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# Yields of the Field Experiments 1991

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## Annuals - Winter Wheat

### Rothamsted Research

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91/R/WW/1

**WINTER WHEAT**

**EYESPOT TYPES AND YIELD**

**Object:** To compare the effects of eyespot (*Pseudocercosporella herpotrichoides*) caused by the R-type and the W-type on the yield of w. wheat - Summerdells II.

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

**Design:** 4 randomised blocks of 12 plots.

**Whole plot dimensions:** 3.0 x 6.0.

**Treatments:** All combinations of:

1. **EYE TYPE** Eyespot types:

R	Rye
W	Wheat

2. **INOCDATE** Dates of inoculation of eyespot types:

NOV	November 23, 1990
MAR	March 13, 1991
NOV+MAR	Both above dates

plus two extra treatments:

**EXTRA**

NONE	None (quintuplicated)
NO I PRO	No inoculation, sprayed prochloraz at 0.40 kg in 200 l on 12 Apr, 1991.

**NOTE:** The eyespot inoculum was sprayed on as a spore suspension.

**Basal applications:** Manure: 'Nitram' at 460 kg. Weedkillers: Bifenox at 0.95 kg and chlorotoluron at 3.5 kg in 200 l. Glyphosate at 1.4 kg in 200 l.

**Seed:** Mercia, sown at 170 kg.

**Cultivations, etc.:** - Deep-tine cultivated: 6 Oct, 1990. Ploughed, furrow pressed: 10 Oct. Rotary harrowed, seed sown: 12 Oct. Bifenox and chlorotoluron applied: 13 Nov. N applied: 3 Apr, 1991. Glyphosate applied: 12 Aug. Combine harvested: 22 Aug. Previous crops: W. oilseed rape 1989, potatoes 1990.

**NOTE:** Plant samples were taken in early May and early July for assessment of eyespot and sharp eyespot.

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GRAIN TONNES/HECTARE

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

INOCDATE	NOV	MAR	NOV+MAR	Mean
<b>EYE TYPE</b>				
R	7.47	7.48	7.24	7.40
W	7.66	7.70	7.47	7.61
Mean	7.56	7.59	7.35	7.50
<b>EXTRA</b>	NONE	NO I PRO	Mean	
	7.53	7.53	7.53	
GRAND MEAN	7.51			

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

EYE TYPE	INOCDATE	EYE TYPE
		INOCDATE
0.088	0.108	0.153

SED for comparing **EXTRA** NONE and N I PRO is 0.119

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	37	0.217	2.9
GRAIN MEAN DM%	86.5		
PLOT AREA HARVESTED	0.00138		

91/R/WW/2

**WINTER WHEAT**

**CONTROL OF VOLUNTEERS**

**Object:** To compare methods of volunteer control in winter wheat after w. and s. barley - Great Knott I, Long Hoos I/II.

**Sponsor:** D.G. Christian.

**Design:** 3 replicates of 8 x 3 criss-cross.

**Column plot dimensions:** 6.0 x 20.0.

**Treatments:** All combinations of:-

Column plots

1. **PRIMCULT** Primary cultivations:  

NONE	None until just before sowing
DYNDRIVE	'Bomford Dynadrive'
PLOUGH	Plough
TINE	Tine
2. **CULTDATE** Date of cultivations:  

EARLY	25 July, 1990 (Great Knott I) 15 Aug (Long Hoos I/II)
LATER	15 Aug (Great Knott I) 5 Sept (Long Hoos I/II)

Row plots

3. **PRSOWCON** Pre-sowing volunteer control using weedkillers:  

GLYPHOS	Glyphosate at 0.27 kg in 200 l on 8 Oct, 1990
PARAQUAT	Paraquat at 0.60 kg ion in 200 l on 8 Oct
NONE	None

- NOTES:** (1) The 'Bomford Dynadrive' has a frame similar to a rotary cultivator but it has two rotating shafts containing flat, slightly twisted, spade-shaped tines. The front shaft drives the rear, it is fitted with twice the number of blades and rotates at about one third the speed of the rear shaft.  
(2) **PRIMCULT TINE** was heavy spring-tine cultivated twice.  
(3) All plots were heavy spring-tine cultivated on 9 Oct, 1990 then rotary harrowed and the seed sown on 10 Oct.

**Basal applications:** Manures: (0:16:36) at 980 kg (Great Knott I only). 'Nitram' at 120 kg and later at 580 kg. Weedkillers: Isoproturon at 1.3 kg and pendimethalin at 1.3 kg in 200 l. Glyphosate (Long Hoos I/II only) at 1.4 kg in 200 l. Fungicides: Fenpropimorph at 0.38 kg in 200 l and on a second occasion with chlorothalonil at 0.49 kg and flutriafol at 78 g in 200 l.

**Seed:** Mercia, sown at 170 kg.

91/R/WW/2

**Cultivations, etc.:-** PK applied (Great Knott I only): 20 Aug, 1990.

Isoproturon and pendimethalin applied: 14 Nov (Great Knott I), 23 Nov (Long Hoos I/II). First N applied: 13 Mar, 1991. Second N applied: 3 Apr (Great Knott I), 8 Apr (Long Hoos I/II). Fenpropimorph alone applied: 27 Apr. Fenpropimorph with chlorothalonil and flutriafol applied: 20 June. Glyphosate applied (Long Hoos I/II only): 12 Aug. Combine harvested: 20 Aug (Great Knott I), 25 Aug (Long Hoos I/II). Previous crops: W. barley 1989 and 1990 (Great Knott I), sunflowers 1989, s. barley 1990 (Long Hoos I/II)

- NOTES:** (1) Ears of volunteer plants were counted at anthesis of the sown crop.  
 (2) Percentage contamination of harvested grain by volunteer grain was measured.

**91/R/WW/2 GREAT KNOTT I W. WHEAT AFTER W. BARLEY**

**GRAIN TONNES/HECTARE**

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

<b>CULTDATE</b>	<b>EARLY</b>	<b>LATER</b>	<b>Mean</b>	
<b>PRIMCULT</b>				
NONE	6.43	7.39	6.91	
DYNDRIVE	6.89	6.72	6.81	
PLOUGH	7.46	7.45	7.46	
TINE	7.10	7.09	7.10	
Mean	6.97	7.16	7.07	
<b>PRROWCON</b>				
<b>PRIMCULT</b>	<b>GLYPHOS</b>	<b>PARAQUAT</b>	<b>NONE</b>	<b>Mean</b>
NONE	7.14	6.88	6.70	6.91
DYNDRIVE	7.09	6.75	6.59	6.81
PLOUGH	7.49	7.42	7.46	7.46
TINE	7.17	7.25	6.87	7.10
Mean	7.22	7.08	6.91	7.07
<b>PRROWCON</b>				
<b>CULTDATE</b>	<b>GLYPHOS</b>	<b>PARAQUAT</b>	<b>NONE</b>	<b>Mean</b>
EARLY	7.11	6.98	6.82	6.97
LATER	7.33	7.18	6.99	7.16
Mean	7.22	7.08	6.91	7.07
<b>PRIMCULT</b>				
<b>CULTDATE</b>	<b>EARLY</b>	<b>LATER</b>		
<b>PRROWCON</b>	<b>GLYPHOS</b>	<b>PARAQUAT</b>	<b>NONE</b>	<b>GLYPHOS</b>
NONE	6.61	6.54	6.12	7.22
DYNDRIVE	7.13	6.75	6.80	6.75
PLOUGH	7.51	7.28	7.60	7.56
TINE	7.19	7.34	6.78	7.17
				7.33
				6.96

91/R/WW/2 GREAT KNOTT I W. WHEAT AFTER W. BARLEY

GRAIN TONNES/HECTARE

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

	PRIMCULT	CULTDATE	PRSOWCON	PRIMCULT CULTDATE
	0.269	0.190	0.238	0.381
	PRIMCULT PRSOWCON	CULTDATE PRSOWCON	PRIMCULT CULTDATE PRSOWCON	
	0.375	0.309	0.482	

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

PRIMCULT	0.279			
CULTDATE		0.252		
PRSOWCON	0.302	0.214	0.427	
PRIMCULT.CULTDATE			0.325	

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	14	0.466	6.6
BLOCK.WP2	4	0.292	4.1
BLOCK.WP1.WP2	28	0.290	4.1

GRAIN MEAN DM% 87.5

SUB PLOT AREA HARVESTED 0.00094

91/R/WW/2 LONG HOOS I/II W. WHEAT AFTER S. BARLEY

GRAIN TONNES/HECTARE

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

CULTDATE	EARLY	LATER	Mean	
PRIMCULT				
NONE	9.10	9.22	9.16	
DYNDRIVE	9.12	9.43	9.28	
PLOUGH	9.25	9.03	9.14	
TINE	9.26	9.26	9.26	
Mean	9.18	9.24	9.21	
PRSOWCON	GLYPHOS	PARAQUAT	NONE	Mean
PRIMCULT				
NONE	9.09	9.02	9.38	9.16
DYNDRIVE	9.27	9.00	9.56	9.28
PLOUGH	9.32	8.88	9.22	9.14
TINE	9.21	9.15	9.43	9.26
Mean	9.22	9.01	9.40	9.21

91/R/WW/2 LONG HOOS I/II W. WHEAT AFTER S. BARLEY

GRAIN TONNES/HECTARE

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

PRISOWCON	GLYPHOS	PARAQUAT	NONE	Mean
<b>CULTDATE</b>				
EARLY	9.28	8.93	9.34	9.18
LATER	9.16	9.09	9.46	9.24
Mean	9.22	9.01	9.40	9.21

  

	CULTDATE	EARLY		LATER			
<b>PRIMCULT</b>	<b>PRISOWCON</b>	<b>GLYPHOS</b>	<b>PARAQUAT</b>	<b>NONE</b>	<b>GLYPHOS</b>	<b>PARAQUAT</b>	<b>NONE</b>
NONE		9.13	9.03	9.15	9.05	9.01	9.61
DYNDRIVE		9.16	8.80	9.41	9.38	9.20	9.70
PLOUGH		9.69	8.86	9.20	8.95	8.91	9.25
TINE		9.14	9.05	9.59	9.28	9.25	9.27

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

	<b>PRIMCULT</b>	<b>CULTDATE</b>	<b>PRISOWCON</b>	<b>PRIMCULT</b>
				<b>CULTDATE</b>
	0.171	0.121	0.119	0.241
	<b>PRIMCULT</b>	<b>CULTDATE</b>	<b>PRIMCULT</b>	
	<b>PRISOWCON</b>	<b>PRISOWCON</b>	<b>CULTDATE</b>	<b>PRISOWCON</b>
	0.232	0.176	0.316	

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

<b>PRIMCULT</b>	0.181		
<b>CULTDATE</b>		0.143	
<b>PRISOWCON</b>	0.214	0.151	0.303
<b>PRIMCULT.CULTDATE</b>			0.241

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	14	0.296	3.2
BLOCK.WP2	4	0.146	1.6
BLOCK.WP1.WP2	28	0.274	3.0

GRAIN MEAN DM% 84.0

SUB PLOT AREA HARVESTED 0.00090

91/R/WW/3

WINTER WHEAT

N AND CROP PHYSIOLOGY

**Object:** To study the relationship between N supply to crops of different size and their nitrate contents, N uptakes, growth rates and yield - Stackyard.

**Sponsors:** R.J. Darby, G.F.J. Milford.

**Design:** 3 randomised blocks of 15 plots.

**Whole plot dimensions:** 3.0 x 20.0.

**Treatments:** All combinations of:-

1. **SOW DATE**            Dates of sowing:
- |        |                    |
|--------|--------------------|
| 12 SEP | 12 September, 1990 |
| 11 OCT | 11 October         |
2. **N R T S**            Nitrogen fertilizer (kg N) as 'Nitro-Chalk', rates, times and plot shading:
- |     |   |
|-----|---|
| -   | None  |
| N1  | 30 kg N on 21 Mar, 1991 + 92 kg N on 11 Apr |
| N2  | 60 " " " " " " + 184 " " " " " "            |
|     | (duplicated)                                |
| N2T | " " " " 11 Apr " " " " " " 29 Apr           |

plus 5 extra treatments all sown on 31 Oct

- N R T S L**            Nitrogen fertilizer (kg N) as 'Nitro-Chalk', rates and times:
- |     |   |
|-----|---|
| -   | None  |
| N1  | 30 kg N on 21 Mar, 1991 + 92 kg N on 11 Apr |
| N2  | 60 " " " " " " + 184 " " " " " "            |
| N3  | " " " " " " " " " " " " " " +               |
|     | 56 kg N on 23 May                           |
| N2T | " " " " 11 Apr " " " " " " 29 Apr           |

- NOTES:** (1) Shading, to reduce light to 44% of normal, was erected on 9 Apr, 1991 on **SOW DATE** 12 SEP and 11 OCT only, on one of the duplicates of **N R T S** N2. On **N R T S L** shading was not erected, because of loss of plants due to bird damage.  
(2) **N R T S** N2T treatment was applied three weeks after a threshold stem nitrate value of 200 ppm.  
(3) Each sowing date was rotary harrowed before drilling.

**Basal applications:** Manure: Magnesian limestone at 5.0 t. Weedkillers: Isoproturon at 1.3 kg and pendimethalin at 1.3 kg in 300 l. Fungicides: Fenpropimorph at 0.75 kg in 250 l and on a second occasion at 0.75 kg with chlorothalonil at 0.50 kg in 300 l. Insecticides: Deltamethrin at 6.2 g in 300 l. Pirimicarb at 0.14 kg in 300 l.



91/R/WW/3

Seed: Mercia, sown at 170 kg.

Cultivations, etc.:— Magnesian limestone applied: 31 July, 1990.  
 Ploughed: 3 Sept. Rolled: 4 Sept. Rotary harrowed: 12 Sept.  
 Deltamethrin applied: 7 Nov. Weedkillers applied: 21 Nov.  
 Fenpropimorph alone applied: 10 May, 1991. Fenpropimorph with  
 chlorothalonil applied: 2 July. Pirimicarb applied: 17 July.  
 Combine harvested: 27 Aug. Previous crops: Fallow 1989, w. oats  
 1990.

NOTE: Soils were sampled, to 90 cm depth, for ammonium and nitrate contents on four occasions from mid-October to the end of February and then at fortnightly intervals corresponding with crop sampling. Crop samples were taken from November to June at fortnightly intervals to measure stem nitrate concentrations and at similar intervals from April to the end of June to measure crop growth and total N content.

GRAIN TONNES/HECTARE

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

N R T S	-	N1	N2	N2T	Mean
SOW DATE					
12 SEPT	2.00	6.31	8.75	8.25	6.81
11 OCT	1.98	6.81	8.91	8.21	6.96
Mean	1.99	6.56	8.83	8.23	6.89

  

N R T SL	-	N1	N2	N3	N2T	Mean
	2.07	6.47	8.52	9.04	8.08	6.84

GRAND MEAN 6.87

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

SOW DATE	N R T S	N R T SL	N R T S
	0.121		SOW DATE
0.076	0.101	0.170	0.170 min.rep
			0.148 max-min
			0.121 max.rep

N R T S  
 max.rep N2 only  
 min.rep any of the remainder  
 max-min N2 v any of the remainder

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.209	3.0
GRAIN MEAN DM%	84.8		

91/R/WW/3

STRAW TONNES/HECTARE

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

N R T S	-	N1	N2	N2T	Mean	
SOW DATE						
12 SEPT	1.73	5.05	7.51	5.78	5.52	
11 OCT	1.48	5.87	7.29	5.99	5.58	
Mean	1.60	5.46	7.40	5.88	5.55	
N R T SL	-	N1	N2	N3	N2T	Mean
	1.18	5.11	6.13	6.31	5.38	4.82

GRAND MEAN 5.31

STRAW MEAN DM% 77.6

PLOT AREA HARVESTED 0.00276

91/R/WW/8

**WINTER WHEAT**

**FOLIAR POTASSIUM NITRATE**

**Object:** To study the effects of foliar applications of potassium nitrate and urea on the yield and nutrient composition of w. wheat - Summerdells II.

**Sponsor:** P.B. Barraclough.

**Design:** 5 randomised blocks of 9 plots.

**Whole plot dimensions:** 3.0 x 15.0.

**Treatments:**

<b>FOLIAR N</b>	Foliar nitrogen; all applications were divided equally and applied on two closely spaced days:
NONE	None (duplicated)
K20E	20 kg K as potassium nitrate at GS 39 on 29 and 30 May, 1991
K20EU40E	" " " " " " plus 40 kg N as urea on 29 and 30 May
U40E	40 kg N as urea on 29 and 30 May
K5M	5 kg K as potassium nitrate at GS 59 on 17 and 20 June
K20M	20 kg K " " " " " " 17 and 20 June
K20EK20M	" " " " " " on 29 and 30 May repeated on 17 and 20 June
K20MK20L	" " " " " " on 17 and 20 June repeated at GS 71 on 9 and 10 July

**NOTE:** All plots received N at 120 kg as 'Nitram' applied on 3 Apr, 1991.

**Basal applications:** Manures: (0:20:32) at 980 kg. Weedkillers: Bifenox at 0.95 kg and chlorotoluron at 3.5 kg in 200 l. Glyphosate at 1.4 kg in 200 l. Fungicide: Fenpropimorph at 0.38 kg in 200 l.

**Seed:** Mercia, sown at 170 kg.

**Cultivations, etc.:-** Deep-tine cultivated: 6 Oct, 1990. Ploughed, furrow pressed: 10 Oct. Rotary harrowed, seed sown: 13 Oct. Bifenox and chlorotoluron applied: 13 Nov. PK applied: 6 Dec. Fungicide applied: 9 May, 1991. Glyphosate applied: 12 Aug. Combine harvested: 22 Aug. Previous crops: W. oilseed rape 1989, potatoes 1990.

**NOTES:** (1) Leaf samples were taken approximately five days after foliar treatment applications to measure N and K contents.  
(2) Components of yield were measured.

91/R/WW/8

**GRAIN TONNES/HECTARE**

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

<b>FOLIAR N</b>	
NONE	8.71
K20E	8.58
K20EU40E	8.41
U40E	8.12
K5M	8.64
K20M	8.63
K20EK20M	8.89
K20MK20L	8.48
Mean	8.58

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

<b>FOLIAR N</b>	
0.113	min.rep
0.098	max-min

  

<b>FOLIAR N</b>	
max-min	NONE v any of the remainder
min.rep	any of the remainder

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	33	0.179	2.1
GRAIN MEAN DM%	87.4		
PLOT AREA HARVESTED	0.00230		