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ROTHAMSTED RESEARCH

Yields of the Field Experiments 1986

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86/R/B/1 Factors Limiting Yield - W. Barley

Rothamsted Research

Rothamsted Research (1987) *86/R/B/1 Factors Limiting Yield - W. Barley ;* Yields Of The Field Experiments 1986, pp 206 - 216 **- DOI: https://doi.org/10.23637/ERADOC-1-36**

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86/R/B/1

WINTER BARLEY

FACTORS LIMITING YIELD

Object: To study the importance of factors that may limit the yield of early-sown winter barley - Sawyers II.

Sponsors: F.V. Widdowson, R.J. Darby, R.J. Gutteridge, J.F. Jenkyn, B.R. Kerry, R.T. Plumb, G.J.S. Ross, D.W. Wood.

Design: Half replicate of (2 x 2 x 2 x 2 x 2 x 2) x 2 (E FUNG) arranged in 2 blocks of 32 plots + 10 extra plots in each block.

Whole plot dimensions: 3.0 x 15.2.

Treatments: Combinations of the following treatments, all variety Panda following a previous barley crop:-

1. SEEDRATE	Seed rate (seeds per square metre):	
	300	
	450	
2. WINTER N	Rates of nitrogen fertilizer in winter (kg N) (as prilled urea 46% N):	
	0	None
	30+30	30 on 27 Nov, 1985, 30 on 10 Mar, 1986
3. SPRING N	Rates of nitrogen fertilizer in spring (kg N) (as 'Nitro-Chalk' 26% N) on 11 Apr:	
	100	
	160	
4. E FUNG	Early fungicides:	
	NONE	None
	TFSD	Triadimenol and fuberidazole seed dressing
5. L FUNG	Late fungicides:	
	NONE	None
	SPRAYS	Prochloraz at 0.40 kg with carbendazim at 0.15 kg in 220 l on 30 Apr, 1986. Carbendazim at 0.15 kg with maneb at 1.6 kg and tridemorph at 0.38 kg in 220 l on 16 May. Captafol at 1.3 kg and triadimefon at 0.12 kg in 220 l on 30 May
6. GRTH REG	Growth regulator:	
	NONE	None
	CHLORMEQ	Chlormequat applied at GS 21, 22, 31 at 0.51 kg in 220 l, on 12 Dec, 1985, 11 Mar, 1986 and 17 Apr

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7. INSCTCDE — Insecticide:

NONE	None
CYPERMET	Cypermethrin at 0.025 kg in 220 l on 25 Nov, 1985

plus 8 extra treatments with variety Panda sown at 300 seeds per square metre and given cypermethrin, late fungicides, no chlormequat and all combinations of the following:

1. PRECROPX — Previous cropping:

OATS	
FALLOW	

2. N DIVX — Division of nitrogen fertilizer (kg N):

30+30+100	30 on 27 Nov, 1985, 30 on 10 Mar, 1986 (both as prilled urea) plus 100 as 'Nitro-Chalk' (26% N) on 11 Apr
160	160 as 'Nitro-Chalk' (26% N) on 11 Apr

3. E FUNGX — Early fungicides:

NONE	None
TFSD	Triadimenol and fuberidazole seed dressing

plus 8 extra treatments with variety Pirate sown at 300 seeds per square metre and given cypermethrin, late fungicides, no chlormequat and all combinations of the following:

1. PRECROPV — Previous cropping:

BARLEY	
OATS	

2. N DIVV — Division of nitrogen fertilizer (kg N):

30+30+100	30 on 27 Nov, 1985, 30 on 10 Mar, 1986 (both as prilled urea) plus 100 as 'Nitro-Chalk' (26% N) on 11 Apr
160	160 as 'Nitro-Chalk' (26% N) on 11 Apr

3. E FUNGV — Early fungicides:

NONE	None
TFSD	Triadimenol and fuberidazole seed dressing

plus 2 extra treatments following previous barley, with variety Panda and given no nitrogen fertilizer or chlormequat but given early fungicides, late fungicides and cypermethrin:

EXTRA NO	
SD 300	Seed sown at 300 seeds per square metre (duplicated)
SD 450	Seed sown at 450 seeds per square metre (duplicated)

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86/R/B/1

Basal applications: Manures: (0:18:36) at 280 kg. Weedkillers: Paraquat at 0.40 kg ion in 200 l. Isoproturon at 2.4 kg in 200 l. Dicamba, mecoprop and MCPA (as 'Herrisol' at 5.0 l) in 200 l. Growth regulators: Mepiquat chloride and 2-chloroethylphosphonic acid (as 'Terpal' at 2.0 l) with a wetting agent ('Citowett' at 0.08 l) in 200 l.

Cultivations, etc.:- PK applied: 5 Sept, 1985. Paraquat applied: 18 Sept. Heavy spring-tine cultivated twice: 19 Sept. Rotary harrowed, subsoiled with 25 cm wide wings on tines 38 cm deep and 66 cm apart: 1 Oct. Rotary harrowed, seed sown: 2 Oct. Isoproturon applied: 6 Dec. 'Herrisol' applied, growth regulators with wetting agent applied: 2 May, 1986. Combine harvested: 1 Aug. Previous crops: W. wheat 1984, w. barley, w. oats, fallow 1985.

NOTES: (1) Soil samples were taken in late October, mid-December and early February for amounts of nitrate and ammonium. Crop samples were taken from October to April for measurements of nitrate N concentration.
(2) Plant samples were taken in March, April and June to measure plant and shoot numbers, leaf areas, dry weights and nitrogen uptakes. After harvest thousand grain weights were measured.
(3) Leaf diseases, take-all, eyespot and barley yellow dwarf virus were assessed and aphids were counted.
(4) A cage was erected over the crop from early June to maturity to prevent damage by birds.

GRAIN TONNES/HECTARE

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

WINTER N	0	30+30	MEAN
SEEDRATE			
300	5.96	5.84	5.90
450	6.08	5.89	5.98
MEAN	6.02	5.86	5.94

E FUNG	NONE	TFSD	MEAN
SEEDRATE			
300	5.61	6.18	5.90
450	5.98	5.98	5.98
MEAN	5.80	6.08	5.94

E FUNG	NONE	TFSD	MEAN
WINTER N			
0	5.83	6.21	6.02
30+30	5.76	5.96	5.86
MEAN	5.80	6.08	5.94

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86/R/B/1

GRAIN TONNES/HECTARE

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

L FUNG	NONE	SPRAYS	MEAN
SEEDRATE			
300	5.45	6.35	5.90
450	5.56	6.40	5.98
MEAN	5.51	6.37	5.94

L FUNG	NONE	SPRAYS	MEAN
WINTER N			
0	5.62	6.42	6.02
30+30	5.39	6.33	5.86
MEAN	5.51	6.37	5.94

L FUNG	NONE	SPRAYS	MEAN
E FUNG			
NONE	5.38	6.21	5.80
TFSD	5.63	6.53	6.08
MEAN	5.51	6.37	5.94

SPRING N	100	160	MEAN
SEEDRATE			
300	5.91	5.88	5.90
450	5.86	6.10	5.98
MEAN	5.89	5.99	5.94

SPRING N	100	160	MEAN
WINTER N			
0	6.00	6.03	6.02
30+30	5.77	5.95	5.86
MEAN	5.89	5.99	5.94

SPRING N	100	160	MEAN
E FUNG			
NONE	5.79	5.80	5.80
TFSD	5.98	6.18	6.08
MEAN	5.89	5.99	5.94

SPRING N	100	160	MEAN
L FUNG			
NONE	5.54	5.48	5.51
SPRAYS	6.24	6.51	6.37
MEAN	5.89	5.99	5.94

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86/R/B/1

GRAIN TONNES/HECTARE

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

INSCTCDE SEEDRATE	NONE	CYPERMET	MEAN
300	6.01	5.79	5.90
450	5.92	6.04	5.98
MEAN	5.96	5.91	5.94

INSCTCDE WINTER N	NONE	CYPERMET	MEAN
0	6.06	5.97	6.02
30+30	5.87	5.86	5.86
MEAN	5.96	5.91	5.94

INSCTCDE E FUNG	NONE	CYPERMET	MEAN
NONE	5.86	5.73	5.80
TFSD	6.07	6.10	6.08
MEAN	5.96	5.91	5.94

INSCTCDE L FUNG	NONE	CYPERMET	MEAN
NONE	5.47	5.54	5.51
SPRAYS	6.46	6.29	6.37
MEAN	5.96	5.91	5.94

INSCTCDE SPRING N	NONE	CYPERMET	MEAN
100	6.04	5.73	5.89
160	5.89	6.09	5.99
MEAN	5.96	5.91	5.94

GRTH REG SEEDRATE	NONE	CHLORMEQ	MEAN
300	5.97	5.83	5.90
450	5.91	6.05	5.98
MEAN	5.94	5.94	5.94

GRTH REG WINTER N	NONE	CHLORMEQ	MEAN
0	6.00	6.03	6.02
30+30	5.88	5.85	5.86
MEAN	5.94	5.94	5.94

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86/R/B/1

GRAIN TONNES/HECTARE

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

GRTH REG E FUNG	NONE	CHLORMEQ	MEAN
NONE	5.82	5.78	5.80
TFSD	6.06	6.10	6.08
MEAN	5.94	5.94	5.94

GRTH REG L FUNG	NONE	CHLORMEQ	MEAN
NONE	5.52	5.49	5.51
SPRAYS	6.36	6.39	6.37
MEAN	5.94	5.94	5.94

GRTH REG SPRING N	NONE	CHLORMEQ	MEAN
100	5.91	5.86	5.89
160	5.97	6.01	5.99
MEAN	5.94	5.94	5.94

GRTH REG INSCTCDE	NONE	CHLORMEQ	MEAN
NONE	5.90	6.03	5.96
CYPERMET	5.97	5.85	5.91
MEAN	5.94	5.94	5.94

N DIVX PRECROPX	30+30+100	160	MEAN
OATS	8.10	7.66	7.88
FALLOW	7.94	8.14	8.04
MEAN	8.02	7.90	7.96

E FUNGX PRECROPX	NONE	TFSD	MEAN
OATS	7.60	8.15	7.88
FALLOW	7.94	8.14	8.04
MEAN	7.77	8.15	7.96

E FUNGX N DIVX	NONE	TFSD	MEAN
30+30+100	7.70	8.34	8.02
160	7.84	7.95	7.90
MEAN	7.77	8.15	7.96

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86/R/B/1

GRAIN TONNES/HECTARE

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

PRECROPX	E FUNGX N DIVX	NONE	TFSD
OATS	30+30+100	7.94	8.26
	160	7.27	8.05
FALLOW	30+30+100	7.47	8.42
	160	8.42	7.86

N DIVV / PRECROPV	30+30+100	160	MEAN
BARLEY	6.58	6.60	6.59
OATS	8.25	8.26	8.26
MEAN	7.41	7.43	7.42

E FUNGV / PRECROPV	NONE	TFSD	MEAN
BARLEY	6.13	7.05	6.59
OATS	8.19	8.33	8.26
MEAN	7.16	7.69	7.42

E FUNGV / N DIVV	NONE	TFSD	MEAN
30+30+100	6.87	7.95	7.41
160	7.44	7.42	7.43
MEAN	7.16	7.69	7.42

PRECROPV	E FUNGV N DIVV	NONE	TFSD
BARLEY	30+30+100	5.61	7.55
	160	6.65	6.54
OATS	30+30+100	8.13	8.36
	160	8.24	8.29

EXTRA NO	SD 300	SD 450	MEAN
	3.89	4.62	4.26

GRAND MEAN 6.19

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

(NOT INCLUDING EXTRA PLOTS)
MARGIN OF TWO FACTOR TABLES 0.120
TWO FACTOR TABLES 0.170

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

STRATUM	DF	SE	CV%
BLOCK.WP	34	0.481	8.1

GRAIN MEAN DM% 84.6

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86/R/B/1

STRAW TONNES/HECTARE

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

WINTER N	0	30+30	MEAN
SEEDRATE			
300	3.62	3.69	3.65
450	3.63	3.65	3.64
MEAN	3.63	3.67	3.65

E FUNG	NONE	TFSD	MEAN
SEEDRATE			
300	3.52	3.79	3.65
450	3.55	3.74	3.64
MEAN	3.53	3.77	3.65

E FUNG	NONE	TFSD	MEAN
WINTER N			
0	3.51	3.74	3.63
30+30	3.56	3.79	3.67
MEAN	3.53	3.77	3.65

L FUNG	NONE	SPRAYS	MEAN
SEEDRATE			
300	3.44	3.87	3.65
450	3.31	3.98	3.64
MEAN	3.37	3.93	3.65

L FUNG	NONE	SPRAYS	MEAN
WINTER N			
0	3.38	3.87	3.63
30+30	3.36	3.98	3.67
MEAN	3.37	3.93	3.65

L FUNG	NONE	SPRAYS	MEAN
E FUNG			
NONE	3.27	3.79	3.53
TFSD	3.47	4.06	3.77
MEAN	3.37	3.93	3.65

SPRING N	100	160	MEAN
SEEDRATE			
300	3.70	3.60	3.65
450	3.64	3.65	3.64
MEAN	3.67	3.63	3.65

SPRING N	100	160	MEAN
WINTER N			
0	3.67	3.58	3.63
30+30	3.67	3.67	3.67
MEAN	3.67	3.63	3.65

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86/R/B/1

STRAW TONNES/HECTARE

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

SPRING N / E FUNG	100	160	MEAN
NONE	3.66	3.40	3.53
TFSD	3.68	3.85	3.77
MEAN	3.67	3.63	3.65

SPRING N / L FUNG	100	160	MEAN
NONE	3.44	3.30	3.37
SPRAYS	3.90	3.95	3.93
MEAN	3.67	3.63	3.65

INSCTCDE / SEEDRATE	NONE	CYPERMET	MEAN
300	3.58	3.72	3.65
450	3.60	3.69	3.64
MEAN	3.59	3.70	3.65

INSCTCDE / WINTER N	NONE	CYPERMET	MEAN
0	3.61	3.64	3.63
30+30	3.58	3.77	3.67
MEAN	3.59	3.70	3.65

INSCTCDE / E FUNG	NONE	CYPERMET	MEAN
NONE	3.48	3.58	3.53
TFSD	3.70	3.83	3.77
MEAN	3.59	3.70	3.65

INSCTCDE / L FUNG	NONE	CYPERMET	MEAN
NONE	3.27	3.48	3.37
SPRAYS	3.92	3.93	3.93
MEAN	3.59	3.70	3.65

INSCTCDE / SPRING N	NONE	CYPERMET	MEAN
100	3.66	3.68	3.67
160	3.52	3.73	3.63
MEAN	3.59	3.70	3.65

GRTH REG / SEEDRATE	NONE	CHLORMEQ	MEAN
300	3.56	3.74	3.65
450	3.47	3.82	3.64
MEAN	3.51	3.78	3.65

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86/R/B/1

STRAW TONNES/HECTARE

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

GRTH REG WINTER N	NONE	CHLORMEQ	MEAN
0	3.51	3.75	3.63
30+30	3.52	3.82	3.67
MEAN	3.51	3.78	3.65

GRTH REG E FUNG	NONE	CHLORMEQ	MEAN
NONE	3.38	3.68	3.53
TFSD	3.65	3.89	3.77
MEAN	3.51	3.78	3.65

GRTH REG L FUNG	NONE	CHLORMEQ	MEAN
NONE	3.29	3.45	3.37
SPRAYS	3.73	4.12	3.93
MEAN	3.51	3.78	3.65

GRTH REG SPRING N	NONE	CHLORMEQ	MEAN
100	3.56	3.78	3.67
160	3.46	3.79	3.63
MEAN	3.51	3.78	3.65

GRTH REG INSCTCDE	NONE	CHLORMEQ	MEAN
NONE	3.39	3.80	3.59
CYPERMET	3.64	3.77	3.70
MEAN	3.51	3.78	3.65

N DIVX PRECROPX	30+30+100	160	MEAN
OATS	3.85	4.17	4.01
FALLOW	4.50	4.58	4.54
MEAN	4.18	4.38	4.28

E FUNGX PRECROPX	NONE	TFSD	MEAN
OATS	4.05	3.98	4.01
FALLOW	4.52	4.56	4.54
MEAN	4.28	4.27	4.28

E FUNGX N DIVX	NONE	TFSD	MEAN
30+30+100	4.14	4.21	4.18
160	4.43	4.33	4.38
MEAN	4.28	4.27	4.28

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86/R/B/1

STRAW TONNES/HECTARE

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

PRECROPX	E FUNGX N DIVX	NONE	TFSD
OATS	30+30+100	4.02	3.68
	160	4.07	4.28
FALLOW	30+30+100	4.25	4.75
	160	4.80	4.37

N DIVV / PRECROPV	30+30+100	160	MEAN
BARLEY	4.00	4.10	4.05
OATS	3.77	3.99	3.88
MEAN	3.88	4.05	3.97

E FUNGV / PRECROPV	NONE	TFSD	MEAN
BARLEY	3.92	4.18	4.05
OATS	4.01	3.75	3.88
MEAN	3.96	3.97	3.97

E FUNGV / N DIVV	NONE	TFSD	MEAN
30+30+100	4.04	3.73	3.88
160	3.88	4.21	4.05
MEAN	3.96	3.97	3.97

PRECROPV	E FUNGV N DIVV	NONE	TFSD
BARLEY	30+30+100	4.18	3.83
	160	3.66	4.54
OATS	30+30+100	3.91	3.63
	160	4.11	3.87

EXTRA NO	SD 300	SD 450	MEAN
	1.49	1.54	1.52

GRAND MEAN 3.64

STRAW MEAN DM% 82.4

PLOT AREA HARVESTED 0.00247

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