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

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88/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, J. Lacey, S.P. McGrath, A.H. Weir.

Design: A half replicate of $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 + 3$ replicates of $2 \times 6 + 12$ extra plots.

Whole plot dimensions: 3.0 x 21.0.

Treatments: Combinations of:-

1. **VARIETY** Varieties, sown at 8 kg in rows 17 cm apart:
ARIANA
BIENVENU
2. **SOW DATE** Dates of sowing:
19 AUG 19 August, 1987
10 SEP 10 September
3. **N RATE** Amounts of N fertilizer (kg N), as 'Nitro-Chalk', in addition to a basal application of 50 kg N as 'Nitram' to the seedbed:
150
250
4. **N DIVIS** Division of N fertilizer application:
SINGLE All on 16 Feb, 1988
DIVIDED 50 kg to N RATE 150, 75 kg to N RATE 250 on 16 Feb, remainder on 17 Mar
5. **GROWREG** Growth regulator:
NONE None
TRIAPEN Triapenthenol at 0.70 kg in 220 l on 8 Apr, 1988 to SOWDATE 19 AUG and on 18 Apr to SOWDATE 10 SEPT
6. **INSCTCDE** Insecticides:
NONE None
DE+MA+TR Deltamethrin at 0.0062 kg in 220 l on 5 Oct, 1987 and 9 Oct
Malathion at 1.26 kg in 220 l on 8 Apr, 1988 and 18 Apr
Triazophos at 0.42 kg in 220 l on 14 June

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7. **FUNGICIDE** Fungicide in autumn, spring and summer:

NONE None
PR+IP Prochloraz in autumn and in spring at 0.50 kg in 220 l on 27 Nov, 1987 and 5 Apr, 1988, iprodione in summer at 0.50 kg in 220 l on 14 June

plus combinations of the following (Ariana, sown later in rows 17 cm apart and all given seedbed nitrogen, divided nitrogen, growth regulator, insecticides and fungicides):

1. **SEEDRA N** Seed rate, (kg):

8
16

2. **N RATE N** Amounts of N fertilizer (kg N) as divided applications on 16 Feb and 17 Mar:

0+0
25+25
25+75
50+100
75+175
125+225

plus two extra treatments (Ariana, sown later at 16 kg in rows 12 cm apart and all given seedbed nitrogen, divided nitrogen, growth regulator, insecticides and fungicides):

N RATE P Amounts of N fertilizer as divided applications on 16 Feb and 17 Mar (kg N):

25+25
125+225

plus two extra treatments (all Ariana, sown later, at 8 kg in rows 17 cm apart and given 150 kg as divided nitrogen, given fungicides as above and oxamyl at 5 kg to the seedbed)

TR IN OX Growth regulator or insecticide given to oxamyl treated plots
TR+OX Triapenthenol in spring, no insecticide
IN+OX Insecticide in autumn and spring, no growth regulator

NOTE: A planned test of foliar nutrients was omitted in error.

Basal applications: Manures: 'Nitram' at 140 kg. Weedkillers: TCA at 16.2 kg in 200 l. Paraquat at 0.40 kg ion in 200 l (to SOWDATE 10 SEP only). Metazachlor at 0.75 kg and later at 0.50 kg in 380 l (to SOWDATE 19 AUG) and at 1.2 kg in 380 l (to SOWDATE 10 SEP). Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 520 l.

Seed: Varieties, dressed gamma HCH, thiram and fenpropimorph.

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Cultivations, etc.:- Ploughed: 12 Aug, 1987. Discd: 17 Aug. TCA applied, N applied: 18 Aug. Seed sown for SOWDATE 19 AUG: 19 Aug. First metazachlor applied to SOWDATE 19 AUG: 21 Aug. Paraquat applied (to SOWDATE 10 SEP): 9 Sept. Oxamyl treatments applied, harrowed in, seed sown for SOWDATE 10 SEP: 10 Sept. Second metazachlor applied to SOWDATE 19 AUG and only application to SOWDATE 10 SEP: 2 Oct. VARIETY BIENVENU, SOWDATE 19 AUG plots desiccant with wetting agent applied: 19 July, 1988. These plots combine harvested, remaining plots desiccant with wetting agent applied: 26 July. These remaining plots combine harvested: 1 Aug. Previous crops: W. wheat 1986, w. barley 1987.

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. Microflora of leaf and pods were assessed up to harvest and some seed analysed for glucosinolate content. Percentage of oil in grain was measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

***** Tables of means *****

SOW DATE	19 AUG	10 SEP	Mean
VARIETY			
ARIANA	3.19	3.16	3.17
BIENVENU	3.58	3.63	3.61
Mean	3.38	3.40	3.39
N RATE			
	150	250	Mean
VARIETY			
ARIANA	3.12	3.23	3.17
BIENVENU	3.57	3.64	3.61
Mean	3.35	3.43	3.39
N RATE			
	150	250	Mean
SOW DATE			
19 AUG	3.26	3.50	3.38
10 SEP	3.43	3.37	3.40
Mean	3.35	3.43	3.39
N DIVIS			
	SINGLE	DIVIDED	Mean
VARIETY			
ARIANA	3.12	3.23	3.17
BIENVENU	3.65	3.56	3.61
Mean	3.38	3.40	3.39
N DIVIS			
	SINGLE	DIVIDED	Mean
SOW DATE			
19 AUG	3.43	3.34	3.38
10 SEP	3.34	3.46	3.40
Mean	3.38	3.40	3.39

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

***** Tables of means *****

N DIVIS	SINGLE	DIVIDED	Mean
N RATE			
150	3.34	3.35	3.35
250	3.43	3.44	3.43
Mean	3.38	3.40	3.39
GROWREG	NONE	TRIAPEN	Mean
VARIETY			
ARIANA	2.98	3.37	3.17
BIENVENU	3.48	3.74	3.61
Mean	3.23	3.55	3.39
GROWREG	NONE	TRIAPEN	Mean
SOW DATE			
19 AUG	3.23	3.53	3.38
10 SEP	3.22	3.58	3.40
Mean	3.23	3.55	3.39
GROWREG	NONE	TRIAPEN	Mean
N RATE			
150	3.23	3.46	3.35
250	3.22	3.65	3.43
Mean	3.23	3.55	3.39
GROWREG	NONE	TRIAPEN	Mean
N DIVIS			
SINGLE	3.18	3.59	3.38
DIVIDED	3.27	3.52	3.40
Mean	3.23	3.55	3.39
INSCTCDE	NONE	DE+MA+TR	Mean
VARIETY			
ARIANA	3.10	3.25	3.17
BIENVENU	3.48	3.73	3.61
Mean	3.29	3.49	3.39
INSCTCDE	NONE	DE+MA+TR	Mean
SOW DATE			
19 AUG	3.21	3.55	3.38
10 SEP	3.37	3.43	3.40
Mean	3.29	3.49	3.39

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

***** Tables of means *****

INSCTCDE	NONE	DE+MA+TR	Mean
N RATE			
150	3.24	3.45	3.35
250	3.34	3.53	3.43
Mean	3.29	3.49	3.39

INSCTCDE	NONE	DE+MA+TR	Mean
N DIVIS			
SINGLE	3.30	3.47	3.38
DIVIDED	3.28	3.51	3.40
Mean	3.29	3.49	3.39

INSCTCDE	NONE	DE+MA+TR	Mean
GROWREG			
NONE	3.21	3.24	3.23
TRIAPEN	3.37	3.74	3.55
Mean	3.29	3.49	3.39

FUNGCIDE	NONE	PR+IP	Mean
VARIETY			
ARIANA	2.84	3.51	3.17
BIENVENU	3.20	4.01	3.61
Mean	3.02	3.76	3.39

FUNGCIDE	NONE	PR+IP	Mean
SOW DATE			
19 AUG	3.08	3.68	3.38
10 SEP	2.96	3.83	3.40
Mean	3.02	3.76	3.39

FUNGCIDE	NONE	PR+IP	Mean
N RATE			
150	3.01	3.68	3.35
250	3.04	3.83	3.43
Mean	3.02	3.76	3.39

FUNGCIDE	NONE	PR+IP	Mean
N DIVIS			
SINGLE	3.00	3.76	3.38
DIVIDED	3.05	3.75	3.40
Mean	3.02	3.76	3.39

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

***** Tables of means *****

FUNGCIDE	NONE	PR+IP	Mean
GROWREG			
NONE	2.84	3.61	3.23
TRIAPEN	3.21	3.90	3.55
Mean	3.02	3.76	3.39
FUNGCIDE	NONE	PR+IP	Mean
INSCTCDE			
NONE	3.00	3.59	3.29
DE+MA+TR	3.05	3.93	3.49
Mean	3.02	3.76	3.39
SEEDRA N	8	16	Mean
N RATE N			
0+0	2.73	2.55	2.64
25+25	3.38	3.12	3.25
25+75	3.39	3.54	3.47
50+100	3.86	3.67	3.76
75+175	4.03	3.98	4.00
125+225	3.95	3.87	3.91
Mean	3.56	3.45	3.51
N RATE P	25+25	125+225	Mean
	3.18	4.05	3.62
TR IN OX	TR+OX	IN+OX	Mean
	4.79	3.91	4.35
GRAIN MEAN	3.47		

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

*** Standard errors of differences of means ***

	VARIETY	SOW DATE	N RATE	N DIVIS
	0.036	0.036	0.080	0.080
	GROWREG	INSCTCDE	FUNGCIDE	VARIETY
	0.080	0.080	0.080	SOW DATE
				0.051
	VARIETY	SOW DATE	VARIETY	SOW DATE
	N RATE	N RATE	N DIVIS	N DIVIS
	0.087	0.087	0.087	0.087
Except when comparing means with the same level(s) of	VARIETY		0.113	
	SOW DATE	0.113		0.113
	N RATE	VARIETY	SOW DATE	N RATE
	N DIVIS	GROWREG	GROWREG	GROWREG
	0.113	0.087	0.087	0.113
Except when comparing means with the same level(s) of	VARIETY	0.113		
	SOW DATE		0.113	
	N RATE			0.087
	GROWREG			0.087
	N DIVIS	VARIETY	SOW DATE	N RATE
	GROWREG	INSCTCDE	INSCTCDE	INSCTCDE
	0.113	0.087	0.087	0.113
Except when comparing means with the same level(s) of	VARIETY	0.113		
	SOW DATE		0.113	
	N DIVIS	GROWREG	VARIETY	SOW DATE
	INSCTCDE	INSCTCDE	FUNGCIDE	FUNGCIDE
	0.113	0.113	0.087	0.087
Except when comparing means with the same level(s) of	VARIETY		0.113	
	SOW DATE			0.113
	N RATE	N DIVIS	GROWREG	INSCTCDE
	FUNGCIDE	FUNGCIDE	FUNGCIDE	FUNGCIDE
	0.113	0.113	0.113	0.113
Except when comparing means with the same level(s) of	N RATE			
	GROWREG		0.087	
	FUNGCIDE		0.087	

***** Stratum standard errors and coefficients of variation *****

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.072	2.1
BLOCK.WP.SP	26	0.318	9.4
GRAND MEAN DM%	78.4	PLOT AREA HARVESTED	0.00299