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## Yields of the Field Experiments 1994

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### Annuals - Winter and Spring Wheat

#### Rothamsted Research

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

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<sup>2</sup>:

	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<sup>2</sup>.  
11-Apr-94 : B : 34.5% N at 448 kg.



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**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 \*\*\*\*\*

<b>WEED DEN SPECIES</b>	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
<b>HERB DSE SPECIES</b>	-	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	
<b>HERB DSE WEED DEN</b>	-	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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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	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		



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<sup>2</sup>.  
19-Oct-93 : T : **SOW DATE 2:** Rotary harrowed, Mercia, dressed Cerevax, drilled at 380 seeds per m<sup>2</sup>.  
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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**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 \*\*\*\*\*

<b>SPRING N SOW DATE</b>	-	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 \*\*\*

<b>SOW DATE</b>	<b>SPRING N</b>	<b>SOW DATE SPRING N</b>
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		

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

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<sup>2</sup>):

	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<sup>2</sup>):

<b>WEED DEN</b>	D1	D2	D4	D8
<b>WEED SD S1:</b>	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<sup>2</sup>.  
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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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
<b>EXTRA</b>					
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