

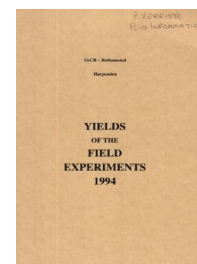
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# Yields of the Field Experiments 1994

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## Crop Sequences

### Rothamsted Research

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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 CaCO<sub>3</sub>) (total applied 1962-87):

R	W	Rothamsted total		Woburn total	
		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
P1			0	P1	P1	0	P2	P1
P2			P	P1	0	P2	P2	P1
P3			P	P3	P1	P2	P4	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

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 : Discd.  
20-Oct-93 : B : Spring-tine cultivated, CH304/70 drilled at 40 seeds per m<sup>2</sup>.  
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<sup>2</sup>.  
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.

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. **FUNGICIDE[1]** Fungicide in autumn:  
(NONE) None  
(TRIADIM) Triadimefon in autumn
3. **FUNGICIDE[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<sup>2</sup>, 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.

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
<b>WEEDKLLR</b>			
(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
<b>WEEDKLLR</b>			
(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
<b>FUNGCIDE [1]</b>			
(NONE)	5.24	5.24	5.24
(TRIADIM)	5.09	5.51	5.30
Mean	5.16	5.37	5.27

INSTCDE	(NONE)	(CHLORFEN)	Mean
<b>WEEDKLLR</b>			
(NONE)	5.45	5.20	5.32
(GLYPHOS)	5.34	5.09	5.22
Mean	5.39	5.14	5.27

INSTCDE	(NONE)	(CHLORFEN)	Mean
<b>FUNGCIDE [1]</b>			
(NONE)	5.24	5.23	5.24
(TRIADIM)	5.55	5.05	5.30
Mean	5.39	5.14	5.27

INSTCDE	(NONE)	(CHLORFEN)	Mean
<b>FUNGCIDE [2]</b>			
(NONE)	5.24	5.09	5.16
(BENOMYL)	5.55	5.20	5.37
Mean	5.39	5.14	5.27

94/R/CS/140

GRAIN TONNES/HECTARE

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

<b>NEMACIDE</b>	(NONE)	(ALDICARB)	Mean	
<b>WEEDKLLR</b>				
(NONE)	5.39	5.26	5.32	
(GLYPHOS)	5.25	5.18	5.22	
Mean	5.32	5.22	5.27	
<b>NEMACIDE</b>	(NONE)	(ALDICARB)	Mean	
<b>FUNGCIDE [1]</b>				
(NONE)	5.31	5.17	5.24	
(TRIADIM)	5.32	5.28	5.30	
Mean	5.32	5.22	5.27	
<b>NEMACIDE</b>	(NONE)	(ALDICARB)	Mean	
<b>FUNGCIDE [2]</b>				
(NONE)	5.20	5.13	5.16	
(BENOMYL)	5.43	5.31	5.37	
Mean	5.32	5.22	5.27	
<b>NEMACIDE</b>	(NONE)	(ALDICARB)	Mean	
<b>INSCTCDE</b>				
(NONE)	5.39	5.40	5.39	
(CHLORFEN)	5.24	5.05	5.14	
Mean	5.32	5.22	5.27	
<b>FUNGCIDE [1]</b>	(NONE)	(TRIADIM)		
<b>WEEDKLLR FUNGCIDE [2]</b>	(NONE)	(BENOMYL)	(NONE)	(BENOMYL)
(NONE)	5.23	5.35	5.27	5.43
(GLYPHOS)	5.25	5.12	4.91	5.59
<b>FUNGCIDE [1]</b>	(NONE)	(TRIADIM)		
<b>WEEDKLLR INSCTCDE</b>	(NONE)	(CS)	(NONE)	(CS)
(NONE)	5.35	5.23	5.54	5.16
(GLYPHOS)	5.14	5.23	5.55	4.94
<b>FUNGCIDE [2]</b>	(NONE)	(BENOMYL)		
<b>WEEDKLLR INSCTCDE</b>	(NONE)	(CS)	(NONE)	(CS)
(NONE)	5.23	5.27	5.66	5.13
(GLYPHOS)	5.25	4.90	5.43	5.28
<b>FUNGCIDE [2]</b>	(NONE)	(BENOMYL)		
<b>FUNGCIDE [1] INSCTCDE</b>	(NONE)	(CS)	(NONE)	(CS)
(NONE)	5.13	5.35	5.36	5.12
(TRIADIM)	5.36	4.82	5.73	5.29

94/R/CS/140

GRAIN TONNES/HECTARE

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

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

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

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

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

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

INSCTCDE		(NONE)	(AL)	(CHLORFEN)	(NONE)	(AL)
FUNGICIDE [2]	NEMACIDE	(NONE)	(AL)	(NONE)	(AL)	(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

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 to 20 cm  
P2 Ploughed to 20 cm depth



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

- 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<sup>2</sup>.  
08-Nov-93 : T : SOW DATE L: Rotary harrowed, Soissons, dressed Cerevax, drilled at 380 seeds per m<sup>2</sup>.  
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<sup>2</sup>.  
08-Nov-93 : T : SOW DATE L: Rotary harrowed, Soissons, dressed Panoctine, drilled at 350 seeds per m<sup>2</sup>.  
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<sup>2</sup>.  
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.

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

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
<b>STRAWCUL</b>			
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				
<b>STRAWCUL</b>			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

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

GRAIN TONNES/HECTARE

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

SOW DATE	E	L	Mean
<b>STRAWCUL</b>			
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			
<b>STRAWCUL</b>		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

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<sup>2</sup>.
- 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.

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
<b>STRAW</b>			
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

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  
TTTOTT  
WWWWWWW  
OWWWOWW  
WOWWWOW  
WWOWWOW  
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

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<sup>2</sup>.  
24-Sep-93 : T : CROPSEQ Oats plots: Rotary harrowed, Image, dressed Ceresol, drilled at 350 seeds per m<sup>2</sup>.  
: T : CROPSEQ Triticale plots: Rotary harrowed, Lasko, dressed Cerevax, drilled at 400 seeds per m<sup>2</sup>.  
: T : CROPSEQ Wheat plots: Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m<sup>2</sup>.  
: 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<sup>2</sup>.  
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.

94/R/CS/323

GRAIN TONNES/HECTARE

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

CROPSEQ	
TTTTTTT	5.35
OTTTOTT	5.04
TOTTTOT	6.23
TTOTTTO	6.95
TTTOTT	5.91
WWWWWWW	4.70
OWWWOWW	4.84
WOWWWOW	5.01
WWOWWVO	6.55
WWWOWWW	6.65
BBBBBBB	6.46
OBBBBBB	7.15
BOBBBB	5.23
BBOBBBO	6.60
BBBOBBB	6.48
WTWTWTW	5.27
WBWBWBW	6.25
TBTBTBT	6.98
SBSBSBS	5.09
WTTTWW	6.64
WWBBBWW	5.65
TTBBBTT	5.87
TTWWTT	5.18
BBWWBB	6.46
BBTTTBB	7.04
WWSSWW	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		



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<sup>2</sup>.
- 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.

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

**Experimental diary:**

Far Field I (W)

- 20-Oct-93 : B : Rotary harrowed, Soissons, dressed Panocetine, drilled at 350 seeds per m<sup>2</sup>.
- 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

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

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:**

<b>INOC+SDT</b>	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<sup>2</sup>.  
          : T : **INOC+SDT** All plots except NONE O W: Mercia, dressed Cerevax, drilled at 380 seeds per m<sup>2</sup>.  
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 \*\*\*\*\*

<b>INOC+SDT</b>	
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 \*\*\*

<b>INOC+SDT</b>
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		

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

<b>CROPS</b>	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<sup>2</sup>.  
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<sup>2</sup>.  
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
<b>PREVCROP</b>				
(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

	(W)	(S)	Mean
<b>WHEAT</b>			
<b>PREVCROP</b>			
(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

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

94/W/CS/347

TEST PHASE

GRAIN TONNES/HECTARE

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

PREVCROP	WHEAT (W)		WHEAT (S)		
	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*	WHEAT*	PREVCROP* WHEAT N
0.565	0.165	0.615

Except when comparing means with the same level(s) of  
PREVCROP 0.532  
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)

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:**

<b>SOW SEQ</b>	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<sup>2</sup>.  
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<sup>2</sup>.  
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.

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		

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<sup>2</sup>.  
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.

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

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<sup>2</sup>.

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.

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



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 Panocline Plus, drilled at 350 seeds per m<sup>2</sup>.  
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.

94/W/CS/386

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

94/W/CS/386

STRAW TONNES/HECTARE

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

N	(-)	(N)	Mean
<b>CROPS</b>			
(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

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. <b>LAND TRT</b> | 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. <b>N</b> | Residues of nitrogen fertilizer (kg N) to s. barley 1993: |
| (0)         |                                                           |
| (75)        |                                                           |

plus one extra treatment

Whole plot

- |                 |                                                                |
|-----------------|----------------------------------------------------------------|
| 1. <b>EXTRA</b> |                                                                |
| (W BARLEY)      | Residues of w. barley, sown in autumn 1992, taken to maturity: |

Sub-plot

- |                   |                                                                           |
|-------------------|---------------------------------------------------------------------------|
| 2. <b>N EXTRA</b> | Residues of nitrogen fertilizer (kg N) to w. barley, sown in autumn 1992: |
| (0)               |                                                                           |
| (150)             |                                                                           |

94/R/CS/399

**Experimental diary:**

13-Sep-93 : B : Ploughed.  
 08-Oct-93 : B : Rotary harrowed, Puffin, dressed Cerevax Extra, drilled at 350 seeds per m<sup>2</sup>.  
 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
<b>LAND TRT</b>				
(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	(0)	(150)	Mean
<b>N EXTRA</b>		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			
<b>CROPS</b>			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	

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		

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. <b>VARIETY</b>  | Variety:                             |
| CAVIN R            | Cave in Rock                         |
| KANLOW             | Kanlow                               |
| PATHFIND           | Pathfinder                           |
| SUNBURST           | Sunburst                             |
| FOREST B           | Forest Burg                          |
| NEBR 28            | NEBR 28                              |
| DAKOTAH            | Dakotah                              |
| 2. <b>NITROGEN</b> | 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.

94/R/CS/411

DRY MATTER TONNES/HECTARE

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

NITROGEN VARIETY	-	N1	Mean
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		



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<sup>2</sup>.  
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 \*\*\*\*\*

<b>NITROGEN</b>	
N0	5.53
N1	5.72
N2	6.44
N3	7.15
N4	6.77
Mean	6.32

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

<b>NITROGEN</b>	
	0.616

94/R/CS/429

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		