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# Yields of the Field Experiments 1983

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## 83/W/WW/2 Growth and Yield on Contrasted Sites - W. Wheat

### Rothamsted Research

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83/W/WW/2

WINTER WHEAT

GROWTH AND YIELD ON CONTRASTED SITES

Object: To study the effects of a range of factors on the incidence of pests and diseases and on the growth and yield of w.wheat grown on light and heavy land and to determine the extent to which differences between the sites can be eliminated by appropriate combinations of factors - Woburn Butt Close IV (BC - light land) and Broad Mead I (BM - heavy land).

Sponsors: F.V. Widdowson, P.J. Welbank, A.H. Weir.

Associate sponsors: P.B. Barraclough, T.D. Williams, R.D. Prew.

Design: Half replicate of  $2^5$ , arranged as 16 plots plus 8 extra plots (BC); half replicate of  $2^6$ , arranged as 32 plots, plus 18 extra plots (BM).

Whole plot dimensions: 3.00 x 14.8 (BC).  
3.00 x 15.2 (BM).

Treatments: Combinations of:-

Whole plots

1. SOWDATE            Dates of sowing (only one date of sowing on BC):  

16 SEPT	16 September, 1982 (BC and BM)
20 OCT	20 October (BM only)
2. WINTER N            Amounts of nitrogen fertilizer applied, as Urea, on  
3 Feb, 1983 (kg N):  

BC	BM
0	0
60	30
3. N RATE            Amounts of nitrogen fertilizer applied, as 'Nitro-Chalk',  
in spring (kg N):  

BC	BM
180	100
240	160
4. N TIME            Times of applying spring fertilizer:  

EARLY	All except 40 kg N on 2 Mar; remainder on 5 May
LATE	All except 40 kg N on 6 Apr; remainder on 17 May
5. IRRIGATN            Irrigation:  

NONE	None
FULL	Full (112.5 mm BC, 87.5 mm BM) to lessen deficit of 25 mm to 12.5 mm

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6. AUT PEST Autumn pesticide:

NONE None  
ALDICARB Aldicarb at 5.6 kg worked into seedbed

Plus all combinations of the following (all given irrigation and aldicarb, but not winter nitrogen):

Whole plots

1. S DATE N Dates of sowing and times of applying nitrogen fertilizer (only single date and time BC):

SEPT NE Sown 16 SEPT, N applied at N TIME EARLY (timing and division as above) (BC and BM)  
OCT NL Sown 20 OCT, N applied at N TIME LATE (timing and division as above) (BM only)

2. N SCALE Amounts of nitrogen fertilizer applied in spring (kg N):

BC	BM
0	0
120	40
150	70
210	130
240	160
270	190

Plus extra plots for root sampling (2 BC, 6 BM)

EXTRA

BC

SE 5E WA Sown 16 SEPT, 240 kg N, N TIME EARLY, 60 kg WINTER N, ALDICARB  
SE 5E -- Sown 16 SEPT, 240 kg N, N TIME EARLY

BM

SE 5E -- Sown 16 SEPT, 160 kg N, N TIME EARLY  
SE 5E W- Sown 16 SEPT, 160 kg N, N TIME EARLY, 30 kg WINTER N  
SE 3E WA Sown 16 SEPT, 100 kg N, N TIME EARLY, 30 kg WINTER N, ALDICARB  
SE 3E -A Sown 16 SEPT, 100 kg N, N TIME EARLY, ALDICARB  
SL 5L -- Sown 20 OCT, 160 kg N, N TIME LATE  
SL 3L W- Sown 20 OCT, 100 kg N, N TIME LATE, 30 kg WINTER N



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Irrigation was applied as follows (mm water):

Butt Close IV (BC)		Broad Mead I (BM)	
17 June	25	17 June	25
23 June	12.5	23 June	12.5
24 June	12.5	24 June	12.5
6 July	12.5	13 July	25
15 July	12.5	19 July	12.5
18 July	12.5		
29 July	25		
Total	112.5	Total	87.5

Standard applications:

Butt Close IV (BC) and Broad Mead I (BM): Manures: (0:14:28) at 310 kg. Chelated manganese applied on two occasions (as 'Vytel' at 2.8 l on the first occasion and 1.4 l on the second occasion) in 280 l. Weedkillers: Chlortoluron at 3.5 kg with mecoprop (as 'Herrifex DS' at 4.2 l) in 280 l. Mecoprop (as 'Herrifex DS' at 4.9 l) in 280 l to (BM) only. Fungicides: Triadimefon at 0.13 kg in 280 l. Captafol at 1.8 kg with carbendazim at 0.13 kg, tridemorph at 0.32 kg and maneb at 1.3 kg with insecticide in 280 l. Insecticide: Pirimicarb at 0.14 kg. Growth regulator: Chlormequat at 1.7 kg in 280 l.

Seed: Avalon, sown at 180 kg.

Cultivations, etc.:-

Butt Close (BC) and Broad Mead I (BM): PK applied: 11 Sept, 1982. Spring-tine cultivated: 13 Sept. Heavy spring-tine cultivated on first occasion to both, second occasion (BM) only: 14 Sept. Aldicarb applied, rotary cultivated and seed sown for SOWDATE 16 SEP: 16 Sept. Chlortoluron and 'Herrifex DS' applied to SOWDATE 16 SEPT: 19 Nov. Fungicides with insecticide applied: 21 June, 1983. Combine harvested: 13 Aug.

Butt Close IV (BC): Growth regulator applied: 15 Mar, 1983. Triadimefon and first manganese applied: 10 May. Second manganese applied: 23 May.

Broad Mead I (BM): Aldicarb applied, rotary cultivated and seed sown for SOWDATE 20 OCT: 20 Oct, 1982. Chlortoluron and 'Herrifex DS' applied to SOWDATE 20 OCT: 3 Dec, 19 Jan, 1983. 'Herrifex DS' and growth regulator applied to SOWDATE 16 SEPT: 8 Apr, and to SOWDATE 20 OCT: 14 Apr. First manganese applied: 14 Apr. Triadimefon and second manganese applied: 10 May.

- NOTES: (1) The planned late sowing date on Butt Close IV was not done because the ground was too wet. Spring wheat, not taken for yield, was sown instead in March.
- (2) Measurements were made of plant and shoot numbers, dry weight of tops and ears, leaf area and N contents during growth. Weekly measurements were made of soil moisture (between April and harvest). Plant water stress and stomatal resistance were measured. Disease assessments were made during the growing season. Soil samples were taken in autumn and spring to determine N contents.

83/W/WW/2 BUTT CLOSE IV (BC)

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

N RATE	180	240	MEAN				
	9.39	8.84	9.11				
N TIME	EARLY	LATE	MEAN				
	9.11	9.12	9.11				
WINTER N	0	60	MEAN				
	8.97	9.26	9.11				
IRRIGATN	NONE	FULL	MEAN				
	9.36	8.87	9.11				
AUT PEST	NONE	ALDICARB	MEAN				
	9.05	9.18	9.11				
N SCALE	0	120	150	210	240	270	MEAN
	2.86	7.13	8.41	8.56	8.61	9.41	7.50
EXTRA	SE 5E WA	SE 5E --					
	9.46	9.52					

GRAND MEAN 8.75

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	N RATE	N TIME	WINTER N	IRRIGATN
-----				
SED	0.349	0.349	0.349	0.349
TABLE	AUT PEST			
-----				
SED	0.349			

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
WP	10	0.699	7.7

GRAIN MEAN DM% 86.2

PLOT AREA HARVESTED 0.00202

83/W/WW/2 BROAD MEAD I (BM)

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

N RATE	100	160	MEAN
SOWDATE			
16 SEPT	8.60	7.99	8.29
20 OCT	8.60	8.92	8.76
MEAN	8.60	8.46	8.53
N TIME	EARLY	LATE	MEAN
SOWDATE			
16 SEPT	8.19	8.40	8.29
20 OCT	8.88	8.63	8.76
MEAN	8.53	8.52	8.53
N TIME	EARLY	LATE	MEAN
N RATE			
100	8.63	8.56	8.60
160	8.44	8.47	8.46
MEAN	8.53	8.52	8.53
WINTER N	0	30	MEAN
SOWDATE			
16 SEPT	8.21	8.38	8.29
20 OCT	8.54	8.97	8.76
MEAN	8.38	8.68	8.53
WINTER N	0	30	MEAN
N RATE			
100	8.48	8.71	8.60
160	8.27	8.64	8.46
MEAN	8.38	8.68	8.53
WINTER N	0	30	MEAN
N TIME			
EARLY	8.45	8.62	8.53
LATE	8.31	8.73	8.52
MEAN	8.38	8.68	8.53
AUT PEST	NONE	ALDICARB	MEAN
SOWDATE			
16 SEPT	8.24	8.35	8.29
20 OCT	8.44	9.07	8.76
MEAN	8.34	8.71	8.53

83/W/WW/2 BROAD MEAD I (BM)

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

AUT PEST	NONE	ALDICARB	MEAN
N RATE			
100	8.40	8.79	8.60
160	8.28	8.63	8.46
MEAN	8.34	8.71	8.53
AUT PEST	NONE	ALDICARB	MEAN
N TIME			
EARLY	8.41	8.66	8.53
LATE	8.27	8.77	8.52
MEAN	8.34	8.71	8.53
AUT PEST	NONE	ALDICARB	MEAN
WINTER N			
0	8.09	8.66	8.38
30	8.60	8.76	8.68
MEAN	8.34	8.71	8.53
IRRIGATN	NONE	FULL	MEAN
SOWDATE			
16 SEPT	8.65	7.94	8.29
20 OCT	9.17	8.35	8.76
MEAN	8.91	8.14	8.53
IRRIGATN	NONE	FULL	MEAN
N RATE			
100	9.05	8.14	8.60
160	8.77	8.14	8.46
MEAN	8.91	8.14	8.53
IRRIGATN	NONE	FULL	MEAN
N TIME			
EARLY	8.83	8.24	8.53
LATE	8.98	8.05	8.52
MEAN	8.91	8.14	8.53
IRRIGATN	NONE	FULL	MEAN
WINTER N			
0	8.77	7.98	8.38
30	9.05	8.31	8.68
MEAN	8.91	8.14	8.53



83/W/WW/2 BROAD MEAD I (BM)

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

IRRIGATN	NONE	FULL	MEAN				
AUT PEST							
NONE	8.67	8.01	8.34				
ALDICARB	9.15	8.27	8.71				
MEAN	8.91	8.14	8.53				
N SCALE	0	40	70	130	160	190	MEAN
S DATE N							
SEPT NE	5.68	7.51	7.90	8.83	8.35	8.59	7.81
OCT NL	5.26	7.15	8.51	8.50	9.23	9.72	8.06
MEAN	5.47	7.33	8.21	8.67	8.79	9.16	7.94
EXTRA	SE 5E --	SE 5E W-	SE 3E WA	SE 3E -A	SL 5L --	SL 3L W-	
	7.83	7.30	8.20	8.53	7.75	8.61	

GRAND MEAN 8.34

SED FOR TABLES EXCEPT THOSE INVOLVING N SCALE AND EXTRA ARE

MARGINS OF 2 WAY TABLES 0.265  
TWO WAY TABLES 0.375

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
WP	10	0.751	8.8

GRAIN MEAN DM% 86.0

PLOT AREA HARVESTED 0.00202