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### Annuals - Winter Wheat

#### Rothamsted Research

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90/R/WW/1

**WINTER WHEAT**

**VARIETIES**

**Object:** To study a selection of newer varieties of w. wheat - Highfield VI.

**Sponsor:** R. Moffitt.

**Design:** 2 blocks of 2 whole plots split into 10 sub plots.

**Whole plot dimensions:** 39.0 x 12.0.

**Treatments:** All combinations of:-

Whole plots

<b>1. FUNGICIDE</b>	<b>Fungicide:</b>
NONE	None
SPRAYED	Prochloraz at 0.40 kg with fenpropimorph at 0.75 kg in 200 l on 8 May, 1990. Propiconazole at 0.12 kg with carbendazim at 0.25 kg and maneb at 1.6 kg in 200 l on 14 June.

Sub plots:

<b>2. VARIETY</b>	<b>Varieties:</b>
APOLLO	Apollo
APOSTLE	Apostle
CAMPREMY	Camp Remy
DEAN	Dean
FORTRESS	Fortress
HORNET	Hornet
MERCIA	Mercia
PARADE	Parade
PASTICHE	Pastiche
RIBAND	Riband

**NOTE:** VARIETY - DEAN and RIBAND were dressed with triadimenol and fuberidazole.

**Basal applications:** Manures: 'Nitram' at 120 kg and later at 460 kg.  
Weedkillers: Isoproturon at 1.7 kg in 200 l. Bromoxynil at 0.19 kg and ioxynil at 0.19 kg with fluroxypyr at 0.20 kg in 200 l.

**Seed:** Varieties sown at 180 kg.

**Cultivations, etc.:-** Heavy spring-tine cultivated: 19 Aug, 1989. Deep-tine cultivated with vibrating tines: 1 Nov. Ploughed: 7 Nov. Rotary harrowed, seed sown: 13 Nov. Isoproturon applied: 20 Nov. First N applied: 2 Mar, 1990. Second N applied: 10 Apr. Remaining weedkillers applied: 12 Apr. Combine harvested: 10 Aug. Previous crops: Mixed cereals 1988, w. wheat 1989.

90/R/WW/1

GRAIN TONNES/HECTARE

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

FUNGCIDE VARIETY	NONE	SPRAYED	Mean
APOLLO	8.72	8.80	8.76
APOSTLE	8.53	8.86	8.70
CAMPREMY	7.00	7.34	7.17
DEAN	8.71	9.13	8.92
FORTRESS	6.94	7.49	7.22
HORNET	7.36	8.66	8.01
MERCIA	8.30	8.57	8.43
PARADE	7.74	8.50	8.12
PASTICHE	7.24	7.58	7.41
RIBAND	8.56	9.43	8.99
Mean	7.91	8.44	8.17

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

	FUNGCIDE	VARIETY	FUNGCIDE VARIETY
	0.369	0.375	0.624
Except when comparing means with the same level(s) of			
FUNGCIDE			0.530

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

Stratum	d.f.	s.e.	cv%
WP.SP	18	0.530	6.5
GRAIN MEAN DM%	88.8		
SUB PLOT AREA HARVESTED	0.00245		

90/R/WW/2

WINTER WHEAT

CONTROL OF VOLUNTEERS

**Object:** To compare methods of volunteer control in winter wheat after w. and s. barley - Delafield, Fosters Corner.

**Sponsors:** R. Moffitt, 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, 1989 (Delafield) 17 Aug (Fosters Corner)
LATER	15 Aug (Delafield) 7 Sept (Fosters Corner)

Row plots

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

GLYPHOS	Glyphosate at 0.27 kg in 200 l on 18 Oct, 1989 (Delafield), 1 Nov and 13 Nov (Fosters Corner)
PARAQUAT	Paraquat at 0.60 kg ion in 200 l on 18 Oct (Delafield), 1 Nov (Fosters Corner)
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) A 1 m strip of Plaisant w. barley was broadcast on the surface, by drill at 120 kg on one end of each plot. It was broadcast before any treatments were applied on 25 July, 1989 (Delafield) and 17 Aug (Fosters Corner).
  - (3) All plots were heavy spring-tine cultivated on 1 Nov, 1989 (Delafield), 14 Nov (Fosters Corner) then rotary harrowed and seed sown by drill 7 Nov (Delafield), 15 Nov (Fosters Corner). The seed was spring-tine cultivated in, (Delafield), and harrowed in, (Fosters Corner), after sowing.
  - (4) **PRIMCULT TINE** was heavy spring-tine cultivated twice.

90/R/WW/2

**Basal applications:** Manures: 'Nitram' at 120 kg and later at 460 kg.  
 Weedkillers: Chlorotoluron at 3.5 kg in 200 l. Bromoxynil at 0.25 kg, ioxynil at 0.25 kg and mecoprop at 2.0 kg with the prochloraz in 200 l (Delafield). Bromoxynil at 0.28 kg, ioxynil at 0.28 kg and mecoprop at 2.2 kg with the prochloraz in 200 l (Fosters Corner). Fungicides: Prochloraz at 0.40 kg. Chlorothalonil at 0.50 kg with propiconazole at 0.12 kg in 200 l (Delafield). Fenpropimorph at 0.75 kg in 200 l.

**Seed:** Mercia, sown at 180 kg.

**Cultivations, etc.:-** Chlorotoluron applied: 21 Nov, 1989 (Fosters Corner), 23 Nov (Delafield). N applied: 9 Mar, 1990 and 12 Apr. Bromoxynil, ioxynil and mecoprop with prochloraz applied: 10 Apr (Delafield), 25 Apr (Fosters Corner). Chlorothalonil applied with the propiconazole (Fosters Corner): 31 May. Fenpropimorph applied: 29 June. Combine harvested: 10 Aug (Delafield), 13 Aug (Fosters Corner). Previous crops: W. oilseed rape 1988, w. barley 1989 (Delafield); sunflowers 1988, s. barley 1989 (Fosters Corner).

**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.

90/R/WW/2 DELAFIELD W.WHEAT AFTER W.BARLEY

GRAIN TONNES/HECTARE

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

CULTDATE	EARLY	LATER	Mean	
<b>PRIMCULT</b>				
NONE	5.73	5.83	5.78	
DYNDRIVE	5.48	5.80	5.64	
PLOUGH	6.30	6.43	6.36	
TINE	5.84	5.89	5.86	
Mean	5.84	5.99	5.91	
<b>PRSOWCON</b>	GLYPHOS	PARAQUAT	NONE	Mean
<b>PRIMCULT</b>				
NONE	6.11	5.79	5.44	5.78
DYNDRIVE	5.85	5.94	5.14	5.64
PLOUGH	6.76	6.38	5.95	6.36
TINE	6.08	6.24	5.27	5.86
Mean	6.20	6.09	5.45	5.91
<b>PRSOWCON</b>	GLYPHOS	PARAQUAT	NONE	Mean
<b>CULTDATE</b>				
EARLY	6.10	5.92	5.50	5.84
LATER	6.30	6.25	5.40	5.99
Mean	6.20	6.09	5.45	5.91

90/R/WW/2 DELAFIELD W.WHEAT AFTER W.BARLEY

GRAIN TONNES/HECTARE

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

PRIMCULT	PRSOWCON CULTDATE	GLYPHOS	PARAQUAT	NONE
NONE	EARLY	6.18	5.57	5.44
	LATER	6.05	6.00	5.44
DYNDRIVE	EARLY	5.75	5.70	4.99
	LATER	5.94	6.17	5.29
PLOUGH	EARLY	6.61	6.22	6.08
	LATER	6.92	6.54	5.81
TINE	EARLY	5.85	6.18	5.48
	LATER	6.30	6.31	5.06

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

PRIMCULT	CULTDATE	PRSOWCON	PRIMCULT CULTDATE
0.167	0.118	0.296	0.236
PRIMCULT PRSOWCON	CULTDATE PRSOWCON	PRIMCULT CULTDATE PRSOWCON	
0.369	0.325	0.445	

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

PRIMCULT	0.354		
CULTDATE		0.317	
PRSOWCON	0.248	0.175	0.350
PRIMCULT.CULTDATE			0.419

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	4	0.363	6.1
BLOCK.WP2	14	0.288	4.9
BLOCK.WP1.WP2	28	0.388	6.6

GRAIN MEAN DM% 89.5

PLOT AREA HARVESTED 0.00075

90/R/WW/2 FOSTERS CORNER W.WHEAT AFTER S.BARLEY

GRAIN TONNES/HECTARE

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

CULTDATE	EARLY	LATER	Mean
<b>PRIMCULT</b>			
NONE	5.61	5.75	5.68
DYNDRIVE	5.43	5.83	5.63
PLOUGH	5.69	5.78	5.73
TINE	5.56	5.65	5.60
Mean	5.57	5.75	5.66

PRROWCON	GLYPHOS	PARAQUAT	NONE	Mean
<b>PRIMCULT</b>				
NONE	5.74	5.43	5.87	5.68
DYNDRIVE	5.59	5.52	5.77	5.63
PLOUGH	5.73	5.59	5.88	5.73
TINE	5.55	5.48	5.78	5.60
Mean	5.65	5.51	5.83	5.66

PRROWCON	GLYPHOS	PARAQUAT	NONE	Mean
<b>CULTDATE</b>				
EARLY	5.55	5.40	5.77	5.57
LATER	5.75	5.61	5.89	5.75
Mean	5.65	5.51	5.83	5.66

PRIMCULT	PRROWCON	GLYPHOS	PARAQUAT	NONE
<b>CULTDATE</b>				
NONE	EARLY	5.72	5.36	5.76
	LATER	5.76	5.50	5.98
DYNDRIVE	EARLY	5.43	5.32	5.55
	LATER	5.76	5.73	5.99
PLOUGH	EARLY	5.60	5.47	5.99
	LATER	5.86	5.71	5.78
TINE	EARLY	5.46	5.46	5.75
	LATER	5.64	5.50	5.80

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

	<b>PRIMCULT</b>	<b>CULTDATE</b>	<b>PRROWCON</b>	<b>PRIMCULT CULTDATE</b>
	0.083	0.059	0.236	0.118
	<b>PRIMCULT PRROWCON</b>	<b>CULTDATE PRROWCON</b>	<b>PRIMCULT CULTDATE PRROWCON</b>	
	0.265	0.246	0.300	
Except when comparing means with the same level(s) of				
<b>PRIMCULT</b>	0.264			
<b>CULTDATE</b>		0.246		
<b>PRROWCON</b>	0.140	0.099	0.197	
<b>PRIMCULT . CULTDATE</b>			0.298	

90/R/WW/2 FOSTERS CORNER W.WHEAT AFTER S.BARLEY

GRAIN TONNES/HECTARE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	4	0.289	5.1
BLOCK.WP2	14	0.144	2.5
BLOCK.WP1.WP2	28	0.238	4.2

GRAIN MEAN DM% 89.1

PLOT AREA HARVESTED 0.00080



90/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 - Little Knott I.

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

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

**Whole plot dimensions:** 3.0 x 14.0.

**Treatments:** All combinations of:-

1. **SOW DATE**                      Dates of sowing:  
  
    6 SEP                              6 September, 1989  
    9 OCT                              9 October  
    15 NOV                             15 November
  
2. **N R T S**                        Nitrogen fertilizer (kg N) as 'Nitro-Chalk' (27% N),  
   rates, times and plot shading:  
  
    NONE                                None  
    115 E                               40 kg N on 16 Mar, 1990 + 75 kg N on 9 Apr  
    230 E                               80 " " " " " " " + 150 " " " " " (duplicated)  
    230 L                               " " " " 9 Apr " " " " " " 26 Apr

- NOTES:**
- (1) Shading, to reduce light to 44% of normal, was erected on 28 Mar, 1990 for the first two sowing dates, on 20 Apr for the third on sampled areas only of one of the duplicates of **N R T S** 230 E.
  - (2) Deltamethrin at 6.2 g in 220 l was applied to **SOW DATE** 6 SEP on 10 Oct, 1989.
  - (3) Deltamethrin at 6.2 g with chlorotoluron at 3.5 kg in 300 l was applied to **SOW DATE** 6 SEP and **SOW DATE** 9 OCT on 9 Nov, 1989.
  - (4) Chlorotoluron at 3.5 kg in 300 l was applied to **SOW DATE** 15 NOV on 15 Nov, 1989.
  - (5) Each sowing date was rotary harrowed before drilling.
  - (6) Irrigation was applied to the whole site, 12 mm on each occasion, on 25 Sept and 27 Sept.

**Basal applications:** Weedkillers: Glyphosate at 1.4 kg in 200 l. Fluroxypyr at 0.20 kg with bromoxynil at 0.19 kg, ioxynil at 0.19 kg and diclofop-methyl at 1.1 kg in 300 l. Fungicides: Chlorothalonil at 0.75 kg with fenpropimorph at 0.75 kg in 300 l. Tridemorph at 0.52 kg with pirimicarb in 300 l. Insecticides: Pirimicarb at 0.14 kg. Omethoate at 0.64 kg in 300 l.

**Seed:** Mercia, dressed triadimenol and fuberidazole, sown at 180 kg.

90/R/WW/3

**Cultivations, etc.:**- Glyphosate applied: 5 Aug, 1989. Deep-tine cultivated with vibrating tines: 22 Aug. Ploughed: 24 Aug. Rotary harrowed, spike rotary cultivated twice: 5 Sept. Omethoate applied: 23 Feb, 1990. Remaining weedkillers applied: 27 Mar. Chlorothalonil with fenpropimorph applied: 25 May. Tridemorph with pirimicarb applied: 26 June. Combine harvested: 11 Aug. Previous crops: W. wheat 1988, w. oats 1989.

**NOTE:** Soils were sampled, to 90 cm depth, for ammonium and nitrate contents on four occasions from mid-October to the end of February. 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 contents.

**GRAIN TONNES/HECTARE**

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

N R T S	NONE	115 E	230 E	230 L	Mean
<b>SOW DATE</b>					
6 SEPT	4.36	8.22	9.18	8.43	7.55
9 OCT	5.19	8.25	9.51	8.42	7.84
15 NOV	4.61	7.62	8.81	7.69	7.18
Mean	4.72	8.03	9.17	8.18	7.52

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

SOW DATE	N R T S	SOW DATE	N R T S
	0.261	0.451	min.rep
0.202	0.226	0.391	max-min
		0.319	max.rep

**N R T S**  
 max.rep 230 E only  
 min.rep any of the remainder  
 max-min 230 E v any of the remainder

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	31	0.553	7.0
GRAIN MEAN DM%	89.6		

90/R/WW/3

STRAW TONNES/HECTARE

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

N R T S	NONE	115 E	230 E	230 L	Mean
SOW DATE					
6 SEPT	1.71	4.05	4.07	3.03	3.22
9 OCT	1.96	3.35	4.54	2.72	3.14
15 NOV	1.52	3.47	3.58	2.59	2.79
Mean	1.73	3.62	4.06	2.78	3.05

STRAW MEAN DM% 86.6

PLOT AREA HARVESTED 0.00172

90/R/WW/7

**WINTER WHEAT**

**STRAW TREATMENT AND EYESPOT**

**Object:** To study the effects of straw treatment and sowing depth on eyespot development and on the yield of w. wheat - W. Barnfield I.

**Sponsors:** J.F. Jenkyn, M. Jalaluddin.

**Design:** 3 randomised blocks of 8 plots.

**Whole plot dimensions:** 10.0 x 10.0.

**Treatments:** All combinations of:-

1. **STRAW** Straw treatment, on 24 Aug, 1989:

BALED	Baled
BURNT	Burnt
CHOP 1	Chopped at normal rate
CHOP 2	Chopped at twice normal rate

2. **SOWDEPTH** Depths of sowing seed (cm):

SHALLOW	3.5
DEEP	7.0

**NOTE:** All plots were shallow cultivated (10 cm) by rotary grubber on 25 Aug, 1989, after application of straw treatments.

**Basal applications:** Manure: 'Nitram' at 580 kg. Weedkillers: Glyphosate at 0.27 kg in 200 l. Chlorotoluron at 3.0 kg with cyanazine at 0.75 kg in 200 l. Bromoxynil at 0.34 kg and clopyralid at 0.07 kg with fluroxypyr at 0.15 kg in 200 l.

**Seed:** Pastiche, sown at 190 kg.

**Cultivations, etc.:-** Glyphosate applied: 21 Sept, 1989. Spiked rotary cultivated: 10 Oct. Seed sown: 12 Oct. Chlorotoluron with cyanazine applied: 10 Nov. N applied: 12 Apr, 1990. Bromoxynil, clopyralid and fluroxypyr applied: 3 May. Combine harvested: 13 Aug. Previous crops: W. wheat 1988 and 1989.

**NOTE:** Plant samples were taken in spring and summer to assess eyespot and other diseases.

90/R/WW/7

GRAIN TONNES/HECTARE

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

STRAWTRT SOWDEPTH	BALED	BURNT	CHOP 1	CHOP 2	Mean
SHALLOW	6.63	7.20	6.26	6.57	6.67
DEEP	6.55	7.41	6.51	6.57	6.76
Mean	6.59	7.30	6.38	6.57	6.71

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

STRAWTRT	SOWDEPTH	STRAWTRT SOWDEPTH
0.308	0.218	0.436

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.533	7.9
GRAIN MEAN DM%	89.8		
PLOT AREA HARVESTED	0.00230		

90/R/WW/9

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 - Great Harpenden II.

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

**Design:** 5 randomised blocks of 8 plots.

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

**Treatments:**

FOLIAR N	Foliar nitrogen; all applications were divided equally and applied on two successive days:
NONE	None
K20E	20 kg K as potassium nitrate at GS 41 on 16 and 17 May, 1990
K20EU40E	" " " " " " plus 40 kg N as urea on 16 and 17 May
U40E	40 kg N as urea on 16 and 17 May
K5M	5 kg K as potassium nitrate at GS 55 on 26 and 27 May
K20M	20 kg K " " " " " " 26 and 27 May
K20EK20M	" " " " " " on 16 and 17 May repeated on 26 and 27 May
K20MK20L	" " " " " " on 26 and 27 May repeated GS 71 on 13 and 14 June

**NOTE:** All plots received N at 131 kg as 'Nitram' applied on 12 Apr, 1990.

**Basal applications:** Weedkillers: Bromoxynil at 0.19 kg and ioxynil at 0.19 kg with metsulfuron-methyl at 6.0 g in 200 l. Fungicides: Chlorothalonil at 0.50 kg with propiconazole at 0.12 kg in 200 l. Tridemorph at 0.52 kg in 200 l.

**Seed:** Mercia, sown at 180 kg.

**Cultivations, etc.:-** Heavy spring-tine cultivated twice: 16 Oct, 1989. Deep-tine cultivated with vibrating tines, disced, rotary harrowed, seed sown: 17 Oct. Weedkillers applied: 24 Apr, 1990. Chlorothalonil with propiconazole applied: 27 May. Tridemorph applied: 26 June. Combine harvested: 7 Aug. Previous crops: W. barley 1988, potatoes 1989.

**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.

90/R/WW/9

GRAIN TONNES/HECTARE

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

FOLIAR N	
NONE	9.98
K20E	10.29
K20EU40E	10.05
U40E	9.94
K5M	10.26
K20M	10.15
K20EK20M	10.10
K20MK20L	9.92
Mean	10.09

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

FOLIAR N  
0.226

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	28	0.358	3.5
GRAIN MEAN DM%	90.4		

STRAW TONNES/HECTARE

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

FOLIAR N	
NONE	6.97
K20E	7.07
K20EU40E	6.60
U40E	6.27
K5M	6.82
K20M	6.89
K20EK20M	6.54
K20MK20L	6.45
Mean	6.70

STRAW MEAN DM% 87.2

PLOT AREA HARVESTED 0.00230