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85/R/RA/1 Factors Limiting Yield - W. Oilseed Rape

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Rothamsted Research (1986) *85/R/RA/1 Factors Limiting Yield - W. Oilseed Rape* ; Yields Of The Field Experiments 1985, pp 285 - 292 - DOI: <https://doi.org/10.23637/ERADOC-1-19>

85/R/RA/1

WINTER OILSEED RAPE

FACTORS LIMITING YIELD

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. oilseed rape - Black Horse II.

Sponsors: C.J. Rawlinson, R.J. Darby, P.G.N. Digby, K. Evans, J.E. Leach, I.H. Williams, D.P. Yeoman.

Associate sponsors: P.B. Barraclough, D.S. Jenkinson, J. Lacey, D.S. Powlson, G.A. Rodgers, J.H. Stevenson, A.J. Thomasson, G.N. Thorne, A.H. Weir.

Design: A half replicate of $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 + 2 \times 4 + 2$ separate half replicates of $2 \times 2 \times 2 \times 2 + 8$ extra plots.

Whole plot dimensions: 3.0 x 17.0.

Treatments: Combinations of:-

1. SOW DATE Dates of sowing:
 16 AUG 16 August, 1984
 6 SEP 6 September
2. N RATE Amounts of N fertilizer (kg N), as 'Nitro-Chalk', (27.5% N) in addition to a basal application of 50 kg N to the seedbed:

 175
 275
3. N DIVIS Division of N fertilizer application:

 SINGLE All on 25 February, 1985
 DIVIDED One third on 25 February, two thirds on 25 March
4. GROWREG Growth regulator:

 NONE None
 2-CHLORO 2-Chloroethylphosphonic acid applied at 1.0 l in 220 l on 23 May to early-sown plots and 29 May to late-sown plots with a wetter ('Agral' at 0.1 l)
5. INSCTCDE Insecticides:

 NONE None
 DE+TR Deltamethrin at 7.5 g in 220 l on 4 October, 1984 and 28 November, triazophos at 0.4 l in 220 l on 17 June, 1985

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6. AUT FUNG Autumn fungicide, in addition to gamma HCH + thiram seed dressing:
NONE None
PROCHLOR Fenpropimorph seed dressing plus prochloraz at 0.5 kg in 220 l on 26 Nov

7. S FUNG Spring and summer fungicides:
NONE None
PRO+IPR Prochloraz at 0.4 kg in 220 l on 4 April, 1985, iprodione at 1.0 kg in 220 l on 17 June

plus combinations of the following (all given growth regulator, insecticides and fungicides as above):

1. SOWDAT N Dates of sowing:
16 AUG 16 August, 1984
6 SEP 6 September
2. N RATE N Amounts of N fertilizer (kg N), as 'Nitro-Chalk', (27.5% N) in addition to a basal application of 50 kg N to the seedbed. Applied as a single dressing on 25 February, 1985:

0
125
225
325

plus combinations of the following (all given insecticides and fungicides as above, combinations chosen are those not provided by the main factorial):

1. SOWDAT P Dates of sowing:
16 AUG 16 August, 1984
6 SEP 6 September
2. N RATE P Amounts of N fertilizer (kg N), as 'Nitro-Chalk', (27.5% N) in addition to a basal application of 50 kg N to the seedbed:

175
275

3. N DIV P Division of N fertilizer application:
SINGLE All on 25 February, 1985
DIVIDED One third on 25 February, two thirds on 25 March

4. GROREG P Growth regulator:
NONE None
2-CHLORO 2-Chloroethylphosphonic acid applied at 1.0 l in 220 l on 23 May to early sown plots and 29 May to late-sown plots with a wetter ('Agral' at 0.1 l)

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plus combinations of the following (all given fungicides as above and oxamyl at 5 kg to the seedbed):

1. SODATE OX Dates of sowing:

 16 AUG 16 August, 1984
 6 SEP 6 September

2. NRATE OX Amounts of N fertilizer (kg N), as 'Nitro-Chalk',
 (27.5% N) in addition to a basal application of
 50 kg N to the seedbed. Applied as a single
 dressing on 25 February, 1985:

 175
 225

3. GRORG OX Growth regulator:

 NONE None
 2-CHLORO 2-Chloroethylphosphonic acid applied at 1.0 l in
 220 l on 23 May to early-sown plots and 29 May to
 late-sown plots with a wetter ('Agral' at 0.1 l)

4. INSCT OX Insecticides:

 NONE None
 DE+TR Deltamethrin at 7.5 g in 220 l on 4 October, 1984 and
 28 November, triazophos at 0.4 l in 220 l on
 17 June, 1985

plus three extra treatments:

EXTRA

- | | |
|----------|--|
| SE275D T | Sown 16 August, 1984 given 275 kg N, divided as
above, given triapenthenol at 0.7 kg in 220 l
on 17 Apr, 1985 but none of the other chemical
treatments above |
| SE NONE | Sown 16 August, given none of the chemical
treatments above |
| SL NONE | Sown 6 September, given none of the chemical
treatments above |

Three additional plots were used for 15N studies, and two for root studies, yields not taken.

Basal applications: Manures: (0:24:24) at 200 kg. 'Nitro-Chalk' (26% N) at 190 kg. Weedkillers: Paraquat at 0.60 kg ion in 200 l. Propyzamide with clopyralid (as 'Matrikerb' at 1.6 kg) in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent, ('Agral' at 0.5 l) in 500 l.

Seed: Bienvenu sown at 8.0 kg.

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Cultivations, etc.:- Discd twice: 31 July, 1984. PK applied: 8 Aug. N applied: 10 Aug. Paraquat applied: 15 Aug. Nematicide applied to early-sown plots, rotary harrowed in, seed sown on these plots: 16 Aug. Heavy spring-tine cultivated late-sown plots: 5 Sept. Nematicide applied to late-sown plots, rotary harrowed in, seed sown on these plots: 6 Sept. 'Matrikerb' applied: 30 Oct. Desiccant applied: 25 July, 1985. Combine harvested: 12 Aug. Previous crops: W. barley 1983 and 1984.

NOTE: Detailed observations were made during the season on diseases, pests, N in plants and soil, dry matter accumulation, leaf areas, soil water, light interception, lodging and seed shedding. Percentage of oil in grain was measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

NRATE	175	275	MEAN
SOWDATE			
16 AUG	3.69	3.57	3.63
6 SEP	4.18	4.38	4.28
MEAN	3.94	3.97	3.95
N DIVIS	SINGLE	DIVIDED	MEAN
SOWDATE			
16 AUG	3.72	3.54	3.63
6 SEP	4.23	4.34	4.28
MEAN	3.97	3.94	3.95
N DIVIS	SINGLE	DIVIDED	MEAN
N RATE			
175	3.86	4.01	3.94
275	4.08	3.87	3.97
MEAN	3.97	3.94	3.95
GROWREG	NONE	2-CHLORO	MEAN
SOWDATE			
16 AUG	3.87	3.38	3.63
6 SEP	4.19	4.37	4.28
MEAN	4.03	3.88	3.95
GROWREG	NONE	2-CHLORO	MEAN
N RATE			
175	4.10	3.78	3.94
275	3.96	3.98	3.97
MEAN	4.03	3.88	3.95
GROWREG	NONE	2-CHLORO	MEAN
N DIVIS			
SINGLE	4.11	3.83	3.97
DIVIDED	3.95	3.93	3.94
MEAN	4.03	3.88	3.95

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

INSCTCDE	NONE	DE+TR	MEAN
SOWDATE			
16 AUG	3.64	3.62	3.63
6 SEP	4.23	4.33	4.28
MEAN	3.93	3.97	3.95
INSCTCDE	NONE	DE+TR	MEAN
N RATE			
175	3.85	4.03	3.94
275	4.02	3.92	3.97
MEAN	3.93	3.97	3.95
INSCTCDE	NONE	DE+TR	MEAN
N DIVIS			
SINGLE	3.92	4.02	3.97
DIVIDED	3.94	3.93	3.94
MEAN	3.93	3.97	3.95
INSCTCDE	NONE	DE+TR	MEAN
GROWREG			
NONE	3.90	4.16	4.03
2-CHLORO	3.97	3.79	3.88
MEAN	3.93	3.97	3.95
AUT FUNG	NONE	PROCHLOR	MEAN
SOWDATE			
16 AUG	3.66	3.60	3.63
6 SEP	4.26	4.30	4.28
MEAN	3.96	3.95	3.95
AUT FUNG	NONE	PROCHLOR	MEAN
N RATE			
175	3.92	3.95	3.94
275	4.00	3.95	3.97
MEAN	3.96	3.95	3.95
AUT FUNG	NONE	PROCHLOR	MEAN
N DIVIS			
SINGLE	3.98	3.97	3.97
DIVIDED	3.94	3.93	3.94
MEAN	3.96	3.95	3.95
AUT FUNG	NONE	PROCHLOR	MEAN
GROWREG			
NONE	4.01	4.05	4.03
2-CHLORO	3.91	3.85	3.88
MEAN	3.96	3.95	3.95

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

AUT FUNG	NONE	PROCHLOR	MEAN		
INSCTCDE					
NONE	3.85	4.02	3.93		
DE+TR	4.07	3.88	3.97		
MEAN	3.96	3.95	3.95		
S FUNG	NONE	PRO+IPR	MEAN		
SOWDATE					
16 AUG	3.64	3.62	3.63		
6 SEP	4.27	4.29	4.28		
MEAN	3.95	3.96	3.95		
S FUNG	NONE	PRO+IPR	MEAN		
N RATE					
175	4.02	3.85	3.94		
275	3.89	4.06	3.97		
MEAN	3.95	3.95	3.95		
S FUNG	NONE	PRO+IPR	MEAN		
N DIVIS					
SINGLE	4.12	3.82	3.97		
DIVIDED	3.79	4.09	3.94		
MEAN	3.95	3.95	3.95		
S FUNG	NONE	PRO+IPR	MEAN		
GROWREG					
NONE	4.05	4.01	4.03		
2-CHLORO	3.86	3.90	3.88		
MEAN	3.95	3.95	3.95		
S FUNG	NONE	PRO+IPR	MEAN		
INSCTCDE					
NONE	3.98	3.89	3.93		
DE+TR	3.92	4.02	3.97		
MEAN	3.95	3.95	3.95		
S FUNG	NONE	PRO+IPR	MEAN		
AUT FUNG					
NONE	3.95	3.97	3.96		
PROCHLOR	3.96	3.94	3.95		
MEAN	3.95	3.95	3.95		
N RATE N	0	125	225	325	MEAN
SOWDAT N					
16 AUG	3.18	3.01	3.76	3.32	3.32
6 SEP	2.68	2.98	4.50	4.17	3.58
MEAN	2.93	3.00	4.13	3.74	3.45

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

N RATE P	175	275	MEAN
SOWDAT P			
16 AUG	3.61	3.35	3.48
6 SEP	4.26	4.42	4.34
MEAN	3.93	3.89	3.91
N DIV P	SINGLE	DIVIDED	MEAN
SOWDAT P			
16 AUG	3.41	3.55	3.48
6 SEP	3.94	4.74	4.34
MEAN	3.67	4.14	3.91
N DIV P	SINGLE	DIVIDED	MEAN
N RATE P			
175	3.51	4.36	3.93
275	3.84	3.93	3.89
MEAN	3.67	4.14	3.91
GROREG P	NONE	2-CHLORO	MEAN
SOWDAT P			
16 AUG	3.79	3.17	3.48
6 SEP	4.50	4.18	4.34
MEAN	4.14	3.68	3.91
GROREG P	NONE	2-CHLORO	MEAN
N RATE P			
175	4.19	3.67	3.93
275	4.09	3.68	3.89
MEAN	4.14	3.68	3.91
GROREG P	NONE	2-CHLORO	MEAN
N DIV P			
SINGLE	3.92	3.43	3.67
DIVIDED	4.36	3.92	4.14
MEAN	4.14	3.68	3.91
NRATE OX	175	275	MEAN
SODATE OX			
16 AUG	3.59	3.51	3.55
6 SEP	3.89	3.98	3.93
MEAN	3.74	3.74	3.74
GRORG OX	NONE	2-CHLORO	MEAN
SODATE OX			
16 AUG	3.88	3.22	3.55
6 SEP	3.98	3.89	3.93
MEAN	3.93	3.56	3.74

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

GRORG OX NRATE OX	NONE	2-CHLORO	MEAN
175	3.95	3.52	3.74
275	3.90	3.59	3.74
MEAN	3.93	3.56	3.74

IN SCT OX SODATE OX	NONE	DE+TR	MEAN
16 AUG	3.72	3.38	3.55
6 SEP	3.93	3.93	3.93
MEAN	3.82	3.66	3.74

IN SCT OX NRATE OX	NONE	DE+TR	MEAN
175	3.82	3.66	3.74
275	3.83	3.66	3.74
MEAN	3.82	3.66	3.74

IN SCT OX GRORG OX	NONE	DE+TR	MEAN
NONE	3.99	3.86	3.93
2-CHLORO	3.65	3.46	3.56
MEAN	3.82	3.66	3.74

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

(NOT INCLUDING EXTRA PLOTS)
 MARGIN OF TWO FACTOR TABLES 0.086
 TWO FACTOR TABLES 0.122

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

STRATUM	DF	SE	CV%
WP	35	0.344	8.7

GRAIN MEAN DM% 85.9

PLOT AREA HARVESTED 0.00227