	3.96	3.68	4.37	2.98
STRAW	0.41	1.36	2.93	3.39	3.35	4.18	2.60
FERT-FYM	0.47	1.82	2.93	2.80	3.55	3.57	2.52
FERT-STR	0.10	1.51	2.61	2.54	3.12	3.66	2.26
Mean	0.50	1.75	3.09	3.62	3.87	4.20	2.84

STRAW MEAN DM% 89.5

SUB PLOT AREA HARVESTED 0.00202

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94/R/CS/10 and 94/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 33rd year, w. lupins.

For previous years see 'Details' 1967, 1973 and 74-93/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), applied cumulatively since 1991:

0
30

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94/R/CS/10 and 94/W/CS/10

NOTES: (1) Until 1978 test P was applied cumulatively, rates varied with crop, none in 1979 and 1980. K was also applied cumulatively, to P1 and P3 plots. Since 1981 K has been applied basally (none in 1986, 1987, 1989, 1990, 1993 and 1994).
(2) Test manganese was applied cumulatively, 1987-90.

Experimental diary:

Sawyers I (R):
16-Oct-93 : B : Ploughed.
19-Oct-93 : B : Disced.
20-Oct-93 : B : Spring-tine cultivated, CH304/70 drilled at 40 seeds per m^2.
26-Oct-93 : B : Opogard 500 FW at 2.8 l in 200 l.
16-Feb-94 : B : Atlas Simazine at 1.0 l in 200 l.
13-Jun-94 : **T** : **SULPHUR** 30: 30 kg S as gypsum.
06-Sep-94 : B : Barclay Gallup at 4.0 l in 200 l.

Stackyard C (W):
16-Sep-93 : B : Ploughed.
24-Sep-93 : B : Rotary harrowed, CH304/70 drilled at 40 seeds per m^2.
18-Feb-94 : B : Atlas Simazine at 1.0 l in 200 l.
10-Mar-94 : **T** : **SULPHUR** 30: 30 kg S as gypsum.
09-May-94 : B : Sportak 45 at 1.5 l in 200 l.

NOTE: Due to poor winter survival at Rothamsted and to excessive grazing damage at Woburn, both crops were abandoned in summer and no yields were taken.

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94/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 21st year, s. barley.

For previous years see 74-93/R/CS/140.

Design: Single replicate of 32 plots.

Whole plot dimensions: 4.06 x 4.57.

Treatments: Applied cumulatively every year until 1993, none in 1994.

All combinations of:-

1. **WEEDKLLR** Weedkiller in autumn:

   (NONE) None
   (GLYPHOS) Glyphosate to barley stubble each autumn

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

   (NONE) None
   (TRIADIM) Triadimefon in autumn

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

   (NONE) None
   (BENOMYL) Benomyl to the seedbed

4. **INSCTCDE** Insecticide:

   (NONE) None
   (CHLORFEN) Chlorfenvinphos to the seedbed

5. **NEMACIDE** Nematicide:

   (NONE) None
   (ALDICARB) Aldicarb to the seedbed

Experimental diary:

03-Nov-93 : B : Ploughed.
17-Mar-94 : B : Spring-tine cultivated, rotary harrowed, Alexis undressed, drilled at 350 seeds per m^2, rolled.
19-Apr-94 : B : 34.5% N at 428 kg.
02-Jun-94 : B : Oxytril CM at 1.5 l with Duplosan New System CMPP at 2.0 l in 200 l.
08-Aug-94 : B : Combine harvested.

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94/R/CS/140

NOTE: Samples of topsoil were taken from representative plots in August 1994 for the estimation of pesticide residues. The influence of treatment history on the breakdown rates of the chemicals was examined in these samples.

GRAIN TONNES/HECTARE

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

FUNGCIDE[1]	(NONE)	(TRIADIM)	Mean
WEEDKLLR			
(NONE)	5.29	5.35	5.32
(GLYPHOS)	5.19	5.25	5.22
Mean	5.24	5.30	5.27

FUNGCIDE[2]	(NONE)	(BENOMYL)	Mean
WEEDKLLR			
(NONE)	5.25	5.39	5.32
(GLYPHOS)	5.08	5.36	5.22
Mean	5.16	5.37	5.27

FUNGCIDE[2]	(NONE)	(BENOMYL)	Mean
FUNGCIDE[1]			
(NONE)	5.24	5.24	5.24
(TRIADIM)	5.09	5.51	5.30
Mean	5.16	5.37	5.27

INSCTCDE	(NONE)	(CHLORFEN)	Mean
WEEDKLLR			
(NONE)	5.45	5.20	5.32
(GLYPHOS)	5.34	5.09	5.22
Mean	5.39	5.14	5.27

INSCTCDE	(NONE)	(CHLORFEN)	Mean
FUNGCIDE[1]			
(NONE)	5.24	5.23	5.24
(TRIADIM)	5.55	5.05	5.30
Mean	5.39	5.14	5.27

INSCTCDE	(NONE)	(CHLORFEN)	Mean
FUNGCIDE[2]			
(NONE)	5.24	5.09	5.16
(BENOMYL)	5.55	5.20	5.37
Mean	5.39	5.14	5.27

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94/R/CS/140

GRAIN TONNES/HECTARE

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

NEMACIDE	(NONE)	(ALDICARB)	Mean
WEEDKLLR			
(NONE)	5.39	5.26	5.32
(GLYPHOS)	5.25	5.18	5.22
Mean	5.32	5.22	5.27

NEMACIDE	(NONE)	(ALDICARB)	Mean
FUNGCIDE[1]			
(NONE)	5.31	5.17	5.24
(TRIADIM)	5.32	5.28	5.30
Mean	5.32	5.22	5.27

NEMACIDE	(NONE)	(ALDICARB)	Mean
FUNGCIDE[2]			
(NONE)	5.20	5.13	5.16
(BENOMYL)	5.43	5.31	5.37
Mean	5.32	5.22	5.27

NEMACIDE	(NONE)	(ALDICARB)	Mean
INSCTCDE			
(NONE)	5.39	5.40	5.39
(CHLORFEN)	5.24	5.05	5.14
Mean	5.32	5.22	5.27

	FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR	**FUNGCIDE[2]**	(NONE)	(BENOMYL)	(NONE)	(BENOMYL)
(NONE)		5.23	5.35	5.27	5.43
(GLYPHOS)		5.25	5.12	4.91	5.59

	FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR	**INSCTCDE**	(NONE)	(CS)	(NONE)	(CS)
(NONE)		5.35	5.23	5.54	5.16
(GLYPHOS)		5.14	5.23	5.55	4.94

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
WEEDKLLR	**INSCTCDE**	(NONE)	(CS)	(NONE)	(CS)
(NONE)		5.23	5.27	5.66	5.13
(GLYPHOS)		5.25	4.90	5.43	5.28

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
FUNGCIDE[1]	**INSCTCDE**	(NONE)	(CS)	(NONE)	(CS)
(NONE)		5.13	5.35	5.36	5.12
(TRIADIM)		5.36	4.82	5.73	5.29

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94/R/CS/140

GRAIN TONNES/HECTARE

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

	FUNGCIDE[1]	(NONE)		(TRIADIM)	
WEEDKLLR	NEMACIDE	(NONE)	(AL)	(NONE)	(AL)
(NONE)		5.38	5.20	5.39	5.31
(GLYPHOS)		5.24	5.13	5.25	5.24

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
WEEDKLLR	NEMACIDE	(NONE)	(AL)	(NONE)	(AL)
(NONE)		5.30	5.20	5.47	5.31
(GLYPHOS)		5.10	5.05	5.39	5.32

	FUNGCIDE[2]	(NONE)		(BENOMYL)	
FUNGCIDE[1]	NEMACIDE	(NONE)	(AL)	(NONE)	(AL)
(NONE)		5.31	5.17	5.31	5.16
(TRIADIM)		5.09	5.09	5.55	5.47

	INSCTCDE	(NONE)		(CHLORFEN)	
WEEDKLLR	NEMACIDE	(NONE)	(AL)	(NONE)	(AL)
(NONE)		5.46	5.43	5.32	5.08
(GLYPHOS)		5.33	5.36	5.17	5.01

	INSCTCDE	(NONE)		(CHLORFEN)	
FUNGCIDE[1]	NEMACIDE	(NONE)	(AL)	(NONE)	(AL)
(NONE)		5.27	5.21	5.35	5.12
(TRIADIM)		5.51	5.58	5.14	4.97

	INSCTCDE	(NONE)		(CHLORFEN)	
FUNGCIDE[2]	NEMACIDE	(NONE)	(AL)	(NONE)	(AL)
(NONE)		5.20	5.28	5.20	4.97
(BENOMYL)		5.58	5.51	5.28	5.12

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

Margins of two factor tables	0.109
Two factor tables	0.154
Three factor tables	0.218

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

Stratum	d.f.	s.e.	cv%
WP	6	0.308	5.8

GRAIN MEAN DM% 87.9

PLOT AREA HARVESTED 0.00069

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94/R/CS/309 and 94/W/CS/309

LONG-TERM STRAW INCORPORATION

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

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

The tenth year, w. wheat.

For previous years see 85-93/R&W/CS/309.

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

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

Treatments: All combinations of:-

Whole plots

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

BT1 BT	
BT1T2 CT	
BP2 BP	
BT1P2 CP	
CT1 CT	
CT1 CP	
CT1T2 CT	(duplicated)
CP2 CP	(duplicated)
CT1P2 CT	(duplicated)

Sub-plots

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

E	Early
L	Late

NOTES: (1) The following codes are used:
B Straw burnt
C Straw chopped and spread
T1 Cultivated to 10 cm depth
T1P2 Cultivated to 10 cm depth, ploughed to 20 cm
T1T2 Cultivated to 10 cm depth and again tc 20 cm
P2 Ploughed to 20 cm depth

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NOTES: (2) In 1994 T plots were cultivated to 10 cm and P plots were ploughed to 20 cm depth.
(3) In the experimental diary only the code after the space is used. i.e. BT, CT, BP, CP.

Experimental diary:

Great Knott III (R).

19-Aug-93 : **T** : **STRAWCUL** CT, CP: Straw chopped.
27-Aug-93 : **T** : **STRAWCUL** BT, BP: Straw burnt, ash incorporated with discs.
18-Sep-93 : B : Sting CT at 2.0 l in 200 l.
27-Sep-93 : **T** : **STRAWCUL** BT, CT: Heavy spring-tine cultivated to 10 cm.
: **T** : **STRAWCUL** BP, CP: Ploughed to 20 cm.
19-Oct-93 : B : Disced, spring-tine cultivated.
20-Oct-93 : **T** : **SOW DATE** E: Rotary harrowed, Soissons, dressed Cerevax, drilled at 380 seeds per m^2.
08-Nov-93 : **T** : **SOW DATE** L: Rotary harrowed, Soissons, dressed Cerevax, drilled at 380 seeds per m^2.
17-Nov-93 : B : Optimol at 15 kg.
09-Mar-94 : B : 34.5% N at 118 kg.
12-Apr-94 : B : 34.5% N at 448 kg.
: B : Starane 2 at 0.75 l with Wildcat at 1.25 l in 200 l.
01-May-94 : B : Halo at 2.0 l with Tripart Brevis at 2.5 l in 200 l.
19-May-94 : B : Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
31-May-94 : B : Bombardier at 1.0 l with Cyclone at 1.0 l in 200 l.
05-Aug-94 : B : Combine harvested.

Far Field I (W).

27-Aug-93 : **T** : **STRAWCUL** BT, BP: Straw burnt.
22-Sep-93 : **T** : **STRAWCUL** BT, CT: Heavy spring-tine cultivated to 10 cm.
22-Sep-93 : **T** : **STRAWCUL** BP, CP: Ploughed to 20 cm.
19-Oct-93 : B : Scythe at 4.0 l in 200 l.
20-Oct-93 : **T** : **SOW DATE** E: Rotary harrowed, Soissons, dressed Panoctine, drilled at 350 seeds per m^2.
08-Nov-93 : **T** : **SOW DATE** L: Rotary harrowed, Soissons, dressed Panoctine, drilled at 350 seeds per m^2.
28-Feb-94 : B : Draza at 5.5 kg.
14-Mar-94 : B : 34.5% N at 116 kg.
17-Mar-94 : **T** : **SOW DATE** L: Rotary harrowed, Soissons, dressed Rappor, drilled at 500 seeds per m^2.
04-May-94 : B : 34.5% N at 348 kg.
06-May-94 : B : Ally at 30 g with Oxytril CM at 1.0 l and Halo at 1.5 l in 200 l.
30-May-94 : B : Cyclone at 1.0 l with Bravo 500 at 1.0 l in 200 l.
14-Jun-94 : B : Hostathion at 0.84 l in 200 l.
28-Jun-94 : B : Halo at 2.0 l in 200 l.
16-Aug-94 : B : Combine harvested.

NOTES: (1) At Woburn the late sowing failed owing to poor establishment and subsequent damage by birds. These plots were re-drilled to w. wheat in spring.

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NOTES: (2) Establishment counts were made in winter, shoot numbers and total DM were measured in spring and components of yield were measured in summer. Numbers of grass weeds were counted in March and numbers of ears of grass weeds were counted in July. Crops were sampled in June or July to measure diseases affecting the stem bases and roots.

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

GRAIN TONNES/HECTARE

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

SOW DATE	E	L	Mean
STRAWCUL			
BT1 BT	8.40	9.30	8.85
BT1T2 CT	7.66	8.74	8.20
BP2 BP	9.72	9.86	9.79
BT1P2 CP	9.71	9.83	9.77
CT1 CT	6.97	7.85	7.41
CT1 CP	9.95	9.78	9.86
CT1T2 CT	6.60	7.80	7.20
CP2 CP	9.58	9.69	9.64
CT1P2 CT	8.42	9.26	8.84
Mean	8.47	9.07	8.77

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

STRAWCUL	**SOW DATE**	**STRAWCUL SOW DATE**	
0.394		0.523	min.rep
0.341	0.140	0.453	max-min
0.279		0.370	max.rep
Except when comparing means with the same level(s) of **STRAWCUL**		0.486	min.rep
		0.421	max-min
		0.344	max.rep

	STRAWCUL
min.rep	Any of the remainder
max-min	CT1T2 CT or CP2 CP or CT1P2 CT v any of the remainder
max.rep	CT1T2 CT or CP2 CP or CT1P2 CT

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	36	0.557	6.4
BLOCK.WP.SP	39	0.688	7.8

GRAIN MEAN DM% 84.9

SUB PLOT AREA HARVESTED 0.00644

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

GRAIN TONNES/HECTARE

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

SOW DATE	E	L	Mean
STRAWCUL			
BT1 BT	3.37	3.12	3.25
BT1T2 CT	2.34	3.11	2.73
BP2 BP	5.94	4.06	5.00
BT1P2 CP	5.22	3.13	4.17
CT1 CT	4.58	3.34	3.96
CT1 CP	8.02	4.12	6.07
CT1T2 CT	3.07	3.14	3.11
CP2 CP	5.35	3.65	4.50
CT1P2 CT	3.68	3.06	3.37
Mean	4.47	3.38	3.93

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

STRAWCUL	**SOW DATE**	**STRAWCUL SOW DATE**	
0.712		0.974	min.rep
0.617	0.271	0.843	max-min
0.504		0.689	max.rep
Except when comparing means with the same level(s) of			
STRAWCUL		0.939	min.rep
		0.813	max-min
		0.664	max.rep

	STRAWCUL
min.rep	Any of the remainder
max-min	CT1T2 CT or CP2 CP or CT1P2 CT v any of the remainder
max.rep	CT1T2 CT or CP2 CP or CT1P2 CT

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.712	18.1
BLOCK.WP.SP	15	0.939	23.9

GRAIN MEAN DM% 84.6

SUB PLOT AREA HARVESTED 0.00638

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94/R/CS/311

EFFECTS OF SHALLOW STRAW INCORPORATION

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

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

The tenth year, w. wheat.

For previous years see 85-93/R/CS/311.

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

Whole plot dimensions: 4.5 x 12.0.

Treatments: Combinations of:-

Whole plots

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

BURNT	Burnt (duplicated)
BALED	Baled and removed (duplicated)
CHOPPED	Chopped (duplicated)

Criss-cross with

2. **CULTIVTN**

SHA CULT	Shallow tine cultivated to 10 cm depth (triplicated)
PLOUGHED	Ploughed to 23 cm depth

Experimental diary:

26-Aug-93 : **T** : **STRAW** BALED: Straw baled and removed.
: **T** : **STRAW** CHOPPED: Straw chopped with trailed chopper.
27-Aug-93 : **T** : **STRAW** BURNT: Straw burnt and ash incorporated with discs.
02-Sep-93 : B : PK as (0:18:36) at 300 kg.
18-Oct-93 : **T** : **CULTIVTN** PLOUGHED: Ploughed.
25-Oct-93 : **T** : **CULTIVTN** SHA CULT: Heavy spring-tine cultivated twice.
26-Oct-93 : B : Heavy spring-tine cultivated.
27-Oct-93 : B : Heavy spring-tine cultivated, rotary harrowed, Soissons, dressed Cerevax, drilled at 380 seeds per m^2.
28-Oct-93 : B : Draza at 5.5 kg.
19-Apr-94 : B : Briotril Plus 19/19 at 2.0 l with Hytane 500 SC at 2.0 l in 200 l.
23-Jun-94 : B : Cyclone at 1.0 l with Mallard 750 EC at 0.5 l in 200 l.
06-Aug-94 : B : Combine harvested.

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94/R/CS/311

NOTE: Established plants were counted in January. Numbers of ears of volunteers and grass weeds were counted in July and components of yield were measured. Crop was sampled in July to measure diseases affecting the stem bases and roots.

GRAIN TONNES/HECTARE

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

CULTIVTN	SHA CULT	PLOUGHED	Mean
STRAW			
BU	8.94	9.19	9.00
BA	5.16	8.44	5.98
CH	5.33	8.47	6.11
Mean	6.48	8.70	7.03

GRAIN MEAN DM% 86.5

SUB PLOT AREA HARVESTED 0.00276

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94/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 seventh year, w. barley, w. oats, w. triticale, w. wheat, s. barley.

For previous years see 88-93/R/CS/323

Design: 3 randomised blocks of 26 plots.

Whole plot dimensions: 3.0 x 10.0.

CROPSEQ Crop sequences (1988 to 1994 respectively):

TTTTTTT
OTTTOTT
TOTTTOT
TTOTTTO
TTTOTTT
WWWWWWW
OWWWOWW
WOWWWOW
WWOWWWO
WWWOWWW
BBBBBBB
OBBBOBB
BOBBBOB
BBOBBBO
BBBOBBB
WTWTWTW
WBWBWBW
TBTBTBT
SBSBSBS
WWTTTWW
WWBBBWW
TTBBBTT
TTWWWTT
BBWWWBB
BBTTTBB
WWSSSWW

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

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94/R/CS/323

Experimental diary:

02-Sep-93	B	PK as (0:18:36) at 300 kg.
09-Sep-93	B	Ploughed.
23-Sep-93	B	Spring-tine cultivated.
23-Sep-93	T	**CROPSEQ** W. barley plots: Rotary harrowed, Magie, dressed Cerevax, drilled at 400 seeds per m^2.
24-Sep-93	T	**CROPSEQ** Oats plots: Rotary harrowed, Image, dressed Ceresol, drilled at 350 seeds per m^2.
	T	**CROPSEQ** Triticale plots: Rotary harrowed, Lasko, dressed Cerevax, drilled at 400 seeds per m^2.
	T	**CROPSEQ** Wheat plots: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
	B	Glytex at 2.25 kg in 200 l.
08-Mar-94	T	**CROPSEQ** W. barley, oats, triticale and wheat plots: 34.5% N at 87 kg.
16-Mar-94	T	**CROPSEQ** S. barley plots: Rotary harrowed, Klaxon undressed, drilled at 350 seeds per m^2.
12-Apr-94	T	**CROPSEQ** Triticale plots: Hoegrass at 3.0 l with Starane 2 at 0.75 l in 220 l.
14-Apr-94	T	**CROPSEQ** Oats and triticale plots: 34.5% N at 346 kg.
	T	**CROPSEQ** W. barley plots: 34.5% N at 428 kg.
	T	**CROPSEQ** Wheat plots: 34.5% N at 496 kg.
	T	**CROPSEQ** S. barley plots: 34.5% N at 346 kg.
09-May-94	T	**CROPSEQ** W. barley plots: Starane 2 at 0.75 l with Tigress at 2.5 l in 200 l.
31-May-94	B	Mistral at 0.5 l with Radar at 0.5 l in 200 l.
01-Jun-94	T	**CROPSEQ** S. barley plots: Duplosan New System CMPP at 1.4 l with Oxytril CM at 1.0 l in 200 l.
26-Jul-94	T	**CROPSEQ** W. barley plots: Combine harvested.
02-Aug-94	T	**CROPSEQ** S. barley, wheat, oats and 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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94/R/CS/323

GRAIN TONNES/HECTARE

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

CROPSEQ	
TTTTTTT	5.35
OTTTOTT	5.04
TOTTTOT	6.23
TTOTTTO	6.95
TTTOTTT	5.91
WWWWWWW	4.70
OWWWOWW	4.84
WOWWWOW	5.01
WWOWWWO	6.55
WWWOWWW	6.65
BBBBBBB	6.46
OBBBOBB	7.15
BOBBBOB	5.23
BBOBBBO	6.60
BBBOBBB	6.48
WTWTWTW	5.27
WBWBWBW	6.25
TBTBTBT	6.98
SBSBSBS	5.09
WWTTTWW	6.64
WWBBBWW	5.65
TTBBBTT	5.87
TTWWWTT	5.18
BBWWWBB	6.46
BBTTTBB	7.04
WWSSSWW	5.28
Mean	5.96

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

CROPSEQ
0.632

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	50	0.774	13.0

GRAIN MEAN DM% 84.8

PLOT AREA HARVESTED 0.00226

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94/R/CS/326 and 94/W/CS/326

AMOUNTS OF STRAW

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

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

The eighth year, w. wheat.

For previous years see 87-93/R&W/CS/326.

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

Whole plot dimensions: 3.0 x 13.5 (R).
3.0 x 14.5 (W).

Treatments:

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

		R	W
NONE	None	-	-
NORMAL	Normal	5.3	2.8
2 NORMAL	Twice normal	10.6	5.6
4 NORMAL	Four times normal	21.2	11.2

Experimental diary:

Great Knott III (R)

25-Aug-93 : **T** : **STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied.
: **T** : **STRAW** NONE: Straw removed.
: B : Straw and stubble chopped.
27-Sep-93 : B : Ploughed.
19-Oct-93 : B : Disced, spring-tine cultivated.
20-Oct-93 : B : Rotary harrowed, Soissons, dressed Cerevax, drilled at 380 seeds per m^2.
17-Nov-93 : B : Optimol at 15 kg.
09-Mar-94 : B : 34.5% N at 118 kg.
12-Apr-94 : B : 34.5% N at 448 kg.
: B : Starane 2 at 0.75 l with Wildcat at 1.25 l in 200 l.
01-May-94 : B : Halo at 2.0 l with Tripart Brevis at 2.5 l in 200 l.
24-May-94 : B : Ally at 30 g with Cheetah Super at 1.5 l and Starane 2 at 0.75 l in 200 l.
31-May-94 : B : Bombardier at 1.0 l with Cyclone at 1.0 l in 200 l.
06-Aug-94 : B : Combine harvested.

Far Field I (W)

17-Aug-93 : **T** : **STRAW** NORMAL, 2 NORMAL, 4 NORMAL: Straw applied.
: **T** : **STRAW** NONE: Straw removed.
20-Aug-93 : B : Straw and stubble chopped.
22-Sep-93 : B : Tine cultivated to 10 cm.
19-Oct-93 : B : Scythe at 4.0 l in 200 l.

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94/R/CS/326 and 94/W/CS/326

Experimental diary:

Far Field I (W)

20-Oct-93 : B : Rotary harrowed, Soissons, dressed Panoctine, drilled at 350 seeds per m^2.
28-Feb-94 : B : Draza at 5.5 kg.
14-Mar-94 : B : 34.5% N at 116 kg.
04-May-94 : B : 34.5% N at 348 kg.
06-May-94 : B : Ally at 30 g with Oxytril CM at 1.0 l and Halo at 1.5 l in 200 l.
30-May-94 : B : Cyclone at 1.0 l with Bravo 500 at 1.0 l in 200 l.
14-Jun-94 : B : Hostathion at 0.84 l in 200 l.
16-Aug-94 : B : Combine harvested.

NOTE: Establishment counts were made in winter. In summer fertile ear numbers and harvest index were measured.

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

GRAIN TONNES/HECTARE

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

STRAW	NONE	NORMAL	2 NORMAL	4 NORMAL	Mean
	9.78	9.69	9.71	9.67	9.71

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

STRAW
0.123

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.173	1.8

GRAIN MEAN DM% 86.2

PLOT AREA HARVESTED 0.00310

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

GRAIN TONNES/HECTARE

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

STRAW	NONE	NORMAL	2 NORMAL	4 NORMAL	Mean
	4.48	5.03	4.59	4.11	4.55

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

STRAW
1.258

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	1.540	33.8

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00319

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94/R/CS/331

TAKE-ALL INOCULATION

Object: To compare a range of methods of artificially inoculating take-all (*Gaeumannomyces graminis*), to assess the residual effects of a seed treatment 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 sixth year, w. wheat, w. oats.

For previous years see 89-93/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 in the fifth year (1993) to control take-all:
NONE O W	None (w. oats 1994, alternating with w. wheat)
NONE W O	None (w. wheat 1994, 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 (cv. Riband) seed drilled.

Experimental diary:

13-Sep-93 : B : Ploughed.
21-Oct-93 : B : Heavy spring-tine cultivated.
22-Oct-93 : **T** : **INOC+SDT** NONE O W: Image, dressed Panoctine Plus, drilled at 350 seeds per m^2.
: **T** : **INOC+SDT** All plots except NONE O W: Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
26-Oct-93 : **T** : **INOC+SDT** NONE O W: Glytex at 2.25 kg in 200 l.
21-Dec-93 : B : Draza at 5.5 kg.
09-Mar-94 : B : 34.5% N at 118 kg.
19-Apr-94 : B : 34.5% N at 448 kg.
09-May-94 : **T** : **INOC+SDT** All plots except NONE O W: Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
: B : Halo at 2.0 l with New 5C Cycocel at 2.5 l in 200 l.
20-May-94 : B : 34.5% N at 100 kg.

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Experimental diary:
17-Jun-94 : B : Hostathion at 840 ml in 200 l.
23-Jun-94 : B : Cyclone at 1.0 l with Mallard 750 EC at 0.5 l in 200 l.
15-Aug-94 : **T** : **INOC+SDT** All plots except NONE O W: Combine harvested.
23-Aug-94 : **T** : **INOC+SDT** NONE O W: Combine harvested.

NOTE: Plant samples were taken in July for take-all assessments.

GRAIN TONNES/HECTARE

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

INOC+SDT	
NONE W O	8.71
NONE W W	8.29
I PRE PL	8.48
I PRE SO	8.56
I CD	8.02
SEEDTR 0	8.51
SEEDTR 1	8.19
SEEDTR 2	8.40
Mean	8.40

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

INOC+SDT
0.295

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	21	0.418	5.0

GRAIN MEAN DM% 84.9

PLOT AREA HARVESTED 0.00506

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94/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, J.F. Jenkyn, R.J. Gutteridge.

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 fifth year, ryegrass, clover, tumbledown, w. oats and w. wheat.

For previous years see 90-93/W/CS/347.

Treatments:

Treatment phase (5th year)

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. oats, in arable sequence w. wheat, w. wheat, w. oats, w. wheat, w. oats

Test phase (2nd year, w. wheat):

Whole plots

1. **PREVCROP** Previous crops, cumulative 1990 to 1992 (as **CROPS** above):

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

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

2. **N** Fertilizer nitrogen, cumulative to 1993, applied in spring:

NO	None
N OPT	Optimum

3. **WHEAT** Residual effects of time of ploughing and drilling w. wheat in autumn 1992 and spring 1993:

(W)	Winter
(S)	Spring

NOTES: (1) Among the three blocks still in the treatment phase, yields were taken from the w. oats plots and from the ley plots from which the cuttings were removed.
(2) The other three blocks were sown to winter-sown or spring-sown wheat in 1993 and were also split to test for nitrogen. These blocks were sown to a second wheat test crop in 1994.

Experimental diary:

Treatment phase:

02-Sep-93 : **T** : **CROPS** ARABLE: Sting CT at 8.0 l in 200 l.
08-Sep-93 : **T** : **CROPS** ARABLE: Ploughed.
20 Oct-93 : **T** : **CROPS** ARABLE: PK as (0:18:36) at 694 kg, spring-tine cultivated.
22-Oct-93 : **T** : **CROPS** ARABLE: Rotary harrowed, Image, dressed Rappor Plus, drilled at 425 seeds per m^2.
02-Nov-93 : **T** : **CROPS** ARABLE: Glytex at 2.25 l in 200 l.
12-Apr-94 : **T** : **CROPS** RY+CL RE: Triple superphosphate at 39 kg and muriate of potash at 137 kg.
: **T** : **CROPS** RY+N RE: Triple superphosphate at 26 kg, muriate of potash at 106 kg and 27% N at 370 kg.
20-Apr-94 : **T** : **CROPS** ARABLE: 27% N at 370 kg.
29-May-94 : **T** : **CROPS** ARABLE: Tilt 250 EC at 0.5 l in 200 l.
01-Jun-94 : **T** : **CROPS** RY LF, RY+CL LF, RY+CL RE, RY+N RE, TU LF: Cut.
: **T** : **CROPS** RY+CL RE, RY+N RE: Cuttings removed.
13-Jul-94 : **T** : **CROPS** RY LF, RY+CL LF, RY+CL RE, RY+N RE, TU LF: Cut.
: **T** : **CROPS** RY+CL RE, RY+N RE: Cuttings removed.
05-Aug-94 : **T** : **CROPS** ARABLE: Combine harvested.
22-Sep-94 : **T** : **CROPS** RY LF, RY+CL LF, RY+CL RE, RY+N RE, TU LF: Cut.
: **T** : **CROPS** RY+CL RE, RY+N RE: Cuttings removed.

Test phase:

02-Sep-93 : **T** : Sting CT at 8.0 l in 200 l.
08-Sep-93 : **T** : Ploughed.
19-Oct-93 : **T** : PK as (0:18:36) at 694 kg.
20-Oct-93 : **T** : Spring-tine cultivated.
23-Oct-93 : **T** : Rotary harrowed twice, Cadenza, dressed Cerevax, drilled at 325 seeds per m^2.
02-Nov-93 : **T** : Glytex at 2.25 l in 200 l.
21-Mar-94 : **T** : **N** N OPT: 27% N at 148 kg.
03-May-94 : **T** : **N** N OPT: 27% N at 592 kg.

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Experimental diary:

30-May-94 : **T** : Ally at 30 g with Starane 2 at 0.75 l in 200 l.
: **T** : Cyclone at 1.0 l with Mistral at 0.50 l in 200 l.
08-Jul-94 : **T** : Aphox at 280 g in 200 l.
20-Aug-94 : **T** : Combine harvested.

NOTES: (1) Soil nitrogen was measured in autumn 1993 and spring 1994. In all crops of the treatment phase, ground cover, plant numbers, plant height and growth stages were estimated in spring 1994 and again in autumn 1994 before sowing the first wheat test crop.
(2) The wheat was sampled in June to measure diseases affecting the stem bases and roots.

TREATMENT PHASE

GRASS

1ST CUT (1/6/94) DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	4.32	3.05	3.68

1ST CUT MEAN DM% 20.9

PLOT AREA HARVESTED 0.00299

2ND CUT (13/7/94) DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	2.28	1.62	1.95

2ND CUT MEAN DM% 28.3

PLOT AREA HARVESTED 0.00264

3RD CUT (22/9/94) DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	0.96	0.37	0.67

3RD CUT MEAN DM% 28.4

PLOT AREA HARVESTED 0.00264

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TOTAL OF 3 CUTS DRY MATTER TONNES/HECTARE

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

CROPS	RY+CL RE	RY+N RE	Mean
	7.56	5.03	6.30

TOTAL OF 3 CUTS MEAN DM% 25.9

W. OATS

GRAIN TONNES/HECTARE 6.00

GRAIN MEAN DM% 87.7

PLOT AREA HARVESTED 0.00572

TEST PHASE

GRAIN TONNES/HECTARE

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

N	NO	N OPT	Mean
PREVCROP			
(RY LF)	3.40	7.35	5.38
(RY+CL LF)	2.97	7.26	5.11
(RY+CL RE)	3.02	7.37	5.19
(RY+N RE)	3.20	6.61	4.91
(TU LF)	2.56	7.39	4.97
(ARABLE)	2.20	5.86	4.03
Mean	2.89	6.97	4.93

WHEAT	(W)	(S)	Mean
PREVCROP			
(RY LF)	5.43	5.32	5.38
(RY+CL LF)	5.10	5.13	5.11
(RY+CL RE)	5.25	5.14	5.19
(RY+N RE)	4.81	5.01	4.91
(TU LF)	5.03	4.92	4.97
(ARABLE)	3.93	4.13	4.03
Mean	4.92	4.94	4.93

WHEAT	(W)	(S)	Mean
N			
NO	2.91	2.87	2.89
N OPT	6.93	7.01	6.97
Mean	4.92	4.94	4.93

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TEST PHASE

GRAIN TONNES/HECTARE

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

	WHEAT	(W)		(S)	
PREVCROP	N	NO	N OPT	NO	N OPT
(RY LF)		3.65	7.20	3.15	7.50
(RY+CL LF)		2.89	7.30	3.04	7.23
(RY+CL RE)		3.13	7.37	2.91	7.36
(RY+N RE)		3.14	6.47	3.27	6.75
(TU LF)		2.60	7.46	2.53	7.31
(ARABLE)		2.07	5.80	2.34	5.93

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

	PREVCROP	WHEAT	PREVCROP WHEAT
.	0.443	0.106	0.480
Except when comparing means with the same level(s) of			
PREVCROP			0.258

	PREVCROP* N	WHEAT* N	PREVCROP* WHEAT N
	0.565	0.165	0.615
Except when comparing means with the same level(s) of			
PREVCROP	0.532		0.592
WHEAT		0.157	
PREVCROP.WHEAT			0.578
PREVCROP.N			0.343

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

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	10	0.543	11.0
BLOCK.WP1.SP	12	0.317	6.4
BLOCK.WP1.WP2	10	0.693	14.1
BLOCK.WP1.SP.WP2	12	0.391	7.9

GRAIN MEAN DM% 83.6

SUB PLOT AREA HARVESTED 0.00279 (AVERAGE)

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94/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 fourth year, w. wheat.

For previous years see 91-93/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 1991-1994 and level of volunteers in 1992-1994:
E E E E	Early in 1991, 1992, 1993 and 1994
E L L L	Early in 1991, late in 1992, 1993 and 1994
E L+ L+ L+	Early in 1991, late in 1992, 1993 and 1994, volunteers encouraged since 1992
L E E E	Late in 1991, early in 1992, 1993 and 1994
L L* L* L*	Late in 1991, 1992, 1993 and 1994, volunteers controlled since 1992

NOTE: On E L+ L+ L+, volunteers simulated by sowing 50 kg wheat seed after cultivations on 24 September, 1993.

Experimental diary:

13-Sep-93 : B : Ploughed.
23-Sep-93 : B : Rotary harrowed.
24-Sep-93 : **T** : **SOW SEQ** E E E E, L E E E: Rotary harrowed twice, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
15-Oct-93 : **T** : **SOW SEQ** L L* L* L*: Gramoxone 100 at 1.5 l with Vassgro Spreader at 220 ml in 220 l.
19-Oct-93 : **T** : **SOW SEQ** E L L L, E L+ L+ L+, L L* L* L*: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
21-Dec-93 : B : Draza at 5.5 kg.
10-Mar-94 : B : 34.5% N at 118 kg.
19-Apr-94 : B : 34.5% N at 448 kg.
01-May-94 : B : Hytane 500 SC at 3.0 l with Starane 2 at 0.75 l and Wildcat at 1.25 l in 200 l.
19-May-94 : B : 34.5% N at 100 kg.
13-Jun-94 : B : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 200 l.
17-Jun-94 : B : Hostathion at 840 ml in 200 l.
29-Jul-94 : B : Glyphogan at 4.0 l in 200 l.
16-Aug-94 : B : Combine harvested.

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94/R/CS/354

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

GRAIN TONNES/HECTARE

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

SOW SEQ	
E E E E	7.54
E L L L	7.19
E L+ L+ L+	7.15
L E E E	7.37
L L* L* L*	7.26
Mean	7.30

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

.	SOW SEQ
	0.162

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.229	3.1

GRAIN MEAN DM% 87.4

PLOT AREA HARVESTED 0.00226

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94/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 fourth year, w. wheat.

For previous years see 91-93/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:

28-Sep-93 : B : Ploughed.
20-Oct-93 : B : Heavy spring-tine cultivated.
21-Oct-93 : B : Disced.
26-Oct-93 : B : Heavy spring-tine cultivated.
29-Oct-93 : B : Rotary harrowed twice, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
21-Dec-93 : B : Draza at 5.5 kg.
18-Apr-94 : **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.
19-Apr-94 : B : Starane 2 at 0.75 l with Wildcat at 1.25 l in 200 l.
01-May-94 : B : Halo at 2.0 l with Tripart Brevis at 2.5 l in 200 l.
31-May-94 : B : Cyclone at 1.0 l with Mallard 750 EC at 0.5 l in 200 l.
13-Jun-94 : B : Hostathion at 840 ml in 200 l.
29-Jul-94 : B : Glyphogan at 4.0 l in 200 l.
15-Aug-94 : B : Combine harvested.

NOTE: Crop samples were taken for chemical analysis.

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94/R/CS/355

GRAIN TONNES/HECTARE

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

N	
0	1.98
50	4.51
100	6.14
150	7.85
200	7.33
250	6.51
300	6.83
Mean	5.88

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

N
0.495

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	12	0.606	10.3

GRAIN MEAN DM% 86.7

PLOT AREA HARVESTED 0.00483

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94/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 third year, w. wheat

For previous years see 92 & 93/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

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)	200	200	-
(2)	400	400	-
(3)	600	600	-
(30)	600	600	Nil
(3S)	600	600	500

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

NOTES: (1) **INOCULTN[92]** (0), (30): Nil occurs where the empty drill was drawn across the plots.
(2) Some of the inoculation rates were incorrectly recorded in 1992 and 1993. These should be corrected using the above rates.

Experimental diary:

16-Sep-93 : B : Ploughed.
18-Oct-93 : B : Rotary harrowed, Mercia, undressed, drilled at 325 seeds per m^2.
14-Mar-94 : B : 34.5% N at 116 kg.
28-Apr-94 : B : 34.5% N at 464 kg.
09-May-94 : B : Ally at 30 g with Oxytril CM at 1.0 l and Halo at 1.5 l in 200 l.
30-May-94 : B : Cyclone at 1.0 l with Mistral at 0.5 l in 200 l.
14-Jun-94 : B : Hostathion at 0.84 l in 200 l.
15-Aug-94 : B : Combine harvested.

NOTE: Plant samples for take-all assessment were taken at the end of June.

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94/W/CS/375

GRAIN TONNES/HECTARE

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

INOCULTN[92]	(0)	(1)	(2)	(3)	(30)	(3S)	Mean
SOW DATE[92]							
(E)	3.66	2.92	3.89	3.81	3.46	4.10	3.64
(L)	3.28	4.64	4.38	4.51	4.40	3.38	4.10
Mean	3.47	3.78	4.13	4.16	3.93	3.74	3.87

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

SOW DATE[92]	**INOCULTN[92]**	**SOW DATE[92] INOCULTN[92]**
0.235	0.407	0.576

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	22	0.705	18.2

GRAIN MEAN DM% 86.1

PLOT AREA HARVESTED 0.00132

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94/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 second year, w. barley.

For previous year see 93/W/CS/386.

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

Whole plot dimensions: 9.0 x 12.0.

Treatments: All combinations of:-

Whole plots

1. **CROPS**		Cover crops, sown in autumn 1992, tumbledown and fallow; all, except (WB), ploughed in spring 1993 and sown to s. barley:
	(FA)	Fallow
	(FR)	Forage rape
	(PH)	Phacelia
	(RG)	Ryegrass
	(RY)	Rye
	(R+M)	Rye and white mustard
	(TD)	Tumbledown
	(WM)	White mustard
	(WB)	W. barley taken to maturity

Sub-plots

2. **N**		Nitrogen fertilizer (kg N) applied in spring 1993:	
		S. barley	W. barley
	(-)	None	None
	(N)	75	150

Experimental diary:

24-Aug-93 : B : Deep tine cultivated.
11-Sep-93 : B : Dolomite at 7.5 t.
15-Sep-93 : B : Ploughed.
16-Oct-93 : B : Rotary harrowed, Puffin, dressed Panoctine Plus, drilled at 350 seeds per m^2.
14-Apr-94 : B : 34.5% N at 464 kg.
01-May-94 : B : Oxytril CM at 1.5 l with Duplosan New system CMPP at 2.0 l and Punch C at 0.5 l in 200 l.
29-May-94 : B : Radar at 0.5 l with Mistral at 0.5 l in 200 l.
26-Jul-94 : B : Combine harvested.

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GRAIN TONNES/HECTARE

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

N CROPS	(-)	(N)	Mean
(FA)	6.70	6.31	6.50
(FR)	6.80	6.77	6.78
(PH)	6.76	6.52	6.64
(RG)	6.49	6.70	6.59
(RY)	6.79	6.94	6.86
(R+M)	7.09	7.12	7.10
(TD)	6.51	6.48	6.50
(WM)	6.62	6.60	6.61
(WB)	6.62	6.95	6.79
Mean	6.71	6.71	6.71

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

CROPS	N	CROPS N
0.265	0.090	0.327

Except when comparing means with the same level(s) of CROPS 0.270

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	16	0.325	4.8
BLOCK.WP.SP	18	0.331	4.9

GRAIN MEAN DM% 87.5

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94/W/CS/386

STRAW TONNES/HECTARE

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

N	(-)	(N)	Mean
CROPS			
(FA)	2.44	2.02	2.23
(FR)	3.38	3.16	3.27
(PH)	3.25	3.82	3.53
(RG)	2.93	2.78	2.85
(RY)	4.45	1.61	3.03
(R+M)	3.70	3.39	3.54
(TD)	3.96	3.60	3.78
(WM)	2.41	3.77	3.09
(WB)	2.77	3.54	3.16
Mean	3.25	3.08	3.17

STRAW MEAN DM% 89.2

SUB PLOT AREA HARVESTED 0.00083

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94/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 second year, w. barley.

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

Whole plot dimensions: 9.0 x 12.0.

Treatments: All plots ploughed in autumn 1993 and sown to w. barley:

Whole plots

1. **LAND TRT** — Residues of cover crops, sown in autumn 1992, tumbledown and fallow. Plots ploughed in spring 1993 and sown to s. barley:

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

Sub-plots

2. **N** — Residues of nitrogen fertilizer (kg N) to s. barley 1993:

(0)
(75)

plus one extra treatment

Whole plot

1. **EXTRA**

(W BARLEY) — Residues of w. barley, sown in autumn 1992, taken to maturity:

Sub-plot

2. **N EXTRA** — Residues of nitrogen fertilizer (kg N) to w. barley, sown in autumn 1992:

(0)
(150)

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Experimental diary:

13-Sep-93 : B : Ploughed.
08-Oct-93 : B : Rotary harrowed, Puffin, dressed Cerevax Extra, drilled at 350 seeds per m^2.
12-Nov-93 : B : Optimol at 15 kg.
19-Apr-94 : B : 34.5% N at 346 kg.
19-Apr-94 : B : Briotril Plus 19/19 at 2.0 l with Hytane 500 SC at 2.0 l in 200 l.
06-May-94 : B : Radar at 0.5 l with Standon Tridemorph 750 at 0.5 l in 200 l.
31-May-94 : B : Mistral at 0.5 l with Radar at 0.5 l in 200 l.
25-Jul-94 : B : Combine harvested.

NOTE: Soil water samples were taken for N analysis during the winter. Soil and crop samples were taken for N analysis during the summer.

GRAIN TONNES/HECTARE

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

N	(0)	(75)	Mean
LAND TRT			
(FALLOWSB)	6.15	5.99	6.07
(FO RA SB)	6.37	6.01	6.19
(RYE SB)	6.74	6.87	6.80
(TUMBDN SB)	6.93	6.74	6.84
Mean	6.55	6.40	6.48

WINTER BARLEY

N EXTRA	(0)	(150)	Mean
	4.81	5.23	5.02

GRAND MEAN 6.19

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

LAND TRT	**N**	**LAND TRT N & N EXTRA**
0.512	0.154	0.557

Except when comparing means with the same level(s) of **CROPS** 0.309

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.627	10.1
BLOCK.WP.SP	10	0.379	6.1

GRAIN MEAN DM% 88.3 SUB PLOT AREA HARVESTED 0.00082

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94/R/CS/408

MISCANTHUS SINENSIS GIGANTEUS STUDY

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

Sponsor: D.G. Christian.

The second year, grass.

Design: 3 randomised blocks of 3 plots.

Whole plot dimensions: 10.0 x 10.0.

Treatments:

NITROGEN	Rates of fertilizer nitrogen (kg N):
-	None
N1	60
N2	120

Experimental diary:

```
   02-Feb-94 : B : Hytane 500 SC at 4.0 l in 220 l.
   08-Apr-94 : B : Scythe at 5.0 l in 220 l.
   06-May-94 : B : Muriate of potash at 233 kg.
             : T : NITROGEN N1, N2: 34.5% N at 174 kg and 348 kg
                   respectively.
   22-Feb-95 : B : Cut
```

NOTE: Crop was transplanted on 25 May, 1993.

DRY MATTER TONNES/HECTARE

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

NITROGEN	-	N1	N2	Mean
	7.30	7.09	8.01	7.47

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

NITROGEN
0.997

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	1.222	16.4

MEAN DM% 49.4

PLOT AREA HARVESTED 0.00422

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94/R/CS/411

PANICUM STUDY

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

Sponsor: D.G. Christian.

The second year, grass.

Design: 3 blocks of 7 x 2 plots.

Whole plot dimensions: 5.0 x 2.0.

Treatments:

1.	**VARIETY**	Variety:
	CAVIN R	Cave in Rock
	KANLOW	Kanlow
	PATHFIND	Pathfinder
	SUNBURST	Sunburst
	FOREST B	Forest Burg
	NEBR 28	NEBR 28
	DAKOTAH	Dakotah
2.	**NITROGEN**	Rates of fertilizer nitrogen (kg N):
	-	None
	N1	60

Experimental diary:

06-Jan-94 : B : Gramoxone 100 at 3.0 l in 220 l.
02-Feb-94 : B : Gesaprim 500 SC at 3.0 l in 220 l.
12-May-94 : **T** : **NITROGEN** N1: 34.5% N at 174 kg.
07-Mar-95 : B : Cut.

NOTE: All varieties were drilled at 10 kg on 12 May 1993.

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94/R/CS/411

DRY MATTER TONNES/HECTARE

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

NITROGEN	-	N1	Mean
VARIETY			
CAVIN R	6.75	5.65	6.20
KANLOW	7.71	3.57	5.64
PATHFIND	6.89	5.43	6.16
SUNBURST	5.34	4.58	4.96
FOREST B	6.27	6.31	6.29
NEBR 28	5.95	5.36	5.66
DAKOTAH	4.41	3.96	4.18
Mean	6.19	4.98	5.58

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

VARIETY	NITROGEN	VARIETY NITROGEN
0.802	0.429	1.134

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	26	1.389	24.9

MEAN DM% 74.8

PLOT AREA HARVESTED 0.00003

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94/R/CS/429

WINTER RYE AS AN ENERGY CROP

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

Sponsor: D.G. Christian.

Design: 3 randomised blocks of 5 plots.

Plot dimensions: 3.0 x 15.0.

Treatments:

NITROGEN	Nitrogen fertilizer (kg N), applied as 'Nitro-Chalk':
N0	None
N1	30
N2	60
N3	90
N4	120

Experimental diary:

13-Sep-93 : B : Ploughed.
15-Oct-93 : B : Rotary harrowed, Amando, dressed Baytan, drilled at 350 seeds per m^2.
14-Dec-93 : B : Draza at 5.5 kg.
22-Apr-94 : **T** : **N** 30: 27% N at 111 kg.
: **T** : **N** 60: 27% N at 222 kg.
: **T** : **N** 90: 27% N at 333 kg.
: **T** : **N** 120: 27% N at 444 kg.
23-Aug-94 : B : Combine harvested.

NOTE: Ear numbers were counted, dry matter yield measured and nutrient concentration analysed on crop samples taken at anthesis and pre-harvest.

GRAIN TONNES/HECTARE

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

NITROGEN	
N0	5.53
N1	5.72
N2	6.44
N3	7.15
N4	6.77
Mean	6.32

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

NITROGEN
0.616

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GRAIN TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	8	0.755	11.9

GRAIN MEAN DM% 84.0

PLOT AREA HARVESTED 0.00230

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94/R/WW/1

WINTER WHEAT

NITROGEN INDICATORS

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

Sponsor: P.B. Barraclough.

Design: 3 randomised blocks of 8 plots.

Plot dimensions: 3.0 x 15.0.

Treatments:

N	Nitrogen in spring (kg N) applied as 34.5% N at first node formation:
-	0
1	50
2	100
3	150
4	200
5	250
6	300
7	40 and, in addition, four subsequent dressings of 40, applied at weekly intervals (total 200)

Experimental diary:

24-Aug-93 : B : Ploughed and furrow pressed.
27-Aug-93 : B : Rolled.
15-Oct-93 : B : Triple superphosphate at 213 kg.
18-Oct-93 : B : Spring-tine cultivated.
23-Oct-93 : B : Rotary harrowed, Hereward, dressed Cerevax, drilled at 380 seeds per m^2.
18-Apr-94 : **T** : **N** 1: 34.5% N at 145 kg.
: **T** : **N** 2: 34.5% N at 290 kg.
: **T** : **N** 3: 34.5% N at 435 kg.
: **T** : **N** 4: 34.5% N at 580 kg.
: **T** : **N** 5: 34.5% N at 725 kg.
: **T** : **N** 6: 34.5% N at 870 kg.
: **T** : **N** 7: 34.5% N at 116 kg.
25-Apr-94 : **T** : **N** 7: 34.5% N at 116 kg.
01-May-94 : B : Halo at 2.0 l with Tripart Brevis at 2.5 l in 200 l.
03-May-94 : **T** : **N** 7: 34.5% N at 116 kg.
09-May-94 : B : Ally at 30 g with Cheetah Super at 3.0 l and Starane 2 at 0.75 l in 200 l.
10-May-94 : **T** : **N** 7: 34.5% N at 116 kg.
18-May-94 : **T** : **N** 7: 34.5% N at 116 kg.
23-Jun-94 : B : Cyclone at 1.0 l with Mallard 750 EC at 0.5 l in 200 l.
22-Aug-94 : B : Combine harvested.

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NOTES: (1) Leaf chlorophyll was measured at weekly intervals with a hand-held meter.
(2) Crop growth, leaf area index and N content of the crop were measured on four occasions in spring and summer.
(3) Yield components and N content of straw and grain were measured at final harvest.

GRAIN TONNES/HECTARE

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

N	
-	5.28
1	7.22
2	8.88
3	9.29
4	9.36
5	10.05
6	9.90
7	9.93
Mean	8.74

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

N
0.432

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.529	6.0

GRAIN MEAN DM% 87.9

PLOT AREA HARVESTED 0.00253

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94/W/WW/1

WINTER WHEAT

SULPHUR AND WHEAT

Object: To measure the uptake of sulphur and the effect of fertilizer sulphur on the yield and quality of w. wheat grown on light soil - Woburn, Lansome II.

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

Design: 5 blocks of 2 plots, systematically arranged.

Plot dimensions: 5.0 x 10.0.

Treatments:

SULPHUR	Sulphur fertilizer (kg S), as potassium sulphate:
S0	0
S4	40

NOTE: The potassium was balanced by applying potassium chloride to the S0 plots.

Experimental diary:

20-Sep-93 : B : Ploughed.
16-Oct-93 : B : Rotary harrowed, Hereward, dressed Cerevax, drilled at 325 seeds per m^2.
10-Mar-94 : **T** : **SULPHUR** S0: Potassium chloride at 186 kg.
: **T** : **SULPHUR** S4: Potassium sulphate at 217 kg.
13-Apr-94 : B : 27% N at 415 kg.
27-Apr-94 : B : 27% N at 415 kg.
01-May-94 : B : Oxytril CM at 1.5 l with Duplosan New System CMPP at 2.0 l and Halo at 1.5 l in 200 l.
30-May-94 : B : Cyclone at 1.0 l with Mistral at 0.5 l in 200 l.
14-Jun-94 : B : Hostathion at 0.84 l in 200 l.
22-Aug-94 : B : Combine harvested.

Previous crops: W. rape 1992, s. barley 1993.

NOTE: Samples of grain and straw were taken for chemicals analysis and grain was tested for baking quality. Soil was also sampled for sulphur content.

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94/W/WW/1

GRAIN TONNES/HECTARE

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

SULPHUR

S0	5.08
S4	5.27
Mean	5.17

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

SULPHUR
0.255

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.403	7.8

GRAIN MEAN DM% 88.2

STRAW TONNES/HECTARE

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

SULPHUR

S0	3.80
S4	4.46
Mean	4.13

STRAW MEAN DM% 86.1

PLOT AREA HARVESTED 0.00220

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94/R/WW/2

WINTER WHEAT

HERBICIDE, WEED SPECIES AND DENSITY

Object: To study the effects of various densities of weeds and their suppression by the use of herbicides on the growth and yield of w. wheat - Fosters.

Sponsor: P.J.W. Lutman.

Design: 2 randomised blocks of 2 x 5 x 4 plots.

Plot dimensions: 3.0 x 14.0.

Treatments:

1. **SPECIES** Weed species:

CL	Cleavers (*Galium aparine*)
CW	Chickweed (*Stellaria media*)

2. **WEED DEN** Target weed densities, plants per m^2:

	Cleavers	Chickweed
D0	0	0
D1	10	100
D2	20	200
D3	40	400
D4	80	800

3. **HERB DSE** Herbicide dosage, g active ingredient:

	Triasulfuron		Bromoxynil	Ioxynil	Mecoprop
	29 Apr	2 Jun	29 Apr	29 Apr	29 Apr
-	0	0	0	0	0
L1	1.0	4.0	0	0	0
L2	1.5	6.0	0	0	0
L3	1.5	6.0	140	140	1120

Experimental diary:

10-Aug-93 : B : Rotary cultivated with Bomford Dynadrive.
13-Aug-93 : B : Deep tine cultivated with vibrating tines 60 cm apart, 45 cm deep.
24-Aug-93 : B : Rolled.
15-Sep-93 : B : Ploughed.
18-Oct-93 : B : Rotary harrowed.
: **T** : **SPECIES** CL, CW: Weed seeds sown by hand.
19-Oct-93 : B : Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
11-Apr-94 : B : 34.5% N at 448 kg.

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94/R/WW/2

Experimental diary:

29-Apr-94 : **T** : **HERB DSE** L1: Lo-gran 20 WG at 5.0 g in 220 l.
: **T** : **HERB DSE** L2: Lo-gran 20 WG at 7.5 g in 220 l.
: **T** : **HERB DSE** L3: Lo-gran 20 WG at 7.5 g with Swipe 560 EC at 2.5 l in 220 l.
01-May-94 : B : Halo at 2.0 l with Tripart Brevis at 2.5 l in 200 l.
31-May-94 : B : Cyclone at 1.0 l with Mallard 750 EC at 0.5 l in 200 l.
02-Jun-94 : **T** : **HERB DSE** L1: Lo-gran 20 WG at 20.0 g in 220 l.
: **T** : **HERB DSE** L2, L3: Lo-gran 20 WG at 30.0 g in 220 l.
16-Jun-94 : B : Dursban 48E at 800 ml in 200 l.
15-Aug-94 : B : Combine harvested.

NOTES: (1) Samples were taken in May, June and July to determine crop and weed dry weights.
(2) Yields, cleaned of weed seeds, are presented. The analysis has been adjusted for the presence of blackgrass, assessed on 17 June.

GRAIN TONNES/HECTARE

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

WEED DEN / **SPECIES**	D0	D1	D2	D3	D4	Mean
CL	8.95	8.91	8.27	8.24	7.79	8.43
CW	9.19	8.49	8.43	8.33	7.86	8.46
Mean	9.07	8.70	8.35	8.28	7.82	8.45

HERB DSE / **SPECIES**	_	L1	L2	L3	Mean
CL	7.74	8.70	8.55	8.73	8.43
CW	7.74	8.74	8.67	8.68	8.46
Mean	7.74	8.72	8.61	8.71	8.45

HERB DSE / **WEED DEN**	_	L1	L2	L3	Mean
D0	8.87	9.21	9.14	9.07	9.07
D1	7.98	8.78	9.06	8.97	8.70
D2	7.87	8.69	8.42	8.42	8.35
D3	7.54	8.73	8.10	8.76	8.28
D4	6.44	8.19	8.34	8.32	7.82
Mean	7.74	8.72	8.61	8.71	8.45

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94/R/WW/2

GRAIN TONNES/HECTARE

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

SPECIES	HERB DSE WEED DEN	_	L1	L2	L3
CL	D0	8.92	9.12	8.93	8.83
	D1	8.65	8.84	8.99	9.15
	D2	7.57	8.54	8.19	8.79
	D3	7.58	8.79	7.89	8.68
	D4	5.98	8.22	8.73	8.20
CW	D0	8.83	9.30	9.34	9.30
	D1	7.32	8.72	9.13	8.79
	D2	8.17	8.84	8.65	8.05
	D3	7.50	8.66	8.31	8.84
	D4	6.90	8.17	7.94	8.43

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

SPECIES	WEED DEN	HERB DSE	SPECIES WEED DEN
0.136	0.215	0.194	0.304

SPECIES HERB DSE	WEED DEN HERB DSE	SPECIES WEED DEN HERB DSE
0.272	0.429	0.605

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	38	0.597	7.1

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00248

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94/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 - Hoosfield Old Four Course.

Sponsors: R.J. Darby, J. Hopkinson.

Design: 3 randomised blocks of 2 x 8 plots.

Plot dimensions: 3.0 x 22.0.

Treatments:

1.	**SOW DATE**	Date of sowing:
	1	Second week in September
	2	Third week in October
2.	**SPRING N**	Rate (kg N), form and timing of nitrogen fertilizer applied in spring and summer to achieve different green area indices (GAI):
	-	None
	A	Conventional: 60 in mid-March, 205 in late April, both as 27% N
	B	GAI 3: 30 in mid-March, 70 in late April, both as 27% N
	C	GAI 5: 60 in mid-March, 140 in late April, both as 27% N
	D	GAI 5: as 'C' plus 40 as foliar urea at growth stage (GS) 34-35
	E	GAI 5: as 'C' plus 40 as foliar urea at GS 39-45
	F	GAI 5: as 'C' plus 40 as foliar urea at GS 68
	G	GAI 5: as 'C' plus 40 as 27% N at GS 39-45

NOTE: Foliar urea contains 46.6% N.

Experimental diary:

10-Sep-93	: B :	Ploughed.
23-Sep-93	: B :	Spring-tine cultivated, twice.
24-Sep-93	: B :	Rotary harrowed.
	: **T** :	**SOW DATE** 1: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
19-Oct-93	: **T** :	**SOW DATE** 2: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m^2.
21-Dec-93	: B :	Draza at 5.5 kg.
06-Apr-94	: **T** :	**SPRING N** A C D E F and G: 27% N at 222 kg.
	: **T** :	**SPRING N** B: 27% N at 111 kg.
28-Apr-94	: **T** :	**SPRING N** A: 27% N at 759 kg.
	: **T** :	**SPRING N** B: 27% N at 259 kg.
	: **T** :	**SPRING N** C D E F and G: 27% N at 519 kg.

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94/R/WW/3

Experimental diary:

```
   24-May-94 : T : SPRING N D: Foliar urea at 86.9 kg in 450 l.
             : B : Ally at 30 g with Cheetah Super at 1.5 l and Starane 2
                   at 0.75 l in 200 l.
   08-Jun-94 : T : SPRING N E: Foliar urea at 86.9 kg in 450 l.
             : T : SPRING N G: 27% N at 148 kg.
   13-Jun-94 : B : Halo at 2.0 l with Mallard 750 EC at 0.5 l in 200 l.
   17-Jun-94 : B : Hostathion at 840 ml in 200 l.
   23-Jun-94 : T : SPRING N F: Foliar urea at 86.9 kg in 450 l.
   16-Aug-94 : B : Combine harvested.
```

NOTE: Soil samples were taken in February and August to determine soil mineral N content. Plant samples were taken for growth analysis and N content at fortnightly intervals from March to August. After each foliar urea spray plant samples were taken to determine the degree of spray penetration and the crop N content. Components of yield were measured at harvest.

GRAIN TONNES/HECTARE

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

SPRING N / SOW DATE	-	A	B	C	D	E	F	G	Mean
1	0.93	6.10	3.63	5.43	5.44	5.07	5.55	5.70	4.73
2	1.70	7.27	4.79	6.40	6.68	6.71	6.86	6.95	5.92
Mean	1.31	6.68	4.21	5.91	6.06	5.89	6.20	6.32	5.33

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

SOW DATE	SPRING N	SOW DATE SPRING N
0.141	0.283	0.400

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.490	9.2

GRAIN MEAN DM% 86.7

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94/R/WW/3

STRAW TONNES/HECTARE

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

SPRING N / SOW DATE	-	A	B	C	D	E	F	G	Mean
1	0.18	3.73	2.46	3.41	2.99	3.09	3.01	3.34	2.77
2	0.59	4.61	2.85	3.95	4.30	3.91	3.82	3.83	3.48
Mean	0.39	4.17	2.65	3.68	3.64	3.50	3.41	3.58	3.13

STRAW MEAN DM% 88.5

PLOT AREA HARVESTED 0.00230

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94/R/WS/1

SPRING WHEAT

WEED SOWING DATE AND DENSITY

Object: To measure the response of s. wheat to competition from white mustard (*Sinapsis alba*) sown on two different dates - Long Hoos I/II.

Sponsor: P.J.W. Lutman.

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

Plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **WEED SD** Time of sowing white mustard:

S1	Same day as drilling wheat
S2	10 days after drilling wheat

2. **WEED DEN** Density of sown white mustard (plants per m^2):

	S1	S2
D1	20	12
D2	56	19
D4	108	73
D8	215	90

plus 2 extra treatments

3. **EXTRA** No mustard sown, hand weeding:

DO	Not hand weeded
OS	Hand weeded

NOTE: Target white mustard densities (plants per m^2):

WEED DEN	D1	D2	D4	D8
WEED SD S1:	25	50	100	200
S2:	50	100	200	400

Experimental Diary:

05-Nov-93 : B : Ploughed.
16-Mar-94 : B : Spring-tine cultivated.
: **T** : **WEED SD** S1: White mustard broadcast by hand.
: B : Rotary harrowed, Canon, dressed Rappor, drilled at 350 seeds per m^2.
28-Mar-94 : **T** : **WEED SD** S2: White mustard broadcast by hand, raked in.
04-May-94 : B : 34.5% N at 348 kg.
22-Aug-94 : B : Combine harvested.

NOTE: Leaf area and ground cover of wheat and mustard were estimated on five occasions in April and May. Dry weights of wheat and mustard were estimated in May, June and August.

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94/R/WS/1

GRAIN TONNES/HECTARE

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

WEED DEN / WEED SD	D1	D2	D8	D8	Mean
S1	4.29	2.16	0.96	0.22	1.91
S2	4.74	4.43	3.64	4.17	4.24
Mean	4.51	3.29	2.30	2.19	3.07

EXTRA	
D0	4.70
OS	4.77
Mean	4.73

GRAND MEAN 3.41

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

WEED SD	WEED DEN	WEED SD WEED DEN & EXTRA
0.225	0.318	0.450

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.551	16.1

GRAIN MEAN DM% *

PLOT AREA HARVESTED 0.00010

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94/R/BW/1

WINTER BARLEY

COMPANION CROPPING

Object: To measure the effects of white mustard (*Sinapsis alba*) and oil radish (*Raphanus sativus*), grown as companion or cover crops, on the pests, diseases, growth, yield and nutrient uptake of w. barley - West Barnfield II.

Sponsor: D.G. Christian.

Design: 3 randomised blocks of 6 plots.

Whole plot dimensions: 6.0 x 10.0.

Treatments:

CROP	Crop, seed rate and time of sowing:
-	None
MC	White mustard, broadcast at 20 kg within one week of previous harvest
M1	White mustard, broadcast at 1.5 kg on the same day as drilling barley
M2	White mustard, broadcast at 3.0 kg on the same day as drilling barley
M3	White mustard, broadcast at 6.0 kg on the same day as drilling barley
R1	Oil radish, broadcast at 3.0 kg on the same day as drilling barley

Experimental diary:

10-Aug-93 : **T** : **CROP** MC: Shallow cultivated twice with Bomford Dynadrive, Thorney white mustard broadcast by hand at 20 kg.
09-Sep-93 : B : Ploughed.
22-Sep-93 : B : Rotary harrowed, Puffin, dressed Cerevax Extra, drilled at 350 seeds per m^2.
: **T** : **CROP** M1, M2, M3: Thorney white mustard broadcast by hand at 1.5 kg, 3.0 and 6.0 kg respectively.
: **T** : **CROP** R1: Trick oil radish broadcast at 3.0 kg.
28-Oct-93 : B : Draza at 5.5 kg.
08-Mar-94 : B : 34.5% N at 87 kg.
14-Apr-94 : B : 34.5% N at 435 kg.
09-May-94 : B : Starane 2 at 0.75 l with Tigress at 2.5 l in 200 l.
31-May-94 : B : Mistral at 0.5 l with Radar at 0.5 l in 200 l.
26-Jul-94 : B : Combine harvested.

Previous crops: W. barley 1992 and 1993.

NOTES: (1) Previous w. barley was combine harvested on 3 August, 1993 and the straw was removed on 6 August.
(2) Plant populations, dry weights and nutrient uptakes of both the w. barley and the cover crops were estimated in January and April.

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94/R/BW/1

GRAIN TONNES/HECTARE

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

CROP	
-	7.04
MC	6.55
M1	7.04
M2	6.95
M3	6.48
R1	6.99
Mean	6.84

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

CROP
0.430

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	10	0.527	7.7

GRAIN MEAN DM% 85.0

PLOT AREA HARVESTED 0.00230

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94/R/BS/1

SPRING BARLEY

TRIASULFURON DOSE AND WEED DENSITY

Object: To study the effects of suppressed weeds on the growth and yield of s. barley - Webbs.

Sponsor: P.J.W. Lutman.

Design: 2 randomised blocks of 2 x 5 x 4 plots.

Whole plot dimensions: 3.0 x 14.0.

Treatments:

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

SM	*Stellaria media* (chickweed)
SA	*Sinapis arvensis* (charlock)

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

	SM	SA
D0	0	0
D1	69	19
D2	125	32
D3	197	71
D4	454	143

3. **HERBCIDE** Rate of triasulfuron, g active ingredient:

H0	None
H1	2.5
H2	5.0
H3	7.5

NOTE: Target weed densities, plants per m^2:
SM: 0, 100, 200, 400 and 800
SA: 0, 50, 100, 200 and 400

Experimental diary:

03-Nov-93 : B : Ploughed.
18-Apr-94 : B : Rotary harrowed.
: **T** : **WEED SP**: Weed seeds broadcast by hand.
: B : Rotary harrowed, Alexis, dressed Panoctine Plus, drilled at 350 seeds per m^2.
10-May-94 : B : 34.5% N at 435 kg.
02-Jun-94 : **T** : **HERBCIDE** H1: Logran 20 WG at 12.5 g in 220 l.
: **T** : **HERBCIDE** H2: Logran 20 WG at 25.0 g in 220 l.
: **T** : **HERBCIDE** H3: Logran 20 WG at 37.5 g in 220 l.
23-Jun-94 : B : Derosal WDG at 312.5 g with Dorin at 1.0 l in 260 l.
09-Aug-94 : B : Combine harvested.

Previous crops: S. barley 1992 and 1993.

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94/R/BS/1

NOTES: (1) Crop and weed dry weights were measured in early and late June and in late July.
(2) Yields, cleaned of weed seeds, are presented.

GRAIN TONNES/HECTARE

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

WEED DEN / **WEED SP**	D0	D1	D2	D3	D4	Mean
SM	5.35	5.09	5.36	5.03	5.14	5.19
SA	5.24	5.26	4.83	5.12	4.93	5.08
Mean	5.30	5.18	5.10	5.07	5.04	5.14

HERBCIDE / **WEED SP**	H0	H1	H2	H3	Mean
SM	4.94	5.25	5.25	5.34	5.19
SA	4.72	5.23	5.23	5.12	5.08
Mean	4.83	5.24	5.24	5.23	5.14

HERBCIDE / **WEED DEN**	H0	H1	H2	H3	Mean
D0	5.03	5.45	5.32	5.38	5.30
D1	4.93	5.49	5.01	5.27	5.18
D2	4.86	5.19	5.31	5.03	5.10
D3	4.80	4.94	5.31	5.23	5.07
D4	4.53	5.14	5.25	5.23	5.04
Mean	4.83	5.24	5.24	5.23	5.14

WEED SP	**WEED DEN**	**HERBCIDE**	H0	H1	H2	H3
SM	D0		5.14	5.42	5.42	5.42
	D1		4.79	5.34	4.96	5.26
	D2		5.15	5.51	5.46	5.32
	D3		4.69	4.79	5.21	5.41
	D4		4.91	5.19	5.18	5.27
SA	D0		4.92	5.49	5.21	5.34
	D1		5.06	5.63	5.07	5.29
	D2		4.56	4.87	5.16	4.75
	D3		4.92	5.10	5.41	5.05
	D4		4.14	5.09	5.32	5.18

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

WEED SP	**WEED DEN**	**HERBCIDE**	**WEED SP** **WEED DEN**
0.068	0.108	0.097	0.153

WEED SP **HERBCIDE**	**WEED DEN** **HERBCIDE**	**WEED SP** **WEED DEN** **HERBCIDE**
0.137	0.216	0.306

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94/R/BS/1

GRAIN TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	39	0.306	6.0

GRAIN MEAN DM% 87.7

PLOT AREA HARVESTED 0.00276

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94/W/BS/1

SPRING BARLEY

SULPHUR AND SPRING BARLEY

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

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

Design: 5 x 5 Latin square.

Whole plot dimensions: 4.8 x 6.0.

Treatments:

SULPHUR	Sulphur fertilizer (kg S), as potassium sulphate:
S0	0
S1	10
S2	20
S3	30
S4	40

NOTE: The potassium was balanced by applying potassium chloride to the S0-S3 plots at rates equivalent to the potassium applied to the S4 plots.

Experimental diary:

09-Feb-94 : B : Ploughed.
21-Mar-94 : B : Rotary harrowed, Alexis, dressed Panoctine Plus, drilled at 325 seeds per m^2.
25-Apr-94 : **T** : **SULPHUR** S1, S2, S3, S4: Potassium sulphate applied at 54.3, 108.7, 163.0 and 217.3 kg respectively.
: **T** : **SULPHUR** S0, S1, S2, S3: Potassium chloride applied at 186.3, 139.7, 93.0 and 46.7 kg respectively.
: B : 34.5% N at 348 kg.
19-May-94 : B : Vindex at 1.1 l with Duplosan New System CMPP at 2.0 l in 200 l.
12-Jun-94 : B : Radar at 0.5 l in 200 l.
23-Aug-94 : B : Combine harvested.

Previous crops: W. rape 1992, s. barley 1993.

NOTE: Samples of plants, grain and straw were taken for chemical analysis, grain quality was assessed and soils were sampled for sulphur content.

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94/W/BS/1

GRAIN TONNES/HECTARE

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

SULPHUR	S0	S1	S2	S3	S4	Mean
	4.58	4.82	5.00	4.84	4.55	4.76

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

SULPHUR
0.169

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.266	5.6

GRAIN MEAN DM% 86.6

PLOT AREA HARVESTED 0.00128

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94/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 - Appletree.

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	Type of behaviour modifying chemical released:
-	None
A	A
B	B
C	C
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 1993 until mid-June 1994.

Experimental diary:

19-Jul-93 : B : Cultivated by rotary grubber.
29-Jul-93 : B : Deep tine cultivated with vibrating tines 60 cm apart, 45 cm deep.
02-Aug-93 : B : Rolled.
16-Aug-93 : B : PK as (0:18:36) at 1250 kg.
18-Aug-93 : B : Ploughed and furrow pressed, rolled.
23-Sep-93 : B : Rotary harrowed, Envol, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
07-Oct-93 : B : Draza at 5.5 kg.
08-Mar-94 : B : 34.5% N at 162 kg.
11-Apr-94 : B : 34.5% N at 346 kg.
08-Aug-94 : B : Combine harvested.

Previous crops: Potatoes 1992, set-aside 1993.

NOTE: Numbers of cabbage stem flea beetle larvae were assessed in plant samples taken in December and February. Numbers of pollen beetles and seed weevils were assessed weekly throughout the spring and early summer. Pod samples were taken in June to assess seed weevil damage.

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94/R/RAW/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

CHEMICAL

-	3.12
A	3.26
B	3.22
C	3.18
D	2.98
Mean	3.15

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

CHEMICAL
0.128

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.203	6.4

GRAIN MEAN DM% 90.4

PLOT AREA HARVESTED 0.00207

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94/W/RAW/3

WINTER OILSEED RAPE

SULPHUR AND NITROGEN

Object: To determine the effects of various rates of sulphur fertilizer on the yield and sulphur content of winter oilseed rape grown at various rates of nitrogen fertilizer - Woburn, Butt Close.

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

Design: 4 randomised blocks of 3 x 4 plots.

Whole plot dimensions: 4.0 x 10.0.

Treatments: All combinations of:-

1. **NITROGEN** Fertilizer nitrogen (kg N), as Nitro-Chalk:

N1	100
N2	180
N3	230

2. **SULPHUR** Fertilizer sulphur (kg S), as gypsum (17.6% S):

S0	0
S1	10
S2	20
S4	40

Experimental diary:

23-Aug-93 : B : Ploughed.
24-Aug-93 : B : Rolled.
07-Sep-93 : B : Rotary harrowed, Libravo, dressed Lindex-Plus FS, drilled at 7.0 kg.
30-Sep-93 : B : 27% N at 50 kg.
10-Feb-94 : B : Carbetamex at 2.0 kg with Benazalox at 1.25 kg in 200 l.
04-Mar-94 : **T** : **NITROGEN** N1, N2, N3: 27% N at 185.2, 333.2 and 426.0 kg respectively.
10-Mar-94 : **T** : **SULPHUR** S1, S2, S4: Gypsum at 56.8, 113.8 and 227.2 kg respectively.
08-Apr-94 : **T** : **NITROGEN** N1, N2, N3: 27% N at 185.2, 333.2 and 426.0 kg respectively.
05-Aug-94 : B : Combine harvested.

Previous crops: W. rape, summer fallow 1992, w. wheat 1993.

NOTE: Plants were sampled throughout the season for sulphur and nitrogen content, soil was also sampled pre-sowing and post-harvest for sulphur content.

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94/W/RAW/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SULPHUR / NITROGEN	S0	S1	S2	S4	Mean
N1	1.06	1.22	1.37	1.05	1.18
N2	1.25	1.86	2.09	2.14	1.84
N3	0.79	2.00	2.08	2.11	1.75
Mean	1.03	1.69	1.85	1.77	1.59

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

NITROGEN	SULPHUR	NITROGEN SULPHUR
0.169	0.195	0.338

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.478	30.1

GRAIN MEAN DM% 87.0

PLOT AREA HARVESTED 0.00176

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94/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 - Summerdells I.

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 20.0.

Treatments:

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

TREATMENT NUMBER	23 NOV	17 DEC	19 JAN	17 FEB	30 MAR	19 APR	09 MAY	13 JUN	04 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	✓	✓	✓	-	-	-	-	-	-

NOTE: (1) Due to adverse weather, some planned treatments were omitted or re-scheduled. Treatments 1, 2 and 3 were identical and treatments 12, 21 and 22 also were identical. The means of the three are presented under treatments 1 and 12.

(2) All plots were inoculated on 1 December, 1993 by applying rape straw from the 1993 harvest. Treatment numbers 23 and 25 were inoculated again on 16 March, 1994 and treatment number 24 on 28 June.

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94/R/RAW/5

Experimental Diary:

01-Jul-93	: B	:	Disced, rolled.
13-Aug-93	: B	:	Sting CT at 2.0 l in 200 l.
19-Aug-93	: B	:	Ploughed and furrow pressed.
20-Aug-93	: B	:	Rolled.
25-Aug-93	: B	:	Disced.
27-Aug-93	: B	:	Rolled.
31-Aug-93	: B	:	Rotary harrowed.
01-Sep-93	: B	:	Rolled.
18-Sep-93	: B	:	Rotary harrowed, Envol, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
30-Sep-93	: B	:	Draza at 5.5 kg.
23-Nov-93	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
17-Dec-93	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
18-Jan-94	: B	:	Draza at 5.5 kg.
19-Jan-94	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
17-Feb-94	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
28-Feb-94	: B	:	Benazalox at 1.0 kg with Carbetamex at 3.0 kg in 200 l.
07-Mar-94	: B	:	34.5% N at 162 kg.
30-Mar-94	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
11-Apr-94	: B	:	34.5% N at 346 kg.
19-Apr-94	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
09-May-94	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
13-Jun-94	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
04-Jul-94	: **T**	:	**FUNGFREQ** Treatment numbers as schedule: Sportak 45 at 0.55 l with Compass at 1.5 l in 200 l.
01-Aug-94	: B	:	Combine harvested.

Previous crops: Potatoes 1992, set-aside 1993.

NOTE: (1) 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.

(2) The analysis presented assumes a linear trend, to represent the weed population.

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94/R/RAW/5

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

FUNGFREQ	
1	3.09
4	3.03
5	3.45
6	3.72
7	3.73
8	3.58
9	3.56
10	3.47
11	3.73
12	3.44
13	3.05
14	3.06
15	3.24
16	3.32
17	3.34
18	3.52
19	3.59
20	3.54
23	3.61
24	3.11
25	3.46
Mean	3.39

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

FUNGFREQ	
0.220	min.rep
0.179	max-min
0.127	max.rep

	FUNGFREQ
max-min	1 or 12 v any of the remainder
max.rep	1 or 12
min.rep	Any of the remainder

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	52	0.365	10.8

GRAIN MEAN DM% 80.2

PLOT AREA HARVESTED 0.00460

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94/R/RAW/6

WINTER OILSEED RAPE

WINTER OILSEED RAPE AND WEED SPECIES

Object: To establish the relative competitive abilities of a range of common broad-leaved weeds in w. rape - Appletree.

Sponsors: P.J.W. Lutman.

Design: 3 blocks of (7 x 2) + 2 plots.

Whole plot dimensions: 3.0 x 14.0.

Treatments: All combinations of:-

1. **SPECIES** Weed species sown:

SM	*Stellaria media* (chickweed)
GA	*Galium aparine* (cleavers)
MP	*Matricaria perforata* (mayweed)
VA	*Viola arvensis* (pansy)
SA	*Sinapis arvensis* (charlock)
LP	*Lamium purpureum* (red dead-nettle)
PR	*Papaver rhoeas* (poppy)

2. **DENSITY**

D1	Moderate
D2	High

plus 2 extra plots

3. **EXTRA** No weeds sown, herbicide application:

OS	Applied
OU	Not applied

Experimental diary:

19-Jul-93 : B : Cultivated by rotary grubber.
29-Jul-93 : B : Deep tine cultivated with vibrating tines, 60 cm apart, 45 cm deep.
02-Aug-93 : B : Rolled.
16-Aug-93 : B : PK as (0:18:36) at 1250 kg.
18-Aug-93 : B : Ploughed and furrow pressed, rolled.
07-Sep-93 : B : Rotary harrowed.
: **T** : **SPECIES** SM, GA, VA, SA, LP, PR: Weed seeds broadcast by hand.
: B : Rotary harrowed twice, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
: **T** : **SPECIES** MP: Weed seeds broadcast by hand.
07-Oct-93 : B : Draza at 5.5 kg.
17-Dec-93 : **T** : **SPECIES** GA, MP, VA, SA, LP, PR and **EXTRA** OS: Kerb Flo at 1.75 l in 220 l.
08-Mar-94 : B : 34.5% N at 162 kg.

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94/R/RAW/6

Experimental diary:
11-Apr-94 : B : 34.5% N at 346 kg.
21-Jul-94 : B : Landgold Diquat at 3.0 l with Vassgro Spreader at 300 ml in 300 l.
29-Jul-94 : B : Combine harvested.

Previous crops: Potatoes 1992, set-aside 1993.

NOTES: (1) Crop and weed densities were assessed in autumn. Crop and weed dry weights were measured in December and April.
(2) Yields, cleaned of weed seeds, are presented.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

DENSITY	D1	D2	Mean
SPECIES			
SM	3.19	3.45	3.32
GA	3.72	2.42	3.07
MP	3.94	4.08	4.01
VA	4.02	3.89	3.96
SA	2.25	0.83	1.54
LP	3.99	3.42	3.71
PR	4.07	4.05	4.06
Mean	3.60	3.16	3.38
EXTRA			
OS	3.91		
OU	3.25		
Mean	3.58		

GRAND MEAN 3.41

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

SPECIES	**DENSITY**	**SPECIES DENSITY & EXTRA**
0.169	0.090	0.239

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.293	8.6

GRAIN MEAN DM% 84.6

PLOT AREA HARVESTED 0.00253

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94/R/RAW/7

WINTER OILSEED RAPE

WINTER OILSEED RAPE DENSITY AND CHICKWEED

Object: To study the effects of crop density and autumn nitrogen on the competitive effects of chickweed (*Stellaria media*) - Appletree.

Sponsor: P.J.W. Lutman.

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

Whole plot dimensions: 3.0 x 14.0.

Treatments:

1. **CROP DEN**	W. rape density, plants per m^2:	
	C1	26
	C2	55
	C3	118
	C4	202
2. **WEED DEN**	Chickweed density, plants per m^2:	
	W0	0
	W1	119
	W2	584
3. **AUT N**	Fertilizer nitrogen in autumn, kg N:	
	N0	0
	N1	50

NOTE: Target chickweed densities were: W0 0, W1 100 and W2 500 plants per m^2.

Experimental diary:

19-Jul-93 : B : Cultivated with rotary grubber.
29-Jul-93 : B : Deep tine cultivated with vibrating tines, 60 cm apart and 45 cm deep.
02-Aug-93 : B : Rolled.
16-Aug-93 : B : PK as (0:18:36) at 1250 kg.
18-Aug-93 : B : Ploughed and furrow pressed, rolled.
20-Sep-93 : **T** : **AUT N** N1: 34.5% N at 145 kg.
22-Sep-93 : B : Rotary harrowed.
: **T** : **CROP DEN** C1: Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 57 seeds (50% dead) per m^2.
: **T** : **CROP DEN** C2, C3, C4: Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 57, 115 and 230 seeds per m^2 respectively.
: **T** : **WEED DEN** W1, W2: Chickweed seed broadcast by hand.
07-Oct-93 : B : Draza at 5.5 kg.

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94/R/RAW/7

Experimental diary:

31-Jan-94 : B : Carbetamex at 3.0 kg in 200 l.
08-Mar-94 : B : 34.5% N at 162 kg.
11-Apr-94 : B : 34.5% N at 346 kg.
21-Jul-94 : B : Landgold Diquat at 3.0 l with Vassgro Spreader at 300 ml in 300 l.
27-Jul-94 : B : Combine harvested.

Previous crops: Potatoes 1992, set-aside 1993.

NOTE: Crop and weed densities were assessed and samples were taken to measure plant growth in winter, spring and summer.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

WEED DEN	W0	W1	W2	Mean
CROP DEN				
C1	3.74	3.23	2.74	3.24
C2	4.12	3.82	3.48	3.81
C3	3.76	3.31	3.73	3.60
C4	3.77	3.69	3.63	3.70
Mean	3.85	3.51	3.39	3.59

AUT N	N0	N1	Mean
CROP DEN			
C1	3.00	3.48	3.24
C2	3.81	3.80	3.81
C3	3.55	3.65	3.60
C4	3.78	3.62	3.70
Mean	3.53	3.64	3.59

AUT N	N0	N1	Mean
WEED DEN			
W0	3.83	3.87	3.85
W1	3.50	3.53	3.51
W2	3.28	3.51	3.39
Mean	3.53	3.64	3.59

WEED DEN	W0		W1		W2	
CROP DEN **AUT N**	N0	N1	N0	N1	N0	N1
C1	3.45	4.03	3.25	3.21	2.29	3.19
C2	4.16	4.08	3.71	3.92	3.57	3.39
C3	3.80	3.71	3.22	3.40	3.62	3.84
C4	3.91	3.64	3.81	3.58	3.62	3.64

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94/R/RAW/7

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

CROP DEN	WEED DEN	AUT N	CROP DEN WEED DEN
0.115	0.099	0.081	0.198

CROP DEN AUT N	WEED DEN AUT N	CROP DEN WEED DEN AUT N
0.162	0.140	0.280

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	23	0.280	7.8

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00253

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94/R/RAW/8

WINTER OILSEED RAPE

WEED COMPETITION - RAPE DRILLING DATE AND CHICKWEED

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

Sponsor: P.J.W. Lutman.

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

Whole plot dimensions: 3.0 x 14.0.

Treatments:

Whole plots

1. **SOW DATE** Target sowing date of w. rape:

SE	Early, 20-25 Aug
SM	Middle, 5-10 Sept
SL	Late, 15-20 Sept

Sub-plots

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

	SE	SM	SL
D0	0	0	0
D1	35	54	39
D2	130	156	112
D3	304	414	342
D4	790	887	659
OS	0	0	0

NOTES: (1) No herbicide applied to D0 plots, herbicide applied to OS plots. OS plots (SE and SM only) were also hand weeded in spring.
(2) Target weed densities were D0 and OS 0, D1 50, D2 150, D3 450 and D4 900 plants per m^2.

Experimental diary:

19-Jul-93 : B : Cultivated with rotary grubber.
29-Jul-93 : B : Deep tine cultivated with vibrating tines 60 cm apart and 45 cm deep.
02-Aug-93 : B : Rolled.
16-Aug-93 : B : PK as (0:18:36) at 1250 kg.
18-Aug-93 : B : Ploughed and furrow pressed, rolled.
25-Aug-93 : **T** : **SOW DATE** SE: Rotary harrowed, chickweed broadcast by hand. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
07-Sep-93 : **T** : **SOW DATE** SM: Rotary harrowed, chickweed broadcast by hand. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.

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94/R/RAW/8

Experimental diary:

23-Sep-93 : **T** : **SOW DATE** SL: Rotary harrowed, chickweed broadcast by hand. Rotary harrowed, Falcon, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
07-Oct-93 : B : Draza at 5.5 kg.
17-Dec-93 : **T** : **WEED DEN** OS: Kerb Flo at 1.75 l in 220 l.
: **T** : **SOW DATE** SE, SM, **WEED DEN** D1-D4: Synchemicals Dalapon at 3.4 kg in 220 l.
31-Jan-94 : **T** : **SOW DATE** SL, **WEED DEN** D1-D4: Synchemicals Dalapon at 3.4 kg in 220 l.
08-Mar-94 : B : 34.5% N at 162 kg.
11-Apr-94 : B : 34.5% N at 346 kg.
19-May-94 : **T** : **SOW DATE** SL: Fastac at 200 ml in 200 l.
21-Jul-94 : B : Landgold Diquat at 3.0 l with Vassgro Spreader at 300 ml in 300 l.
27-Jul-94 : B : Combine harvested.

Previous crops: Potatoes 1992, set-aside 1993.

NOTE: (1) Crop and weed densities were assessed and samples were taken to measure plant growth in December and March.
(2) The yields on two plots were treated as missing because of severe lodging, with treatment combinations:

SOW DATE	SM	SM
WEED DEN	D2	OS

Estimated values were used in the analysis.

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94/R/RAW/8

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

WEED DEN / SOW DATE	D0	D1	D2	D3	D4	OS	Mean
SE	2.98	3.81	3.74	3.72	3.55	4.12	3.65
SM	2.16	3.55	3.58	3.54	3.70	4.00	3.42
SL	4.10	3.33	3.32	3.27	3.17	4.06	3.54
Mean	3.08	3.56	3.55	3.51	3.47	4.06	3.54

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

	SOW DATE	WEED DEN	SOW DATE WEED DEN
	0.286	0.160	0.382
Except when comparing means with the same level(s) of SOW DATE			0.278

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	4	0.351	9.9
BLOCK.WP.SP	28	0.340	9.6

GRAIN MEAN DM% 89.6

SUB PLOT AREA HARVESTED 0.00290

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94/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 - Appletree.

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

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

Whole plot dimensions: 6.0 x 10.0.

Treatments: All combinations of:-

Whole plots

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

NOFUNG	No fungicide spray, no inoculation
FUNGCDE	Fungicide spray applied autumn, spring and summer, no inoculation
INOC 1	No fungicide spray. Inoculation level 1
INOC 2	No fungicide spray. Inoculation level 2

Sub-plots

2. **VARIETY**

CA	Capricorn
FA	Falcon

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

Experimental diary:

19-Jul-93 : B : Cultivated by rotary grubber.
29-Jul-93 : B : Deep tine cultivated with vibrating tines 60 cm apart, 45 cm deep.
02-Aug-93 : B : Rolled.
16-Aug-93 : B : PK as (0:18:36) at 1250 kg.
18-Aug-93 : B : Ploughed and furrow pressed, rolled.
25-Aug-93 : B : Disced twice, rotary harrowed twice.
: **T** : **VARIETY** CA, FA: Varieties, dressed Lindex-Plus FS, drilled at 120 seeds per m^2.
07-Oct-93 : B : Draza at 5.5 kg.
14-Oct-93 : **T** : **FUNGINOC** INOC 1, INOC 2: Infected straw applied.
04-Nov-93 : B : Benazalox at 0.75 l with Butisan S at 1.5 l in 200 l.
16-Nov-93 : **T** : **FUNGINOC** FUNGCDE: Sportak 45 at 1.1 l in 220 l.
08-Mar-94 : B : 34.5% N at 162 kg.

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94/R/RAW/10

Experimental diary:

08-Apr-94 : **T** : **FUNGINOC** FUNGCDE: Sportak 45 at 1.1 l in 220 l.
11-Apr-94 : B : 34.5% N at 346 kg.
15-Jun-94 : **T** : **FUNGINOC** FUNGCDE: Rovral Flo at 2.0 l in 200 l.
14-Jul-94 : B : Landgold Diquat at 3.0 l with Vassgro Spreader at 400 ml in 400 l.
21-Jul-94 : B : Combine harvested.

Previous crops: Potatoes 1992, set-aside 1993.

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 the measurement of glucosinolate concentrations and oil content.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

VARIETY	CA	FA	Mean
FUNGINOC			
NOFUNG	2.46	3.70	3.08
FUNGCDE	3.55	3.77	3.66
INOC 1	2.70	3.53	3.11
INOC 2	2.42	3.46	2.94
Mean	2.78	3.62	3.20

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

FUNGINOC	**VARIETY**	**FUNGINOC VARIETY**
0.119	0.032	0.127

Except when comparing means with the same level(s) of **FUNGINOC** 0.064

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.168	5.2
BLOCK.WP.SP	12	0.090	2.8

GRAIN MEAN DM% 88.2

SUB PLOT AREA HARVESTED 0.00230

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94/R/RAS/1

SPRING OILSEED RAPE

SPRING OILSEED RAPE AND SCLEROTINIA

Object: To study the effects of the timing of ascospore release and spore concentrations of *Sclerotinia sclerotinium* on infection rates and disease development for s. oilseed rape - Great Field I/II.

Sponsors: A.H. McCartney, M. Lacey.

Design: 4 randomised blocks of 4 plots.

Whole plot dimensions: 9.0 x 10.0.

Treatments:

INOCULTN	Time of inoculation in relation to the flowering of the s. rape:
-	None
BF	Before flowering
DF	During flowering
AF	After flowering

NOTE: Inoculation was achieved by placing pots containing apothecia at the plot centres.

Experimental diary:

30-Sep-93 : B : Ploughed.
26-Mar-94 : B : Scythe at 4.0 l in 200 l.
20-Apr-94 : B : Spring-tine cultivated twice.
21-Apr-94 : B : Rotary harrowed, Starlight, dressed Lindex Plus FS, drilled at 160 seeds per m^2.
22-Apr-94 : B : Butisan S at 1.5 l in 200 l.
04-May-94 : B : 34.5% N at 348 kg.
02-Jun-94 : B : Benazalox at 1.0 kg in 200 l.
17-Jun-94 : B : Fastac at 200 ml in 200 l.
29-Jun-94 : **T** : **INOCULTN** BF: Inoculation started.
06-Jul-94 : **T** : **INOCULTN** DF: Inoculation started.
13-Jul-94 : **T** : **INOCULTN** AF: Inoculation started.
20-Jul-94 : **T** : **INOCULTN** BF, DF, AF: Inoculation completed.
24-Aug-94 : B : Combine harvested.

NOTE: Experiment was originally planned to be sown to w. rape. As the sowing date was delayed, w. rape was replaced by s. rape, within which the disease results proved inconclusive.

Previous crops: Sunflower 1992, linseed 1993.

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94/R/RAS/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

INOCULTN	
-	2.08
BF	2.08
DF	2.41
AF	2.05
Mean	2.16

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

INOCULTN
0.486

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	9	0.687	31.9

GRAIN MEAN DM% 81.4

PLOT AREA HARVESTED 0.00190

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94/R/RAS/3

SPRING OILSEED RAPE

SEMIOCHEMICALS AND POLLEN BEETLES

Object: To test behaviour modifying chemicals on pollen beetles (*Meligethes spp.*) and seed weevils (*Ceutorhynchus assimilis*) in the field - Sawyers II.

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

Design: 5 x 5 quasi-complete Latin square.

Whole plot dimensions: 9.0 x 9.0.

Treatments:

SEMICHEM	Behaviour modifying chemical:
-	None
A	2-phenyl ethyl isothiocyanate
B	butyl isothiocyanate
C	pentyl isothiocyanate
D	methyl salicylate

NOTE: These behaviour modifying chemicals are host plant volatiles. They were released from point sources in the centre of the plots from mid-June till mid-August.

Experimental diary:

04-Nov-93 : B : Ploughed.
18-Apr-94 : B : Spring-tine cultivated, rotary harrowed, Starlight, dressed Lindex-Plus FS, drilled at 200 seeds per m^2.
19-Apr-94 : B : Butisan S at 1.5 l in 200 l.
10-May-94 : B : 34.5% N at 348 kg.
24-Aug-94 : B : Combine harvested.

Previous crops: S. wheat 1992, linseed 1993.

NOTE: Numbers of pollen beetles and seed weevils were assessed weekly throughout the summer. Pods were sampled in July to assess seed weevil damage.

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94/R/RAS/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SEMICHEM

-	1.95
A	1.84
B	1.86
C	1.89
D	1.61
Mean	1.83

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

SEMICHEM
0.109

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.172	9.4

GRAIN MEAN DM% 82.5

PLOT AREA HARVESTED 0.00207

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94/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 - Pastures.

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

Design: 3 randomised blocks of 5 x 5 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments:

1. **BRLY DEN** Number of established barley plants per m^2:

B0	0
B1	13
B2	27
B3	81
B4	170

2. **MUST DEN** Number of established white mustard plants per m^2:

M0	0
M1	18
M2	38
M3	66
M4	119

NOTES: (1) Target weed densities, number of established plants per m^2:
BRLY DEN: 0, 50, 100, 200, 400
MUST DEN: 0, 50, 100, 200, 400
(2) Barley and mustard seeds were sown on restricted areas of each plot as follows:
BRLY DEN central 2m, **MUST DEN** central 2.5m.

Experimental diary:

29-Oct-93 : B : Ploughed, spring-tine cultivated.
01-Nov-93 : B : Rotary harrowed.
02-Nov-93 : B : Rotary harrowed, Punch drilled at 25 seeds per m^2.
: **T** : **BRLY DEN** B1, B2, B3, B4: Puffin, dressed Cerevax, broadcast by machine.
05-Nov-93 : B : 34.5% N at 145 kg.
23-Feb-94 : **T** : **MUST DEN** M1, M2, M3, M4: White mustard seed broadcast by hand.
01-Mar-94 : B : Basagran at 1.5 l in 200 l.
10-Mar-94 : B : Hoegrass at 3.0 l in 200 l.
06-May-94 : B : Bombardier at 1.5 l with Ronilan FL at 0.5 l in 300 l.
23-Aug-94 : B : Hand harvested.

Previous crops: W. rape 1992, w. wheat 1993.

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94/R/BEW/2

NOTES: (1) Chickweed, sown by hand after drilling the w. beans, failed to emerge due to subsequent cold, wet conditions. White mustard was sown instead in late winter.

(2) Leaf area indices of barley, mustard and beans were measured on two occasions during the growing season. Percentage ground cover was assessed by visual and photographic methods on two occasions early in the growing season. Weed seed yield, as well as crop components of yield, were measured before harvest.

GRAIN TONNES/HECTARE

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

MUST DEN / BRLY DEN	M0	M1	M2	M3	M4	Mean
B0	5.23	4.76	4.28	4.20	4.51	4.60
B1	5.03	4.72	4.16	3.92	4.07	4.38
B2	5.48	4.50	3.95	4.06	4.11	4.42
B3	4.35	4.22	4.23	3.81	4.29	4.18
B4	3.93	4.39	4.23	3.97	3.83	4.07
Mean	4.80	4.52	4.17	3.99	4.16	4.33

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

BRLY DEN	MUST DEN	BRLY DEN MUST DEN
0.191	0.191	0.426

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	48	0.522	12.1

GRAIN MEAN DM% *

PLOT AREA HARVESTED 0.00010

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94/R/BEW/3

WINTER BEANS

PHEROMONE-BAITED TRAP CROP

Object: To investigate the use of pheromone-baited winter beans as a trap crop for migrants of the pea and bean weevil (*Sitona lineatus*) - Pastures.

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:

TREATMNT	Pheromone release and timing of insecticide applications:
-	None
P	Pheromone released, no insecticide
PI-1	Pheromone released, insecticide applied late
PI-2	Pheromone released, insecticide applied early
PI-3	Pheromone released, insecticide applied early and late

Experimental diary:

29-Oct-93 : B : Punch broadcast at 25 seeds per m^2, ploughed, spring-tine cultivated.
31-Jan-94 : B : Carbetamex at 3.0 kg in 200 l.
21-Apr-94 : **T** : **TREATMNT** PI-2, PI-3: Decis at 7.5 g in 200 l.
06-May-94 : B : Bombardier at 1.5 l with Ronilan FL at 0.5 l in 300 l.
19-May-94 : **T** : **TREATMNT** PI-1, PI-3: Decis at 7.5 g in 200 l.
18-Aug-94 : **T** : Combine harvested.

Previous crops: W rape 1992, w.wheat 1993.

NOTES: (1) From late February, pheromone was released from a point source, which was hung above the crop at the plot centre.
(2) Assessments of damage to leaves by adult weevils were made during March and April.

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94/R/BEW/3

GRAIN TONNES/HECTARE

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

TREATMNT	
-	3.78
P	4.01
PI-1	4.56
PI-2	4.38
PI-3	4.19
Mean	4.18

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

TREATMNT
0.341

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.540	12.9

GRAIN MEAN DM% 85.7

SUB PLOT AREA HARVESTED 0.00138

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94/R/BES/2

SPRING BEANS

WEEVILS AND INSECTICIDE

Object: To relate numbers of overwintering *Sitona lineatus* to the most effective timing of insecticide applied to spring beans - Long Hoos V 7 & 8.

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
EAR+LAT	Early and late
MID	Middle
LATE	Late
ERMIDLAT	Early, middle and late

Experimental diary:

01-Nov-93 : B : Roundup at 3.0 l in 200 l.
18-Nov-93 : B : Ploughed.
10-Mar-94 : B : Heavy spring-tine cultivated, rotary harrowed, Alfred drilled at 60 seeds per m^2.
11-Mar-94 : B : Opogard 500 SC at 3.4 l in 200 l.
25-Apr-94 : **T** : **DELT TIM** EAR+LAT, ERMIDLAT: Decis at 7.5 g in 200 l.
06-May-94 : **T** : **DELT TIM** MID, ERMIDLAT: Decis at 7.5 g in 200 l.
19-May-94 : **T** : **DELT TIM** EAR+LAT, LATE, ERMIDLAT: Decis at 7.5 g in 200 l.
11-Jul-94 : B : Bravo 500 at 1.0 l with Rovral Flo at 1.5 l and Pirimicarb 50 DG at 280 g in 300 l.
18-Aug-94 : B : Combine harvested.

Previous crops: S. barley 1992, potatoes 1993.

NOTE: Assessments of damage to leaves by adult weevils were made during April and May and the number of larvae in root nodules was assessed at the end of May.

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94/R/BES/2

GRAIN TONNES/HECTARE

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

DELT TIM	NONE	EAR+LAT	MID	LATE	ERMIDLAT	Mean
	3.17	3.46	3.14	3.32	3.61	3.34

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

DELT TIM
0.101

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

Stratum	d.f.	s.e.	cv%
ROW.COL	12	0.159	4.8

GRAIN MEAN DM% 83.7

PLOT AREA HARVESTED 0.00138

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94/R/BES/3

SPRING BEANS

BEAN FLOWER COLOUR AND PHEROMONE

Object: To compare the incidence of *Sitona lineatus* in purple and white flowered beans with and without insecticide and pheromone - Little Hoos.

Sponsors: L.E. Smart, M.M. Blight, R.T. Glinwood.

Design: 6 x 6 quasi-complete Latin square.

Whole plot dimensions: 6.0 x 6.0.

Treatments:

TREATMNT	Variety, insecticide and pheromone:
A-	Alfred
AI	Alfred with insecticide
AP	Alfred with pheromone
C-	Caspar
CI	Caspar with insecticide
CP	Caspar with pheromone

Experimental diary:

29-Nov-93 : B : Deep tine cultivated.
21-Mar-94 : B : Scythe at 2.0 l in 200 l.
26-Mar-94 : B : Oxytril CM at 1.5 l with Starane 2 at 1.0 l in 200 l.
30-Mar-94 : B : Heavy spring-tine cultivated, spring-tine cultivated.
: **T** : **TREATMNT** A-, AI, AP: Alfred drilled at 60 seeds per m^2.
: **T** : **TREATMNT** C-, CI, CP: Caspar drilled at 60 seeds per m^2.
12-May-94 : **T** : **TREATMNT** AI, CI: Decis at 7.5 g in 200 l.
08-Jul-94 : B : Bombardier at 1.0 l with Rovral Flo at 1.5 l and Pirimicarb 50 DG at 0.28 kg in 200 l.
18-Aug-94 : **T** : Combine harvested.

Previous crops : S. barley 1992, potatoes 1993.

NOTES: (1) From late April, pheromone was released from a point source, which was hung above the crop at the plot centre.
(2) Assessments were made of weevil larval numbers in root nodules at the end of May and of damage to leaves by adult weevils in April and May. Pitfall traps were used to assess weevil populations during the season.

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94/R/BES/3

GRAIN TONNES/HECTARE

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

TREATMNT	
A-	2.27
AI	2.36
AP	2.11
C-	2.47
CI	2.16
CP	1.71
Mean	2.18

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

TREATMNT
0.267

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

Stratum	d.f.	s.e.	cv%
ROW.COL	20	0.463	21.2

GRAIN MEAN DM% 80.3

PLOT AREA HARVESTED 0.00276

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94/R/BES/4

SPRING BEANS

WEED COMPETITION AND SPRING BEANS

Object: To study the effect of time of emergence on the competition between beans and oats and to correlate assessments of competition and bean yields - Little Hoos.

Sponsor: P.J.W. Lutman.

Design: 3 randomised blocks of 2 x 5 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments:

1. **SOW DATE** Time of sowing oats:

   S2 Same day as beans
   S3 Ten days after sowing beans

2. **OAT DEN** Number of established oat plants per m^2:

	S2	S3
D0	0	0
D1	23	17
D2	60	53
D3	127	84
D4	192	165

NOTE: Target oat densities, plants per m^2: D0 0, D1 40, D2 120, D3 240, D4 480.

Experimental diary:

```
04-Nov-93 : B : Deep tine cultivated twice.
21-Mar-94 : B : Scythe at 2.0 l in 200 l.
26-Mar-94 : B : Oxytril CM at 1.5 l with Starane 2 at 1.0 l in 200 l.
31-Mar-94 : B : Heavy spring-tine cultivated.
19-Apr-94 : B : Spring-tine cultivated.
20-Apr-94 : B : Rotary harrowed.
          : T : SOW DATE S2: Oats broadcast by machine.
          : B : Rotary harrowed, Alfred drilled at 60 seeds per m².
28-Apr-94 : T : SOW DATE S3: Oats broadcast by machine.
          : B : Harrowed.
12-May-94 : B : Ripcord at 250 ml in 200 l.
02-Jun-94 : B : Basagran at 3.0 l in 200 l.
08-Jul-94 : B : Bombardier at 1.0 l with Rovral Flo at 1.5 l and
                Pirimicarb 50 DG at 0.28 kg in 200 l.
15-Aug-94 : B : Hand harvested.
```

Previous crops: S. barley 1992, potatoes 1993.

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94/R/BES/4

NOTE: Dry weight, ground cover and leaf area of crop and weed were assessed throughout the summer with the main samples taken in June, July and August.

GRAIN TONNES/HECTARE

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

OAT DEN / SOW DATE	D0	D1	D2	D3	D4	Mean
S2	2.42	1.83	1.41	1.03	0.42	1.42
S3	2.19	2.30	1.70	1.48	1.12	1.76
Mean	2.30	2.07	1.55	1.26	0.77	1.59

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

SOW DATE	OAT DEN	SOW DATE OAT DEN
0.150	0.238	0.336

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.411	25.9

MEAN DM% *

PLOT AREA HARVESTED 0.00010

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94/R/LP/2

WINTER LUPINS

SOWING DATES AND POPULATION

Object: To study the effects of sowing date and plant density on plant structure, yield, components of yield and harvest date - Great Harpenden I.

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

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

Whole plot dimensions: 14.52 x 6.0.

Treatments:

Whole plots

1.	**SOW DATE**	Date of sowing:
	S1	2 September, 1993
	S2	22 September
	S3	17 October
	S4	28 October

Sub-plots

2.	**POPULATN**	Number of seeds sown per m^2:
	P1	28
	P2	42
	P3	56
	P4	70

Experimental diary:

31-Aug-93 : B : Ploughed and furrow pressed.
01-Sep-93 : B : Rolled, rotary harrowed.
02-Sep-93 : **T** : **SOW DATE** S1: Rotary harrowed, CH304/70, dressed iprodione and carbendazim, drilled.
06-Sep-93 : **T** : **SOW DATE** S1: Opogard 500 FW at 2.8 l in 220 l.
20-Sep-93 : **T** : **SOW DATE** S2: Rotary harrowed.
22-Sep-93 : **T** : **SOW DATE** S2: Rotary harrowed, CH304/70, dressed iprodione and carbendazim, drilled. Opogard 500 FW at 2.8 l in 220 l.
15-Oct-93 : **T** : **SOW DATE** S3, S4: Spring-tine cultivated.
16-Oct-93 : **T** : **SOW DATE** S3: Rotary harrowed.
17-Oct-93 : **T** : **SOW DATE** S3: CH304/70, dressed iprodione and carbendazim, drilled.
28-Oct-93 : **T** : **SOW DATE** S4: CH304/70, dressed iprodione and carbendazim, drilled.
01-Nov-93 : **T** : **SOW DATE** S3, S4: Opogard 500 FW at 2.8 l in 220 l.
23-Dec-93 : B : Sportak 45 at 1.1 l in 220 l.
16-Feb-94 : B : Atlas Simazine at 1.0 l in 200 l.

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94/R/LP/2

Experimental diary:

30-Mar-94 : **T** : **SOW DATE** S4: Heavy spring-tine cultivated.
20-Apr-94 : **T** : **SOW DATE** S4: Rotary harrowed, Minori drilled.
21-Apr-94 : **T** : **SOW DATE** S1: Laser at 1.25 l in 186 l.
29-Apr-94 : **T** : **SOW DATE** S4: Opogard 500 SC at 2.8 l in 220 l.
08-Jul-94 : B : Atlas Dimethoate 40 at 850 ml in 200 l.
06-Sep-94 : **T** : **SOW DATE** S1, S2: Combine harvested.
19-Oct-94 : **T** : **SOW DATE** S4: Combine harvested.

Previous crops: W. wheat 1992, w. barley 1993.

NOTES: (1) All seed was inoculated with rhizobium.
(2) Lupins on the S3 and S4 plots failed. S4 plots were resown with a spring variety.

GRAIN TONNES/HECTARE

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

POPULATN / **SOW DATE**	P1	P2	P3	P4	Mean
S1	1.94	1.92	2.20	2.55	2.15
S2	0.33	0.37	0.56	1.07	0.58
S4	0.10	0.04	0.07	0.20	0.10
Mean	0.79	0.78	0.94	1.27	0.94

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

	SOW DATE	**POPULATN**	**SOW DATE POPULATN**
s.e.d.	0.152	0.147	0.267
Except when comparing means with the same level(s) of **SOW DATE**			0.254

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.214	22.7
BLOCK.WP.SP	27	0.360	38.1

GRAIN MEAN DM% 79.1

SUB PLOT AREA HARVESTED 0.00058 (**SOW DATE** S1, S2)
0.00090 (**SOW DATE** S4)

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94/R/LP/3

WINTER LUPINS

SOWING DATES, PESTS AND DISEASES

Object: To measure overwinter losses in early and late sown lupins and to identify any pests or diseases causing such losses - Great Harpenden I.

Sponsors: A.W. Ferguson, G. L. Bateman, G.F.J. Milford, I. Shield, J.M. Day.

Design: 3 blocks of a half-replicate of 2 x 2 x 2 x 2 x 2 plots.

Whole plot dimensions: 2.88 x 15.0.

Treatments:

1.	**SOW DATE**	Date of sowing:
	E	23 September, 1993
	L	20 October
2.	**SEED TRT**	Seed treatment:
	1-	None
	1T	Thiram
3.	**SOIL INS**	Soil-applied insecticide:
	2-	None
	2C	Chlorpyrifos
4.	**AUT SPRY**	Autumn fungicide:
	A-	None
	AP	Prochloraz
5.	**SUM FUNG**	Summer fungicide:
	F-	None
	FF	Iprodione and thiophanate-methyl
6.	**SUM INS**	Summer insecticide:
	I-	None
	IA	Pirimicarb
	ID	Dimethoate

NOTE: **SEED TRT** 1T: Thiram, as Agrichem Flowable Thiram, was applied at 900 g active ingredient per t of seed.

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94/R/LP/3

Experimental diary:

31-Aug-93 : B : Ploughed and furrow pressed.
23-Sep-93 : B : Rotary harrowed.
: **T** : **SOW DATE** E: CH 304/70 drilled at 40 seeds per m^2.
: **T** : **SOW DATE** E, **SOIL INS** 2C: Dursban 48E at 1.5 l in 220 l.
24-Sep-93 : **T** : **SOW DATE** E: Opogard 500 FW at 2.8 l in 200 l.
20-Oct-93 : **T** : **SOW DATE** L: Rotary harrowed, CH304/70 drilled at 40 seeds per m^2.
26-Oct-93 : **T** : **SOW DATE** L, **SOIL INS** 2C: Dursban 48E at 1.5 l in 220 l.
01-Nov-93 : **T** : **SOW DATE** L: Opogard 500 FW at 2.8 l in 220 l.
14-Dec-93 : **T** : **AUT SPRY** AP: Sportak 45 at 1.1 l in 220 l.
16-Feb-94 : B : Atlas Simazine at 1.0 l in 200 l.
13-Jun-94 : **T** : **SUM FUNG** FF: Compass at 3.0 l in 220 l.
12-Jul-94 : **T** : **SUM INS** IA: Pirimicarb 50 DG at 0.28 kg with Vassgro Spreader at 125 ml in 220 l.
: **T** : **SUM INS** ID: Atlas Dimethoate 40 at 0.85 l in 220 l.
06-Sep-94 : B : Combine harvested.

Previous crops: W. wheat 1992. w. barley 1993.

NOTE: Plant establishment was assessed in autumn, spring and summer. Aphid populations were assessed before and after insecticide treatments were applied. Diseases were assessed in summer.

GRAIN TONNES/HECTARE

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

SEED TRT	1-	1T	Mean
SOW DATE			
E	1.18	0.98	1.08
L	0.09	0.11	0.10
Mean	0.63	0.54	0.59

SOIL INS	2-	2C	Mean
SOW DATE			
E	1.25	0.91	1.08
L	0.10	0.09	0.10
Mean	0.68	0.50	0.59

SOIL INS	2-	2C	Mean
SEED TRT			
1-	0.75	0.52	0.63
1T	0.61	0.48	0.54
Mean	0.68	0.50	0.59

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94/R/LP/3

GRAIN TONNES/HECTARE

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

AUT SPRY	A-	AP	Mean
SOW DATE			
E	1.01	1.15	1.08
L	0.11	0.09	0.10
Mean	0.56	0.62	0.59

AUT SPRY	A-	AP	Mean
SEED TRT			
1-	0.63	0.63	0.63
1T	0.49	0.60	0.54
Mean	0.56	0.62	0.59

AUT SPRY	A-	AP	Mean
SOIL INS			
2-	0.67	0.68	0.68
2C	0.45	0.56	0.50
Mean	0.56	0.62	0.59

SUM FUNG	F-	FF	Mean
SOW DATE			
E	1.15	1.01	1.08
L	0.10	0.10	0.10
Mean	0.62	0.55	0.59

SUM FUNG	F-	FF	Mean
SEED TRT			
1-	0.65	0.62	0.63
1T	0.60	0.49	0.54
Mean	0.62	0.55	0.59

SUM FUNG	F-	FF	Mean
SOIL INS			
2-	0.67	0.68	0.68
2C	0.58	0.42	0.50
Mean	0.62	0.55	0.59

SUM FUNG	F-	FF	Mean
AUT SPRY			
A-	0.55	0.57	0.56
AP	0.70	0.54	0.62
Mean	0.62	0.55	0.59

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94/R/LP/3

GRAIN TONNES/HECTARE

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

SUM INS SOW DATE	I-	IA	ID	Mean
E	1.20	1.25	0.80	1.08
L	0.10	0.09	0.10	0.10
Mean	0.65	0.67	0.45	0.59

SUM INS SEED TRT	I-	IA	ID	Mean
1-	0.68	0.70	0.53	0.63
1T	0.62	0.65	0.37	0.54
Mean	0.65	0.67	0.45	0.59

SUM INS SOIL INS	I-	IA	ID	Mean
2-	0.80	0.77	0.46	0.68
2C	0.49	0.58	0.43	0.50
Mean	0.65	0.67	0.45	0.59

SUM INS AUT SPRY	I-	IA	ID	Mean
A-	0.59	0.64	0.46	0.56
AP	0.71	0.71	0.44	0.62
Mean	0.65	0.67	0.45	0.59

SUM INS SUM FUNG	I-	IA	ID	Mean
F-	0.65	0.76	0.47	0.62
FF	0.65	0.59	0.42	0.55
Mean	0.65	0.67	0.45	0.59

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94/R/LP/3

GRAIN TONNES/HECTARE

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

SOW DATE	SEED TRT	SOIL INS	AUT SPRY
0.081	0.081	0.081	0.081

SUM FUNG	SUM INS	SOW DATE SEED TRT	SOW DATE SOIL INS
0.081	0.099	0.115	0.115

SEED TRT SOIL INS	SOW DATE AUT SPRY	SEED TRT AUT SPRY	SOIL INS AUT SPRY
0.115	0.115	0.115	0.115

SOW DATE SUM FUNG	SEED TRT SUM FUNG	SOIL INS SUM FUNG	AUT SPRY SUM FUNG
0.115	0.115	0.115	0.115

SOW DATE SUM INS	SEED TRT SUM INS	SOIL INS SUM INS	AUT SPRY SUM INS
0.141	0.141	0.141	0.141

SUM FUNG SUM INS
0.141

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	20	0.281	47.7

GRAIN MEAN DM% 80.5

PLOT AREA HARVESTED 0.00216

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94/R/LP/9

SPRING LUPINS

SOWING DATES OF SPRING LUPINS

Object: To observe the development of a variety of lupin sown on three dates in spring. To measure the physiological development and yield, and to relate these to sowing date and period of vernalisation - Long Hoos IV 3.

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

Design: 5 randomised blocks of 3 plots.

Whole plot dimensions: 2.88 x 9.0.

Treatments:

SOW DATE	Date of sowing:
E	Early 7 March, 1994
M	Middle 14 March
L	Late 29 March

Experimental diary:

01-Nov-93 : B : Sting CT at 4.0 l in 200 l.
04-Nov-93 : B : Ploughed.
07-Mar-94 : **T** : **SOW DATE** E: Rotary harrowed, CH304/73 drilled at 60 seeds per m^2.
10-Mar-94 : **T** : **SOW DATE** E: Opogard 500 SC at 2.8 l in 220 l.
14-Mar-94 : **T** : **SOW DATE** M: Rotary harrowed, CH304/73 drilled at 60 seeds per m^2.
18-Mar-94 : **T** : **SOW DATE** M: Opogard 500 SC at 2.8 l in 220 l.
29-Mar-94 : **T** : **SOW DATE** L: Rotary harrowed, CH304/73 drilled at 60 seeds per m^2.
12-Apr-94 : **T** : **SOW DATE** L: Opogard 500 SC at 2.8 l in 220 l.
29-Sep-94 : **T** : **SOW DATE** E: Hand harvested.
10-Oct-94 : **T** : **SOW DATE** M: Hand harvested.
01-Nov-94 : **T** : **SOW DATE** L: Hand harvested.

Previous crops: Fallow 1992, w. rape and shepherd's purse 1993.

NOTES: (1) Plant populations were assessed at emergence and in June, leaf primordia were counted in late spring. Leaves, branches and florets were counted in July and at harvest components of yield were assessed.

(2) The yield of one plot was lost during harvesting, with treatment E. An estimated value was used in the analysis

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94/R/LP/9

GRAIN TONNES/HECTARE

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

SOW DATE	
E	2.26
M	2.52
L	1.52
Mean	2.10

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

SOW DATE
0.154

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.243	11.6

GRAIN MEAN DM% 80.0

PLOT AREA HARVESTED 0.00171

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94/R/SU/1

SUNFLOWERS

VARIETIES & DISEASE

Object: To assess early maturing varieties of sunflowers and their susceptibility to *Botrytis cinerea* and other fungal diseases - Ex-allotments.

Sponsors: V.J. Church, H.A. McCartney.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 3.5 x 10.0.

Treatments:

CULTIVAR

345	SAM 345
348	SAM 348
AV	Avante
AL	Allegro
PAN	PAN 9405
AGC	AGC 92445

Experimental diary:

01-Nov-93 : B : Sting CT at 4.0 l in 200 l.
06-Dec-93 : B : Ploughed.
27-Apr-94 : B : Heavy spring-tine cultivated.
28-Apr-94 : B : Rotary harrowed.
29-Apr-94 : **T** : **CULTIVAR** 345, 348, AV, AL, PAN, AGC: Varieties, dressed, drilled at 14 seeds per m^2.
03-May-94 : B : 34.5% N at 145 kg.
04-May-94 : B : Rolled.
06-May-94 : B : Stomp 400 at 5.0 l in 200 l.
20-May-94 : B : Decis at 300 ml in 200 l.
13-Jun-94 : B : Laser at 2.25 l with Actipron at 1.8 l in 220 l.
24-Aug-94 : **T** : **CULTIVAR** 345: Hand harvested, threshed by stationary combine.
25-Aug-94 : **T** : **CULTIVAR** AV, AL, AGC: Reglone at 3.0 l with Vassgro Spreader at 0.44 l in 440 l.
02-Sep-94 : **T** : **CULTIVAR** AV, AL, AGC: Hand harvested, threshed by stationary combine.
22-Sep-94 : **T** : **CULTIVAR** PAN: Reglone at 3.0 l with Vassgro Spreader at 0.44 l in 440 l.
: **T** : **CULTIVAR** 348: Hand harvested, threshed by stationary combine.
29-Sep-94 : **T** : **CULTIVAR** PAN: Hand harvested, threshed by stationary combine.

Previous crops: W. wheat 1992, s. barley 1993.

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94/R/SU/1

NOTE: Plant populations, growth stages, diseases and head size were monitored throughout the season, moisture content was measured prior to desiccation and grain density and oil content were measured after harvest.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

CULTIVAR	
345	2.41
348	3.15
AV	2.59
AL	2.63
PAN	3.35
AGC	2.68
Mean	2.80

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

CULTIVAR
0.189

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	15	0.267	9.5

GRAIN MEAN DM% 69.7

PLOT AREA HARVESTED 0.00150

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94/R/SU/2

SUNFLOWERS

BOTRYTIS, HONEYBEES AND POLLEN BEETLES

Object: To determine whether visits by honeybees and pollen beetles to sunflower heads during flowering affects subsequent development of *Botrytis cinerea* - Long Hoos V 2.

Sponsors: J.R. Simpkins, N.L. Carreck, V.J. Church.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 2.74 x 2.74.

Treatments:

BEE ADDN	Presence of bees or pollen beetles and introduction of a bacterium (*Bacillus subtilis*) or fungicide (pyrimethanil) as a powder or spray:
-	None
B	Bees only
BB	Bees plus bacterium
P	Pollen beetles only
BF	Bees plus fungicide powder
F	No bees plus fungicide spray

NOTE: Bacterium and fungicide powder were mixed with talc and 'biobeads' for spreading by bees. Pyrimethanil was an experimental fungicide. Insect cages, each 2.74m x 2.74m, were placed on each plot.

Experimental diary:

08-Mar-94	: B	:	Ploughed.
14-Mar-94	: B	:	Heavy spring-tine cultivated.
17-Mar-94	: B	:	Heavy spring-tine cultivated.
24-Mar-94	: B	:	Rolled.
03-May-94	: B	:	34.5% N at 145 kg.
	: B	:	Rotary harrowed twice, Avante, dressed, drilled at 14 seeds per m^2.
04-May-94	: B	:	Rolled.
06-May-94	: B	:	Stomp 400 at 5.0 l in 220 l.
15-Jul-94	: **T**	:	**BEE ADDN** B, BB, BF: Honey bee colonies introduced.
18-Jul-94	: **T**	:	**BEE ADDN** P: Pollen beetles introduced into cages.
	: **T**	:	**BEE ADDN** BB, BF: Bacterium and fungicide powder respectively introduced each day until 03-Aug.
20-Jul-94	: **T**	:	**BEE ADDN** F: Pyrimethanil spray at 4 kg in 220 l. plots.
22-Jul-94	: B	:	Irrigated.
25-Jul-94	: B	:	Irrigated.
27-Jul-94	: B	:	Irrigated.
02-Aug-94	: B	:	Irrigated.
04-Aug-94	: **T**	:	**BEE ADDN** B, BB, BF: Honey bee colonies removed.
06-Sep-94	: B	:	Reglone at 3.0 l with Vassgrow Spreader at 400 ml in 440 l.
08-Sep-94	: B	:	Hand harvested, threshed by stationary combine.

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94/R/SU/2

Previous crops: Mustard 1992, potatoes 1993.

NOTES: (1) Plots were netted against birds from after sowing to harvest. Irrigation for 1-2 hours on each occasion, was applied to increase disease spread. Plants were assessed for disease during the season and individual grain weights were measured.
(2) The harvested seed was mixed in error on two plots, with the treatments P and BF. Estimated values were used in the analysis.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

BEE ADDN	
-	1.94
B	1.78
BB	2.02
P	1.83
BF	1.82
F	1.77
Mean	1.86

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

BEE ADDN
0.190

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	13	0.269	14.5

GRAIN MEAN DM% *

PLOT AREA HARVESTED 0.0001

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94/R/LN/1

LINSEED

FUNGICIDE TIMING

Object: To study the effects of the timing and number of fungicide sprays on disease incidence and seed and oil yields of linseed - Delafield.

Sponsors: J.F.S. Harold, B.D.L. Fitt.

Design: 3 randomised blocks of 3 plots (duplicated).

Whole plot dimensions: 3.0 x 15.0.

Treatments:

FUNGCIDE	Timing and number of fungicide sprays:
-	None
E	Iprodione mid-flowering
F	Iprodione mid-flowering, repeated at late flowering, and benomyl at capsule formation

NOTE: In treatment F, iprodione at late flowering was omitted.

Experimental diary:

12-Nov-93	: B	:	FYM at 25 t.
02-Dec-93	: B	:	Ploughed.
20-Apr-94	: B	:	Spring-tine cultivated.
	: B	:	Rotary harrowed, Antares, dressed Prelude 20LF, drilled at 700 seeds per m^2.
21-Apr-94	: B	:	Rolled.
10-May-94	: B	:	34.5% N at 220 kg.
12-May-94	: B	:	Ripcord at 250 ml in 200 l.
13-Jun-94	: B	:	Dow Shield at 0.5 l in 200 l.
12-Jul-94	: **T**	:	**FUNGCIDE** E, F: Rovral Flo at 2.0 l in 200 l.
05-Aug-94	: **T**	:	**FUNGCIDE** F: Benlate at 1.1 kg with Vassgro Spreader at 110 ml in 220 l.
13-Sep-94	: B	:	Combine harvested.

Previous crops: S. beans 1992, linseed 1993.

NOTE: Diseases were assessed at intervals throughout the season. Fungal spores were monitored continuously.

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94/R/LN/1

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

FUNGCIDE	
-	0.71
E	0.79
F	0.86
Mean	0.79

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

FUNGCIDE
0.102

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	13	0.177	22.4

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00276

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94/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 - Geescroft.

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

Design: 2 randomised blocks of (5 x 5) + 5 plots.

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **BARLEY** Number of barley plants established per m^2:

B0	0
B1	16
B2	22
B3	59
B4	164

2. **CHKWEED** Number of chickweed plants established per m^2:

C0	0
C1	73
C2	161
C3	345
C4	546

plus 5 extra treatments

3. **EXTRA** Number of barley or chickweed plants established per m^2:

	Barley	Chickweed
-	-	-
EB1	80	-
EB2	237	-
EC1	-	430
EC2	-	712

NOTE: Target 'weed' densities, plants per m^2, were as follows:
BARLEY B0 0, B1 25, B2 50, B3 100, B4 300.
CHCKWEED C0 0, C1 100, C2 200, C3 400, C4 800.
EXTRA - 0, EB1 200, EB2 400, EC1 600, EC2 1200.

Experimental diary:
03-Dec-93 : B : Ploughed.
25-Apr-94 : B : Rotary harrowed.
: **T** : **BARLEY** B1, B2, B3, B4, **EXTRA** EB1, EB2: Alexis, dressed Panoctine Plus, broadcast by machine.

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94/R/LN/2

Experimental diary:

25-Apr-94 : **T** : **CHKWEED** C1, C2, C3, C4, **EXTRA** EC1, EC2: Chickweed seeds broadcast by hand.
: B : Rotary harrowed, Antares, dressed Prelude 20LF, drilled at 700 seeds per m^2.
12-May-94 : B : Ripcord at 250 ml in 200 l.
18-May-94 : B : 34.5% N at 220 kg.
13-Jun-94 : B : Dow Shield at 0.5 l in 200 l.
06-Sep-94 : B : Hand harvested.

Previous crops: W. wheat 1992, w. wheat 1993.

NOTE: Leaf area indices of the barley, chickweed and linseed were measured on two occasions during the growing season. Percentage ground cover was assessed by visual and photographic methods on two occasions early in the growing season. Weed seed yield, as well as crop components of yield, were measured before harvest.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

BARLEY / **CHKWEED**	B0	B1	B2	B3	B4	Mean
C0	0.84	0.76	0.76	0.60	0.32	0.66
C1	0.90	0.71	0.73	0.54	0.31	0.64
C2	0.80	0.61	0.60	0.61	0.32	0.59
C3	0.76	0.67	0.62	0.53	0.36	0.59
C4	0.75	0.63	0.61	0.35	0.26	0.52
Mean	0.81	0.68	0.66	0.53	0.31	0.60

EXTRA	
-	0.96
EB1	0.49
EB2	0.34
EB3	0.77
EB4	0.82
Mean	0.68

GRAND MEAN 0.61

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

BARLEY	**CHKWEED**	**BARLEY CHKWEED**
0.055	0.055	0.124

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94/R/LP/2

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	29	0.124	20.2

GRAIN MEAN DM% *

PLOT AREA HARVESTED 0.00010

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94/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 - Geescroft.

Sponsor: P.J.W. Lutman.

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

Whole plot dimensions: 3.0 x 10.0.

Treatments: All combinations of:-

1. **SPECIES**

CO	Cultivated oats (*Avena sativa* cv. Dula)
FH	Fat hen (*Chenopodium album*)
CW	Chickweed (*Stellaria media*)

2. **RATE** Number of plants established per m^2:

	CO	FH	CW
0	0	0	0
1	9	6	57
2	25	31	87
3	91	24	232
4	150	55	261

plus two extra plots

3. **EXTRA** Number of wild oats (*Avena fatua*) plants established per m^2:

W1	15
W2	54

NOTES: (1) Target 'weed' densities, seeds per m^2:
RATE CO 0 0, CO 1 20, CO 2 60, CO 3 180, CO 4 360
FH 0 0, FH 1 100, FH 2 400, FH 3 800, FH 4 1600
CW 0 0, CW 1 100, CW 2 200, CW 3 400, CW 4 800
EXTRA W1 60, W2 180
(2) Cultivated oats were dressed with Rappor Plus.

Experimental diary:
03-Dec-93 : B : Ploughed.
26-Apr-94 : B : Rotary harrowed.
: **T** : **SPECIES** FH, CW: Seed broadcast by hand.
: **T** : **SPECIES** CO, **EXTRA** W1, W2: Seed broadcast by machine.
: B : Rotary harrowed, Antares, dressed Prelude 20LF, drilled at 700 seeds per m^2.

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94/R/LN/6

Experimental diary:

12-May-94 : B : Ripcord at 250 ml in 200 l.
18-May-94 : B : 34.5% N at 220 kg.
13-Jun-94 : B : Dow Shield at 0.5 l in 200 l.
17-Jun-94 : **T** : **SPECIES** CO 0, CO 1, CO 2, CO 3, CO 4, FH 0, **EXTRA** W1, W2: Ally at 30 g in 220 l.
02-Sep-94 : B : Hand harvested.

Previous crops: W. wheat 1992, s. wheat 1993.

NOTE: (1) Weed densities were measured in May. Growth of crop and 'weeds' were measured in June and July.
(2) Because of a severe thistle infestation the yields of two plots were lost, those with the treatment combination:
SPECIES CO, **RATE** 0 and **EXTRA** W1.
Estimated values were used in the analysis.

GRAIN (AT 90% DM) TONNES/HECTARE

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

RATE / **SPECIES**	0	1	2	3	4	Mean
CO	0.98	0.71	0.58	0.32	0.20	0.56
FH	0.80	1.07	0.84	0.88	0.69	0.86
CW	0.99	0.92	0.80	0.74	0.79	0.85
Mean	0.93	0.90	0.74	0.65	0.56	0.76

EXTRA	
W1	0.70
W2	0.51
Mean	0.58

GRAND MEAN 0.74

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

SPECIES	**RATE**	**SPECIES** **RATE** & **EXTRA**
0.056	0.073	0.120

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.154	20.9

MEAN DM% *

PLOT AREA HARVESTED 0.00010

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94/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 VI/VII 5.

Sponsor: P.J. Read.

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

Whole plot dimensions: 1.5 x 5.7.

Treatments: All combinations of:-

1. **VARIETY**

ES	Estima
KE	King Edward

2. **SIL SCRF** Infection with silver scurf (*Helminthosporium solani*):

S-	None
SD	Infected

3. **BLK DOT** Infection with black dot (*Colletotrichum coccodes*):

B-	None
BD	Infected

4. **HARVEST** Time of harvesting:

HS	Mid-September
HO	Mid-October

NOTES: (1) **SIL SCRF** S-: Tubers treated with imazalil to guarantee no infection.
(2) **SIL SCRF** SD: Tubers naturally infected with *H. solari*.
(3) **BLK DOT** BD: Vermiculite, infected with *C. coccodes*, scattered on tubers at planting.

Experimental diary:

07-Sep-93 : B : PK as (0:18:36) at 1390 kg.
29-Nov-93 : B : Ploughed.
08-Apr-94 : B : NPK as (12:20:20) at 1750 kg.
25-Apr-94 : B : Heavy spring-tine cultivated twice, rotary harrowed, ridged, potatoes hand planted. Ridges split back.
16-May-94 : B : Rotary ridged.
23-May-94 : B : Farmon PDQ at 2.0 l with Rotalin at 5.0 l in 200 l.
23-Jun-94 : B : Dithane 945 at 1.7 kg with Intracrop BLA at 0.2 l in 200 l.

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94/R/P/4

Experimental diary:

07-Jul-94 : B : Dithane 945 at 1.7 kg with Pirimicarb 50 DG at 0.28 kg and Intracrop BLA at 0.2 l in 200 l.
25-Jul-94 : B : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
15-Aug-94 : B : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
30-Aug-94 : B : Ashlade Mancozeb FL at 2.5 l with Intracrop BLA at 0.2 l in 200 l.
24-Sep-94 : B : Haulm mechanically destroyed.
27-Sep-94 : **T** : **HARVEST** HS: Potatoes lifted.
25-Oct-94 : **T** : **HARVEST** HO: Potatoes lifted.

Previous crops: Lupins 1992, mustard and s. rape 1993.

NOTE: After harvest samples were assessed for silver scurf and black dot, further assessments were made after various storage regimes.

TOTAL TUBERS TONNES/HECTARE

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

SIL SCRF	S-	SD	Mean
VARIETY			
ES	25.4	22.9	24.1
KE	56.5	51.5	54.0
Mean	41.0	37.2	39.1

BLK DOT	B-	BD	Mean
VARIETY			
ES	24.2	24.1	24.1
KE	56.3	51.8	54.0
Mean	40.2	37.9	39.1

BLK DOT	B-	BD	Mean
SIL SCRF			
S-	40.8	41.1	41.0
SD	39.7	34.7	37.2
Mean	40.2	37.9	39.1

HARVEST	HS	HO	Mean
VARIETY			
ES	23.3	24.9	24.1
KE	51.3	56.8	54.0
Mean	37.3	40.9	39.1

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94/R/P/4

TOTAL TUBERS TONNES/HECTARE

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

HARVEST	HS	HO	Mean
SIL SCRF			
S-	39.0	42.9	41.0
SD	35.6	38.8	37.2
Mean	37.3	40.9	39.1

HARVEST	HS	HO	Mean
BLK DOT			
B-	37.9	42.5	40.2
BD	36.6	39.2	37.9
Mean	37.3	40.9	39.1

	SIL SCRF	S-		SD	
VARIETY	BLK DOT	B-	BD	B-	BD
ES		24.9	25.9	23.5	22.3
KE		56.6	56.4	55.9	47.2

	SIL SCRF	S-		SD	
VARIETY	HARVEST	HS	HO	HS	HO
ES		24.1	26.6	22.5	23.2
KE		53.9	59.2	48.6	54.4

	BLK DOT	B-		BD	
VARIETY	HARVEST	HS	HO	HS	HO
ES		22.5	25.9	24.1	24.0
KE		53.4	59.2	49.2	54.4

	BLK DOT	B-		BD	
SIL SCRF	HARVEST	HS	HO	HS	HO
S-		37.9	43.6	40.1	42.2
SD		37.9	41.4	33.2	36.2

		BLK DOT	B-		BD	
VARIETY	SIL SCRF	HARVEST	HS	HO	HS	HO
ES	S-		22.3	27.5	25.9	25.8
	SD		22.7	24.3	22.3	22.2
KE	S-		53.6	59.7	54.2	58.6
	SD		53.2	58.6	44.1	50.2

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94/R/P/4

TOTAL TUBERS TONNES/HECTARE

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

VARIETY	SIL SCRF	BLK DOT	HARVEST
0.90	0.90	0.90	0.90

VARIETY SIL SCRF	VARIETY BLK DOT	SIL SCRF BLK DOT	VARIETY HARVEST
1.28	1.28	1.28	1.28

SIL SCRF HARVEST	BLK DOT HARVEST	VARIETY SIL SCRF BLK DOT	VARIETY SIL SCRF HARVEST
1.28	1.28	1.80	1.80

VARIETY BLK DOT HARVEST	SIL SCRF BLK DOT HARVEST	VARIETY SIL SCRF BLK DOT HARVEST
1.80	1.80	2.55

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	3.12	8.0
PLOT AREA HARVESTED	0.00086		

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94/W/SB/1

SUGAR BEET

SULPHUR, NITROGEN AND SUGAR BEET

Object: To assess the effects of nitrogen and sulphur fertilizers on the growth, yield and quality of sugar beet grown in a sulphur deficient soil - Woburn, Butt Close II.

Sponsors: C. Bell, J. Jones.

Design: 3 randomised blocks of 3 x 3 plots.

Whole plot dimensions: 2.5 x 24.0.

Treatments: All combinations of:-

1. **NITROGEN** Nitrogen fertilizer (kg N) as 34.5% N, 30 kg N to seedbed, remainder at 4 to 6 leaf stage:

N1	75
N2	120
N3	180

2. **SULPHUR** Sulphur fertilizer (kg S) as gypsum at 4 to 6 leaf stage:

S0	0
S1	25
S2	50

Experimental diary:

03-Apr-94 : B : Scythe at 3.0 l in 200 l.
15-Apr-94 : B : PK as (0:18:36) at 600 kg.
22-Apr-94 : B : Rotary harrowed, Saxon dressed Thiram, drilled at 9.3 seeds per m^2.
25-Apr-94 : B : 34.5% N at 87 kg.
09-May-94 : B : Goltix at 1.7 kg with Adder at 1.7 l in 200 l.
24-May-94 : **T** : **NITROGEN** N1, N2, N3: 34.5% N applied.
27-May-94 : **T** : **SULPHUR** S1, S2: Gypsum applied.
12-Jun-94 : B : Goltix at 1.7 kg with Adder at 1.7 l in 200 l.
08-Jul-94 : B : Inter-row cultivated.
21-Dec-94 : B : Hand lifted.

Previous crops: S. barley 1992, w. wheat 1993.

NOTE: Plants were sampled sequentially throughout the growing period and were analysed for shoot and root dry matter, nitrogen and sulphur content. The roots were also analysed for sugar, potassium, sodium, amino-N and glycine betaine. Root osmotic pressure was measured.

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94/W/SB/1

ROOTS WASHED TONNES/HECTARE

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

SULPHUR / NITROGEN	S0	S1	S2	Mean
N1	26.3	28.0	25.2	26.5
N2	29.2	29.2	26.6	28.3
N3	25.6	34.2	23.4	27.7
Mean	27.0	30.4	25.1	27.5

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

NITROGEN	SULPHUR	NITROGEN SULPHUR
1.87	1.87	3.24

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	16	3.97	14.4

PLOT AREA HARVESTED 0.00100

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94/R/M/1

MIXED 1

SOWING DATE AND INSECTICIDE

Object: To compare the consequences for w. wheat and w. barley of sowing at different times in the autumn and treating or not with insecticide - Osier.

Sponsor: R.T. Plumb.

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

Whole plot dimensions: 3.0 x 21.0.

Treatments: All combinations of:-

1. **CROP**

WW	W. wheat
WB	W. barley

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

E	First half of September
M	Second half of September
L	First half of October

3. **INSCTCDE** Insecticide applied in early November:

-	None
C	Cypermethrin

Experimental diary:

30-Jul-93 : B : Deep tine cultivated with vibrating tines 60 cm apart, 45 cm deep.
13-Aug-93 : B : Ploughed.
17-Aug-93 : B : Rolled.
06-Sep-93 : B : Scythe at 2.0 l with Vassgro Spreader at 200 ml in 200 l.
17-Sep-93 : **T** : **SOW DATE** E: W. wheat, Mercia, dressed Cerevax, drilled at 350 seeds per m^2. W. barley, Puffin, dressed Cerevax Extra, drilled at 350 seeds per m^2.
04-Oct-93 : **T** : **SOW DATE** M: W. wheat and w. barley drilled as above.
07-Oct-93 : **T** : **SOW DATE** E, M: Optimol at 15.0 kg. hand.
15-Oct-93 : **T** : **SOW DATE** L: W. wheat and w. barley drilled as above.
12-Nov-93 : **T** : **INSCTCDE** C: Ripcord at 250 ml in 220 l.
09-Mar-94 : B : 34.5% N at 118 kg.
19-Apr-94 : B : 34.5% N at 346 kg.
: B : Briotril Plus 19/19 at 2.0 l with Hytane 500 SC at 2.0 l in 200 l.
06-May-94 : B : Radar at 0.5 l with Standon Tridemorph 750 at 0.5 l in 200 l.
31-May-94 : B : Mistral at 0.5 l with Radar at 0.5 l in 200 l.

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94/R/M/1

Experimental diary:
26-Jul-94 : **T** : **CROP** WB: Combine harvested.
02-Aug-94 : **T** : **CROP** WW: Combine harvested.

Previous crops: W. barley 1992, set-aside 1993.

NOTE: Emergence counts were made in autumn. Level of virus infection was estimated visually and by ELISA in winter, spring and summer.

GRAIN TONNES/HECTARE

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

SOW DATE	E	M	L	Mean
CROP				
WW	8.80	8.59	8.10	8.50
WB	9.32	8.91	8.56	8.93
Mean	9.06	8.75	8.33	8.72

INSCTCDE	-	C	Mean
CROP			
WW	8.51	8.49	8.50
WB	8.92	8.94	8.93
Mean	8.71	8.72	8.72

INSCTCDE	-	C	Mean
SOW DATE			
E	9.17	8.96	9.06
M	8.78	8.72	8.75
L	8.19	8.47	8.33
Mean	8.71	8.72	8.72

SOW DATE	E		M		L	
CROP **INSCTCDE**	-	C	-	C	-	C
WW	8.87	8.74	8.59	8.59	8.06	8.14
WB	9.47	9.18	8.97	8.84	8.32	8.80

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

CROP	**SOW DATE**	**INSCTCDE**	**CROP** **SOW DATE**
0.160	0.196	0.160	0.277

CROP **INSCTCDE**	**SOW DATE** **INSCTCDE**	**CROP** **SOW DATE** **INSCTCDE**
0.226	0.277	0.392

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94/R/M/1

GRAIN TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.554	6.4

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00230

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METEOROLOGICAL RECORDS 1994 - ROTHAMSTED

(Departure from 30-year means in brackets)

MONTH	Total sunshine: hours	Mean temperature: °C Air(1)	Dew point	In ground under grass 30cm	In ground under grass 100cm
JAN	71 (+19)	4.8 (+1.8)	3.5	4.8	6.3
FEB	65 (+0)	3.0 (-0.2)	1.5	4.1	5.8
MAR	139 (+32)	7.5 (+2.3)	4.5	6.7	6.3
APR	176 (+38)	7.9 (+0.3)	4.3	8.0	7.4
MAY	156 (-31)	10.6 (-0.3)	7.4	11.8	10.0
JUNE	264 (+73)	14.7 (+0.8)	10.4	14.3	11.9
JULY	253 (+64)	18.7 (+2.9)	14.2	17.5	14.5
AUG	197 (+18)	16.4 (+0.6)	12.2	16.7	15.6
SEPT	114 (-27)	13.1 (-0.5)	10.2	14.1	14.3
OCT	126 (+22)	10.1 (-0.3)	8.4	11.7	12.6
NOV	42 (-24)	9.8 (+3.8)	8.7	10.8	11.3
DEC	73 (+27)	6.1 (+2.0)	4.7	7.9	9.8
YEAR*	1674 (+212)	10.2 (+1.1)	7.5	10.7	10.5

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	20	103 (+38)	22	89	10.8
FEB	22	54 (+6)	14	41	7.9
MAR	16	55 (-2)	19	14	13.7
APR	12	65 (+12)	16	35	11.4
MAY	5	69 (+16)	15	24	7.3
JUNE	2	18 (-39)	9	0	7.9
JULY	0	23 (-24)	10	0	5.3
AUG	0	54 (+0)	12	10	5.8
SEPT	1	65 (+10)	14	25	7.1
OCT	12	88 (+23)	15	56	6.8
NOV	4	41 (-24)	12	31	7.0
DEC	19	91 (+21)	15	71	10.8
YEAR*	113	726 (+38)	173	396	8.5

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 1994 - WOBURN

(Departure from 30-year means in brackets)

		Mean temperature: °C								
				In ground under grass			Total rainfall: mm			Wind km per
MONTH	Total sunshine: hours	Air(1)	Dew point	30 cm	100 cm	Ground frosts (2)	12.7 cm (5in) gauge		Rain days (3)	hour (4)
JAN	79 (+30)	5.3 (+1.9)	3.3	5.0	6.5	20	72	(+19)	19	12.5
FEB	65 (+5)	3.3 (-0.2)	1.6	3.9	6.0	21	55	(+16)	13	6.8
MAR	133 (+30)	7.7 (+2.2)	4.2	7.1	6.5	14	43	(-9)	19	15.0
APR	160 (+30)	8.2 (+0.5)	4.2	8.3	7.6	12	54	(+4)	15	10.4
MAY	148 (-31)	10.6 (-0.4)	7.1	12.5	10.2	6	66	(+12)	15	6.7
JUNE	242 (+59)	14.6 (+0.6)	10.2	15.7	12.4	0	32	(-23)	9	8.8
JULY	234 (+54)	18.5 (+2.5)	13.5	19.1	15.1	0	9	(-40)	5	5.9
AUG	182 (+12)	16.5 (+0.8)	11.1	18.0	16.1	0	47	(-11)	16	7.1
SEPT	108 (-27)	12.8 (-0.8)	9.8	14.4	14.7	0	72	(+21)	16	7.5
OCT	105 (+4)	9.8 (-0.7)	7.7	11.4	12.9	11	66	(+10)	14	7.2
NOV	39 (-22)	9.6 (+3.3)	8.4	10.5	11.6	5	35	(-22)	11	7.4
DEC	60 (+17)	6.1 (+1.8)	4.4	6.9	9.7	15	59	(+0)	15	12.2
YEAR*	1555(+162)	10.3 (+0.9)	7.1	11.1	10.8	104	610	(-22)	167	9.0

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