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Winter Oilseed Rape

Rothamsted Research

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87/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.

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, S.P. McGrath, D.S. Powlson, A.J. Thomasson, A.H. Weir.

Design: A half replicate of $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ + a replicate of $2 \times 2 \times 4$ + half replicates of $2 \times 2 \times 2 \times 2$ and $2 \times 2 \times 2$ + 14 extra plots

Whole plot dimensions: 3.0 x 21.0.

Treatments: Combinations of:-

- | | |
|-------------|---|
| 1. VARIETY | Varieties: |
| ARIANA | |
| BIENVENU | |
| 2. SOW DATE | Dates of sowing: |
| 14 AUG | 14 August, 1986 |
| 4 SEP | 4 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, 1987 |
| DIVIDED | 50 kg on 16 Feb, remainder on 16 Mar |
| 5. GROWREG | Growth regulator: |
| NONE | None |
| TRIAPEN | Triapenthenol at 0.70 kg in 220 l on 10 Apr, 1987 |
| 6. INSCTCDE | Insecticides: |
| NONE | None |
| DE+TR | Deltamethrin at 7.5 g in 220 l on 3 Oct, 1986 and 20 Nov and triazophos at 0.42 g in 220 l on 15 June, 1987 |

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7. FUNGCIDE Fungicide in autumn, spring and summer:
- | | |
|-------|---|
| NONE | None |
| PR+IP | Prochloraz in autumn and in spring at 0.50 kg in 200 l on 17 Nov, 1986 and 10 Apr, 1987, iprodione in summer at 0.50 kg in 200 l on 15 June |

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

1. VARIETY N Varieties:
- | | |
|----------|--|
| ARIANA | |
| BIENVENU | |
2. SOWDAT N Dates of sowing:
- | | |
|--------|-----------------|
| 14 AUG | 14 August, 1986 |
| 4 SEP | 4 September |
3. N RATE N Amounts of N fertilizer (kg N), as 'Nitro-Chalk', in addition to a basal application of 50 kg N as 'Nitram' to the seedbed. Applied as a single dressing on 16 Feb, 1987:
- | | |
|-----|--|
| 0 | |
| 100 | |
| 200 | |
| 300 | |

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

1. VARIETY P Varieties:
- | | |
|----------|--|
| ARIANA | |
| BIENVENU | |
2. SOWDAT P Dates of sowing:
- | | |
|--------|-----------------|
| 14 AUG | 14 August, 1986 |
| 4 SEP | 4 September |
3. N RATE P Amounts of N fertilizer (kg N), as 'Nitro-Chalk', in addition to a basal application of 50 kg N as 'Nitram' to the seedbed. Applied as a single dressing on 16 Feb, 1987:
- | | |
|-----|--|
| 150 | |
| 250 | |
4. GROREG P Growth regulator:
- | | |
|---------|---|
| NONE | None |
| TRIAPEN | Triapenthenol at 0.70 kg in 220 l on 10 Apr, 1987 |

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plus combinations of the following (all Ariana given N as N RATE 150, SINGLE, fungicides as above and oxamyl at 5 kg to the seedbed):

1. SODATE OX Dates of sowing:
 14 AUG 14 August, 1986
 4 SEP 4 September
2. GRORG OX Growth regulator:
 NONE None
 TRIAPEN Triapenthenol at 0.70 kg in 220 l on 10 Apr, 1987
3. INSCT OX Insecticides:
 NONE None
 DE+TR Deltamethrin at 7.5 g in 220 l on 3 Oct, 1986 and
 20 Nov, triazophos at 0.42 l in 220 l on 15 June,
 1987

plus two replicates (all sown 4 SEP and given N as N RATE 250, DIVIDED and insecticides and fungicides as above) of all combinations of:

1. VAR NUT Varieties:
 ARIANA
 BIENVENU
2. 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 16 Apr,
 1987, 12 June and 23 June)
 N+MIC+S 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 (as 'BASF Foliar 36' at
 12 l), plus sulphur at 8.0 kg (as 'Thiovit')
 applied in 220 l on 16 Apr, 1987, 12 June and
 23 June

plus all combinations of (all given no other inputs):

1. VAR NIL Varieties:
 ARIANA Ariana (duplicated)
 BIENVENU Bienvenu
2. SDAT NIL Dates of sowing:
 14 AUG 14 August, 1986
 4 SEP 4 September

plus 4 plots for N15 studies and 2 plots for root studies not taken for yield.

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Basal applications: Manures: (0:18:36) at 700 kg. 'Nitram' at 140 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Metazachlor at 0.75 kg in 280 l. Metazachlor at 0.50 kg with fluazifop-P-butyl at 0.19 kg and a wetting agent ('Agral' at 0.20 l) in 200 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at 0.50 l) in 500 l.

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

Cultivations, etc.:— Spring-tine cultivated: 8 Aug, 1986. PK applied: 11 Aug. Sodium trichloroacetate applied, basal N applied, oxamyl treatments to SOWDATE 14 AUG applied, harrowed: 13 Aug. Seed sown for SOWDATE 14 AUG: 14 Aug. Metazachlor applied to SOWDATE 14 AUG: 15 Aug. Oxamyl treatments applied and seed sown to SOWDATE 4 SEPT, harrowed in, metazachlor applied to these plots: 4 Sept. Metazachlor with fluazifop-P-butyl and the wetting agent applied: 4 Oct. Desiccant with wetting agent applied: 30 July, 1987. Combine harvested: 4 Aug. Previous crops: W. wheat 1985, w. barley 1986.

NOTE: Detailed observations were made during the season on diseases, pests, N in plants and soil, dry matter accumulation, leaf areas, root growth, light interception and lodging. Measurements were taken of N15 uptake and the fate of N in crop residues. Microflora of leaf and pods were assessed up to harvest and some seed analysed for mineral composition and glucosinolate contents. Percentage of oil in grain was measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SOW DATE	14 AUG	4 SEP	Mean
VARIETY			
ARIANA	3.66	3.78	3.72
BIENVENU	3.91	4.10	4.00
Mean	3.78	3.94	3.86
N RATE	150	250	Mean
VARIETY			
ARIANA	3.65	3.78	3.72
BIENVENU	3.90	4.11	4.00
Mean	3.77	3.95	3.86
N RATE	150	250	Mean
SOW DATE			
14 AUG	3.58	3.98	3.78
4 SEP	3.96	3.91	3.94
Mean	3.77	3.95	3.86
N DIVIS	SINGLE	DIVIDED	Mean
VARIETY			
ARIANA	3.67	3.77	3.72
BIENVENU	4.07	3.94	4.00
Mean	3.87	3.85	3.86

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

N DIVIS	SINGLE	DIVIDED	Mean
SOW DATE			
14 AUG	3.75	3.82	3.78
4 SEP	3.99	3.89	3.94
Mean	3.87	3.85	3.86
N DIVIS	SINGLE	DIVIDED	Mean
N RATE			
150	3.74	3.80	3.77
250	3.99	3.91	3.95
Mean	3.87	3.85	3.86
GROWREG	NONE	TRIAPEN	Mean
VARIETY			
ARIANA	3.49	3.94	3.72
BIENVENU	3.60	4.40	4.00
Mean	3.55	4.17	3.86
GROWREG	NONE	TRIAPEN	Mean
SOW DATE			
14 AUG	3.31	4.26	3.78
4 SEP	3.79	4.09	3.94
Mean	3.55	4.17	3.86
GROWREG	NONE	TRIAPEN	Mean
N RATE			
150	3.48	4.06	3.77
250	3.61	4.29	3.95
Mean	3.55	4.17	3.86
GROWREG	NONE	TRIAPEN	Mean
N DIVIS			
SINGLE	3.60	4.14	3.87
DIVIDED	3.50	4.21	3.85
Mean	3.55	4.17	3.86
INSCTCDE	NONE	DE+TR	Mean
VARIETY			
ARIANA	3.64	3.80	3.72
BIENVENU	4.04	3.97	4.00
Mean	3.84	3.88	3.86
INSCTCDE	NONE	DE+TR	Mean
SOW DATE			
14 AUG	3.80	3.76	3.78
4 SEP	3.87	4.01	3.94
Mean	3.84	3.88	3.86

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

INSCTCDE	NONE	DE+TR	Mean
N RATE			
150	3.72	3.82	3.77
250	3.95	3.95	3.95
Mean	3.84	3.88	3.86
INSCTCDE	NONE	DE+TR	Mean
N DIVIS			
SINGLE	3.78	3.96	3.87
DIVIDED	3.89	3.81	3.85
Mean	3.84	3.88	3.86
INSCTCDE	NONE	DE+TR	Mean
GROWREG			
NONE	3.57	3.53	3.55
TRIAPEN	4.11	4.24	4.17
Mean	3.84	3.88	3.86
FUNGCIDE	NONE	PR+IP	Mean
VARIETY			
ARIANA	3.53	3.90	3.72
BIENVENU	3.82	4.19	4.00
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
SOW DATE			
14 AUG	3.65	3.91	3.78
4 SEP	3.70	4.17	3.94
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
N RATE			
150	3.55	3.99	3.77
250	3.80	4.09	3.95
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
N DIVIS			
SINGLE	3.70	4.04	3.87
DIVIDED	3.66	4.05	3.85
Mean	3.68	4.04	3.86
FUNGCIDE	NONE	PR+IP	Mean
GROWREG			
NONE	3.33	3.77	3.55
TRIAPEN	4.03	4.32	4.17
Mean	3.68	4.04	3.86

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

FUNGCIDE	NONE	PR+IP	Mean		
INSCTCDE					
	NONE	4.04	3.63	3.84	
	DE+TR	4.04	3.72	3.88	
Mean	3.68	4.04	3.86		
SOWDAT N	14 AUG	4 SEP	Mean		
VARIETY N					
	ARIANA	3.47	3.70	3.59	
	BIENVENU	4.05	4.18	4.11	
Mean	3.94	3.76	3.85		
N RATE N	0	100	200	300	Mean
VARIETY N					
	ARIANA	3.58	4.19	4.19	3.59
	BIENVENU	4.20	4.60	4.81	4.11
Mean	2.61	3.89	4.40	4.50	3.85
N RATE N	0	100	200	300	Mean
SOWDAT N					
	14 AUG	3.94	4.43	4.45	3.94
	4 SEP	3.84	4.36	4.55	3.76
Mean	2.61	3.89	4.40	4.50	3.85
SOWDAT P	14 AUG	4 SEP	Mean		
VARIETY P					
	ARIANA	3.86	4.14	4.00	
	BIENVENU	4.56	4.25	4.41	
Mean	4.19	4.21	4.20		
N RATE P	150	250	Mean		
VARIETY P					
	ARIANA	4.15	3.85	4.00	
	BIENVENU	4.92	3.89	4.41	
Mean	3.87	4.53	4.20		
N RATE P	150	250	Mean		
SOWDAT P					
	14 AUG	4.64	3.75	4.19	
	4 SEP	4.43	3.99	4.21	
Mean	3.87	4.53	4.20		
GROREG P	NONE	TRIAPEN	Mean		
VARIETY P					
	ARIANA	4.13	3.87	4.00	
	BIENVENU	4.54	4.27	4.41	
Mean	4.07	4.34	4.20		

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GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

GROREG P	NONE	TRIAPEN	Mean
SOWDAT P			
14 AUG	4.06	4.33	4.19
4 SEP	4.08	4.34	4.21
Mean	4.07	4.34	4.20
GROREG P	NONE	TRIAPEN	Mean
N RATE P			
150	3.74	4.00	3.87
250	4.40	4.67	4.53
Mean	4.07	4.34	4.20
GRORG OX	NONE	TRIAPEN	Mean
SODATE O			
14 AUG	2.97	4.32	3.65
4 SEP	3.89	4.00	3.95
Mean	3.43	4.16	3.80
INSCT OX	NONE	DE+TR	Mean
SODATE O			
14 AUG	2.97	4.32	3.65
4 SEP	4.00	3.89	3.95
Mean	3.49	4.11	3.80
INSCT OX	NONE	DE+TR	Mean
GRORG OX			
NONE	2.97	3.89	3.43
TRIAPEN	4.00	4.32	4.16
Mean	3.49	4.11	3.80
FOL NUT	N	N+MIC+S	Mean
VAR NUT			
ARIANA	3.95	4.15	4.05
BIENVENU	4.70	4.24	4.47
Mean	4.32	4.19	4.26
SDAT NIL	14 AUG	4 SEP	Mean
VAR NIL			
ARIANA	2.31	2.25	2.28
BIENVENU	2.59	2.44	2.52
Mean	2.41	2.31	2.36
GRAIN MEAN	3.83		

87/R/RA/1

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

Table	VARIETY	SOW DATE	N RATE	N DIVIS
s.e.d.	0.094	0.094	0.090	0.090

Table	GROWREG	INSCTCDE	FUNGCIDE	VARIETY
s.e.d.	0.090	0.090	0.090	SOW DATE
				0.133

Table	VARIETY	SOW DATE	VARIETY	SOW DATE
s.e.d.	N RATE	N RATE	N DIVIS	N DIVIS
	0.131	0.131	0.131	0.131
Except when comparing means with the same level(s) of				
	VARIETY		0.128	
	SOW DATE	0.128		0.128

Table	N RATE	VARIETY	SOW DATE	N RATE
s.e.d.	N DIVIS	GROWREG	GROWREG	GROWREG
	0.128	0.131	0.131	0.128
Except when comparing means with the same level(s) of				
	VARIETY	0.128		
	SOW DATE		0.128	
	N RATE			0.131
	GROWREG			0.131

Table	N DIVIS	VARIETY	SOW DATE	N RATE
s.e.d.	GROWREG	INSCTCDE	INSCTCDE	INSCTCDE
	0.128	0.131	0.131	0.128
Except when comparing means with the same level(s) of				
	VARIETY	0.128		
	SOW DATE		0.128	

Table	N DIVIS	GROWREG	VARIETY	SOW DATE
s.e.d.	INSCTCDE	INSCTCDE	FUNGCIDE	FUNGCIDE
	0.128	0.128	0.131	0.131
Except when comparing means with the same level(s) of				
	VARIETY		0.128	
	SOW DATE			0.128

Table	N RATE	N DIVIS	GROWREG	INSCTCDE
s.e.d.	FUNGCIDE	FUNGCIDE	FUNGCIDE	FUNGCIDE
	0.128	0.128	0.128	0.128
Except when comparing means with the same level(s) of				
	N RATE			
	GROWREG		0.131	
	FUNGCIDE	0.131	0.131	

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	6	0.189	4.9
BLOCK.WP.SP	26	0.361	9.4

GRAIN MEAN DM% 87.1

PLOT AREA HARVESTED 0.00299

87/R/RA/2

WINTER OILSEED RAPE

SEED RATES AND ROW SPACINGS

Object: To compare c.v. Ariana on a range of row-widths and seed rates - Great Knott II.

Sponsor: D.P. Yeoman.

Design: 3 randomised blocks of 11 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments: All combinations of:-

1. SEEDRATE Seed rates:
4 KG
6 KG
8 KG
2. ROWSPACE Row spacings:
17.5 CM
35 CM
52.5 CM

plus two extra treatments, sown at 2 kg seed rate:-

- | EXTRA | Row spacings: |
|-----------|---------------|
| 2 KG 35 | 35 cm |
| 2 KG 52.5 | 52.5 cm |

Basal applications: Manures: 'Nitram' at 140 kg and later at 720 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Clopyralid and proyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Fungicides: Prochloraz at 0.50 kg in 200 l. Iprodione at 0.50 kg in 200 l. Insecticides: Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Triazophos at 0.42 l in 200 l. Bird repellent: 'Hoppit' at 3.0 l in 220 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

Seed: Ariana, dressed iprodione, gamma HCH and captan.

Cultivations, etc.: - Heavy spring-tine cultivated, cultivated with rotary grubber: 12 Aug, 1986. First N applied: 15 Aug. Rotary harrowed: 31 Aug. Sodium trichloroacetate applied, harrowed: 1 Sept. Seed sown: 3 Sept. Remaining weedkillers applied: 20 Nov. Bird repellent applied: 12 Dec. Second N applied: 18 Feb, 1987. Prochloraz applied: 22 Apr. Azinphos methyl and demeton-S-methyl sulphone applied: 29 Apr. Iprodione and triazophos applied: 15 June. Desiccant with wetting agent applied: 28 July. Combine harvested: 5 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Plant counts were made at establishment and again in spring.

87/R/RA/2

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

ROWSPACE	17.5 CM	35 CM	52.5 CM	Mean
SEEDRATE				
4 KG	3.45	3.36	3.48	3.43
6 KG	3.17	3.13	2.90	3.07
8 KG	3.02	3.02	2.94	2.99
Mean	3.21	3.17	3.11	3.16

EXTRA	2 KG	35	2 KG	52.5	Mean
		3.61		3.39	3.50

GRAND MEAN 3.22

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

Table	EXTRA	SEEDRATE	ROWSPACE	SEEDRATE ROWSPACE
s.e.d.	0.229	0.132	0.132	0.229

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	20	0.280	8.7

GRAIN MEAN DM% 71.3

PLOT AREA HARVESTED 0.00345

87/R/RA/3

WINTER OILSEED RAPE

VARIETIES AND FUNGICIDES

Object: To study the effects of times of applying fungicides on the incidence of diseases and on the yield of six varieties of w. oilseed rape - Black Horse I.

Sponsor: C.J. Rawlinson.

Design: 2 randomised blocks of 8 plots split into 6.

Whole plot dimensions: 21.0 x 15.0.

Treatments: All combinations of:-

Whole plots

- | | |
|-------------|--|
| 1. AUT FUNG | Fungicide in autumn: |
| NONE | None |
| PROCHLOR | Prochloraz at 0.50 kg in 500 l on 12 Nov, 1986 |
| 2. SPR FUNG | Fungicide in spring: |
| NONE | None |
| PROCHLOR | Prochloraz at 0.50 kg in 200 l on 21 Apr, 1987 |
| 3. SUM FUNG | Fungicide in summer: |
| NONE | None |
| IPRODION | Iprodione at 0.50 kg in 200 l on 15 June, 1987 |

Sub plots

- | | |
|------------|------------|
| 4. VARIETY | Varieties: |
| ARIANA | Ariana |
| BIENVENU | Bienvenu |
| JET NEUF | Jet Neuf |
| LIRADONN | Liradonna |
| MIKADO | Mikado |
| RAFAL | Rafal |

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitram' at 140 kg and later at 800 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Metazachlor at 1.2 kg with fluazifop-P-butyl at 0.19 kg and a wetting agent ('Agral' at 0.20 l) in 200 l. Insecticides: Deltamethrin at 0.0062 kg in 200 l. Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 220 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

87/R/RA/3

Seed : Varieties, sown at 8.0 kg.

Cultivations, etc.:- Spring-tine cultivated: 8 Aug, 1986. PK applied: 11 Aug. Sodium trichloroacetate applied, N applied: 13 Aug. Seed sown: 2 Sept. Remaining weedkillers applied: 4 Oct. Deltamethrin applied: 11 Oct. Bird repellent applied: 12 Dec. Second N applied: 17 Feb, 1987. Remaining insecticides applied: 28 Apr. Desiccant with wetting agent applied: 28 July. Combine harvested: 3 Aug. Previous crops: W. wheat 1985, w. barley 1986.

NOTE: Diseases were assessed between November and July. Growth stage, height and plant development were recorded from May to harvest. Ripening and lodging were assessed before harvest and stubble stem population counts made immediately after harvest.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SPR FUNG	NONE	PROCHLOR						Mean	
AUT FUNG									
	NONE		3.16	3.43				3.29	
	PROCHLOR		3.53	3.32				3.43	
	Mean		3.35	3.38				3.36	
SUM FUNG	NONE	IPRODION						Mean	
AUT FUNG									
	NONE		3.18	3.41				3.29	
	PROCHLOR		3.28	3.58				3.43	
	Mean		3.23	3.49				3.36	
SUM FUNG	NONE	IPRODION						Mean	
SPR FUNG									
	NONE		3.22	3.48				3.35	
	PROCHLOR		3.24	3.51				3.38	
	Mean		3.23	3.49				3.36	
VARIETY	ARIANA	BIENVENU	JET	NEUF	LIRADONN	MIKADO	RAFAL	Mean	
AUT FUNG									
	NONE		3.28	3.88	2.56	2.89	3.91	3.23	3.29
	PROCHLOR		3.25	3.83	2.73	3.16	4.27	3.32	3.43
	Mean		3.27	3.86	2.65	3.03	4.09	3.27	3.36
VARIETY	ARIANA	BIENVENU	JET	NEUF	LIRADONN	MIKADO	RAFAL	Mean	
SPR FUNG									
	NONE		3.23	3.79	2.70	2.96	4.03	3.37	3.35
	PROCHLOR		3.31	3.93	2.59	3.10	4.14	3.18	3.38
	Mean		3.27	3.86	2.65	3.03	4.09	3.27	3.36

87/R/RA/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL	Mean
SUM FUNG							
NONE	3.14	3.76	2.54	2.88	3.93	3.14	3.23
IPRODION	3.40	3.96	2.76	3.17	4.25	3.41	3.49
Mean	3.27	3.86	2.65	3.03	4.09	3.27	3.36

AUT FUNG	SUM FUNG	NONE	IPRODION
NONE	SPR FUNG		
	NONE	3.00	3.32
PROCHLOR	PROCHLOR	3.36	3.49
	NONE	3.44	3.63
	PROCHLOR	3.12	3.53

AUT FUNG	VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL
NONE	SPR FUNG						
	NONE	3.15	3.66	2.43	2.83	3.79	3.11
PROCHLOR	PROCHLOR	3.41	4.10	2.70	2.96	4.03	3.36
	NONE	3.31	3.91	2.98	3.08	4.28	3.62
	PROCHLOR	3.20	3.76	2.49	3.23	4.25	3.01

AUT FUNG	VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL
NONE	SUM FUNG						
	NONE	3.02	3.79	2.56	2.68	3.78	3.26
PROCHLOR	IPRODION	3.54	3.98	2.57	3.11	4.04	3.20
	NONE	3.25	3.73	2.51	3.09	4.08	3.01
	IPRODION	3.26	3.94	2.95	3.23	4.45	3.62

SPR FUNG	VARIETY	ARIANA	BIENVENU	JET NEUF	LIRADONN	MIKADO	RAFAL
NONE	SUM FUNG						
	NONE	3.12	3.64	2.62	2.76	3.86	3.30
PROCHLOR	IPRODION	3.33	3.94	2.79	3.15	4.21	3.43
	NONE	3.15	3.88	2.45	3.01	4.00	2.97
	IPRODION	3.46	3.98	2.73	3.18	4.29	3.40

87/R/RA/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

VARIETY	AUT FUNG	SUM FUNG	NONE	IPRODION
ARIANA	NONE	SPR FUNG		
		NONE	2.86	3.44
	PROCHLOR	PROCHLOR	3.19	3.64
BIENVENU	NONE	NONE	3.39	3.23
		PROCHLOR	3.11	3.29
	PROCHLOR	NONE	3.57	3.75
		PROCHLOR	4.00	4.21
JET NEUF	NONE	NONE	3.70	4.12
		PROCHLOR	3.76	3.76
	PROCHLOR	NONE	2.33	2.52
LIRADONN	NONE	PROCHLOR	2.78	2.61
		NONE	2.91	3.05
	PROCHLOR	PROCHLOR	2.12	2.85
		NONE	2.55	3.10
MIKADO	NONE	PROCHLOR	2.80	3.11
		NONE	2.96	3.21
	PROCHLOR	PROCHLOR	3.21	3.26
RAFAL	NONE	NONE	3.56	4.02
		PROCHLOR	4.00	4.07
	PROCHLOR	NONE	4.17	4.39
		PROCHLOR	3.99	4.51
RAFAL	NONE	NONE	3.10	3.11
		PROCHLOR	3.42	3.30
	PROCHLOR	NONE	3.50	3.75
		PROCHLOR	2.53	3.50

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

Table	AUT FUNG	SPR FUNG	SUM FUNG	VARIETY
s.e.d.	0.136	0.136	0.136	0.104
Table	AUT FUNG	AUT FUNG	SPR FUNG	AUT FUNG
s.e.d.	SPR FUNG	SUM FUNG	SUM FUNG	VARIETY
0.193	0.193	0.193	0.193	0.191
Except when comparing means with the same level(s) of AUT FUNG				0.147
Table	SPR FUNG	SUM FUNG	AUT FUNG	AUT FUNG
s.e.d.	VARIETY	VARIETY	SPR FUNG	SPR FUNG
0.191		0.191	SUM FUNG	VARIETY
Except when comparing means with the same level(s) of SPR FUNG				0.271
			0.147	
				0.208

87/R/RA/3

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

Table	AUT FUNG SUM FUNG VARIETY	SPR FUNG SUM FUNG VARIETY	AUT FUNG SPR FUNG SUM FUNG VARIETY
s.e.d.	0.271	0.271	0.383
Except when comparing means with the same level(s) of			
AUT FUNG.SUM FUNG	0.208		
SPR FUNG.SUM FUNG		0.208	
AUT FUNG.SPR FUNG.SUM FUNG			0.294

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	7	0.273	8.1
BLOCK.WP.SP	40	0.294	8.7

GRAIN MEAN DM% 83.9

SUB PLOT AREA HARVESTED 0.00345

87/R/RA/4

WINTER OILSEED RAPE

GROWTH REGULATORS AND FUNGICIDES

Object: To study the effects of a range of materials on the control of fungi and on the growth and the yield of w. oilseed rape - Black Horse I.

Sponsor: C.J. Rawlinson.

Design: Single replicate of 3 x 4 x 2 x 2.

Whole plot dimensions: 3.0 x 20.0.

Treatments: All combinations of:-

Whole plots

- | | |
|--------------|---|
| 1. FUNGICIDE | Fungicides: |
| NONE | None |
| PROCHLOR | Prochloraz at 0.50 kg |
| PROPICON | Propiconazole at 0.12 kg |
| 2. GRTH REG | Growth regulators: |
| NONE | None |
| MEPIQUAT | Mepiquat chloride at 0.915 kg + 2-chlorethyl-phosphonic acid at 0.465 kg |
| TRIAPENT | Triapenthenol (as 'U.K.244a' at 0.70 kg) with a wetting agent ('Cittowett' at 0.10 l) |
| BAS11100 | 'BAS 11100W' at 3.0 l |
| 3. VARIETY | Varieties: |
| ARIANA | |
| PRIMOR | |
| 4. APP TIME | Times of application: |
| AUTUMN | Autumn, on 27 Nov, 1986 |
| SPRING | Spring, on 15 Apr, 1987 |

NOTE: Treatment sprays were applied in 220 l.

Basal applications: Manures: (0:18:36) at 690 kg. 'Nitram' at 140 kg, and later at 800 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Metazachlor at 1.2 kg with fluazifop-P-butyl at 0.19 kg and a wetting agent ('Agral' at 0.20 l) in 200 l. Insecticides: Deltamethrin at 0.0062 kg in 200 l. Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 220 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

87/R/RA/4

Seed: Varieties, sown at 8.0 kg.

Cultivations, etc.:— Spring-tine cultivated: 8 Aug, 1986. PK applied: 11 Aug. Sodium trichloroacetate applied, N applied: 13 Aug. Seed sown: 2 Sept. Remaining weedkillers applied: 4 Oct. Deltamethrin applied: 11 Oct. Bird repellent applied: 12 Dec. Second N applied: 17 Feb, 1987. Remaining insecticides applied: 28 Apr. Desiccant with wetting agent applied: 28 July. Combine harvested: 3 Aug. Previous crops: W. wheat 1985, w. barley 1986.

NOTE: Plant heights and diseases were assessed throughout the season. Flowering dates were noted and plant population counts made at harvest. Growth analysis and plant structure measurements were made just before harvest, stubble stem population counts were made immediately after harvest. Components of yield were measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

GRTH REG	NONE	MEPIQUAT	TRIAPENT	BAS11100	Mean
FUNGICIDE					
NONE	2.71	2.84	3.10	2.75	2.85
PROCHLOR	3.19	2.98	3.24	3.20	3.15
PROPICON	2.82	2.78	3.17	3.04	2.95
Mean	2.90	2.86	3.17	2.99	2.98
VARIETY	ARIANA	PRIMOR	Mean		
FUNGICIDE					
NONE	3.24	2.45	2.85		
PROCHLOR	3.54	2.76	3.15		
PROPICON	3.25	2.66	2.95		
Mean	3.34	2.62	2.98		
VARIETY	ARIANA	PRIMOR	Mean		
GRTH REG					
NONE	3.36	2.45	2.90		
MEPIQUAT	3.30	2.43	2.86		
TRIAPENT	3.41	2.93	3.17		
BAS11100	3.30	2.69	2.99		
Mean	3.34	2.62	2.98		
APP TIME	AUTUMN	SPRING	Mean		
FUNGICIDE					
NONE	2.83	2.86	2.85		
PROCHLOR	3.19	3.11	3.15		
PROPICON	2.96	2.95	2.95		
Mean	2.99	2.97	2.98		

87/R/RA/4

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

APP TIME	AUTUMN	SPRING	Mean
GRTH REG			
NONE	2.88	2.93	2.90
MEPIQUAT	2.95	2.78	2.86
TRIAPENT	3.12	3.22	3.17
BAS11100	3.02	2.97	2.99

Mean	2.99	2.97	2.98
------	------	------	------

APP TIME	AUTUMN	SPRING	Mean
VARIETY			
ARIANA	3.39	3.29	3.34
PRIMOR	2.60	2.65	2.62

Mean	2.99	2.97	2.98
------	------	------	------

FUNGICIDE	VARIETY	ARIANA	PRIMOR
GRTH REG			
NONE	NONE	3.30	2.12
	MEPIQUAT	3.24	2.44
	TRIAPENT	3.41	2.78
	BAS11100	3.01	2.48
PROCHLOR	NONE	3.59	2.79
	MEPIQUAT	3.47	2.49
	TRIAPENT	3.55	2.93
	BAS11100	3.54	2.85
PROPICON	NONE	3.18	2.45
	MEPIQUAT	3.19	2.37
	TRIAPENT	3.28	3.07
	BAS11100	3.34	2.74

FUNGICIDE	APP TIME	AUTUMN	SPRING
GRTH REG			
NONE	NONE	2.68	2.74
	MEPIQUAT	2.81	2.86
	TRIAPENT	3.04	3.15
	BAS11100	2.79	2.70
PROCHLOR	NONE	3.28	3.10
	MEPIQUAT	3.23	2.72
	TRIAPENT	3.13	3.35
	BAS11100	3.14	3.26
PROPICON	NONE	2.69	2.94
	MEPIQUAT	2.81	2.75
	TRIAPENT	3.19	3.16
	BAS11100	3.13	2.94

FUNGICIDE	VARIETY	ARIANA	PRIMOR	SPRING
APP TIME				
NONE		3.21	3.27	2.45
PROCHLOR		3.56	3.51	2.82
PROPICON		3.39	3.11	2.52
				2.46
				2.70
				2.79

87/R/RA/4

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

	VARIETY	ARIANA		PRIMOR	
GRTH REG	APP TIME	AUTUMN	SPRING	AUTUMN	SPRING
NONE		3.24	3.47	2.52	2.38
MEPIQUAT		3.38	3.22	2.53	2.33
TRIAPENT		3.43	3.39	2.81	3.04
BAS11100		3.50	3.09	2.54	2.84

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

Table	FUNGCIDE	GRTH REG	VARIETY	APP TIME
s.e.d.	0.103	0.119	0.084	0.084

Table	FUNGCIDE	FUNGCIDE	GRTH REG	FUNGCIDE
s.e.d.	GRTH REG	VARIETY	VARIETY	APP TIME
	0.206	0.145	0.168	0.145

Table	GRTH REG	VARIETY	FUNGCIDE	FUNGCIDE
s.e.d.	APP TIME	APP TIME	GRTH REG	GRTH REG
			VARIETY	APP TIME
	0.168	0.119	0.291	0.291

Table	FUNGCIDE	GRTH REG
s.e.d.	VARIETY	VARIETY
	APP TIME	APP TIME
	0.206	0.237

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

Stratum	d.f.	s.e.	cv%
WP	6	0.291	9.7

GRAIN MEAN DM% 83.6

PLOT AREA HARVESTED 0.00460

87/R/RA/5

WINTER OILSEED RAPE

PRECISION SOWING

Object: To compare four drills at two seed rates on two sowing dates with and without an insecticide - Great Knott II.

Sponsor: D.P. Yeoman.

Design: 2 replicates of 4 x 2 x 2 x 2 arranged in 4 blocks of 16 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments: All combinations of:-

1. DRILL Drills used to sow seed:

ALPHA AC	Alpha Accord sown in rows 12.5 cm apart, seeds randomly spaced
CNVNTIAL	Conventional, sown in rows 17.6 cm apart, seeds randomly spaced
MONOCENT	Monocentra, sown in rows 25 cm apart, seeds precisely spaced
STANHAY	Stanhay, sown in rows 25 cm apart, seeds precisely spaced

2. SOW DATE Dates of sowing:

18 AUG	18 August, 1986
5 SEP	5 September

3. SEEDRATE Seed rates:

4 KG	
8 KG	

4. INSC TCDE Insecticide:

NONE	None
DELTAMET	Deltamethrin at 0.0075 kg in 220 l on 3 Oct, 1986

NOTES: (1) For the Monocentra drill the seed within the row was spaced at 5.5 cm for the 4 kg seed rate and 2.7 cm for the 8 kg seed rate.

(2) For the Stanhay drill the seed within the row was spaced at 4.8 cm for the 4 kg seed rate and 2.8 cm for the 8 kg seed rate.

Basal applications: Manures: 'Nitram' at 140 kg and later at 720 kg. Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Fungicides: Prochloraz at 0.50 kg in 200 l. Iprodione at 0.50 kg in 200 l. Insecticides: Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

87/R/RA/5

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

Cultivations, etc.:- Heavy spring-tine cultivated, cultivated with rotary grubber: 12 Aug, 1986. First N applied, sodium trichloroacetate applied, harrowed: 15 Aug. SOWDATE 18 AUG seed sown: 18 Aug. SOWDATE 5 SEPT seed sown: 5 Sept. 'Matrikerb' applied: 20 Nov. Bird repellent applied: 24 Dec. Second N applied: 18 Feb, 1987. Prochloraz applied: 22 Apr. Insecticides applied: 29 Apr. Iprodione applied: 15 June. Desiccant with wetting agent applied: 28 July. Combine harvested: 6 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Plant counts were made at establishment and in spring.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SOW DATE	18 AUG	5 SEP	Mean
DRILL			
ALPHA AC	3.88	3.44	3.66
CNVNTIAL	3.85	3.27	3.56
MONOCENT	3.84	3.40	3.62
STANHAY	3.92	3.69	3.81
Mean	3.87	3.45	3.66
SEEDRATE	4 KG	8 KG	Mean
DRILL			
ALPHA AC	3.84	3.48	3.66
CNVNTIAL	3.87	3.25	3.56
MONOCENT	3.83	3.41	3.62
STANHAY	3.93	3.68	3.81
Mean	3.87	3.46	3.66
SEEDRATE	4 KG	8 KG	Mean
SOW DATE			
18 AUG	4.02	3.72	3.87
5 SEP	3.71	3.19	3.45
Mean	3.87	3.46	3.66
INSCTCDE	NONE	DELTAMET	Mean
DRILL			
ALPHA AC	3.51	3.81	3.66
CNVNTIAL	3.52	3.60	3.56
MONOCENT	3.60	3.65	3.62
STANHAY	3.91	3.70	3.81
Mean	3.63	3.69	3.66

87/R/RA/5

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

INSCTCDE	NONE	DELTAMET	Mean	
SOW DATE				
18 AUG	3.84	3.91	3.87	
5 SEP	3.43	3.47	3.45	
Mean	3.63	3.69	3.66	

INSCTCDE	NONE	DELTAMET	Mean	
SEEDRATE				
4 KG	3.85	3.88	3.87	
8 KG	3.41	3.50	3.46	
Mean	3.63	3.69	3.66	

DRILL	SOW DATE	18 AUG		5 SEP	
	SEEDRATE	4 KG	8 KG	4 KG	8 KG
ALPHA AC		3.96	3.80	3.72	3.16
CNVNTIAL		4.08	3.62	3.65	2.89
MONOCENT		3.99	3.69	3.67	3.13
STANHAY		4.06	3.79	3.81	3.57

DRILL	INSCTCDE	18 AUG		5 SEP	
		NONE	DELTAMET	NONE	DELTAMET
ALPHA AC		3.82	3.94	3.20	3.68
CNVNTIAL		3.73	3.97	3.30	3.24
MONOCENT		3.82	3.87	3.37	3.43
STANHAY		3.98	3.87	3.84	3.53

DRILL	INSCTCDE	4 KG		8 KG	
		NONE	DELTAMET	NONE	DELTAMET
ALPHA AC		3.63	4.05	3.39	3.57
CNVNTIAL		3.90	3.84	3.13	3.37
MONOCENT		3.90	3.77	3.29	3.53
STANHAY		3.98	3.88	3.84	3.52

SOW DATE	INSCTCDE	4 KG		8 KG	
		NONE	DELTAMET	NONE	DELTAMET
18 AUG		3.95	4.10	3.73	3.72
5 SEP		3.76	3.67	3.10	3.27

DRILL	SOW DATE	SEEDRATE	4 KG		8 KG	
			INSCTCDE	NONE	DELTAMET	NONE
ALPHA AC	18 AUG		3.81	4.12	3.83	3.77
	5 SEP		3.46	3.98	2.95	3.37
CNVNTIAL	18 AUG		4.00	4.17	3.47	3.77
	5 SEP		3.81	3.50	2.80	2.97
MONOCENT	18 AUG		3.94	4.05	3.70	3.69
	5 SEP		3.85	3.50	2.89	3.37
STANHAY	18 AUG		4.04	4.07	3.92	3.66
	5 SEP		3.93	3.69	3.76	3.38

87/R/RA/5

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

Table	DRILL	SOW DATE	SEEDRATE	INSCTCDE
s.e.d.	0.072	0.051	0.051	0.051
Table	DRILL	DRILL	SOW DATE	DRILL
s.e.d.	SOW DATE	SEEDRATE	SEEDRATE	INSCTCDE
	0.101	0.101	0.072	0.101
Table	SOW DATE	SEEDRATE	DRILL	DRILL
s.e.d.	INSCTCDE	INSCTCDE	SOW DATE	SOW DATE
	0.072	0.072	SEEDRATE	INSCTCDE
			0.143	0.143
Table	DRILL	DRILL*		
s.e.d.	SEEDRATE	SOW DATE		
	INSCTCDE	SEEDRATE		
	0.143	INSCTCDE		
		0.203		

* Within the same level of SOW DATE.SEEDRATE.INSCTCDE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	30	0.203	5.5

GRAIN MEAN DM% 79.1

PLOT AREA HARVESTED 0.00345

87/R/RA/6

WINTER OILSEED RAPE

STRAW TREATMENTS BEFORE SOWING

Object: To study the effects of a range of methods of treating cereal straw on the establishment and yield of w. oilseed rape sown on two dates, with and without seedbed N - Great Knott II.

Sponsors: R.J. Darby, D.P Yeoman.

Design: 2 randomised blocks of 6 plots split into 2 sub plots each split into 2 sub sub plots.

Whole plot dimensions: 6.0 x 33.0.

Treatments: All combinations of:-

Whole plots

- | | |
|-------------|------------------------------------|
| 1. STR DISP | Disposal of straw: |
| BURN | Burnt on 13 Aug, 1986 |
| CHOP | Chopped on 8 Aug |
| BALE | Baled on 7 Aug |
| 2. CULTIVTN | Method of primary cultivation: |
| TINE CULT | Tine cultivated, without inversion |
| PLOUGH | Ploughed on 15 Aug, 1986 |

Sub plots

- | | |
|-------------|------------------|
| 3. SOW DATE | Dates of sowing: |
| 20 AUG | 20 Aug, 1986 |
| 5 SEPT | 5 Sept |

Sub sub plots

- | | |
|------------|--|
| 4. SDBED N | Seedbed nitrogen (kg N) as 'Nitram' on 18 Aug, 1986: |
| 0 | |
| 50 | |

- NOTES: (1) All plots were disced and rotary harrowed on 18 Aug, 1986.
(2) STR DISP BURN plots were spring-tine cultivated on 14 Aug.
(3) CULTIVTN TINE CULT plots were heavy spring-tine cultivated on 18 Aug, and except for STR DISP BURN plots were also rotary cultivated the same day.
(4) CULTIVTN PLOUGH plots were rolled immediately after ploughing.
(5) All plots were harrowed immediately after sowing. All SOW DATE 5 SEPT plots were rolled immediately after harrowing.

87/R/RA/6

Basal applications: Manures: 'Nitram' at 580 kg. Weedkillers: Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Metazachlor at 0.75 kg in 280 l. Molluscicide: Methiocarb at 0.22 kg. Bird repellent: 'Hoppit' at 3.0 l in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at 0.50 l) in 500 l.

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

Cultivations, etc.: - Molluscicide applied to all plots, metazachlor applied to SOWDATE 20 AUG only: 20 Aug, 1986. Metazachlor applied to SOWDATE 5 SEPT: 6 Sept. Remaining weedkillers applied: 20 Nov. Bird repellent applied: 24 Dec. N applied: 18 Feb, 1987. Desiccant with wetting agent applied: 30 July. Combine harvested: 5 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Emergence counts were made in autumn and plant counts in mid-March.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

CULTIVTN	TINE CLT	PLOUGH	Mean
STR DISP			
BURN	3.84	3.78	3.81
CHOP	3.48	3.74	3.61
BALED	3.67	3.63	3.65
Mean	3.66	3.72	3.69
SOW DATE	20 AUG	5 SEPT	Mean
STR DISP			
BURN	3.83	3.79	3.81
CHOP	3.79	3.43	3.61
BALED	3.86	3.44	3.65
Mean	3.82	3.55	3.69
SOW DATE	20 AUG	5 SEPT	Mean
CULTIVTN			
TINE CLT	3.82	3.51	3.66
PLOUGH	3.83	3.60	3.72
Mean	3.82	3.55	3.69
SDBED N	0	50	Mean
STR DISP			
BURN	3.67	3.95	3.81
CHOP	3.56	3.66	3.61
BALED	3.52	3.77	3.65
Mean	3.58	3.79	3.69

87/R/RA/6

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SDBED N	0	50	Mean
CULTIVTN			
TINE CLT	3.52	3.81	3.66
PLOUGH	3.65	3.78	3.72
Mean	3.58	3.79	3.69
SDBED N	0	50	Mean
SOW DATE			
20 AUG	3.72	3.93	3.82
5 SEPT	3.45	3.66	3.55
Mean	3.58	3.79	3.69
STR DISP	SOW DATE	20 AUG	5 SEPT
BURN	CULTIVTN		
	TINE CLT	3.84	3.84
	PLOUGH	3.82	3.74
CHOP	TINE CLT	3.66	3.30
	PLOUGH	3.92	3.56
BALED	TINE CLT	3.95	3.38
	PLOUGH	3.76	3.50
STR DISP	SDBED N	0	50
BURN	CULTIVTN		
	TINE CLT	3.66	4.02
	PLOUGH	3.68	3.88
CHOP	TINE CLT	3.43	3.53
	PLOUGH	3.69	3.79
BALED	TINE CLT	3.46	3.87
	PLOUGH	3.59	3.67
STR DISP	SDBED N	0	50
BURN	SOW DATE		
	20 AUG	3.61	4.04
	5 SEPT	3.73	3.86
CHOP	20 AUG	3.83	3.75
	5 SEPT	3.29	3.57
BALED	20 AUG	3.73	3.99
	5 SEPT	3.32	3.56
CULTIVTN	SDBED N	0	50
TINE CLT	SOW DATE		
	20 AUG	3.66	3.97
	5 SEPT	3.37	3.64
PLOUGH	20 AUG	3.78	3.88
	5 SEPT	3.52	3.68

87/R/RA/6

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

	SOW DATE	20 AUG	5 SEPT	
STR DISP CULTIVTN SDBED N		0	50	0 50
BURN TINE CLT		3.55	4.12	3.76 3.92
PLOUGH		3.66	3.97	3.69 3.79
CHOP TINE CLT		3.69	3.64	3.17 3.43
PLOUGH		3.96	3.87	3.42 3.71
BALED TINE CLT		3.74	4.17	3.19 3.58
PLOUGH		3.72	3.81	3.46 3.54

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

Table	STR DISP	CULTIVTN	SOW DATE	SDBED N
s.e.d.	0.158	0.129	0.043	0.055

Table	STR DISP CULTIVTN	STR DISP SOW DATE	CULTIVTN SOW DATE	STR DISP SDBED N
s.e.d.	0.223	0.166	0.136	0.172
Except when comparing means with the same level(s) of				
STR DISP		0.075		0.096
CULTIVTN			0.061	

Table	CULTIVTN SDBED N	SOW DATE SDBED N	STR DISP CULTIVTN SOW DATE	STR DISP CULTIVTN SDBED N
s.e.d.	0.140	0.070	0.235	0.243
Except when comparing means with the same level(s) of				
CULTIVTN	0.078			
SOW DATE		0.078		
STR DISP.CULTIVTN			0.106	0.135

Table	STR DISP SOW DATE SDBED N	CULTIVTN SOW DATE SDBED N	STR DISP CULTIVTN SOW DATE SDBED N
s.e.d.	0.192	0.157	0.271
Except when comparing means with the same level(s) of			
STR DISP	0.122		
CULTIVTN		0.099	
STR DISP.CULTIVTN			0.172
STR DISP.SOW DATE	0.135		
CULTIVTN.SOW DATE		0.111	
STR DISP.SDBED N	0.122		
CULTIVTN.SDBED N		0.099	
STR DISP.CULTIVTN.SOW DATE			0.192
STR DISP.CULTIVTN.SDBED N			0.172

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	5	0.223	6.0
BLOCK.WP.SP	6	0.106	2.9
BLOCK.WP.SP.SSP	12	0.192	5.2

GRAIN MEAN DM% 86.7 SUB PLOT AREA HARVESTED 0.00368

87/R/RA/7

WINTER OILSEED RAPE

FORMS AND TIMES OF N

Object: To compare the effects of single and divided dressings of urea and 'Nitro-Chalk' on the yield of w. oilseed rape - Great Knott II.

Sponsor: R.J. Darby.

Design: 2 randomised blocks of 2 plots split into 15 sub plots.

Whole plot dimensions: 30.0 x 27.0.

Treatments: All combinations of:-

Whole plots

1. VARIETY Variety:

ARIANA
MIKADO

Sub plots

2. N FORM Forms of nitrogen fertilizer:

AMM NIT Ammonium nitrate (as 'Nitro-Chalk')
UREA Prilled urea

3. N TIME Times of applying a total dressing of 200 kg N:

4 - - - All on 23 Feb, 1987
3 1 - - Three quarters on 23 Feb, one quarter on 16 Mar
3 - 1 - Three quarters on 23 Feb, one quarter on 9 Apr
2 2 - - Half on 23 Feb, half on 16 Mar
2 - 2 - Half on 23 Feb, half on 9 Apr
2 1 1 - Half on 23 Feb, quarter on 16 Mar, quarter on 9 Apr
1 1 1 1 One quarter on 23 Feb and 16 Mar and 9 Apr and 27 Apr

plus two extra treatments

EXTRA

NONE AR No nitrogen fertilizer ARIANA
NONE MI No nitrogen fertilizer MIKADO

NOTE: Seed was dressed with gamma HCH, thiram and fenpropimorph and sown at 8 kg on 3 Sept, 1986.

Basal applications: Weedkillers: Sodium trichloroacetate at 16 kg in 200 l. Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Bird repellent: 'Hoppit' at 3.0 l in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at 0.50 l) in 500 l.

87/R/RA/7

Cultivations, etc.: - Heavy spring-tine cultivated, cultivated with rotary grubber: 12 Aug, 1986. Rotary harrowed: 31 Aug. Sodium trichloroacetate applied, harrowed: 1 Sept. Clopyralid and propyzamide applied: 20 Nov. Bird repellent applied: 24 Dec. Desiccant with wetting agent applied: 30 July, 1987. Combine harvested: 5 Aug. Previous crops: S. wheat 1985, w. barley 1986.

NOTE: Alternaria infection was assessed in July. Percentage of oil in grain was measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

N FORM N TIME	AMM NIT	UREA	Mean
4 - - -	2.65	2.79	2.72
3 1 - -	2.77	2.74	2.76
3 - 1 -	2.61	2.76	2.68
2 2 - -	2.76	2.73	2.74
2 - 2 -	2.64	2.62	2.63
2 1 1 -	2.67	2.83	2.75
1 1 1 1	2.78	2.78	2.78
Mean	2.70	2.75	2.72

VARIETY N TIME	ARIANA	MIKADO	Mean
4 - - -	2.73	2.71	2.72
3 1 - -	2.81	2.71	2.76
3 - 1 -	2.63	2.74	2.68
2 2 - -	2.63	2.86	2.74
2 - 2 -	2.60	2.67	2.63
2 1 1 -	2.75	2.74	2.75
1 1 1 1	2.64	2.92	2.78
Mean	2.68	2.76	2.72

VARIETY N FORM	ARIANA	MIKADO	Mean
AMM NIT	2.68	2.72	2.70
UREA	2.69	2.81	2.75
Mean	2.68	2.76	2.72

87/R/RA/7

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

N FORM VARIETY N TIME	AMM NIT ARIANA	MIKADO	UREA ARIANA	MIKADO
4 - - -	2.69	2.62	2.78	2.80
3 1 - -	2.84	2.71	2.77	2.71
3 - 1 -	2.55	2.67	2.70	2.81
2 2 - -	2.66	2.85	2.59	2.87
2 - 2 -	2.60	2.68	2.59	2.66
2 1 1 -	2.83	2.52	2.68	2.97
1 1 1 1	2.59	2.96	2.68	2.88

EXTRA	NONE AR	NONE MI	Mean
	1.13	1.13	1.13

Grand mean 2.62

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

Table	EXTRA	N TIME	N FORM	
s.e.d.	0.190	0.095	0.051	
Table	N TIME N FORM	N TIME* VARIETY	N FORM* VARIETY	N TIME* N FORM VARIETY*
s.e.d.	0.134	0.134	0.072	0.190

* Within the same level of VARIETY only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	28	0.190	7.3

MEAN DM% 84.4

SUB PLOT AREA HARVESTED 0.00299

87/R/RA/11

WINTER OILSEED RAPE

OVERSOWING IN WHEAT

Object: To study the establishment of rape after wheat by oversowing into the wheat - Great Knott III.

Sponsors: R.J. Darby, D.P. Yeoman.

Design: 3 randomised blocks of 3 plots split into 3 sub plots.

Whole plot dimensions: 15.0 x 16.0.

Treatments: All combinations of:-

Whole plots

- | | |
|-----------|---|
| 1. SOWING | Methods of sowing and straw disposal: |
| OVERS BA | Oversown on 20 Aug, 1986, straw baled on 21 Aug |
| OVERS CH | Oversown on 20 Aug, 1986, straw chopped and spread on 21 Aug |
| CONVEN S | Straw baled on 21 Aug, conventionally sown into conventionally prepared seedbed |

Sub plots

- | | |
|-----------|---|
| 2. N TIME | Timing of nitrogen as 'Nitram'. (Total spring N same for all treatments): |
| SN FN MN | 50 kg N to seedbed, 50 kg N on 19 Feb, 1987 and 150 kg N on 19 Mar |
| - FN - | 200 kg N on 19 Feb |
| - FN MN | 50 kg N on 19 Feb and 150 kg N on 19 Mar |

- NOTES: (1) Oversowing was done into standing wheat. The wheat was harvested later that day.
(2) SOWING CONVEN S plots were ploughed and rolled on 22 Aug, rotary harrowed on 31 Aug.
(3) SOWING OVERS BA and OVERS CH plots were sprayed with fluazifop-P-butyl at 0.19 kg with a wetting agent ('Agral' at 0.38 l) in 380 l on 26 Sept.
(4) One whole plot CONVEN S was missing. An estimated value was used in the analysis.

Basal applications: Weedkillers: Clopyralid and propyzamide (as 'Matrikerb' at 1.6 kg) in 500 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Agral' at 0.50 l) in 500 l.

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

Cultivations, etc.:- Weedkillers applied: 20 Nov, 1986. Desiccant with wetting agent applied: 31 July, 1987. Combine harvested: 6 Aug. Previous crops: W. wheat 1985 and 1986.

NOTE: Plant counts were made in autumn and again in mid-March.

87/R/RA/11

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

	N TIME	SN FN MN	- FN -	- FN MN	Mean
SOWING					
OVERS BA		3.61	3.51	3.38	3.50
OVERS CH		3.47	2.86	2.66	3.00
CONVEN S		3.51	3.28	3.22	3.34
Mean		3.53	3.22	3.09	3.28

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

Table	N TIME	SOWING*
s.e.d.	0.184	0.319

* Within same level of SOWING only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	10	0.391	11.9

GRAIN MEAN DM% 75.2

SUB PLOT AREA HARVESTED 0.00368

87/R/RA/13

WINTER OILSEED RAPE

TIMES AND METHODS OF HARVEST

Object: To investigate the effects of times and methods of harvest on the yield and glucosinolate content of the seed - Webbs and Drapers.

Sponsor: C.J. Rawlinson.

Design: 4 blocks of 2 whole plots each split into 3 sub-plots each split into 3 sub-sub plots.

Whole plot dimensions: Webbs (2 blocks): 78 x 14.
Drapers (2 blocks): 24 x 64.

Treatments: All combinations of:-

Whole plots

- | | |
|--------------|--|
| 1. FUNGICIDE | Fungicide at stem extension: |
| NONE | None |
| PROCHLOR | Prochloraz at 0.50 kg in 500 l on 23 Apr, 1987 |

Sub plots

- | | |
|-------------|--|
| 2. HAR METH | Method of harvest: |
| COMBINE | Combined direct, without prior treatment |
| DESICATE | Desiccated with diquat |
| SWATHE | Swathed before combining |

Sub sub plots

- | | |
|-------------|---------------------------------|
| 3. HAR TIME | Time of harvest: |
| EARLY | Early (seed above 20% moisture) |
| NORMAL | Normal (seed 10 - 15% moisture) |
| LATE | Late (7 - 10 days after NORMAL) |

- NOTES: (1) The HAR METH DESICATE plots were desiccated on 9 July, 1987 24 July and 5 Aug respectively for early, normal and late HAR TIME using diquat at 0.60 kg ion with a wetting agent in 500 l. The wetting agent was 'Enhance' at 0.50 l on the first two occasions, 'Agral' at 0.50 l on the third.
- (2) The HAR METH SWATHE plots were swathed on 9 July, 1987, 23 July and 5 Aug respectively for early, normal and late HAR TIME.
- (3) All HAR METH plots for early and normal HAR TIME were combine harvested on 5 Aug, 1987 and for late HAR TIME on 12 Aug.

Basal applications: Manures: 'Nitram' at 720 kg. Weedkillers: Fluazifop-P-butyl at 0.19 kg with metazachlor at 1.2 kg and a wetting agent ('Agral' at 0.20 l) in 200 l. Insecticides: Azinphos methyl at 0.40 kg and demeton-S-methyl sulphone at 0.12 kg in 300 l. Bird repellent: 'Hoppit' at 3.0 l in 500 l.

Seed: Ariana, dressed iprodione, sown at 6.0 kg.

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Cultivations, etc.:- Heavy spring-tine cultivated: 5 Sept, 1986. Rotary harrowed: 6 Sept. Seed sown: 7 Sept. Weedkillers applied: 4 Oct (Webbs) and 17 Oct (Drapers). Bird repellent applied: 23 Dec. N applied: 20 Feb, 1987. Insecticides applied: 28 Apr. Previous crops: W. wheat 1985 and 1986 on both sites.

NOTE: Seed samples were taken frequently from early July until harvest for glucosinolate analysis.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

HAR METH	COMBINE	DESICATE	SWATHE	Mean
FUNGICIDE				
NONE	3.07	2.63	2.27	2.65
PROCHLOR	3.52	2.71	2.62	2.95
Mean	3.29	2.67	2.44	2.80
HAR TIME	EARLY	NORMAL	LATE	Mean
FUNGICIDE				
NONE	1.99	3.00	2.97	2.65
PROCHLOR	2.18	3.33	3.33	2.95
Mean	2.09	3.17	3.15	2.80
HAR TIME	EARLY	NORMAL	LATE	Mean
HAR METH				
COMBINE	3.26	3.21	3.41	3.29
DESICATE	1.46	3.06	3.48	2.67
SWATHE	1.54	3.22	2.56	2.44
Mean	2.09	3.17	3.15	2.80
FUNGICIDE	HAR TIME	EARLY	NORMAL	LATE
NONE	HAR METH			
	COMBINE	3.04	3.02	3.14
	DESICATE	1.41	2.98	3.49
	SWATHE	1.52	3.01	2.27
PROCHLOR	COMBINE	3.47	3.41	3.67
	DESICATE	1.51	3.14	3.47
	SWATHE	1.57	3.44	2.86

87/R/RA/13

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

Table	HAR METH	HAR TIME	FUNGCIDE* HAR METH
s.e.d.	0.058	0.063	0.082

Table	FUNGCIDE* HAR TIME	HAR METH HAR TIME	FUNGCIDE* HAR METH HAR TIME
s.e.d.	0.090	0.107	0.151
Except when comparing means with the same level(s) of			
	HAR METH	0.110	
	FUNGCIDE.HAR METH		0.155

* Within the same level of FUNGCIDE only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	12	0.116	4.1
BLOCK.WP.SP.SSP	36	0.219	7.8

GRAIN MEAN DM% 79.8

PLOT AREA HARVESTED

HAR METH SWATHE 0.00519

HAR METH COMBINE OR DESICATE 0.00322