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Yields of the Field Experiments 1986

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

Rothamsted Research

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86/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 I.

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Associate sponsors: P.B. Barraclough, J. Lacey, J.H. Stevenson, A.J. Thomasson, G.N. Thorne, A.H. Weir.

Design: A half replicate of 2 x 2 x 2 x 2 x 2 x 2 x 2 + 2 x 4 + half replicates of 2 x 2 x 2 x 2 and 2 x 2 x 2 + 12 extra plots

Whole plot dimensions: 3.0 x 20.0.

Treatments: Combinations of:-

1.	SOW DATE	Dates of sowing:
	20 AUG	20 August, 1985
	6 SEP	6 September
2.	N RATE	Amounts of N fertilizer (kg N), as 'Nitro-Chalk', 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 11 Mar, 1986
	DIVIDED	One third on 11 Mar, two thirds on 1 Apr
4.	GROWREG	Growth regulator:
	NONE	None
	2-CHLORO	2-chloroethylphosphonic acid applied at 0.48 kg in 220 l on 12 June, with a wetter ('Agral' at 0.10 l)
5.	INSCTCDE	Insecticides:
	NONE	None
	DE+TR	Deltamethrin at 7.5 g in 220 l on 12 Nov, 1985, triazophos at 0.40 l in 220 l on 24 June, 1986

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6. AUT FUNG		Autumn fungicide:
	NONE	None
	PROCHLOR	Prochloraz at 0.50 kg in 220 l on 26 Nov, 1985
7. S FUNG		Spring and summer fungicides:
	NONE	None
	PRO+IPR	Prochloraz at 0.50 kg in 220 l on 28 April, 1986, iprodione at 0.50 kg in 220 l on 23 June

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

1. SOWDAT N		Dates of sowing:
	20 AUG	20 August, 1985
	6 SEP	6 September
2. N RATE N		Amounts of N fertilizer (kg N), as 'Nitro-Chalk', in addition to a basal application of 50 kg N to the seedbed. Applied as a single dressing on 11 March, 1986:
	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:
	20 AUG	20 August, 1985
	6 SEP	6 September
2. N RATE P		Amounts of N fertilizer (kg N), as 'Nitro-Chalk', 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 11 Mar, 1986
	DIVIDED	One third on 11 Mar, two thirds on 1 Apr
4. GROREG P		Growth regulator:
	NONE	None
	2-CHLORO	2-chloroethylphosphonic acid applied at 0.48 kg in 220 l on 12 June, 1986, with a wetter ('Agral' at 0.1 l)

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plus combinations of the following (all given N as N RATE 175, SINGLE, fungicides as above and oxamyl at 5 kg to the seedbed):

1. SODATE OX	Dates of sowing:
20 AUG	20 August, 1985
6 SEP	6 September
2. GRORG OX	Growth regulator:
NONE	None
2-CHLORO	2-chloroethylphosphonic acid applied at 0.48 kg in 220 l on 12 June, with a wetter ('Agral' at 0.1 l)
3. INSCT OX	Insecticides:
NONE	None
DE+TR	Deltamethrin at 7.5 g in 220 l on 12 Nov, 1985, triazophos at 0.40 l in 220 l on 24 June, 1986

plus two replicates of three treatments (all given N as N RATE 275, DIVIDED and insecticides and fungicides as above):

FOL NUT	Foliar nutrients:
N	N at 3.2 kg (1.0 kg as ammonium nitrate, 2.2 kg as urea; solution applied at 12 l in 220 l on 30 Apr, 1986)
N+MIC	N (as above) plus micronutrients: Mg at 480 g, Mn at 162 g, Cu at 32.4 g, Fe at 3.6 g, B at 3.6 g, Zn at 1.68 g and Mo at 0.84 g applied (as 'BASF Foliar 36' at 12 l) in 220 l on 30 Apr
N+MIC+S	Extra N plus micronutrients (as above) plus sulphur at 8.0 kg (as 'Thiovit' at 10 kg) in 220 l on 12 Mar

plus two extra treatments all given N as N RATE 275, DIVIDED and insecticides and fungicides as above:

EXT GREG	
20 AUG T	Sown 20 August, 1985, triapenthenol applied (as 'UK 244a' at 0.70 kg) in 220 l on 30 Apr, 1986
6 SEP T	Sown 6 September, 1985, triapenthenol applied (as 'UK 244a' at 0.70 kg) in 220 l on 30 Apr, 1986

plus two extra treatments:

EXT NONE	
SE NONE	Sown 20 August, 1985, given none of the chemical treatments above
SL NONE	Sown 6 September, given none of the chemical treatments above

Two additional plots were used for root studies, yields not taken.

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Basal applications: Manures: (0:24:24) at 200 kg. 'Nitro-Chalk' at 180 kg. Weedkillers: Fluazifop-P-butyl at 0.19 kg in 280 l with a wetting agent ('Agral' at 0.28 l). Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Desiccant: Diquat at 0.60 kg ion in 500 l with a wetting agent ('Agral' at 0.50 l).

Seed: Bienvenu, dressed gamma HCH, thiram and fenpropimorph, sown at 8.0 kg.

Cultivations, etc.:- Rotary grubbed: 16 Aug, 1985. PK applied, basal N applied, spring-tine cultivated: 19 Aug. Fluazifop-P-butyl, with wetting agent, applied to SOW DATE 20 AUG: 26 Sept and to SOW DATE 6 SEP: 17 Oct. 'Matrikerb' applied: 30 Oct. Desiccant with wetting agent applied: 24 July, 1986. Combine harvested: 2 Aug. Previous crops: W. wheat 1984, w. barley 1985.

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

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

N RATE	175	275	MEAN
SOW DATE			
20 AUG	3.55	3.83	3.69
6 SEPT	3.67	3.83	3.75
MEAN	3.61	3.83	3.72

N DIVIS	SINGLE	DIVIDED	MEAN
SOW DATE			
20 AUG	3.70	3.69	3.69
6 SEPT	3.70	3.81	3.75
MEAN	3.70	3.75	3.72

N DIVIS	SINGLE	DIVIDED	MEAN
N RATE			
175	3.62	3.60	3.61
275	3.77	3.90	3.83
MEAN	3.70	3.75	3.72

GROWREG	NONE	2-CHLORO	MEAN
SOW DATE			
20 AUG	3.69	3.69	3.69
6 SEPT	3.75	3.75	3.75
MEAN	3.72	3.72	3.72

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

GROWREG N RATE	NONE	2-CHLORO	MEAN
175	3.61	3.61	3.61
275	3.83	3.84	3.83
MEAN	3.72	3.72	3.72

GROWREG N DIVIS	NONE	2-CHLORO	MEAN
SINGLE	3.71	3.68	3.70
DIVIDED	3.73	3.77	3.75
MEAN	3.72	3.72	3.72

INSCTCDE SOW DATE	NONE	DE+TR	MEAN
20 AUG	3.70	3.69	3.69
6 SEPT	3.78	3.72	3.75
MEAN	3.74	3.71	3.72

INSCTCDE N RATE	NONE	DE+TR	MEAN
175	3.60	3.62	3.61
275	3.88	3.79	3.83
MEAN	3.74	3.71	3.72

INSCTCDE N DIVIS	NONE	DE+TR	MEAN
SINGLE	3.77	3.62	3.70
DIVIDED	3.71	3.79	3.75
MEAN	3.74	3.71	3.72

INSCTCDE GROWREG	NONE	DE+TR	MEAN
NONE	3.78	3.67	3.72
2-CHLORO	3.70	3.75	3.72
MEAN	3.74	3.71	3.72

AUT FUNG SOW DATE	NONE	PROCHLOR	MEAN
20 AUG	3.62	3.77	3.69
6 SEPT	3.72	3.78	3.75
MEAN	3.67	3.77	3.72

AUT FUNG N RATE	NONE	PROCHLOR	MEAN
175	3.52	3.70	3.61
275	3.82	3.85	3.83
MEAN	3.67	3.77	3.72

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

AUT FUNG N DIVIS	NONE	PROCHLOR	MEAN
SINGLE	3.60	3.79	3.70
DIVIDED	3.75	3.75	3.75
MEAN	3.67	3.77	3.72

AUT FUNG GROWREG	NONE	PROCHLOR	MEAN
NONE	3.69	3.76	3.72
2-CHLORO	3.66	3.79	3.72
MEAN	3.67	3.77	3.72

AUT FUNG INSCTCDE	NONE	PROCHLOR	MEAN
NONE	3.67	3.81	3.74
DE+TR	3.67	3.74	3.71
MEAN	3.67	3.77	3.72

S FUNG SOW DATE	NONE	PRO+IPR	MEAN
20 AUG	3.61	3.78	3.69
6 SEPT	3.65	3.85	3.75
MEAN	3.63	3.81	3.72

S FUNG N RATE	NONE	PRO+IPR	MEAN
175	3.52	3.70	3.61
275	3.74	3.93	3.83
MEAN	3.63	3.81	3.72

S FUNG N DIVIS	NONE	PRO+IPR	MEAN
SINGLE	3.53	3.86	3.70
DIVIDED	3.73	3.77	3.75
MEAN	3.63	3.81	3.72

S FUNG GROWREG	NONE	PRO+IPR	MEAN
NONE	3.60	3.84	3.72
2-CHLORO	3.66	3.79	3.72
MEAN	3.63	3.81	3.72

S FUNG INSCTCDE	NONE	PRO+IPR	MEAN
NONE	3.64	3.84	3.74
DE+TR	3.62	3.79	3.71
MEAN	3.63	3.81	3.72

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

S FUNG / AUT FUNG	NONE	PRO+IPR	MEAN
NONE	3.54	3.80	3.67
PROCHLOR	3.72	3.83	3.77
MEAN	3.63	3.81	3.72

N RATE N / SOWDAT N	0	125	225	325	MEAN
20 AUG	2.68	3.94	3.80	4.16	3.64
6 SEPT	1.94	3.69	4.06	3.79	3.37
MEAN	2.31	3.81	3.93	3.97	3.51

N RATE P / SOWDAT P	175	275	MEAN
20 AUG	3.86	3.91	3.88
6 SEPT	3.75	3.73	3.74
MEAN	3.81	3.82	3.81

N DIV P / SOWDAT P	SINGLE	DIVIDED	MEAN
20 AUG	4.00	3.76	3.88
6 SEPT	3.67	3.81	3.74
MEAN	3.84	3.79	3.81

N DIV P / N RATE P	SINGLE	DIVIDED	MEAN
175	3.90	3.71	3.81
275	3.78	3.86	3.82
MEAN	3.84	3.79	3.81

GROREG P / SOWDAT P	NONE	2-CHLORO	MEAN
20 AUG	3.90	3.87	3.88
6 SEPT	3.79	3.69	3.74
MEAN	3.85	3.78	3.81

GROREG P / N RATE P	NONE	2-CHLORO	MEAN
175	3.77	3.85	3.81
275	3.92	3.71	3.82
MEAN	3.85	3.78	3.81

GROREG P / N DIV P	NONE	2-CHLORO	MEAN
SINGLE	3.96	3.72	3.84
DIVIDED	3.74	3.84	3.79
MEAN	3.85	3.78	3.81

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

***** TABLES OF MEANS

GRORG OX / SODATE OX	NONE	2-CHLORO	MEAN
20 AUG	3.97	4.16	4.07
6 SEPT	3.64	3.83	3.73
MEAN	3.80	3.99	3.90

INSCT OX / SODATE OX	NONE	DE+TR	MEAN
20 AUG	3.95	4.18	4.07
6 SEPT	3.61	3.85	3.73
MEAN	3.78	4.02	3.90

INSCT OX / GRORG OX	NONE	DE+TR	MEAN
NONE	3.69	3.92	3.80
2-CHLORO	3.88	4.11	3.99
MEAN	3.78	4.02	3.90

FOL NUT	N	N+MIC	N+MIC+S	MEAN
	4.00	3.70	4.19	3.96

EXT GREG	20 AUG T	6 SEPT T	MEAN
	4.38	4.31	4.35

EXTR NON	SE NONE	SL NONE	MEAN
	2.34	1.83	2.09

GRAND MEAN 3.72

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

(NOT INCLUDING EXTRA PLOTS)
MARGIN OF TWO FACTOR TABLES 0.063
TWO FACTOR TABLES 0.089

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

STRATUM	DF	SE	CV%
BLOCK.WP	32	0.252	6.8

GRAIN MEAN DM% 88.9

PLOT AREA HARVESTED 0.00294

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