

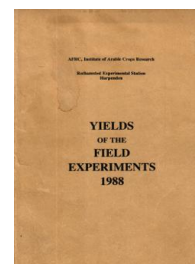
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Winter Oilseed Rape

Rothamsted Research

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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 x 2 x 2 x 2 x 2 x 2 + 3 replicates of 2 x 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

88/R/RA/1

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.

88/R/RA/1

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

88/R/RA/1

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

88/R/RA/1

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

88/R/RA/1

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		

88/R/RA/1

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

88/R/RA/2

WINTER OILSEED RAPE

SEED RATES AND ROW SPACINGS

Object: To compare cv. Ariana on a range of row-widths and seed rates - Whittlocks.

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: Paraquat at 0.40 kg ion in 200 l. Metazachlor at 1.2 kg in 200 l. Insecticides: Azinphos methyl at 0.40 kg and demeton-s-methyl sulphone at 0.12 kg in 300 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 520 l.

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

Cultivations, etc.:- Paraquat applied: 8 Sept, 1987. First N applied, heavy spring-tine cultivated: 14 Sept. Rotary harrowed, seed sown: 15 Sept. Metazachlor applied: 1 Oct. Second N applied: 19 Feb, 1988. Insecticides applied: 18 Apr. Desiccant with wetting agent applied: 20 July. Combine harvested: 27 July. Previous crops: W. wheat 1986, w. barley 1987.

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

88/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	2.92	3.83	3.32	3.36
6 KG	3.64	3.16	3.52	3.44
8 KG	3.29	3.00	3.27	3.18
Mean	3.28	3.33	3.37	3.33

EXTRA	2 KG	35	2 KG	52.5	Mean
	3.45		3.97		3.71

GRAND MEAN 3.40

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

SEEDRATE	ROWSPACE	SEEDRATE ROWSPACE & EXTRA
0.206	0.206	0.356

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	20	0.436	12.8
MEAN DM%	72.2		
PLOT AREA HARVESTED	0.00345		

88/R/RA/3

WINTER OILSEED RAPE

VARIETIES, PESTS AND DISEASES

Object: To investigate the effects of full pest and disease control on a range of low glucosinolate varieties compared with Bienvenu - Black Horse II.

Sponsors: C.J. Rawlinson, I.H. Williams.

Design: 2 randomised blocks of 24 plots.

Whole plot dimensions: 3.0 x 15.0.

Treatments: All combinations of:-

1. **VARIETY** Varieties:

 ARIANA Ariana
 BIENVENU Bienvenu
 COBRA Cobra
 NRPB 2 NRPB 0087-2
 PBI 1 PBI 1
 PBI 3 PBI 3

2. **INSCTCDE** Insecticides:

 NONE None
 FULL Deltamethrin at 0.0062 kg in 200 l on 13 Nov, 1987.
 Azinphos methyl at 0.40 kg and demeton-S-methyl
 sulphone at 0.12 kg in 300 l on 18 Apr, 1988.
 Triazophos at 0.42 kg in 200 l on 16 June.

3. **FUNGCIDE** Fungicides:

 NONE None
 FULL Prochloraz at 0.50 kg in 200 l on 18 Nov, 1987 and
 11 Apr, 1988. Iprodione at 0.50 kg in 200 l on
 16 June.

Basal applications: Manures: 'Nitram' at 140 kg, later at 260 kg and a third time at 460 kg. Weedkiller: Metazachlor at 1.2 kg in 200 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 500 l.

Seed: Varieties, sown at 8.0 kg.

Cultivations, etc.:- Ploughed: 12 Aug, 1987. First N applied: 18 Aug. Discd: 9 Sept. Seed sown: 17 Sept. Weedkillers applied: 5 Oct. Second N applied: 1 Mar, 1988. Third N applied: 7 Apr. Desiccant with wetting agent applied: 27 July. Combine harvested: 1 Aug. Previous crops: W. wheat 1986, w. barley 1987.

NOTE: Disease assessments were made on eight occasions throughout the season and pest numbers were recorded in autumn, spring and summer. Glucosinolate contents, plant tissues and seed, were measured throughout the season.

88/R/RA/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

INSCTCDE	NONE	FULL	Mean
VARIETY			
ARIANA	3.59	3.50	3.54
BIENVENU	3.80	4.24	4.02
COBRA	3.44	3.97	3.70
NRPB 2	3.31	3.81	3.56
PBI 1	3.76	3.82	3.79
PBI 3	3.68	3.98	3.83
Mean	3.60	3.89	3.74

FUNGCIDE	NONE	FULL	Mean
VARIETY			
ARIANA	3.19	3.90	3.54
BIENVENU	3.76	4.29	4.02
COBRA	3.20	4.21	3.70
NRPB 2	3.11	4.01	3.56
PBI 1	3.17	4.41	3.79
PBI 3	3.10	4.56	3.83
Mean	3.26	4.23	3.74

FUNGCIDE	NONE	FULL	Mean
INSCTCDE			
NONE	3.05	4.15	3.60
FULL	3.47	4.31	3.89
Mean	3.26	4.23	3.74

VARIETY	INSCTCDE	NONE	FULL	FULL	
	FUNGCIDE	NONE	FULL	NONE	FULL
ARIANA		3.02	4.16	3.36	3.64
BIENVENU		3.72	3.88	3.79	4.70
COBRA		2.68	4.20	3.71	4.22
NRPB 2		2.83	3.79	3.40	4.22
PBI 1		3.13	4.40	3.22	4.42
PBI 3		2.89	4.47	3.31	4.65

88/R/RA/3

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

VARIETY	INSCTCDE	FUNGCIDE	VARIETY INSCTCDE
0.159	0.092	0.092	0.225
VARIETY FUNGCIDE	INSCTCDE FUNGCIDE	VARIETY INSCTCDE FUNGCIDE & EXTRA	
0.225	0.130	0.318	

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	24	0.318	8.5
GRAIN MEAN DM%	78.1		
PLOT AREA HARVESTED	0.00299		

88/R/RA/4

WINTER OILSEED RAPE

TIMES AND METHODS OF HARVEST

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

Sponsors: C.J. Rawlinson, G.F.J. Milford.

Design: 4 blocks of 2 whole plots each split into 2 sub-plots each split into 3 sub-sub-plots plus 24 extra sub-sub-plots.

Whole plot dimensions: 78.0 x 14.0.

Treatments: All combinations of:-

Whole plots

- | | |
|---------------------|--|
| 1. FUNGICIDE | Fungicide at stem extension: |
| NONE | None |
| PROCHLOR | Prochloraz at 0.50 kg in 200 l on 11 Apr, 1988 |

Sub plots

- | | |
|--------------------|--------------------------|
| 2. HAR METH | Method of harvest: |
| DESICATE | Desiccated with diquat |
| SWATHE | Swathed before combining |

Sub sub plots

- | | |
|--------------------|------------------|
| 3. HAR TIME | Time of harvest: |
| EARLY | 20 July, 1988 |
| NORMAL | 28 July |
| LATE | 2 Aug |

plus eight extra sub plots, to test combining direct, without prior treatment, within **FUNGICIDE**, each divided into 3 sub sub plots for the intended test of **HAR TIME**. Conditions did not permit the sub sub plot test so this became:

FUNG DIR

- | | |
|----------|--|
| 0 | No prochloraz, combined direct, no prior treatment, harvested late (12 sub sub plots) |
| PROCHLOR | Prochloraz at 0.50 kg in 200 l, combined direct, no prior treatment, harvested late (12 sub sub plots) |

88/R/RA/4

- NOTES: (1) The HAR METH DESICATE plots were desiccated on 12 July, 1988 19 July and 1 Aug respectively for early, normal and late HAR TIME using diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 520 l.
- (2) The HAR METH SWATHE plots were swathed on the same dates on which desiccation was done.

Basal applications: Manures: 'Nitram' at 140 kg and later at 720 kg.
Weedkillers: Paraquat at 0.40 kg ion in 200 l. Metazachlor at 1.2 kg in 200 l.

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

Cultivations, etc.:— Paraquat applied: 8 Sept, 1987. First N applied, heavy spring-tine cultivated: 14 Sept. Rotary harrowed: 15 Sept. Seed sown: 16 Sept. Metazachlor applied: 1 Oct. Second N applied: 19 Feb, 1988. Previous crops: W. wheat 1986, w. barley 1987.

NOTE: Seed samples were taken frequently from early July until harvest for glucosinolate analysis. Disease assessments were made on several occasions during July and August.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

**** Tables of means ****

HAR METH	DESICATE	SWATHE	Mean		
FUNGCIDE					
NONE	2.23	1.90	2.07		
PROCHLOR	2.50	2.15	2.33		
Mean	2.36	2.03	2.20		
HAR TIME	EARLY	NORMAL	LATE	Mean	
FUNGCIDE					
NONE	1.91	2.13	2.16	2.07	
PROCHLOR	2.18	2.40	2.40	2.33	
Mean	2.04	2.27	2.28	2.20	
HAR TIME	EARLY	NORMAL	LATE	Mean	
HAR METH					
DESICATE	2.13	2.47	2.49	2.36	
SWATHE	1.95	2.06	2.07	2.03	
Mean	2.04	2.27	2.28	2.20	
FUNGCIDE	HAR METH	HAR TIME	EARLY	NORMAL	LATE
NONE	DESICATE		2.03	2.28	2.37
	SWATHE		1.78	1.98	1.95
PROCHLOR	DESICATE		2.23	2.66	2.61
	SWATHE		2.13	2.15	2.18
FUNG DIR	0	PROCHLOR	MEAN		
	2.39	2.55	2.47		
GRAND MEAN	2.29				

88/R/RA/4

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

	HAR METH	HAR TIME	FUNGCIDE*
			HAR METH
	0.053	0.105	0.075
	FUNGCIDE*	HAR METH	FUNGCIDE*
	HAR TIME	HAR TIME	HAR METH
			HAR TIME
	0.148	0.132	0.186
Except when comparing means with the same level(s) of			
HAR METH		0.148	
FUNGCIDE.HAR METH			0.209

* Within the same level of FUNGCIDE

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	12	0.105	4.6
BLOCK.WP.SP.SSP	40	0.296	12.9

GRAIN MEAN DM% 69.1

SUB PLOT AREA HARVESTED	HAR METH	SWATHE	0.00518
		OTHERS	0.00322

88/R/RA/5

Cultivations, etc.:- Discd twice, first N applied: 19 Aug, 1987. TCA applied, harrowed twice, rotary harrowed: 20 Aug. **SOW DATE** 21 AUG seed sown: 21 Aug. **SOW DATE** 11 SEP rotary harrowed, seed sown: 11 Sept. Metazachlor applied: 1 Oct. Second N applied: 19 Feb, 1988. Desiccant with wetting agent applied: 20 July. Combine harvested: 27 July. Previous crops: W. wheat 1986, w. barley 1987.

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

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SOW DATE	21 AUG	11 SEP	Mean	
DRILL				
ALPHA C	2.32	3.25	2.79	
CNVNTIAL	2.96	3.47	3.22	
STANHAY	2.75	3.27	3.01	
Mean	2.68	3.33	3.00	
SEEDRATE	4 KG	8 KG	Mean	
DRILL				
ALPHA C	2.89	2.68	2.79	
CNVNTIAL	3.39	3.05	3.22	
STANHAY	3.03	2.99	3.01	
Mean	3.10	2.91	3.00	
SEEDRATE	4 KG	8 KG	Mean	
SOW DATE				
21 AUG	2.87	2.49	2.68	
11 SEP	3.34	3.33	3.33	
Mean	3.10	2.91	3.00	
SOW DATE	21 AUG		11 SEP	
DRILL SEEDRATE	4 KG	8 KG	4 KG	8 KG
ALPHA C	2.27	2.36	3.51	3.00
CNVNTIAL	3.28	2.64	3.49	3.46
STANHAY	3.05	2.46	3.01	3.53
SOWDATEX	21 AUG	11 SEP	Mean	
A SDRTX				
2 KG	2.92	3.61	3.26	
16 KG	1.94	2.75	2.35	
Mean	2.43	3.18	2.81	
GRAND MEAN	2.95			

88/R/RA/5

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

DRILL	SOW DATE	SEEDRATE	DRILL SOW DATE
0.162	0.133	0.133	0.230
DRILL SEEDRATE	SOW DATE SEEDRATE	DRILL SOW DATE SEEDRATE	A SDRTX
0.230	0.187	0.325	0.230
SOWDATEX	A SDRTX SOWDATEX		
0.230	0.325		

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	47	0.459	15.5
MEAN DM%	80.0		
PLOT AREA HARVESTED	0.00345		

88/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 - Whittlocks.

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 31.0.

Treatments: All combinations of:-

Whole plots

1. **STR DISP** Disposal of straw:
 - BURN Burnt 14 Aug, 1987
 - CHOP Chopped 18 Aug
 - BALE Baled 14 Aug and bales removed
2. **CULTIVTN** Method of primary cultivation:
 - TINE CULT Tine cultivated, without inversion
 - PLOUGH Ploughed 18 Aug, 1987

Sub plots

3. **SOW DATE** Dates of sowing:
 - 20 AUG 20 Aug, 1987
 - 11 SEPT 11 Sept

Sub sub plots

4. **SDBED N** Seedbed nitrogen (kg N) as 'Nitram' on 19 Aug, 1987:
 - 0
 - 50

- NOTES:**
- (1) All plots were rotary harrowed on 19 Aug, 1987.
 - (2) **STR DISP** BURN plots were disced on 15 Aug.
 - (3) **CULTIVTN** TINE CULT plots were cultivated by rotary grubber and **CULTIVTN** PLOUGH plots were disced on 19 Aug.
 - (4) All plots were harrowed before drilling. **SOW DATE** 11 SEPT plots were also rotary harrowed before drilling. All plots were harrowed in and rolled after drilling.
 - (5) **SOW DATE** 20 AUG plots were sprayed with metazachlor at 0.75 kg in 380 l on 21 Aug, 1987 and at 0.50 kg in 200 l on 1 Oct. **SOW DATE** 11 SEPT plots received metazachlor at 1.2 kg in 200 l on 1 Oct.

88/R/RA/6

Basal applications: Manures: 'Nitram' at 580 kg. Weedkiller:
TCA at 16 kg in 200 l. Desiccant: Diquat at 0.60 kg ion with a
wetting agent ('Enhance' at 0.50 l) in 520 l.

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

Cultivations, etc.:- Weedkiller applied: 20 Aug, 1987. N applied:
18 Feb, 1988. Desiccant with wetting agent applied: 20 July.
Combine harvested: 26 July. Previous crops: W. wheat 1986, w. barley
1987.

NOTE: Emergence counts were made in autumn and plant counts in mid-
March. Percentages of oil in the grain were measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

CULTIVTN	TINE CULT	PLOUGH	Mean
STR DISP			
BURN	3.05	3.20	3.12
CHOP	3.35	3.16	3.25
BALE	3.19	3.33	3.26
Mean	3.20	3.23	3.21
SOW DATE 20 AUG 11 SEPT Mean			
STR DISP			
BURN	2.79	3.45	3.12
CHOP	2.77	3.74	3.25
BALE	2.77	3.76	3.26
Mean	2.78	3.65	3.21
SOW DATE 20 AUG 11 SEPT Mean			
CULTIVTN			
TINE CULT	2.74	3.65	3.20
PLOUGH	2.82	3.64	3.23
Mean	2.78	3.65	3.21
SDBED N 0 50 Mean			
STR DISP			
BURN	3.19	3.06	3.12
CHOP	3.35	3.16	3.25
BALE	3.25	3.28	3.26
Mean	3.26	3.16	3.21
SDBED N 0 50 Mean			
CULTIVTN			
TINE CULT	3.21	3.18	3.20
PLOUGH	3.31	3.14	3.23
Mean	3.26	3.16	3.21

88/R/RA/6

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SDBED N	0	50	Mean
SOW DATE			
20 AUG	2.84	2.72	2.78
11 SEPT	3.69	3.61	3.65
Mean	3.26	3.16	3.21

STR DISP	CULTIVTN	TINE CULT		PLOUGH	
		20 AUG	11 SEPT	20 AUG	11 SEPT
BURN		3.03	3.06	2.55	3.84
CHOP		2.53	4.17	3.01	3.31
BALE		2.66	3.73	2.88	3.78

STR DISP	CULTIVTN	TINE CULT		PLOUGH		
		SDBED N	0	50	0	50
BURN			3.13	2.96	3.25	3.15
CHOP			3.52	3.18	3.18	3.13
BALE			2.99	3.40	3.51	3.15

STR DISP	SDBED N	SOW DATE		20 AUG		11 SEPT	
		0	50	0	50	0	50
BURN		2.70	2.89	3.68	3.22		
CHOP		2.95	2.59	3.75	3.73		
BALE		2.86	2.68	3.64	3.87		

CULTIVTN	SDBED N	SOW DATE		20 AUG		11 SEPT	
		0	50	0	50	0	50
TINE CULT		2.79	2.70	3.64	3.67		
PLOUGH		2.89	2.74	3.74	3.55		

STR DISP	CULTIVTN	SDBED N	SOW DATE		20 AUG		11 SEPT	
			0	50	0	50	0	50
BURN	TINE CULT		2.86	3.20	3.39	2.73		
	PLOUGH		2.54	2.57	3.96	3.72		
CHOP	TINE CULT		2.87	2.20	4.17	4.17		
	PLOUGH		3.04	2.98	3.33	3.28		
BALE	TINE CULT		2.63	2.69	3.34	4.12		
	PLOUGH		3.09	2.67	3.93	3.63		

88/R/RA/6

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

	STR DISP	CULTIVTN	SOW DATE	SDBED N
	0.044	0.036	0.252	0.093

	STR DISP	STR DISP	CULTIVTN	STR DISP
	CULTIVTN	SOW DATE	SOW DATE	SDBED N
	0.062	0.312	0.254	0.122

Except when comparing means with the same level(s) of

STR DISP	0.436		0.160
CULTIVTN		0.356	

	CULTIVTN	SOW DATE	STR DISP	STR DISP
	SDBED N	SDBED N	CULTIVTN	CULTIVTN
			SOW DATE	SDBED N
	0.099	0.268	0.441	0.172

Except when comparing means with the same level(s) of

CULTIVTN	0.131		
SOW DATE		0.131	
STR DISP.CULTIVTN			0.617
			0.227

	STR DISP	CULTIVTN	STR DISP
	SOW DATE	SOW DATE	CULTIVTN
	SDBED N	SDBED N	SOW DATE
			SDBED N
	0.351	0.286	0.496

Except when comparing means with the same level(s) of

STR DISP	0.465		
CULTIVTN		0.380	
STR DISP.CULTIVTN			0.658
STR DISP.SOW DATE			
	0.227		
CULTIVTN.SOW DATE		0.185	
STR DISP.SDBED N			
	0.465		
CULTIVTN.SDBED N		0.380	
STR DISP.CULTIVTN.SOW DATE			0.321
STR DISP.CULTIVTN.SDBED N			0.658

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	5	0.062	1.9
BLOCK.WP.SP1	6	0.617	19.2
BLOCK.WP.SP1.SP2	12	0.321	10.0

GRAIN MEAN DM% 79.7

PLOT AREA HARVESTED 0.00345

88/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 2 varieties of w. oilseed rape - Whittlocks.

Sponsors: R.J. Darby, M.V. Hewitt.

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

Whole plot dimensions: 30.0 x 31.0.

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 22 Feb, 1988
3 1 - - Three quarters on 22 Feb, one quarter on 17 Mar
3 - 1 - Three quarters on 22 Feb, one quarter on 6 Apr
2 2 - - Half on 22 Feb, half on 17 Mar
2 - 2 - Half on 22 Feb, half on 6 Apr
2 1 1 - Half on 22 Feb, quarter on 17 Mar, quarter on 6 Apr
1 1 1 1 One quarter on 22 Feb and 17 Mar and 6 Apr and 26 Apr

plus two extra treatments

EXTRA

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

Basal applications: Weedkillers: Paraquat at 0.40 kg ion in 200 l.
Metazachlor at 1.2 kg in 200 l. Desiccant (to **VARIETY** ARIANA only):
Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 520 l.

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

88/R/RA/7

Cultivations, etc.: - Paraquat applied: 8 Sept, 1987. Heavy spring-tine cultivated: 14 Sept. Rotary harrowed, seed sown: 15 Sept. Metazachlor applied: 1 Oct. Combine harvested (**VARIETY MIKADO**), desiccant with wetting agent applied (**VARIETY ARIANA**): 20 July, 1988. Combine harvested (**VARIETY ARIANA**): 27 July. Previous crops: W. wheat 1986, w. barley 1987.

NOTE: Percentages of oil and N in the grain were measured.

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

N FORM N TIME	AMM NIT	UREA	Mean
4 - - -	3.45	3.53	3.49
3 1 - -	3.52	3.33	3.43
3 - 1 -	3.43	3.24	3.33
2 2 - -	3.40	3.19	3.30
2 - 2 -	3.37	3.39	3.38
2 1 1 -	3.41	3.13	3.27
1 1 1 1	3.57	3.44	3.51
Mean	3.45	3.32	3.39

VARIETY N TIME	ARIANA	MIKADO	Mean
4 - - -	3.04	3.94	3.49
3 1 - -	2.87	3.98	3.43
3 - 1 -	2.82	3.84	3.33
2 2 - -	2.73	3.86	3.30
2 - 2 -	2.85	3.91	3.38
2 1 1 -	2.73	3.81	3.27
1 1 1 1	3.00	4.01	3.51
Mean	2.87	3.91	3.39

VARIETY N FORM	ARIANA	MIKADO	Mean
AMM NIT	2.97	3.94	3.45
UREA	2.76	3.88	3.32
Mean	2.87	3.91	3.39

N TIME	N FORM VARIETY	AMM NIT ARIANA	MIKADO	UREA ARIANA	MIKADO
4 - - -		2.94	3.97	3.14	3.91
3 1 - -		3.03	4.01	2.71	3.96
3 - 1 -		3.02	3.84	2.63	3.85
2 2 - -		2.83	3.98	2.64	3.75
2 - 2 -		2.80	3.94	2.90	3.88
2 1 1 -		3.03	3.80	2.44	3.83
1 1 1 1		3.11	4.02	2.88	4.00
EXTRA	NONE AR	NONE MI	Mean		
	2.10	2.61	2.35		

GRAND MEAN 3.32

88/R/RA/7

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

EXTRA	N TIME	N FORM	
0.282	0.141	0.075	
N TIME	N TIME*	N FORM*	N TIME*
N FORM	VARIETY	VARIETY	N FORM
			VARIETY
0.199	0.199	0.106	0.282

* Within the same level of **VARIETY** only

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP.SP	28	0.282	8.5
MEAN DM%	78.6		
SUB PLOT AREA HARVESTED	0.00345		

88/R/RA/8

WINTER OILSEED RAPE

OVERSOWING IN WHEAT

Object: To study the establishment of rape after wheat by oversowing into the wheat - Delafield.

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

Design: 3 randomised blocks of 6 whole plots split into 2 sub plots.

Whole plot dimensions: 8.0 x 15.0.

Treatments: All combinations of:-

Whole plots

- | | |
|------------------|---|
| 1. SOWING | Methods of sowing and straw disposal: |
| OVERS BA | Oversown on 3 Sept, 1987, straw baled on 8 Sept and bales removed |
| OVERS CH | Oversown on 3 Sept, straw chopped and spread on 8 Sept |
| CONVEN S | Straw baled on 8 Sept and bales removed, conventionally sown into conventionally prepared seedbed |

- | | |
|--------------------|-----------------|
| 2. SEEDRATE | Seed rate (kg): |
|--------------------|-----------------|

8
16

Sub plots

- | | |
|---------------|---|
| N RATE | Nitrogen fertilizer as 'Nitram': |
| 0 | None |
| 50 | 50 kg N to seedbed (post-sowing to OVERS BA and OVERS CH) on 14 Sept, 1987. |

- NOTES:** (1) Oversowing was done into standing wheat. The wheat was harvested the next day.
(2) **SOWING** CONVEN S plots were cultivated by rotary grubber on 14 Sept 1987, rotary harrowed and the seed sown on 15 Sept.

Basal applications: Manures: 'Nitram' at 580 kg. Weedkillers: Metazachlor at 1.2 kg in 200 l. Fluazifop-p-butyl at 0.18 kg with a wetting agent ('Enhance' at 0.20 l) in 200 l. Desiccant: Diquat at 0.60 kg ion with a wetting agent ('Enhance' at 0.50 l) in 520 l.

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

Cultivations, etc.:- Metazachlor applied: 1 Oct, 1987. Fluazifop-p-butyl with wetting agent applied: 24 Oct. Basal N applied: 18 Feb, 1988. Desiccant with wetting agent applied: 27 July. Combine harvested: 8 Aug. Previous crops: Potatoes 1986, w. wheat 1987.

NOTE: Plant counts were made in autumn and in mid-February. Percentages of oil in the grain were measured.

88/R/RA/8

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

SEEDRATE	8	16	Mean
SOWING			
OVERS BA	3.52	3.18	3.35
OVERS CH	3.37	3.34	3.36
CONVEN S	3.49	3.13	3.31
Mean	3.46	3.22	3.34

N RATE	0	50	Mean
SOWING			
OVERS BA	3.51	3.19	3.35
OVERS CH	3.47	3.24	3.36
CONVEN S	3.52	3.10	3.31
Mean	3.50	3.18	3.34

N RATE	0	50	Mean
SEEDRATE			
8	3.57	3.35	3.46
16	3.43	3.00	3.22
Mean	3.50	3.18	3.34

	SEEDRATE	8	16		50
SOWING N RATE					
OVERS BA		3.41	3.63	3.60	2.75
OVERS CH		3.61	3.13	3.34	3.34
CONVEN S		3.69	3.28	3.36	2.91

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

	SOWING	SEEDRATE	N RATE	SOWING SEEDRATE
	0.167	0.137	0.182	0.237
	SOWING N RATE	SEEDRATE N RATE	SOWING SEEDRATE N RATE	
	0.279	0.227	0.394	

Except when comparing means with the same level(s) of

SOWING	0.315		
SEEDRATE		0.257	
SOWING. SEEDRATE			0.445

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	10	0.290	8.7
BLOCK.WP.SP	12	0.545	16.3
GRAIN MEAN DM%	92.6		
SUB PLOT AREA HARVESTED	0.00345		

88/R/RA/12

SPRING OILSEED RAPE

ANTI-FEEDANTS

Object: To study the effects of insect anti-feedants on pests of oilseed rape - Long Hoos V 7.

Sponsors: D.C. Griffiths, L.E. Smart.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 2.5 x 5.0.

Treatments:

PESTCONT Methods of insect pest control:

NONE	None
HCH TRI	Gamma-HCH and triazophos
AJUGA C	Ajuga chamaeipyttis extract
AJUGA R	Ajuga remota extract
HOP EXTR	Beta-acid extract of hops
NEEM OIL	Neem oil

Notes: (1) Gamma-HCH was applied at 0.53 kg on 14 June, 1988, triazophos at 0.42 kg on 12 July.
(2) Remaining materials were applied on 14, 20, 29 June and 5, 12, 20 and 26 July. On each occasion Ajuga chamaeipyttis extract was applied at a rate equivalent to the extract from 20 kg of fresh plant material, Ajuga remota from 5 kg of fresh plant material. The beta-acid extract of hops was applied at 1.0 l, neem oil at 0.10 l.
(3) All treatments were applied in 10 l water.

Basal applications: Manures: (0:18:36) at 1040 kg. 'Nitro-Chalk' at 600 kg. Weedkiller: Clopyralid at 0.10 kg in 220 l. Desiccant: Diquat at 0.60 kg ion in 220 l, applied twice.

NOTE: The desiccant was repeated because of rain soon after the first application.

Seed: Topas, sown at 8 kg.

Cultivations, etc.:- PK applied: 30 Sept, 1987. Ploughed: 14 Dec. Rotary harrowed, seed sown, N applied, rolled: 18 Apr, 1988. Weedkiller applied: 14 June. Desiccant applied twice: 14 Sept. Combine harvested: 30 Sept. Previous crops: Fallow 1986, lupins 1987.

NOTES: (1) Pollen beetle, seed weevil and pod midge damage were assessed at intervals during the season.
(2) Because of a combine malfunction yields from two plots were lost, with treatments NONE and HCH TRI. Estimated values were used in the analysis.

88/R/RA/12

GRAIN (AT 90% DRY MATTER) TONNES/HECTARE

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

PESTCONT	NONE	HCH	TRI	AJUGA C	AJUGA R	HOP	EXTR	NEEM	OIL	Mean
	1.14		1.22	0.98	1.00		1.11		1.12	1.10

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

PESTCONT
0.076

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

Stratum	d.f.	s.e.	cv%
BLOCK.WP	13	0.107	9.8

GRAIN MEAN DM% 83.5

PLOT AREA HARVESTED 0.00084