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# Yields of the Field Experiments 1988

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## Mixed Crops

### Rothamsted Research

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88/R/M/1 and 88/W/M/1

MIXED 1

INPUTS FOR WINTER CEREALS

**Object:** To compare amounts of disease and the yield of triticale with those of w. wheat, w. barley and w. rye on two contrasted sites each given contrasted amounts of agrochemicals - Rothamsted Highfield VI (R) Woburn Far Field II (W).

**Sponsors:** R.J. Gutteridge, D. Hornby, R.D. Prew (R), P.R. Scott, W. Hollins, R.L. Gregory (I.P.S.R., Cambridge).

**Design:** 3 randomised blocks of 10 plots.

**Whole plot dimensions:** 3.0 x 10.0 (R), 4.0 x 10.0 (W).

**Treatments:** All combinations of :-

1. CROP VAR	Crop and variety:	(R)	(W)
B PANDA	W. barley, Panda sown at	200 kg,	200 kg
R DOMINT	W. rye, Dominant sown at	120 kg,	140 kg
T LASKO	W. triticale, Lasko sown at	180 kg,	180 kg
T STATUS	W. triticale, Status sown at	130 kg,	140 kg
W AVALON	W. wheat, Avalon sown at	180 kg,	190 kg

  

2. INPUT	Inputs of agrochemicals, in addition to basals:		
LARGE	High input, 40 kg N early plus 160 kg N later (R) and (W). Prochloraz + carbendazim + tridemorph (April) (R) and (W). Fenpropimorph + chlorothalonil (May) (R) Propiconazole + tridemorph (May) (W) Propiconazole + carbendazim (June) (W)		
SMALL	Low input, 120 kg N in early April. No fungicides or summer insecticides.		

**NOTES:** (1) Treatments were applied as follows:

Highfield (R): N treatments: 23 Feb, 1988 and 5 Apr.  
Prochloraz at 0.40 kg, carbendazim at 0.15 kg with tridemorph at 0.52 kg in 220 l: 26 Apr. Fenpropimorph at 0.75 kg with chlorothalonil at 1.0 kg in 220 l: 25 May.  
Far Field II (W): N treatments: 3 Mar, 1988 and 13 Apr.  
Prochloraz at 0.40 kg, carbendazim at 0.15 kg with tridemorph at 0.52 kg in 220 l: 26 Apr. Propiconazole at 0.12 kg and tridemorph at 0.25 kg in 220 l: 23 May.  
Propiconazole at 0.12 kg with carbendazim at 0.15 kg: 18 June.

(2) The R DOMINT and the T STATUS plots at Rothamsted failed and were cultivated and fallowed in early May 1988.

88/R/M/1 and 88/W/M/1

**Basal applications:**

Highfield VI (R): Manures: Chalk at 5.0 t. Weedkillers: Glyphosate at 0.27 kg in 200 l. Diclofop-methyl at 0.95 kg in 200 l. Fluroxypyr at 0.20 kg with metsulfuron-methyl at 0.006 kg in 200 l. Insecticide: Fonofos at 1.4 kg in 200 l.  
 Far Field II (W): Weedkillers: Isoxaben at 0.12 kg in 200 l. Diclofop-methyl at 0.57 kg in 200 l. Insecticide: Fonofos at 1.4 kg in 200 l.

**Cultivations, etc.:-**

Highfield VI (R): Chalk applied: 16 Sept, 1987. Glyphosate applied: 29 Sept. Ploughed: 2 Oct. Rotary harrowed: 5 Oct. Rotary harrowed, seed sown, harrowed: 6 Oct. Diclofop-methyl applied: 18 Nov. Insecticide applied: 14 Jan, 1988. Fluroxypyr and metsulfuron-methyl applied: 25 Apr. Combine harvested: 4 Aug (barley), 23 Aug (wheat), 26 Aug (triticale). Previous crops: W. wheat 1986 and 1987.  
 Far Field II (W): Ploughed: 21 Sept, 1987. Rotary cultivated with crumbler attached, seed sown: 1 Oct. Harrowed and rolled: 2 Oct. Isoxaben applied: 23 Oct. Diclofop-methyl applied: 24 Oct. Insecticide applied: 12 Jan, 1988. Combine harvested: 3 Aug (barley) 25 Aug (other cereals). Previous crops: W. wheat 1986 and 1987.

**88/R/M/1 W.BARLEY, W.TRITICALE, W.WHEAT**

**GRAIN TONNES/HECTARE**

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

INPUT CROP VAR	LARGE	SMALL	Mean
B PANDA	8.40	6.44	7.42
T LASKO	8.27	6.18	7.22
W AVALON	6.88	5.87	6.37
Mean	7.85	6.16	7.01

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

CROP VAR	INPUT	CROP VAR INPUT
0.458	0.374	0.647

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	10	0.793	11.3
GRAIN MEAN DM%	81.9		
PLOT AREA HARVESTED	0.00272		

88/W/M/1 W.BARLEY, W.TRITICALE, W.WHEAT

GRAIN TONNES/HECTARE

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

INPUT	LARGE	SMALL	Mean
CROP VAR			
B PANDA	6.99	4.52	5.76
R DOMINT	8.15	7.09	7.62
T LASKO	3.90	3.80	3.85
T STATUS	5.22	2.95	4.09
W AVALON	4.26	2.77	3.52
Mean	5.71	4.23	4.97

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

CROP VAR	INPUT	CROP VAR
		INPUT
0.354	0.224	0.500

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	18	0.613	12.3
GRAIN MEAN DM%	81.3		
PLOT AREA HARVESTED	0.00271		

88/R/M/5

MIXED 5

### COMPARISON OF COMBINES

**Object:** To evaluate the suitability of two combines for plot work in respect of purity of sample and accuracy when working on slopes - Great Knott II.

**Sponsors:** R. Moffitt, M.N. Rogers.

**Design:** A systematic split-plot design of 56 whole plots arranged as shown below.

W	B	W	B	W	B	W	B	Top of slope
W	W	W	W	W	W	W	W	
W	W	W	W	W	W	W	W	
B	B	B	B	B	B	B	B	
W	W	W	W	W	W	W	W	
W	W	W	W	W	W	W	W	
W*	B	W	B	W	B	W	B	Bottom of slope

\* Combines started here (after harvesting a dummy wheat plot downhill), worked up the column of plots then down the next column etc.

B = Barley      W = wheat

**NOTES:** (1) Each whole plot was systematically divided to compare the two combine harvesters.  
(2) There were 10 m headlands between contiguous barley and wheat plots. These were removed before combining the plots. There were 1 m paths between contiguous wheat plots.

**Whole plot dimensions:** 9.0 x 11.0.

#### Treatments:

Whole plots

- CROP**                      Crop:  
WHEAT                      W. wheat  
BARLEY                      S. barley
- DIRECTN**                  Combine direction in relation to slope:  
UP                              Up slope  
DOWN                          Down slope
- ORDER**                      Order of combining:  
BEGIN                          First plot in column  
STRAIGHT                      Central plots in column  
END                              Last plot in column

88/R/M/5

Sub plots

4. **COMBINE**                      Combine type:  
  
    CLAYSON                      Clayson 1530  
    DEUTZ-F                      Deutz-Fahr 660

**NOTE:** Spring barley replaced autumn-sown rye which failed.

**Basal applications:** Manures: Chalk at 5.0 t. 'Nitram' at 120 kg and later at 250 kg. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Glyphosate at 0.36 kg in 200 l (to failed rye plots only). Fluroxypyr at 0.15 kg with clopyralid at 0.05 kg and bromoxynil at 0.24 kg in 200 l. Fungicide: Propiconazole at 0.12 kg in 200 l.

**Seed:** W. wheat: Mission, sown at 200 kg.  
          W. rye: Dominant, sown at 200 kg.  
          S. barley: Klaxon, sown at 180 kg.

**Cultivations, etc.:**- Ploughed: 12 Aug, 1987. Discd: 17 Aug. Chalk applied: 16 Sept. Paraquat applied: 28 Oct. Rotary harrowed, w. wheat and w. rye seed sown: 18 Nov. First N applied: 2 Mar, 1988. Glyphosate applied (to rye plots): 19 Apr. Second N applied: 22 Apr. Ex-rye plots heavy spring-tine cultivated, rotary harrowed, s. barley seed sown: 29 Apr. Remaining weedkillers applied: 13 May. Fungicide applied: 27 May. Combine harvested: 5 Sept (CLAYSON plots) and 6 Sept (DEUTZ-F plots). Previous crops: W. barley 1986, w. oilseed rape 1987.

88/R/M/5

GRAIN TONNES/HECTARE

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

COMBINE	CLAYSON	DEUTZ-F						
	5.77	5.33						
	<b>DIRECTN</b>	<b>UP</b>						
<b>CROP</b>	<b>ORDER</b>	<b>BEGIN</b>	<b>STRAIGHT</b>	<b>END</b>	<b>DOWN</b>	<b>BEGIN</b>	<b>STRAIGHT</b>	<b>END</b>
WHEAT		5.45	6.38	6.48			6.67	
BARLEY			3.07			3.70	3.41	3.41
<b>CROP</b>	<b>DIRECTN</b>	<b>ORDER</b>	<b>COMBINE</b>	<b>CLAYSON</b>	<b>DEUTZ-F</b>			
WHEAT	UP	BEGIN		6.10	4.79			
		STRAIGHT		6.87	5.88			
		END		6.87	6.09			
	DOWN	STRAIGHT		7.00	6.34			
BARLEY	UP	STRAIGHT		2.52	3.62			
	DOWN	BEGIN		3.53	3.87			
		STRAIGHT		3.10	3.73			
		END		3.19	3.63			

Grand mean 5.55

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

COMBINE	CROP	CROP		
	DIRECTN	DIRECTN		
	ORDER	ORDER		
		COMBINE		
0.082	0.375	0.434	min.rep	
	0.297	0.343	max-min	
	0.188	0.217	max.rep	
Except when comparing means with the same level(s) of				
<b>CROP.DIRECTN.ORDER</b>			0.307	min.rep
			0.242	max-min
			0.153	max.rep

max.rep CROP WHEAT and ORDER STRAIGHT  
 min.rep any of the remainder  
 max-min CROP WHEAT and ORDER STRAIGHT v any of the remainder

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

Stratum	d.f.	s.e.	cv%
WP	48	0.531	9.6
WP.SP	48	0.434	7.8

GRAIN MEAN DM% 84.0

PLOT AREA HARVESTED	CLAYSON	0.00310
	DEUTZ F	0.00230

88/R/M/6

MIXED 6

**FACTORS AFFECTING EYESPOT**

**Object:** To study eyespot (*Pseudocercospora herpotrichoides*) development after inoculation with different pathotypes in relation to host crop and seed rate - Great Knott II.

**Sponsors:** A. Goulds, B.D.L. Fitt.

**Design:** 2 randomised blocks of 12 plots split into 4.

**Whole plot dimensions:** 3.0 x 37.0.

**Treatments:** All combinations of:-

Whole plots

1. **W CEREAL** Winter cereals sown on 30 October, 1987:  
BARLEY Winter barley cv. Opera  
WHEAT Winter wheat cv. Avalon
2. **SEEDRATE** Seed rates (seeds per square metre):  
NORMAL Normal - 300 barley, 400 wheat  
HALF N Half normal - 150 barley, 200 wheat
3. **INOCULUM** Inoculation with different eyespot pathogen types:  
NONE None  
RYE INOC Rye type  
WHE INOC Wheat type

Sub plots

4. **FUNGTIME** Times of applying prochloraz at 0.40 kg and carbendazim at 0.15 kg in 220 l:  
NONE None  
EARLY Sprayed at growth stage 30/31 on 26 Apr, 1988  
LATE Sprayed at growth stage, 33/37 wheat, 41/49 barley on 20 May

**NOTES:** (1) One additional sub-plot in each whole plot was systematically arranged for sampling, yields not taken.  
(2) Strains of wheat and rye type inoculum were colonised on oat seed and broadcast within two weeks of emergence.

**Basal applications:** Manures: Chalk at 5.0 t. 'Nitram' at 120 kg and later at 250 kg. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Fluroxypyr at 0.20 kg with clopyralid at 0.07 kg and bromoxynil at 0.34 kg with the tridemorph in 200 l. Fungicides: Tridemorph at 0.52 kg. Chlorothalonil at 1.0 kg in 200 l.



88/R/M/6

**Cultivations, etc.:-** Ploughed: 12 Aug, 1987. Discd: 17 Aug. Chalk applied: 16 Sept. Paraquat applied: 28 Oct. Rotary harrowed, seed sown: 30 Oct. First N applied: 2 Mar, 1988. Second N applied 22 Apr. Remaining weedkillers with tridemorph applied: 10 May. Chlorothalonil applied: 6 June. Combine harvested: 4 Aug (barley), 22 Aug (wheat). Previous crops: W. barley 1986, w. oilseed rape 1987.

**NOTE:** Eyespot was assessed on plants at weekly intervals from early March until early August.

**GRAIN TONNES/HECTARE**

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

<b>SEEDRATE</b>	NORMAL	HALF N	Mean	
<b>W CEREAL</b>				
BARLEY	6.93	6.58	6.76	
WHEAT	8.96	8.26	8.61	
Mean	7.94	7.42	7.68	
<b>INOCULUM</b>	NONE	RYE INOC	WHE INOC	Mean
<b>W CEREAL</b>				
BARLEY	6.74	6.81	6.71	6.76
WHEAT	8.62	8.55	8.66	8.61
Mean	7.68	7.68	7.69	7.68
<b>INOCULUM</b>	NONE	RYE INOC	WHE INOC	Mean
<b>SEEDRATE</b>				
NORMAL	7.97	8.04	7.82	7.94
HALF N	7.39	7.32	7.55	7.42
Mean	7.68	7.68	7.69	7.68
<b>FUNGTIME</b>	NONE	EARLY	LATE	Mean
<b>W CEREAL</b>				
BARLEY	6.62	6.82	6.82	6.76
WHEAT	8.42	8.64	8.76	8.61
Mean	7.52	7.73	7.79	7.68
<b>FUNGTIME</b>	NONE	EARLY	LATE	Mean
<b>SEEDRATE</b>				
NORMAL	7.78	8.02	8.04	7.94
HALF N	7.27	7.45	7.55	7.42
Mean	7.52	7.73	7.79	7.68
<b>FUNGTIME</b>	NONE	EARLY	LATE	Mean
<b>INOCULUM</b>				
NONE	7.61	7.73	7.70	7.68
RYE INOC	7.43	7.80	7.82	7.68
WHE INOC	7.53	7.66	7.87	7.69
Mean	7.52	7.73	7.79	7.68

88/R/M/6

GRAIN TONNES/HECTARE

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

		INOCULUM	NONE	RYE INOC	WHE INOC
<b>W CEREAL</b>	<b>SEEDRATE</b>				
BARLEY	NORMAL		6.97	7.03	6.78
	HALF N		6.52	6.59	6.65
WHEAT	NORMAL		8.97	9.05	8.86
	HALF N		8.26	8.05	8.46
		<b>FUNGTIME</b>	<b>NONE</b>	<b>EARLY</b>	<b>LATE</b>
<b>W CEREAL</b>	<b>SEEDRATE</b>				
BARLEY	NORMAL		6.78	7.06	6.93
	HALF N		6.46	6.57	6.72
WHEAT	NORMAL		8.77	8.97	9.15
	HALF N		8.08	8.32	8.38
		<b>FUNGTIME</b>	<b>NONE</b>	<b>EARLY</b>	<b>LATE</b>
<b>W CEREAL</b>	<b>INOCULUM</b>				
BARLEY	NONE		6.64	6.72	6.88
	RYE INOC		6.57	6.98	6.89
	WHE INOC		6.67	6.76	6.71
WHEAT	NONE		8.58	8.75	8.52
	RYE INOC		8.29	8.62	8.75
	WHE INOC		8.39	8.56	9.02
		<b>FUNGTIME</b>	<b>NONE</b>	<b>EARLY</b>	<b>LATE</b>
<b>SEEDRATE</b>	<b>INOCULUM</b>				
NORMAL	NONE		7.75	8.09	8.07
	RYE INOC		7.91	8.06	8.16
	WHE INOC		7.67	7.89	7.89
HALF N	NONE		7.47	7.37	7.32
	RYE INOC		6.95	7.54	7.48
	WHE INOC		7.39	7.43	7.84
		<b>FUNGTIME</b>	<b>NONE</b>	<b>EARLY</b>	<b>LATE</b>
<b>W CEREAL</b>	<b>SEEDRATE</b>	<b>INOCULUM</b>			
BARLEY	NORMAL	NONE	6.76	7.11	7.04
		RYE INOC	6.93	7.21	6.97
		WHE INOC	6.67	6.88	6.79
	HALF N	NONE	6.51	6.32	6.71
		RYE INOC	6.21	6.75	6.81
		WHE INOC	6.67	6.65	6.63
WHEAT	NORMAL	NONE	8.74	9.08	9.11
		RYE INOC	8.90	8.91	9.34
		WHE INOC	8.68	8.91	9.00
	HALF N	NONE	8.43	8.42	7.94
		RYE INOC	7.68	8.33	8.15
		WHE INOC	8.11	8.21	9.05

88/R/M/6

GRAIN TONNES/HECTARE

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

	W CEREAL	SEEDRATE	INOCULUM	FUNGTIME
	0.090	0.090	0.110	0.086
	W CEREAL	W CEREAL	SEEDRATE	W CEREAL
	SEEDRATE	INOCULUM	INOCULUM	FUNGTIME
	0.127	0.156	0.156	0.134

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

0.122

	SEEDRATE	INOCULUM	W CEREAL	W CEREAL
	FUNGTIME	FUNGTIME	SEEDRATE	SEEDRATE
			INOCULUM	FUNGTIME
	0.134	0.164	0.220	0.190

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

0.122

INOCULUM

0.150

W CEREAL. SEEDRATE

0.173

	W CEREAL	SEEDRATE	W CEREAL
	INOCULUM	INOCULUM	SEEDRATE
	FUNGTIME	FUNGTIME	INOCULUM
			FUNGTIME
	0.233	0.233	0.329

Except when comparing means with the same level(s) of  
W CEREAL. INOCULUM

0.212

SEEDRATE. INOCULUM

0.212

W CEREAL. SEEDRATE. INOCULUM

0.299

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	11	0.220	2.9
BLOCK.WP.SP	24	0.299	3.9

GRAIN MEAN DM% 80.5

SUB PLOT AREA HARVESTED 0.00235