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78/R/WW/4 Precision Sowing, Irrigation and N - W. Wheat

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78/R/WW/4

WINTER WHEAT

PRECISION SOWING, IRRIGATION & N

Object: To study the effects of precision sowing, seed rates, irrigation and nitrogen fertiliser on the growth and yield of winter wheat - Gt. Field I & II.

Sponsors: G.N. Thorne, P.J. Welbank, F.V. Widdowson.

Design: Single replicate of 3 x 2 x 2 x 2 x 2 + 20 extra plots.

Whole plot dimensions: (1) ND, BND and HS: 4.27 x 15.2
(2) ST: 4.88 x 15.2

Treatments: All combinations of:-

1. DRL SPAC Drills and spacing between rows:
 ST1 Stanhay precision drill, rows 10.5 cm apart
 ND1 Nordsten drill, rows 10.5 cm apart
 ND2 Nordsten drill, rows 21 cm apart
2. SEEDRATE Seed rates:
 S1 Half standard (188 seeds per square metre, 115 kg)
 S2 Standard (376 seeds per square metre, 230 kg)
3. IRRIGATN Irrigation:
 NONE None
 FULL Irrigated (total 102.2 mm). Whenever the soil moisture deficit exceeded 25 mm, irrigation was applied to reduce this to 12 mm.
4. EARLY N Nitrogen fertiliser as 'Nitro-Chalk 25' on 28 April (kg N):
 EN3 90
 EN5 150
5. LATE N Nitrogen fertiliser as 'Nitro-Chalk 25' on 24 May (kg N):
 LNO 0
 LN1 30

plus twenty additional plots:

- EXTRA Sown with the Nordsten drill, rows 10.5 cm apart, standard seed rate, not irrigated, with eight nitrogen rates, applied in April (kg N):
- | | |
|----------|-----|
| ND1S2EN0 | 0 |
| ND1S2EN1 | 30 |
| ND1S2EN2 | 60 |
| ND1S2EN3 | 90 |
| ND1S2EN4 | 120 |
| ND1S2EN5 | 150 |
| ND1S2EN6 | 180 |
| ND1S2EN7 | 210 |

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Sown with Nordsten drill but with seed tubes disconnected to broadcast the seed, unirrigated, nitrogen applied on 28 April, all treatments duplicated:

BNDS1EN3	Half standard seed rate, 90 kg N
BNDS1EN5	Half standard seed rate, 150 kg N
BNDS2EN3	Standard seed rate, 90 kg N
BNDS2EN5	Standard seed rate, 150 kg N

Sown by hand at half standard seed rate in rows 10.5 cm apart, unirrigated, nitrogen applied on 28 April, all treatments duplicated:

HS1S1EN3	Half standard seed rate, 90 kg N
HS1S1EN5	Half standard seed rate, 150 kg N

NOTE: Irrigation treatments (mm water)

30 May, 1978	25.6
14 June	21.6
21 June	15.5
19 July	18.3
28 July	21.2
Total	102.2

Basal applications: Manures: (0:20:20) at 310 kg. Weedkillers: (1) Methabenzthiazuron 2.0 kg in 280 l, (2) Dicamba with mecoprop and MCPA ('Banlene Plus' at 4.9 l in 220 l). Growth regulator: Chlormequat at 1.4 kg in 220 l. Fungicide: Triadimefon at 0.13 kg in 220 l.

Seed: Maris Huntsman.

Cultivations, etc.:— Ploughed: 20 Oct, 1977. Heavy spring-tine cultivated, PK applied: 24 Oct. Rotary harrowed: 25 Oct. Seed sown: 27 Oct. Weedkiller (1) applied: 4 Nov. Rolled: 6 April, 1978. Weedkiller (2) and growth regulator (mix) applied: 10 May. Fungicide applied: 14 June. Combine harvested: 4 Sept. Previous crops: Barley 1976, beans 1977.

NOTE: Emergence counts were made in December. Measurements were made of shoot numbers, dry weight of tops and ears, leaf area, and nitrogen content four times during the season. Weekly measurements were made of stem nitrate (between late April and mid July), of soil moisture (between mid April and August) and on two occasions measurements were made of light intensity at ground level.

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GRAIN TONNES/HECTARE

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

SEEDRATE	S1	S2	MEAN
DRL SPAC			
ST1	7.99	8.11	8.05
ND1	8.00	8.33	8.17
ND2	7.86	8.01	7.94
MEAN	7.95	8.15	8.05
IRRIGATN	NONE	FULL	MEAN
DRL SPAC			
ST1	8.16	7.94	8.05
ND1	8.27	8.06	8.17
ND2	8.09	7.78	7.94
MEAN	8.18	7.93	8.05
IRRIGATN	NONE	FULL	MEAN
SEEDRATE			
S1	8.00	7.91	7.95
S2	8.35	7.94	8.15
MEAN	8.18	7.93	8.05
EARLY N	EN3	EN5	MEAN
DRL SPAC			
ST1	7.81	8.29	8.05
ND1	7.96	8.38	8.17
ND2	7.55	8.32	7.94
MEAN	7.77	8.33	8.05
EARLY N	EN3	EN5	MEAN
SEEDRATE			
S1	7.70	8.21	7.95
S2	7.85	8.45	8.15
MEAN	7.77	8.33	8.05
EARLY N	EN3	EN5	MEAN
IRRIGATN			
NONE	7.88	8.47	8.18
FULL	7.67	8.18	7.93
MEAN	7.77	8.33	8.05
LATE N	LNO	LN1	MEAN
DRL SPAC			
ST1	7.81	8.29	8.05
ND1	8.03	8.30	8.17
ND2	7.80	8.07	7.94
MEAN	7.88	8.22	8.05

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GRAIN TONNES/HECTARE

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

LATE N SEEDRATE	LNO	LN1	MEAN
S1	7.80	8.10	7.95
S2	7.95	8.34	8.15
MEAN	7.88	8.22	8.05

LATE N IRRIGATN	LNO	LN1	MEAN
NONE	7.99	8.36	8.18
FULL	7.77	8.08	7.93
MEAN	7.88	8.22	8.05

LATE N EARLY N	LNO	LN1	MEAN
EN3	7.52	8.03	7.77
EN5	8.24	8.42	8.33
MEAN	7.88	8.22	8.05

SEEDRATE IRRIGATN DRL SPAC	S1 NONE	S2 FULL	S2 NONE	S2 FULL
ST1	8.19	7.80	8.13	8.09
ND1	7.95	8.06	8.60	8.06
ND2	7.85	7.87	8.33	7.68

SEEDRATE EARLY N DRL SPAC	S1 EN3	S2 EN5	S2 EN3	S2 EN5
ST1	7.82	8.17	7.80	8.41
ND1	7.83	8.18	8.09	8.57
ND2	7.45	8.27	7.65	8.37

IRRIGATN EARLY N DRL SPAC	NONE EN3	FULL EN5	FULL EN3	FULL EN5
ST1	7.78	8.54	7.84	8.04
ND1	8.19	8.36	7.72	8.39
ND2	7.66	8.53	7.45	8.11

IRRIGATN EARLY N SEEDRATE	NONE EN3	FULL EN5	FULL EN3	FULL EN5
S1	7.72	8.27	7.68	8.14
S2	8.03	8.68	7.66	8.22

SEEDRATE LATE N DRL SPAC	S1 LNO	S2 LN1	S2 LNO	S2 LN1
ST1	7.71	8.27	7.90	8.31
ND1	7.88	8.13	8.18	8.47
ND2	7.82	7.91	7.78	8.24

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

IRRIGATN	NONE		FULL	
LATE N	LNO	LN1	LNO	LN1
DRL SPAC				
ST1	7.92	8.39	7.69	8.19
ND1	8.11	8.43	7.95	8.17
ND2	7.93	8.25	7.66	7.89
IRRIGATN	NONE		FULL	
LATE N	LNO	LN1	LNO	LN1
SEEDRATE				
S1	7.84	8.16	7.77	8.05
S2	8.14	8.57	7.77	8.12
EARLY N	EN3		EN5	
LATE N	LNO	LN1	LNO	LN1
DRL SPAC				
ST1	7.47	8.16	8.15	8.43
ND1	7.83	8.08	8.23	8.52
ND2	7.26	7.84	8.33	8.30
EARLY N	EN3		EN5	
LATE N	LNO	LN1	LNO	LN1
SEEDRATE				
S1	7.51	7.89	8.09	8.32
S2	7.52	8.17	8.38	8.52
EARLY N	EN3		EN5	
LATE N	LNO	LN1	LNO	LN1
IRRIGATN				
NONE	7.57	8.19	8.41	8.54
FULL	7.47	7.87	8.07	8.30
EXTRA				
ND1S2EN0	5.75			
ND1S2EN1	6.20			
ND1S2EN2	6.09			
ND1S2EN3	7.41			
ND1S2EN4	7.85			
ND1S2EN5	8.30			
ND1S2EN6	8.59			
ND1S2EN7	8.71			
BNDS1EN3	8.05			
BNDS1EN5	8.84			
BNDS2EN3	8.05			
BNDS2EN5	8.78			
HS1S1EN3	7.52			
HS1S1EN5	8.62			

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GRAIN TONNES/HECTARE

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

TABLE	DRL SPAC	SEEDRATE	IRRIGATN	EARLY N
SED	0.155	0.127	0.127	0.127
TABLE	LATE N	DRL SPAC SEEDRATE	DRL SPAC IRRIGATN	SEEDRATE IRRIGATN
SED	0.127	0.220	0.220	0.179
TABLE	DRL SPAC EARLY N	SEEDRATE EARLY N	IRRIGATN EARLY N	DRL SPAC LATE N
SED	0.220	0.179	0.179	0.220
TABLE	SEEDRATE LATE N	IRRIGATN LATE N	EARLY N LATE N	DRL SPAC SEEDRATE IRRIGATN
SED	0.179	0.179	0.179	0.311
TABLE	DRL SPAC SEEDRATE EARLY N	DRL SPAC IRRIGATN EARLY N	SEEDRATE IRRIGATN EARLY N	DRL SPAC SEEDRATE LATE N
SED	0.311	0.311	0.254	0.311
TABLE	DRL SPAC IRRIGATN LATE N	SEEDRATE IRRIGATN LATE N	DRL SPAC EARLY N LATE N	SEEDRATE EARLY N LATE N
SED	0.311	0.254	0.311	0.254
TABLE	IRRIGATN EARLY N LATE N	EXTRA		
SED	0.254	0.621 MIN REP 0.538 MAX-MIN 0.439 MAX REP		

EXTRA
 MAX REP BND51EN3, BND51EN5, BND52EN3, BND52EN5,
 HS1S1EN3, HS1S1EN5
 MAX-MIN THOSE IN MAX REP V ANY OF REMAINDER
 MIN REP ANY OF REMAINDER

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

STRATUM	DF	SE	CV%
WP	17	0.439	5.5
MEAN DM%	83.2		
PLOT AREA HARVESTED	0.00195		