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## Yields of the Field Experiments 1989

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### Annuals - Winter Wheat

#### Rothamsted Research

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89/R/WW/1 and 89/W/WW/1

**WINTER WHEAT**

**VARIETIES**

**Object:** To study a selection of newer varieties of w. wheat on land in rotation (pathogen free) and after wheat (pathogen infected) - Rothamsted Pastures (pathogen free RH) and Summerdells I (pathogen infected RD), Woburn Lansome II (pathogen free WH).

**Sponsor:** R. Moffitt.

**Design:** Two blocks of 2 whole plots split into 7 (RH,RD), 4 blocks of 8 plots (WH).

**Whole plot dimensions:** 27.0 x 12.0 (RH,RD)  
48.0 x 12.0 (WH)

**Treatments:** All combinations of:-

Whole plots

- |                    |   |
|--------------------|---|
| 1. <b>INSCTCDE</b> | Insecticide (R only):                           |
| NONE               | None  |
| PIRIMICA           | Pirimicarb at 0.14 kg in 200 l on 20 June, 1989 |

Sub plots (R), whole plots (WH):

- |                   |                      |
|-------------------|----------------------|
| 2. <b>VARIETY</b> | Varieties:           |
| ALEXAND           | Alexandria (WH only) |
| APOLLO            | Apollo               |
| APOSTLE           | Apostle              |
| AVALON            | Avalon               |
| HORNET            | Hornet               |
| MERCIA            | Mercia               |
| PASTICHE          | Pastiche             |
| RENDEZVO          | Rendezvous           |

**Basal applications:**

Pastures (RH): Manure: 'Nitram' at 360 kg. Weedkillers: Fluroxypyr at 0.20 kg with bromoxynil at 0.27 kg and ioxynil at 0.27 kg in 200 l. Fungicides: Propiconazole at 0.12 kg with chlorothalonil at 1.0 kg in 200 l.

Summerdells I (RD): Manures: (0:18:36) at 920 kg. 'Nitram' at 580 kg. Weedkillers: Glyphosate at 0.27 kg in 200 l. Isoproturon at 2.5 kg in 200 l. Fungicides: Propiconazole at 0.12 kg with chlorothalonil at 1.0 kg in 200 l.

Lansome II (WH): Manure: 'Nitram' at 460 kg. Weedkillers: Bromoxynil at 0.34 kg and clopyralid at 0.07 kg with mecoprop at 2.5 kg in 220 l. Fungicides: Propiconazole at 0.12 kg with chlorothalonil at 1.0 kg in 220 l.

**Seed:** Varieties sown at 180 kg (R).  
Varieties sown at 160 kg (W).

89/R/WW/1 and 89/W/WW/1

**Cultivations, etc.:-**

Pastures (RH): Heavy spring-tine cultivated twice: 1 Nov, 1988.  
 Rotary harrowed, seed sown and harrowed: 2 Nov. N applied:  
 19 Apr, 1989. Weedkillers applied: 2 May. Fungicides applied:  
 16 June. Combine harvested: 7 Aug. Previous crops: S. beans  
 1987, potatoes 1988.

Summerdells I (RD): Straw burnt: 21 Sept, 1988. Rotary cultivated:  
 22 Sept. PK applied: 2 Oct. Glyphosate applied: 22 Oct. Heavy  
 spring-tine cultivated: 30 Oct. Rotary harrowed, seed sown,  
 harrowed: 2 Nov. Isoproturon applied: 16 Nov. N applied: 16 Apr,  
 1989. Fungicides applied: 16 June. Combine harvested: 8 Aug.  
 Previous crops: W. wheat 1987, s. wheat 1988.

Lansome II (WH): Heavy spring-tine cultivated: 3 Nov, 1988. Spike-  
 harrowed with crumbler attached, seed sown: 4 Nov. N applied:  
 29 Apr, 1989. Weedkillers applied: 2 May. Fungicides applied:  
 12 June. Combine harvested: 8 Aug. Previous crops: S. barley  
 1987, potatoes 1988.

89/R/WW/1 PASTURES (RH)

**GRAIN TONNES/HECTARE**

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

INSCTCDE VARIETY	NONE	PIRIMICA	Mean
APOLLO	8.90	8.70	8.80
APOSTLE	8.85	8.65	8.75
AVALON	8.39	8.68	8.54
HORNET	9.11	8.84	8.97
MERCIA	8.72	8.66	8.69
PASTICHE	7.91	8.09	8.00
RENDEZVO	8.72	8.54	8.63
Mean	8.66	8.60	8.63

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

VARIETY	INSCTCDE* VARIETY
0.208	0.295

\* Within the same level of INSCTCDE only

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

Stratum	d.f.	s.e.	cv%
WP.SP	12	0.295	3.4

GRAIN MEAN DM% 89.8

SUB PLOT AREA HARVESTED 0.00245

89/R/WW/1 SUMMERDELLS (RD)

GRAIN TONNES/HECTARE

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

INSCTCDE VARIETY	NONE	PIRIMICA	Mean
APOLLO	8.47	8.18	8.32
APOSTLE	7.87	7.22	7.54
AVALON	7.15	6.73	6.94
HORNET	6.95	7.36	7.16
MERCIA	7.93	7.92	7.93
PASTICHE	6.86	6.29	6.57
RENDEZVO	7.49	6.37	6.93
Mean	7.53	7.15	7.34

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

VARIETY	VARIETY* INSCTCDE
0.351	0.496

\* Within the same level of INSCTCDE only

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

Stratum	d.f.	s.e.	cv%
WP.SP	12	0.496	6.8
GRAIN MEAN DM%	89.7		
SUB PLOT AREA HARVESTED	0.00245		

89/W/WW/1 LANSOME (W)

GRAIN TONNES/HECTARE

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

VARIETY	
ALEXAND	3.96
APOLLO	6.10
APOSTLE	5.57
AVALON	5.45
HORNET	4.93
MERCIA	5.89
PASTICHE	4.92
RENDEZVO	5.79
Mean	5.33

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

VARIETY

0.446

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

Stratum	d.f.	s.e.	cv%
WP.SP	21	0.631	11.8

GRAIN MEAN DM% 89.7

SUB PLOT AREA HARVESTED 0.00330

89/R/WW/2

**WINTER WHEAT**

**CONTROL OF VOLUNTEERS**

**Object:** To compare methods of volunteer control in winter wheat after w. and s. barley - Scout N, Great Field I.

**Sponsors:** R. Moffitt, D.G. Christian.

**Design:** 3 replicates of 6 x 3 criss-cross.

**Column plot dimensions:** 6.0 x 23.0.

**Treatments:** All combinations of:-

1. **PRIMCULT**            Primary cultivations:  

NONE	None until just before sowing
DYNDRIVE	'Bomford Dynadrive'
DISC	Disc
PLOUGH	Plough
ROTAVATE	Rotary cultivate
TINE	Tine
  
2. **PRSOWCON**        Pre-sowing volunteer control:  

GLYPHOS	Glyphosate at 0.27 kg in 200 l on 1 Oct, 1988 (Scout N), 17 Oct (Great Field I)
PARAQUAT	Paraquat at 0.60 kg ion in 200 l on above dates
ROT HARR	Rotary harrowed on 3 Oct (Scout N), 28 Oct (Great Field I)

- NOTES:**
- (1) Primary cultivation treatments were carried out on 19 Aug, 1988 (Scout N) and 5 Sept (Great Field I). **PRIMCULT DISC** and **PRIMCULT TINE** were cultivated twice in Scout N.
  - (2) All plots were disced twice on 3 Oct (Scout N) and 27 Oct (Great Field I) and seed sown on 4 Oct and 28 Oct respectively.
  - (3) 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.
  - (4) A 1 m strip of Plaisant w. barley was broadcast on the surface, by drill at 100 kg on one end of each plot on Great Field I only. It was broadcast before any treatments were applied on 2 Sept, 1988.

**Basal applications:**

Scout N: Manure: 'Nitram' at 600 kg. Weedkillers: Chlortoluron at 3.5 kg in 200 l. Mecoprop at 2.2 kg, bromoxynil at 0.28 kg and ioxynil at 0.28 kg with the prochloraz and carbendazim in 200 l. Fungicides: Prochloraz at 0.40 kg and carbendazim at 0.15 kg. Fenpropimorph at 0.56 kg in 200 l. Molluscicide: Methiocarb at 0.22 kg.

89/R/WW/2

**Basal applications:**

Great Field I: Manure: 'Nitram' at 580 kg. Weedkillers:  
Chlortoluron at 3.5 kg in 200 l. Mecoprop at 2.2 kg, bromoxynil  
at 0.28 kg and ioxynil at 0.28 kg in 200 l.

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

**Cultivations, etc.:-**

Scout N: Chlortoluron applied: 21 Oct, 1988. Methiocarb applied:  
30 Jan, 1989. N applied: 10 Apr. Remaining weedkillers with  
prochloraz and carbendazim applied: 2 May. Fenpropimorph applied:  
28 June. Combine harvested: 4 Aug. Previous crops: W. barley  
1987 and 1988.

Great Field I: Chlortoluron applied: 16 Nov, 1988. N applied:  
19 Apr, 1989. Remaining weedkillers applied: 4 May. Combine  
harvested: 4 Aug. Previous crops: W. wheat 1987, s. barley 1988.

- NOTES:** (1) Volunteer plants were assessed in October after sowing and  
before crop emergence.  
(2) Ears of volunteer plants were counted at anthesis of the sown  
crop.  
(3) Percentage contamination of harvested grain by volunteer  
grain was measured.

89/R/WW/2 SCOUT N AFTER W. BARLEY

GRAIN TONNES/HECTARE

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

PRROWCON PRIMCULT	GLYPHOS	PARAQUAT	ROT HARR	Mean
NONE	4.17	4.75	4.12	4.35
DYNDRIVE	3.95	4.75	3.60	4.10
DISC	3.75	4.39	3.89	4.01
PLOUGH	4.75	4.64	4.17	4.52
ROTAVATE	4.26	5.21	4.19	4.55
TINE	3.57	4.17	3.34	3.70
Mean	4.07	4.65	3.89	4.20

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

	PRIMCULT	PRROWCON	PRIMCULT PRROWCON
	0.252	0.265	0.432
Except when comparing means with the same level(s) of			
PRIMCULT			0.398
PRROWCON			0.366

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	10	0.309	7.4
BLOCK.WP2	4	0.324	7.7
BLOCK.WP1.WP2	20	0.398	9.5

GRAIN MEAN DM% 86.7

SUB PLOT AREA HARVESTED 0.00161



89/R/WW/2 GREAT FIELD I AFTER S. BARLEY

GRAIN TONNES/HECTARE

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

PRSOWCON	GLYPHOS	PARAQUAT	ROT HARR	Mean
PRIMCULT				
NONE	5.42	5.15	5.64	5.40
DYNDRIVE	5.16	4.78	5.34	5.09
DISC	6.12	5.57	5.91	5.87
PLOUGH	5.36	5.11	5.21	5.22
ROTAVATE	5.38	5.34	5.51	5.41
TINE	5.76	5.47	5.73	5.65
Mean	5.53	5.24	5.56	5.44

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

	PRIMCULT	PRSOWCON	PRIMCULT PRSOWCON
	0.281	0.229	0.402
Except when comparing means with the same level(s) of			
PRIMCULT			0.319
PRSOWCON			0.344

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP1	10	0.345	6.3
BLOCK.WP2	4	0.281	5.2
BLOCK.WP1.WP2	20	0.297	5.5

GRAIN MEAN DM% 87.3

SUB PLOT AREA HARVESTED 0.00161

89/R/WW/3

**WINTER WHEAT**

**N AND CROP PHYSIOLOGY**

**Object:** To study, in crops given optimal or less than optimal N, the dynamics of late N within the plant, the effects on flag leaf photosynthesis and protein retention and the N status of individual organs - Little Knott I.

**Sponsors:** G.F.J. Milford, D.W. Lawlor, P.B. Barraclough.

**Associate sponsor:** D.S. Powlson.

**Design:** 3 randomised blocks of 9 plots.

**Whole plot dimensions:** 3.0 x 9.0.

**Treatments:** All combinations of:-

1. **EARLY N** Nitrogen fertilizer (kg N) applied as 'Nitro-Chalk' divided in a 1:2:1 ratio between 30 Mar, 1989, 14 Apr and 5 May respectively:

0  
80  
200

2. **LATE N** Nitrogen fertilizer applied late:

0 None  
NLEAF To foliage, 40 kg N as urea in 225 l in two equal applications on 25 May, 1989 and 26 May  
NSOIL To soil, 40 kg N as prilled urea on 25 May

plus two extra treatments given EARLY N 200 and magnesium at 2.5 kg on 23 June and on 7 July:

**EARLYNMG**

NONE None  
UREA 40 kg N as urea in 225 l in two equal applications on 23 June, 1989, and 24 June

**Basal applications:** Manures: (0:18:36) at 280 kg. Weedkillers: Glyphosate at 0.27 kg in 200 l. Paraquat at 0.60 kg ion in 200 l. Metsulfuron-methyl at 6.0 g with the prochloraz in 220 l. Fungicides: Prochloraz at 0.40 kg. Propiconazole at 0.12 kg with chlorothalonil at 1.0 kg in 220 l. Insecticide: Fonofos at 1.4 kg in 200 l.

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

89/R/WW/3

**Cultivations, etc.:-** Rotary cultivated: 17 Sept, 1988. Glyphosate applied: 17 Oct. Paraquat applied: 24 Oct. Heavy spring-tine cultivated: 26 Oct. PK applied: 28 Oct. Ploughed: 29 Oct. Rotary harrowed: 1 Nov. Rotary harrowed, seed sown: 3 Nov. Fonofos applied: 26 Jan, 1989. Metsulfuron-methyl with prochloraz applied: 3 May. Propiconazole with chlorothalonil applied: 15 June. Combine harvested: 3 Aug. Previous crops: S. beans 1987, w. oats 1988.

**NOTE:** Samples were taken for measurements of crop and grain growth and N content, weekly from April until maturity.

**GRAIN TONNES/HECTARE**

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

LATE N	0	NLEAF	NSOIL	Mean
<b>EARLY N</b>				
0	3.19	3.55	3.95	3.56
80	5.95	5.69	5.61	5.75
200	6.94	6.73	6.49	6.72
Mean	5.36	5.32	5.35	5.34
<b>EARLYNMG</b>	NONE	UREA	Mean	
	6.68	6.63	6.66	
GRAND MEAN	5.58			

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

EARLY N	LATE N	EARLY N LATE N & EARLYNMG
0.287	0.287	0.497

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	20	0.608	10.9
GRAIN MEAN DM%	85.0		
PLOT AREA HARVESTED	0.00207		

89/R/WW/4

WINTER WHEAT

FACTORS AFFECTING TAKE-ALL

**Object:** To study the effects of a range of factors on the incidence of take-all and on the yield of w. wheat - White Horse II.

**Sponsors:** D. Hornby, G.L. Bateman, R.J. Gutteridge.

**Design:** A single replicate of 2 x 2 x 2 x 2 x 4.

**Whole plot dimensions:** 3.0 x 10.0.

**Treatments:** All combinations of:-

1. **SOWDATE**                      Dates of sowing:  
    22 SEPT                      22 September, 1988  
    28 OCT                        28 October
2. **SOILFUNG**                    Application of fungicide to the seedbed:  
    NONE                         None  
    NUARIMOL                    Nuarimol at 1.1 kg in 375 l
3. **SEEDRATE**                    Seed rates:  
    100 KG  
    200 KG
4. **AUTUMN N**                    N application to the seedbed:  
    0                              None  
    60                             60 kg N as 'Nitro-Chalk' on 21 Sept, 1988 or 27 Oct  
                                      for successive SOWDATES
5. **SPRING N**                    Nitrogen fertilizer (kg N) in spring, as 'Nitro-Chalk', applied 20 Apr, 1989:  
    100  
    150  
    200  
    250

**Basal applications:** Manures: (0:18:36) at 920 kg. Weedkillers: Chlortoluron at 3.5 kg in 200 l. Fluroxypyr at 0.20 kg in 200 l. Fungicide: Fenpropimorph at 0.75 kg in 200 l.

**Cultivations, etc.:** Heavy spring-tine cultivated: 17 Sept, 1988. PK applied: 19 Sept. Rotary harrowed: 20 Sept. Chlortoluron applied: 16 Nov. Fluroxypyr applied: 8 May 1989. Fungicide applied: 23 May. Combine harvested: 8 Aug. Previous crops: W. wheat 1987 and 1988.

**NOTE:** Plant samples were taken in mid-April and June to assess take-all, eyespot, sharp eyespot, damage by stem-boring larvae (April only) and brown foot rot (June only). Grain quality was measured.

89/R/WW/4

GRAIN TONNES/HECTARE

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

<b>SOILFUNG</b>	NONE	NUARIMOL	Mean		
<b>SOWDATE</b>					
22 SEPT	6.58	6.81	6.69		
28 OCT	6.91	6.99	6.95		
Mean	6.74	6.90	6.82		
<b>SEEDRATE</b>	100 KG	200 KG	Mean		
<b>SOWDATE</b>					
22 SEPT	6.68	6.70	6.69		
28 OCT	6.86	7.03	6.95		
Mean	6.77	6.87	6.82		
<b>SEEDRATE</b>	100 KG	200 KG	Mean		
<b>SOILFUNG</b>					
NONE	6.68	6.81	6.74		
NUARIMOL	6.86	6.93	6.90		
Mean	6.77	6.87	6.82		
<b>AUTUMN N</b>	0	60	Mean		
<b>SOWDATE</b>					
22 SEPT	6.55	6.84	6.69		
28 OCT	6.86	7.04	6.95		
Mean	6.70	6.94	6.82		
<b>AUTUMN N</b>	0	60	Mean		
<b>SOILFUNG</b>					
NONE	6.58	6.91	6.74		
NUARIMOL	6.82	6.97	6.90		
Mean	6.70	6.94	6.82		
<b>AUTUMN N</b>	0	60	Mean		
<b>SEEDRATE</b>					
100 KG	6.68	6.86	6.77		
200 KG	6.72	7.01	6.87		
Mean	6.70	6.94	6.82		
<b>SPRING N</b>	100	150	200	250	Mean
<b>SOWDATE</b>					
22 SEPT	6.52	6.79	6.76	6.71	6.69
28 OCT	6.88	7.01	6.99	6.92	6.95
Mean	6.70	6.90	6.87	6.81	6.82

89/R/WW/4

GRAIN TONNES/HECTARE

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

<b>SPRING N</b>	100	150	200	250	Mean
<b>SOILFUNG</b>					
NONE	6.51	6.88	6.93	6.66	6.74
NUARIMOL	6.89	6.92	6.82	6.97	6.90
Mean	6.70	6.90	6.87	6.81	6.82
<b>SPRING N</b>	100	150	200	250	Mean
<b>SEEDRATE</b>					
100 KG	6.70	6.83	6.85	6.70	6.77
200 KG	6.70	6.96	6.90	6.93	6.87
Mean	6.70	6.90	6.87	6.81	6.82
<b>SPRING N</b>	100	150	200	250	Mean
<b>AUTUMN N</b>					
0	6.49	6.74	6.84	6.74	6.70
60	6.91	7.06	6.90	6.89	6.94
Mean	6.70	6.90	6.87	6.81	6.82
	<b>SEEDRATE</b>	100 KG	200 KG		
<b>SOWDATE</b>	<b>SOILFUNG</b>				
22 SEPT	NONE	6.53	6.63		
	NUARIMOL	6.83	6.78		
28 OCT	NONE	6.83	6.98		
	NUARIMOL	6.89	7.09		
	<b>AUTUMN N</b>	0	60		
<b>SOWDATE</b>	<b>SOILFUNG</b>				
22 SEPT	NONE	6.41	6.75		
	NUARIMOL	6.68	6.93		
28 OCT	NONE	6.76	7.06		
	NUARIMOL	6.96	7.02		
	<b>AUTUMN N</b>	0	60		
<b>SOWDATE</b>	<b>SEEDRATE</b>				
22 SEPT	100 KG	6.49	6.87		
	200 KG	6.60	6.81		
28 OCT	100 KG	6.87	6.85		
	200 KG	6.85	7.22		
	<b>AUTUMN N</b>	0	60		
<b>SOILFUNG</b>	<b>SEEDRATE</b>				
NONE	100 KG	6.50	6.87		
	200 KG	6.67	6.95		
NUARIMOL	100 KG	6.86	6.86		
	200 KG	6.78	7.08		

89/R/WW/4

GRAIN TONNES/HECTARE

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

	<b>SPRING N</b>	100	150	200	250
<b>SOWDATE</b>	<b>SOILFUNG</b>				
22 SEPT	NONE	6.18	6.76	6.94	6.44
	NUARIMOL	6.87	6.81	6.57	6.98
28 OCT	NONE	6.85	6.99	6.91	6.88
	NUARIMOL	6.90	7.03	7.06	6.96
	<b>SPRING N</b>	100	150	200	250
<b>SOWDATE</b>	<b>SEEDRATE</b>				
22 SEPT	100 KG	6.56	6.71	6.87	6.58
	200 KG	6.48	6.86	6.64	6.83
28 OCT	100 KG	6.84	6.95	6.83	6.81
	200 KG	6.91	7.06	7.15	7.02
	<b>SPRING N</b>	100	150	200	250
<b>SOILFUNG</b>	<b>SEEDRATE</b>				
NONE	100 KG	6.48	6.92	6.81	6.52
	200 KG	6.55	6.83	7.05	6.79
NUARIMOL	100 KG	6.93	6.74	6.89	6.88
	200 KG	6.84	7.09	6.74	7.06
	<b>SPRING N</b>	100	150	200	250
<b>SOWDATE</b>	<b>AUTUMN N</b>				
22 SEPT	0	6.39	6.66	6.60	6.54
	60	6.66	6.91	6.91	6.88
28 OCT	0	6.58	6.82	7.08	6.94
	60	7.17	7.20	6.89	6.89
	<b>SPRING N</b>	100	150	200	250
<b>SOILFUNG</b>	<b>AUTUMN N</b>				
NONE	0	6.36	6.66	6.86	6.44
	60	6.67	7.09	6.99	6.88
NUARIMOL	0	6.61	6.81	6.82	7.04
	60	7.16	7.02	6.81	6.90
	<b>SPRING N</b>	100	150	200	250
<b>SEEDRATE</b>	<b>AUTUMN N</b>				
100 KG	0	6.44	6.72	6.88	6.67
	60	6.97	6.95	6.81	6.72
200 KG	0	6.53	6.76	6.80	6.81
	60	6.86	7.17	6.99	7.05

89/R/WW/4

GRAIN TONNES/HECTARE

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

SOWDATE	SOILFUNG	SEEDRATE	AUTUMN N
0.064	0.064	0.064	0.064
SPRING N	SOWDATE	SOWDATE	SOILFUNG
	SOILFUNG	SEEDRATE	SEEDRATE
0.090	0.090	0.090	0.090
SOWDATE	SOILFUNG	SEEDRATE	SOWDATE
AUTUMN N	AUTUMN N	AUTUMN N	SPRING N
0.090	0.090	0.090	0.128
SOILFUNG	SEEDRATE	AUTUMN N	SOWDATE
SPRING N	SPRING N	SPRING N	SOILFUNG
			SEEDRATE
0.128	0.128	0.128	0.128
SOWDATE	SOWDATE	SOILFUNG	SOWDATE*
SOILFUNG	SEEDRATE	SEEDRATE	SOILFUNG
AUTUMN N	AUTUMN N	AUTUMN N	SPRING N
0.128	0.128	0.128	0.180
SOWDATE	SOILFUNG	SOWDATE	SOILFUNG
SEEDRATE	SEEDRATE	AUTUMN N	AUTUMN N
SPRING N	SPRING N	SPRING N	SPRING N
0.180	0.180	0.180	0.180
SEEDRATE			
AUTUMN N			
SPRING N			
0.180			

\* Only when comparing means with the same level of SOWDATE.SOILFUNG.NIT, where NIT has 2 levels. The first corresponding to levels 100, 250 of SPRING N and the second to the other 2 levels.

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.255	3.7
GRAIN MEAN DM%	89.1		
PLOT AREA HARVESTED	0.00226		



89/R/WW/5

WINTER WHEAT

APHICIDE, N AND FUNGICIDE

**Object:** To determine the economic thresholds for cereal aphids with different levels of inputs - Black Horse II.

**Sponsor:** N. Carter, X. Zhou.

**Design:** 3 randomised blocks of 12 plots.

**Whole plot dimensions:** 3.0 x 12.0.

**Treatments:** All combinations of:-

1. **APHICIDE**            Aphicide:
  - NONE                    None
  - PIRIMICA                Pirimicarb applied at 0.14 kg in 200 l on 31 May, 1989, 13 June and 28 June
  
2. **N RATE**             Nitrogen fertilizer (kg N) as 'Nitram' on 18 Apr, 1989:
  - 80
  - 120
  - 160
  
3. **FUNGICIDE**          Fungicides:
  - NONE                    None
  - 31+39+65                Fungicide sprays at growth stages 31, 39 and 65:
    - G.S. 31 - Prochloraz at 0.40 kg and carbendazim at 0.15 kg in 200 l on 15 Apr, 1989
    - G.S. 39 - Propiconazole at 0.125 kg in 200 l on 17 May
    - G.S. 65 - Propiconazole at 0.125 kg with chlorothalonil at 1.0 kg in 200 l on 13 June

**Basal applications:** Weedkillers: Chlortoluron at 3.5 kg in 200 l. Metsulfuron-methyl at 6.0 g in 400 l. Insecticide: Deltamethrin at 6.2 g in 200 l. Growth regulator: Chlormequat at 1.3 kg in 200 l.

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

**Cultivations, etc.:-** Rotary cultivated: 6 Aug, 1988. Ploughed: 19 Sept. Heavy spring-tine cultivated: 26 Sept. Rotary harrowed, seed sown: 30 Sept. Chlortoluron applied: 21 Oct. Insecticide applied: 7 Nov. Growth regulator applied: 19 Apr, 1989. Metsulfuron-methyl applied: 3 May. Combine harvested: 3 Aug. Previous crops: W. barley 1987, w. oilseed rape 1988.

**NOTE:** Aphids were counted from mid-April until early July. Plant dry weights were measured at anthesis. Disease assessments were made in mid-June. Components of yield were measured.

89/R/WW/5

GRAIN TONNES/HECTARE

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

N RATE	80	120	160	Mean
<b>APHICIDE</b>				
NONE	8.32	8.26	8.01	8.20
PIRIMICA	8.61	8.21	8.11	8.31
Mean	8.46	8.23	8.06	8.25
<b>FUNGCIDE</b>	NONE	31+39+65	Mean	
<b>APHICIDE</b>				
NONE	8.02	8.37	8.20	
PIRIMICA	8.18	8.44	8.31	
Mean	8.10	8.41	8.25	
<b>FUNGCIDE</b>	NONE	31+39+65	Mean	
<b>N RATE</b>				
80	8.29	8.64	8.46	
120	8.00	8.46	8.23	
160	8.00	8.12	8.06	
Mean	8.10	8.41	8.25	
<b>APHICIDE</b>	<b>FUNGCIDE</b>	NONE	31+39+65	
NONE	<b>N RATE</b>			
	80	7.89	8.75	
	120	8.24	8.27	
	160	7.92	8.10	
PIRIMICA	80	8.69	8.53	
	120	7.77	8.65	
	160	8.08	8.15	

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

APHICIDE	N RATE	FUNGCIDE	APHICIDE
			N RATE
0.104	0.128	0.104	0.181
APHICIDE	N RATE	APHICIDE	
FUNGCIDE	FUNGCIDE	N RATE	FUNGCIDE
0.148	0.181	0.256	

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	22	0.313	3.8
GRAIN MEAN DM%	85.7		
PLOT AREA HARVESTED	0.00331		

89/R/WW/6

**WINTER WHEAT**

**CONTROL OF EYESPOT AND SEPTORIA**

**Object:** To test effects of different strategies on disease control and yield under different degrees of risk from eyespot and Septoria - Black Horse I N.

**Sponsors:** A. Goulds, D. Henry.

**Associate Sponsors:** J.F. Jenkyn, D.J. Royle (LARS).

**Design:** 3 whole plots divided into 40 sub-plots arranged as 4 replicates of 10 treatments.

**Whole plot dimensions:** 123 x 63.0.

**Treatments:** All combinations of:-

Whole plots

1. <b>VARIETY</b>	Variety:
AVALON	Avalon
LONGBOW	Longbow
RENDEZVO	Rendezvous

Sub plots

2. <b>FUNGICIDE</b>	Fungicides applied according to growth stage or disease forecast:
O	None (duplicated on Rendezvous)
F1	Prochloraz on 26 April, 1989 (G.S.31) (duplicated on Avalon and Longbow)
F2	Prochloraz on 17 May (G.S.37), propiconazole on 14 June (G.S.59) (triplicated)
F3	Prochloraz on 26 April, propiconazole on 31 May
F4	Prochloraz on 26 April, propiconazole on 24 May (G.S.39)
F5	Prochloraz on 26 April, propiconazole on 14 June
F6	Prochloraz on 17 May

- NOTES:** (1) Fungicides were applied according to growth stages or in response to disease forecasts. Some growth stage and forecast spray timings coincided leading to duplication of some treatments.  
(2) Prochloraz was applied at 0.40 kg in 200 l.  
(3) Propiconazole was applied at 0.125 kg in 200 l.

**Basal applications:** Manures: 'Nitram' at 580 kg. Weedkillers: Glyphosate at 0.27 kg in 200 l. Isoproturon at 2.5 kg in 200 l. Metsulfuron-methyl at 0.0060 kg in 400 l. Molluscicide: Methiocarb at 0.22 kg.

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

89/R/WW/6

**Cultivations, etc.:-** Heavy spring-tine cultivated: 31 Aug, 1988.  
Glyphosate applied: 1 Oct. Heavy spring-tine cultivated: 14 Oct.  
Seed sown: 17 Oct. Isoproturon applied: 14 Nov. Molluscicide  
applied: 5 Dec. N applied: 15 Apr, 1989. Metsulfuron-methyl  
applied: 3 May. Combine harvested: 2 Aug. Previous crops:  
W. oilseed rape 1987, w. wheat 1988.

**NOTE:** Eyespot and septoria were assessed at regular intervals throughout  
the season. Thousand grain weights and specific weights were  
taken.

89/R/WW/6 AVALON

GRAIN TONNES/HECTARE

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

FUNGICIDE	
0	5.88
F1	6.81
F2	6.57
F3	6.34
F4	5.87
F5	6.80
F6	6.46
Mean	6.47

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

FUNGICIDE	
0.397	between 0,F3,F4,F5,F6
0.324	F2 v any of 0,F3,F4,F5,F6
0.343	F1 v any of 0,F3,F4,F5,F6
0.256	F1 v F2

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.562	8.7
GRAIN MEAN DM%	86.1		
PLOT AREA HARVESTED	0.00256		

89/R/WW/6 LONGBOW

GRAIN TONNES/HECTARE

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

FUNGICIDE	
O	7.02
F1	7.82
F2	7.68
F3	7.89
F4	7.69
F5	7.64
F6	7.64
Mean	7.66

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

FUNGICIDE	
0.369	between O, F3, F4, F5, F6
0.301	F2 v any of O, F3, F4, F5, F6
0.319	F1 v any of O, F3, F4, F5, F6
0.238	F1 v F2

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.521	6.8
GRAIN MEAN DM%	85.8		
PLOT AREA HARVESTED	0.00256		

89/R/WW/6 RENDEZVOUS

GRAIN TONNES/HECTARE

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

FUNGICIDE	
O	6.59
F1	6.48
F2	6.90
F3	6.79
F4	6.68
F5	6.57
F6	6.95
Mean	6.74

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

FUNGICIDE	
0.171	between F1,F3,F4,F5,F6
0.139	F2 v any of F1,F3,F4,F5,F6
0.148	O v any of F1,F3,F4,F5,F6
0.110	O v F2

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.242	3.6
GRAIN MEAN DM%	86.0		
PLOT AREA HARVESTED	0.00256		

89/R/WW/9 and 89/W/WW/9

**WINTER WHEAT**

**CONTROL OF SLUGS**

**Object:** To compare two experimental bait poisons with two standard bait poisons in preventing slug damage to w. wheat - Rothamsted (R) Pastures and Woburn (W) Warren Field II.

**Sponsors:** I.F. Henderson, N. Coward, G. Turner.

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

**Whole plot dimensions:** 3.0 x 10.0.

**Treatments:**

<b>MOLLCIDE</b>	<b>Molluscicides:</b>
NONE	None
AAA	Tris (2,4-pentandionate) Al III (10% a.i.)
ENH	Tris (1-oxo-1,2-diazabutan-2-oxido) Fe III (10% a.i.)
METHIO B	Methiocarb, Bayer formulation as 'Draza' (4% a.i.)
METHIO R	Methiocarb, Rothamsted formulation (4% a.i.)
METALD P	Metaldehyde, Plant Protection formulation as 'Mini Pellets' (6% a.i.)
METALD R	Metaldehyde, Rothamsted formulation (6% a.i.)
NONE RFP	Rothamsted formulation pellets, no molluscicide

**NOTE:** All baits were applied at 5.5 kg formulated product on 8 Nov, 1988 (R) and 4 Nov (W).

**Basal applications:**

Pastures (R): Manure: 'Nitram' at 360 kg. Weedkillers: Glyphosate at 1.4 kg in 200 l. Chlortoluron at 3.5 kg in 200 l. Fluroxypyr at 0.20 kg in 200 l.

Warren Field II (W): Manures: Magnesian limestone at 7.5 t. 'Nitram' at 470 kg. Weedkiller: Isoproturon at 2.1 kg in 220 l. Fungicide: Propiconazole at 0.12 kg in 220 l.

**Seed:** Mercia, sown at 180 kg (R).  
Mercia, sown at 160 kg (W).

**Cultivations, etc.:-**

Pastures (R): Glyphosate applied: 28 Oct, 1988. Cultivated by rotary grubber: 7 Nov. Seed sown, harrowed: 8 Nov. Chlortoluron applied: 16 Nov. N applied: 19 Apr, 1989. Fluroxypyr applied: 8 May. Combine harvested: 4 Aug. Previous crops: Ley 1987 and 1988.

Warren Field II (W): Magnesian limestone applied: 14 Sept, 1988. Rotary harrowed with crumbler attached: 4 Oct. Rotary harrowed with crumbler attached, seed sown: 2 Nov. N applied: 19 Apr, 1989. Weedkiller applied: 6 May. Fungicide applied: 5 June. Combine harvested: 8 Aug. Previous crops: S. barley 1987, s. rape 1988.

89/R/WW/9 PASTURES (R)

GRAIN TONNES/HECTARE

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

MOLLCIDE	
NONE	4.75
AAA	5.06
ENH	5.29
METHIO B	5.29
METHIO R	5.21
METALD P	5.29
METALD R	5.28
NONE RFP	5.28
Mean	5.18

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

MOLLCIDE  
0.329

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	0.402	7.8
GRAIN MEAN DM%	86.6		
PLOT AREA HARVESTED	0.00230		



89/W/WW/9 WARREN FIELD II (W)

GRAIN TONNES/HECTARE

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

MOLLCIDE	
NONE	6.73
AAA	7.31
ENH	5.01
METHIO B	6.29
METHIO R	5.24
METALD P	6.29
METALD R	5.93
NONE RFP	5.92
Mean	6.09

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

MOLLCIDE  
0.931

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	14	1.140	18.7
GRAIN MEAN DM%	90.1		
PLOT AREA HARVESTED	0.00300		