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Yields of the Field Experiments 1979

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Beans

Rothamsted Research

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79/R/BE/1

WINTER BEANS

CONTROL OF CHOCOLATE SPOT

Object: To study the effects of irrigation and benomyl on Chocolate Spot (*Botrytis* spp.) and yield of winter beans - Fosters West.

Sponsors: A. Bainbridge, M.E. Finney.

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

Whole plot dimensions: 4.27 x 9.14.

Treatments: All combinations of:-

Whole plots

1. IRRIGATN	Irrigation:
NONE	None
APPLIED	Applied (50 mm)

Sub plots

2. BENOMYL	Frequency of applying benomyl (at 1.1 kg in 340 l on each occasion):-
0+0	Never
1+0	Once, on 25 May, 1979
1+1	Twice, on 25 May and 29 June (duplicated)

NOTES: (1) IRRIGATN APPLIED plots were given 12.5 mm of irrigation on each of the following dates: 2 July, 11 July, 16 July, 22 July.

(2) On one of the duplicates of 1+1 the first treatment was not applied until 30 May because the sprayer broke down.

Basal applications: Weedkiller: Simazine at 1.1 kg in 220 l. Aphicide: Pirimicarb at 0.14 kg in 220 l. Desiccant: Diquat at 0.59 kg ion with 'Agral' (a wetting agent) at 0.21 kg in 220 l.

Seed: Throws MS, sown at 250 kg.

Cultivations, etc.:- Ploughed: 24 Aug, 1978. Spring-tine cultivated: 2 Oct. Rotary harrowed, seed sown, weedkiller applied: 9 Oct. Tractor hoed: 11 June. Aphicide applied: 25 June. Desiccant applied: 4 Sept. Combine harvested: 7 Sept. Previous cropping: Wheat 1977, barley 1978.

NOTE: Counts were made of seedling emergence, percentage leaf area affected by *Botrytis* spp., stems per row, pods per stem and 1000 grain weights.

79/R/BE/1

GRAIN TONNES/HECTARE

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

BENOMYL IRRIGATN	0+0	1+0	1+1	MEAN
NONE	3.03	3.34	3.40	3.29
APPLIED	4.26	4.05	4.37	4.26
MEAN	3.65	3.69	3.88	3.78

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

TABLE	BENOMYL	IRRIGATN* BENOMYL	
SED	0.244	0.345	MIN REP
	0.211	0.299	MAX-MIN

BENOMYL
MAX-MIN 1+1 V ANY OF REMAINDER
MIN REP ANY OF REMAINDER

* WITHIN THE SAME LEVEL OF IRRIGATN ONLY

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	14	0.423	11.2
GRAIN MEAN DM%	79.8		
SUB PLOT AREA HARVESTED	0.00293		

79/R/BE/2

WINTER BEANS

CONTROL OF SITONA

Object: To study the effects of three chemicals on the control of Sitona larvae and on the yield of winter beans - Fosters West.

Sponsors: R. Bardner, K.E. Fletcher, D.C. Griffiths.

Design: 4 randomised blocks of 6 plots.

Whole plot dimensions: 5.33 x 13.7.

Treatments:

CHEMICAL	Chemicals and times of application:
NONE	None (duplicated)
ALDICARB	Aldicarb at 5 kg applied to the seedbed on 5 Oct, 1978
FONOFOS	Fonofos at 5 kg applied to the seedbed
PERMETH	Permethrin applied as foliar spray in 340 l on 2 May, 1979 and 30 May
ALD+PER	Aldicarb to seedbed plus permethrin as foliar spray at above rates and times

NOTE: Permethrin was applied on the first occasion at 0.2 kg in 200 l and on the second occasion at 0.15 kg in 340 l.

Basal applications: Weedkillers: Simazine at 1.1 kg in 220 l. Aphicide: Pirimicarb at 0.14 kg in 220 l. Desiccant: Diquat at 0.59 kg ion with 'Agral' (a wetting agent) at 0.21 kg in 220 l.

Seed: Throws MS, sown at 250 kg.

Cultivations, etc.: - Ploughed: 24 Aug, 1978. Spring-tine cultivated twice: 2 Oct and 6 Oct. Rotary harrowed, seed sown, weedkiller applied: 9 Oct. Tractor-hoed: 11 June, 1979. Aphicide applied: 25 June. Desiccant applied: 4 Sept. Combine harvested: 7 Sept. Previous cropping: Wheat 1977, barley 1978.

NOTE: Incidence of ground beetles was assessed in April. Numbers of plants and stems per plant were counted. Leaf notching by adult Sitona lineatus was assessed several times during the season, and soil cores were examined for larval populations in June.

79/R/BE/2

GRAIN TONNES/HECTARE

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

CHEMICAL	NONE	ALDICARB	FONOFOS	PERMETH	ALD+PER	MEAN
	3.47	3.20	3.70	4.00	3.77	3.60

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

TABLE	CHEMICAL
SED	0.226 MIN REP 0.196 MAX-MIN

CHEMICAL
MAX-MIN NONE V ANY OF REMAINDER
MIN REP ANY OF REMAINDER

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

STRATUM	DF	SE	CV%
BLOCK.WP	16	0.320	8.9

GRAIN MEAN DM% 83.6

PLOT AREA HARVESTED 0.00293

79/R/BE/5

SPRING BEANS

FACTORS AFFECTING YIELD

Object: To study the effects of a range of factors on pests, diseases, nitrogen fixation and yield of field beans - Little Hoos.

Sponsors: R. Bardner, G.G. Briggs, A.J. Cockbain, J.M. Day, K.E. Fletcher, B.J. Legg, J. McEwen, R.J. Roughley, G.A. Salt, H.R. Simpson, R.M. Webb, D.P. Yeoman, J.F. Witty.

Design: Single replicate of 2^6 in 2 blocks of 2 plots split into 4 sub plots, split into 4 sub sub plots.

Whole plot dimensions: 22.6 x 10.5.

Treatments: All combinations of:-

Whole plots

- | | |
|-------------|---------------------|
| 1. IRRIGATN | Irrigation: |
| NONE | None |
| FULL | Full (total 100 mm) |

Sub plots

- | | |
|------------|------------|
| 2. VARIETY | Varieties: |
| BLAZE | |
| MINDEN | |
-
- | | |
|------------|--|
| 3. AL TRIS | Aluminium tris-ethyl phosphonate (kg) foliar spray on 14 June: |
| 0.0 | |
| 2.0 | |

Sub sub plots

- | | |
|-------------|------------------------------------|
| 4. ALDICARB | Aldicarb to seedbed (kg) on 1 May: |
| 0 | |
| 10 | |
-
- | | |
|------------|--|
| 5. PERMETH | Permethrin foliar spray (kg) on 18 June: |
| 0.00 | |
| 0.15 | |
-
- | | |
|------------|--------------------------------------|
| 6. BENOMYL | Benomyl foliar spray (kg) on 15 Aug: |
| 0.0 | |
| 0.6 | |

79/R/BE/5

- NOTES: (1) A planned test of benomyl + thiram seed dressing failed because of seed-flow problems with the dressed seed, this treatment was replaced by AL TRIS.
- (2) A planned test of conventional sowing versus precision sowing was abandoned because of extremely poor establishment with conventional sowing. All treatments presented were precision sown.
- (3) A planned test of pirimicarb applied early was abandoned because of late sowing and the need to apply basal pirimicarb twice to control *Aphis fabae*.
- (4) Irrigation was applied to reduce a deficit of 50 mm to 25 mm before pod set, and one of 80 mm to 55 mm after pod set (mm water):

2 July	25
6 July	25
10 July	25
23 July	<u>25</u>
Total	100

Basal applications: Weedkillers: Trietazine and simazine (as 'Rental SC' at 2.8 kg) in 220 l. Insecticide: Pirimicarb at 0.14 kg in 220 l applied twice.

Seed: Sown at 500,000 seeds per hectare in rows 20 cm apart. For Blaze 230 kg seed, for Minden 260 kg.

Cultivations, etc.:— Ploughed: 13 Dec, 1978. Heavy spring-tine cultivated: 21 Apr, 1979. Rotary harrowed: 1 May. Seed sown: 9 May. Weedkillers applied: 14 May. Insecticide applied: 22 June and 13 July. Combine harvested: 16 Oct. Previous cropping: Wheat 1977 and 1978.

NOTE: Plant counts were made after establishment and components of yield measured before harvest. Nitrogenase activity was measured during the season. Ectoparasitic nematodes, root and foliar fungi, aphids, weevils and viruses were counted at intervals during the season. Nitrogen percentages of grain were measured.

79/R/BE/5

GRAIN TONNES/HECTARE

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

VARIETY	BLAZE	MINDEN	MEAN
IRRIGATN			
NONE	3.98	3.92	3.95
FULL	5.00	5.21	5.11
MEAN	4.49	4.56	4.53
AL TRIS	0.0	2.0	MEAN
IRRIGATN			
NONE	3.84	4.05	3.95
FULL	5.08	5.13	5.11
MEAN	4.46	4.59	4.53
AL TRIS	0.0	2.0	MEAN
VARIETY			
BLAZE	4.42	4.56	4.49
MINDEN	4.50	4.62	4.56
MEAN	4.46	4.59	4.53
ALDICARB	0	10	MEAN
IRRIGATN			
NONE	3.88	4.02	3.95
FULL	5.11	5.10	5.11
MEAN	4.50	4.56	4.53
ALDICARB	0	10	MEAN
VARIETY			
BLAZE	4.42	4.56	4.49
MINDEN	4.57	4.56	4.56
MEAN	4.50	4.56	4.53
ALDICARB	0	10	MEAN
AL TRIS			
0.0	4.44	4.49	4.46
2.0	4.55	4.63	4.59
MEAN	4.50	4.56	4.53
PERMETH	0.00	0.15	MEAN
IRRIGATN			
NONE	4.05	3.85	3.95
FULL	5.08	5.14	5.11
MEAN	4.56	4.49	4.53
PERMETH	0.00	0.15	MEAN
VARIETY			
BLAZE	4.51	4.47	4.49
MINDEN	4.61	4.52	4.56
MEAN	4.56	4.49	4.53

79/R/BE/5

GRAIN TONNES/HECTARE

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

PERMETH	0.00	0.15	MEAN	
AL TRIS				
0.0	4.52	4.41	4.46	
2.0	4.60	4.58	4.59	
MEAN	4.56	4.49	4.53	
PERMETH	0.00	0.15	MEAN	
ALDICARB				
0	4.56	4.43	4.50	
10	4.56	4.56	4.56	
MEAN	4.56	4.49	4.53	
BENQMYL	0.0	0.6	MEAN	
IRRIGATN				
NONE	3.85	4.05	3.95	
FULL	5.00	5.21	5.11	
MEAN	4.43	4.63	4.53	
BENQMYL	0.0	0.6	MEAN	
VARIETY				
BLAZE	4.33	4.65	4.49	
MINDEN	4.52	4.60	4.56	
MEAN	4.43	4.63	4.53	
BENQMYL	0.0	0.6	MEAN	
AL TRIS				
0.0	4.34	4.59	4.46	
2.0	4.51	4.67	4.59	
MEAN	4.43	4.63	4.53	
BENQMYL	0.0	0.6	MEAN	
ALDICARB				
0	4.45	4.54	4.50	
10	4.40	4.72	4.56	
MEAN	4.43	4.63	4.53	
BENQMYL	0.0	0.6	MEAN	
PERMETH				
0.00	4.43	4.69	4.56	
0.15	4.42	4.56	4.49	
MEAN	4.43	4.63	4.53	
VARIETY	BLAZE		MINDEN	
ALDICARB	0	10	0	10
IRRIGATN				
NONE	3.86	4.10	3.90	3.94
FULL	4.99	5.02	5.24	5.18

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GRAIN TONNES/HECTARE

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

AL TRIS	0.0		2.0	
ALDICARB	0	10	0	10
IRRIGATN				
NONE	3.71	3.98	4.05	4.06
FULL	5.17	5.00	5.06	5.20
AL TRIS	0.0		2.0	
ALDICARB	0	10	0	10
VARIETY				
BLAZE	4.41	4.43	4.44	4.68
MINDEN	4.46	4.55	4.67	4.57
VARIETY	BLAZE		MINDEN	
PERMETH	0.00	0.15	0.00	0.15
IRRIGATN				
NONE	4.05	3.90	4.04	3.80
FULL	4.97	5.04	5.19	5.24
AL TRIS	0.0		2.0	
PERMETH	0.00	0.15	0.00	0.15
IRRIGATN				
NONE	4.01	3.67	4.08	4.02
FULL	5.03	5.14	5.12	5.13
AL TRIS	0.0		2.0	
PERMETH	0.00	0.15	0.00	0.15
VARIETY				
BLAZE	4.40	4.44	4.62	4.50
MINDEN	4.64	4.37	4.59	4.66
ALDICARB	0		10	
PERMETH	0.00	0.15	0.00	0.15
IRRIGATN				
NONE	3.99	3.77	4.11	3.93
FULL	5.14	5.09	5.01	5.18
ALDICARB	0		10	
PERMETH	0.00	0.15	0.00	0.15
VARIETY				
BLAZE	4.50	4.35	4.52	4.59
MINDEN	4.63	4.51	4.60	4.52
ALDICARB	0		10	
PERMETH	0.00	0.15	0.00	0.15
AL TRIS				
0.0	4.55	4.33	4.49	4.48
2.0	4.58	4.53	4.63	4.63
VARIETY	BLAZE		MINDEN	
BENOMYL	0.0	0.6	0.0	0.6
IRRIGATN				
NONE	3.84	4.12	3.86	3.98
FULL	4.82	5.19	5.19	5.23

79/R/BE/5

GRAIN TONNES/HECTARE

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

AL TRIS	0.0		2.0	
BENOMYL	0.0	0.6	0.0	0.6
IRRIGATN				
NONE	3.70	3.99	4.00	4.11
FULL	4.98	5.19	5.03	5.23
AL TRIS	0.0		2.0	
BENOMYL	0.0	0.6	0.0	0.6
VARIETY				
BLAZE	4.24	4.60	4.41	4.70
MINDEN	4.44	4.57	4.61	4.64
ALDICARB	0		10	
BENOMYL	0.0	0.6	0.0	0.6
IRRIGATN				
NONE	3.80	3.95	3.89	4.15
FULL	5.10	5.13	4.91	5.29
ALDICARB	0		10	
BENOMYL	0.0	0.6	0.0	0.6
VARIETY				
BLAZE	4.35	4.50	4.30	4.81
MINDEN	4.55	4.58	4.50	4.62
ALDICARB	0		10	
BENOMYL	0.0	0.6	0.0	0.6
AL TRIS				
0.0	4.39	4.49	4.29	4.68
2.0	4.52	4.59	4.51	4.75
PERMETH	0.00		0.15	
BENOMYL	0.0	0.6	0.0	0.6
IRRIGATN				
NONE	3.93	4.17	3.77	3.93
FULL	4.93	5.22	5.08	5.19
PERMETH	0.00		0.15	
BENOMYL	0.0	0.6	0.0	0.6
VARIETY				
BLAZE	4.29	4.73	4.37	4.57
MINDEN	4.57	4.66	4.48	4.55
PERMETH	0.00		0.15	
BENOMYL	0.0	0.6	0.0	0.6
AL TRIS				
0.0	4.32	4.72	4.36	4.45
2.0	4.54	4.67	4.48	4.67
PERMETH	0.00		0.15	
BENOMYL	0.0	0.6	0.0	0.6
ALDICARB				
0	4.51	4.62	4.39	4.46
10	4.35	4.77	4.45	4.66

79/R/BE/5

GRAIN TONNES/HECTARE

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

VARIETY	BLAZE		MINDEN	
AL TRIS	0.0	2.0	0.0	2.0
IRRIGATN				
NONE	3.80	4.16	3.88	3.95
FULL	5.04	4.96	5.12	5.30

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

TABLE	ALDICARB	PERMETH	BENOMYL	IRRIGATN* ALDICARB
SED	0.046	0.046	0.046	0.065

TABLE	VARIETY* ALDICARB	AL TRIS* ALDICARB	IRRIGATN* PERMETH	VARIETY* PERMETH
SED	0.065	0.065	0.065	0.065

TABLE	AL TRIS* PERMETH	ALDICARB PERMETH	IRRIGATN* BENOMYL	VARIETY* BENOMYL
SED	0.065	0.065	0.065	0.065

TABLE	AL TRIS* BENOMYL	ALDICARB BENOMYL	PERMETH+ BENOMYL	IRRIGATN* AL TRIS* ALDICARB
SED	0.065	0.065	0.065	0.092

TABLE	VARIETY* AL TRIS* ALDICARB	IRRIGATN* VARIETY* PERMETH	IRRIGATN* AL TRIS* PERMETH	VARIETY* AL TRIS* PERMETH
SED	0.092	0.092	0.092	0.092

79/R/BE/5

GRAIN TONNES/HECTARE

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

TABLE	IRRIGATN* ALDICARB PERMETH	VARIETY* ALDICARB PERMETH	AL TRIS* ALDICARB PERMETH	IRRIGATN* VARIETY* BENOMYL
SED	0.092	0.092	0.092	0.092

TABLE	IRRIGATN* AL TRIS* BENOMYL	VARIETY* AL TRIS* BENOMYL	IRRIGATN* ALDICARB BENOMYL	VARIETY* ALDICARB BENOMYL
SED	0.092	0.092	0.092	0.092

TABLE	AL TRIS* ALDICARB BENOMYL	IRRIGATN* PERMETH BENOMYL	VARIETY* PERMETH BENOMYL	ALDICARB* PERMETH BENOMYL
SED	0.092	0.092	0.092	0.092

TABLE	IRRIGATN* VARIETY* ALDICARB
SED	0.092

* SED ONLY VALID FOR COMPARING MEANS WITH THE SAME LEVELS
(COMBINATIONS) OF THE FACTORS MARKED WITH *
+ SED NOT VALID FOR COMPARING MEANS WITH THE SAME LEVELS
OF PERMETH OR BENOMYL

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP.SSP	18	0.185	4.1
GRAIN MEAN DM%	73.4		
SUB PLOT AREA HARVESTED	0.00248		

79/R/BE/6

SPRING BEANS

N AND PATHOGEN CONTROL

Object: To study the effect of enhanced pathogen control on the proportion of nitrogen in the crop derived from the soil, from fertiliser and from nitrogen-fixation. The study was aided by using ^{15}N -labelled fertilisers and spring barley as a crop which did not fix nitrogen - Little Hoos.

Sponsors: J.M. Day, R.J. Roughley, J.F. Witty.

Design: 4 randomised blocks of 12 plots.

Whole plot dimensions: Beans: 3.25 x 4.57, barley 2.13 x 4.57.

Treatments: All combinations of:-

1. PATHCONT Pathogen control:
 STANDARD Standard, pirimicarb foliar spray only
 ENHANCED Aldicarb at 10 kg to seedbed plus pirimicarb foliar spray
2. BEANS N Nitrogen fertiliser (kg N) to beans:
 0
 50
 100
 150

plus four extra treatments sown to spring barley and given rates of nitrogen fertiliser (kg N):

BARLEY N

- 0
- 50
- 100
- 150

Standard applications: Barley: Manures: (0:20:20) at 310 kg, combine drilled.
Beans: Insecticide: Pirimicarb at 0.14 kg in 340 l.

Seed: Barley: Porthos, sown at 160 kg.
Beans: Minden, sown at 260 kg.

Cultivations, etc.: - Ploughed: 13 Dec, 1978. Heavy spring-tine cultivated: 21 Apr, 1979. Aldicarb applied, rotary harrowed: 1 May. Barley sown: 3 May. Beans sown: 9 May. Insecticide applied: 12 July. Barley hand harvested: 7 Sept. Beans hand harvested: 24 Sept. Previous cropping: Wheat 1977 and 1978.

NOTES: (1) Content of ^{15}N was assessed in whole plants shortly before harvest.
(2) Nitrogen percentages of grain were measured.

79/R/BE/6

BEANS

GRAIN TONNES/HECTARE

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

BEANS N PATHCONT	0	50	100	150	MEAN
STANDARD	4.05	4.10	4.25	4.13	4.13
ENHANCED	5.33	5.38	5.86	5.75	5.58
MEAN	4.69	4.74	5.05	4.94	4.86

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

TABLE	PATHCONT	BEANS N	PATHCONT BEANS N
SED	0.131	0.185	0.261

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

STRATUM	DF	SE	CV%
BLOCK.WP	21	0.369	7.6

GRAIN MEAN DM% 83.2

PLOT AREA HARVESTED 0.00074

BARLEY

GRAIN TONNES/HECTARE

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

BARLEY N	0	50	100	150	MEAN
	3.48	4.00	4.93	4.72	4.28

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

TABLE	BARLEY N
SED	0.297

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.420	9.8

GRAIN MEAN DM% 94.0

PLOT AREA HARVESTED 0.00049

79/R/BE/8
 SPRING BEANS
 FOLIAR NUTRITION

Object: To study the effects of a range of foliar-applied nutrients on the yield and nitrogen uptake of spring beans - Summerdells II.

Sponsors: J.M. Day, R.J. Roughley, J.F. Witty.

Design: 4 randomised blocks of 15 plots.

Whole plot dimensions: 2.66 x 3.66.

Treatments: All combinations of:-

1. NUT FORM	Form of nutrients:
AP U K	Ammonium polyphosphate + urea + potassium sulphate
AHP U K	Ammonium hydrogen phosphate + urea + potassium sulphate
AHP - K	Ammonium hydrogen phosphate + potassium sulphate (but see NOTE)
PP U K	Potassium polyphosphate + urea + potassium sulphate
PP - K	Potassium polyphosphate + potassium sulphate
U	Urea

2. NUT FREQ	Frequency of applying nutrients:
2	Twice 13 July, 1979 and 20 July
4	Four times 13 July, 1979, 20 July, 27 July and 3 Aug

plus two extra treatments:

EXTRA

-	None (duplicated)
K 4	Potassium sulphate applied four times

NOTE: It was intended that each treatment containing nitrogen should supply about 20 kg N per occasion. The first spray of AHP - K scorched the leaves. The problem with this treatment was overcome by including urea in later sprays to maintain the rate of nitrogen but lessen the amount of ammonium hydrogen phosphate.

Rates of nutrients (kg element) applied on each spray occasion:

	N	P	K	S		
	in urea	in phosphates	in sulphate	in phosphate		
AP U K	20	1.6	4.3	7.5	-	3.0
AHP U K	20	3.6	5.5	7.5	-	3.0
AHP - K (1)	-	20	30.4	7.5	-	3.0
AHP - K (2,3 & 4)	15	5	5.5	7.5	-	3.0
PP U K	20	-	20	1.1	9.9	0.5
PP - K	-	-	20	1.1	9.9	0.5
U	20	-	-	-	-	-
-	-	-	-	-	-	-
K 4	-	-	-	7.5	-	3.0

Treatments were applied in 536 l.

79/R/BE/8

Basal applications: Manures: Chalk at 7.5 t. FYM at 35 t. Weedkiller: Simazine at 0.82 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 220 l.

Seed: Minden, sown at 220 kg.

Cultivations, etc.:— Chalk applied: 26 Oct, 1978. FYM applied: 14 Nov. Ploughed: 23 Nov. Heavy spring-tine cultivated: 19 Apr, 1979. Rotary harrowed: 20 Apr. Seed sown: 21 Apr. Weedkiller applied: 15 May. Insecticide applied: 22 June. Harvested by hand: 17 Sept. Previous crops: Spring wheat, 1977, barley 1978.

NOTES: (1) Content of 15N (added to certain of the treatments) was assessed in whole plants shortly before harvest.
(2) Nitrogen percentages of grain were measured.

GRAIN TONNES/HECTARE

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

NUT FREQ	2	4	MEAN
NUT FORM			
AP U K	4.11	4.20	4.15
AHP U K	4.06	3.90	3.98
AHP - K	3.65	4.00	3.82
PP U K	3.92	4.27	4.09
PP -K	4.19	4.47	4.33
U	4.34	4.17	4.26
MEAN	4.04	4.17	4.11
EXTRA	-	K4	MEAN
	4.49	4.55	4.51

GRAND MEAN 4.19

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

TABLE	EXTRA	NUT FORM	NUT FREQ	NUT FORM NUT FREQ & EXTRA
SED	0.214	0.175	0.101	0.247 0.214*

* USE ONLY FOR COMPARISONS BETWEEN NUT FORM.NUT FREQ AND LEVEL - OF EXTRA

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

STRATUM	DF	SE	CV%
BLOCK.WP	43	0.350	8.4

GRAIN MEAN DM% NOT AVAILABLE

PLOT AREA HARVESTED 0.00112

79/R/BE/9

SPRING BEANS

CONTROL OF SITONA

Object: To study the effects of a range of insecticidal treatments on the incidence of Sitona larvae and on the yield of beans - Summerdells II.

Sponsors: R. Bardner, D.C. Griffiths, K.E. Fletcher.

Design: 4 blocks of 6 plots.

Whole plot dimensions: 5.33 x 9.14.

Treatments:

INSCTCDE Insecticides and methods of application:

NONE None
 ALD SOIL Aldicarb at 10 kg worked into soil before sowing
 CAR FURR Carbofuran at 2.24 kg applied in the seed furrow at sowing by combine drill
 PHO SEED Phorate applied as a seed dressing at 3 g kg⁻¹ seed
 PHO FURR Phorate at 2.24 kg applied in the seed furrow at sowing by combine drill
 PER LEAF Permethrin foliar spray applied at 0.15 kg in 340 l on 18 May, 1979

Basal applications: Manures: Chalk at 7.5 t. FYM at 35 t. Weedkiller: Simazine at 0.84 kg in 220 l. Aphicide: Pirimicarb at 0.14 kg in 220 l.

Seed: Minden, sown at 220 kg.

Cultivations, etc.:— Chalk applied: 26 Oct, 1978. FYM applied: 14 Nov. Ploughed: 23 Nov. Heavy spring-tine cultivated: 19 Apr, 1979. Rotary harrowed: 20 Apr. Seed sown: 21 Apr. Weedkiller applied: 15 May. Aphicide applied: 22 June. Combine harvested: 21 Sept. Previous cropping: Barley 1977 & 1978.

NOTE: Leaf notching by adult Sitona lineatus was assessed in June, July and August; soil cores were examined for larval populations in July. Incidence of Aphis fabae was assessed in June.

GRAIN TONNES/HECTARE

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

INSCTCDE	NONE	ALD SOIL	CAR FURR	PHO SEED	PHO FURR	PER LEAF	MEAN
	4.16	4.89	4.61	4.16	4.40	4.44	4.44

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

TABLE	INSCTCDE
SED	0.165

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

STRATUM	DF	SE	CV%
BLOCK.WP	15	0.233	5.2
GRAIN MEAN DM%	80.3	PLOT AREA HARVESTED	0.00293

79/R/BE/10

SPRING BEANS

TIMES OF APPLYING PERMETHRIN

Object: To study the effects of applying foliar sprays of permethrin at a range of dates on the incidence of Sitona and on the yield of spring beans - Summerdells II.

Sponsors: R. Bardner, D.C. Griffiths, K.E. Fletcher.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 5.33 x 9.14.

Treatments:

PER DATE	Dates of applying permethrin (at 150 g on each occasion):
-	Not applied
18 MAY	Single spray on 18 May
18 JUNE	Single spray on 18 June
2 JULY	Single spray on 2 July
MA JN JL	Sprayed on all three above dates

NOTE: Permethrin was applied in 340 l.

Basal applications: Manures: Chalk at 7.5 t. FYM at 35 t. Weedkiller: Simazine at 0.84 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 220 l.

Seed: Minden, sown at 220 kg.

Cultivations, etc.: - Chalk applied: 26 Oct, 1978. FYM applied: 14 Nov. Ploughed: 23 Nov. Heavy spring-tine cultivated: 19 Apr, 1979. Rotary harrowed: 20 Apr. Seed sown: 21 Apr. Weedkiller applied: 15 May. Basal insecticide applied: 22 June. Combine harvested: 21 Sept. Previous cropping: Spring wheat 1977, barley 1978.

- NOTES: (1) On 2 July part of one of the 18 JUNE plots was sprayed with permethrin in error. An estimated value was used in the analysis.
- (2) After each treatment plots were assessed for leaf notches. In June ground beetles were trapped and leaf samples were taken for permethrin decomposition measurements. In July the incidence of Sitona larvae was estimated from soil cores and in August adult populations were estimated by trapping.

79/R/BE/10

GRAIN TONNES/HECTARE

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

PER DATE	-	18 MAY	18 JUNE	2 JULY	MA	JN	JL	MEAN
	4.14	3.81	4.05	3.95		4.25		4.04

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

TABLE	PER DATE
SED	0.259

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

STRATUM	DF	SE	CV%
BLOCK.WP	11	0.366	9.1

GRAIN MEAN DM% 80.0

PLOT AREA HARVESTED 0.00293

79/R/BE/11
 SPRING BEANS
 PYRETHROIDS AND SITONA

Object: To study the effects of four pyrethroid insecticides, applied as foliar sprays, on the incidence of Sitona and on the yield of spring beans - Summerdells II.

Sponsors: D.C. Griffiths, R. Bardner, K.E. Fletcher.

Design: 4 randomised blocks of 5 plots.

Whole plot dimensions: 5.33 x 9.14.

Treatments:

PYRETH	Pyrethroids, applied in 340 l:
NONE	None
CYPERMET	Cypermethrin at 0.06 kg on 28 May, 1979
DECAMETH	Decamethrin at 0.03 kg on 28 May
FENVALER	Fenvalerate at 0.06 kg on 28 May
PERMETH	Permethrin at 0.15 kg on 18 May

Basal applications: Manures: Chalk at 7.5 t. FYM at 35 t. Weedkiller: Simazine at 0.84 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 220 l.

Seed: Minden, sown at 220 kg.

Cultivations, etc.:- Chalk applied: 26 Oct, 1978. FYM applied: 14 Nov. Ploughed: 23 Nov. Heavy spring-tine cultivated: 19 Apr, 1979. Rotary harrowed: 20 Apr. Seed sown: 21 Apr. Weedkiller applied: 15 May. Basal insecticide applied: 22 June. Combine harvested: 21 Sept. Previous cropping: Spring wheat 1977, barley 1978.

NOTE: Leaf notching by adult Sitona lineatus was assessed in June and adults counted in August. Soil cores were examined for larval populations in July.

GRAIN TONNES/HECTARE

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

PYRETH	NONE	CYPERMET	DECAMETH	FENVALER	PERMETH	MEAN
	4.08	4.41	4.06	4.04	4.01	4.12

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

TABLE	PYRETH
SED	0.320

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

STRATUM	DF	SE	CV%
BLOCK.WP	12	0.453	11.0

GRAIN MEAN DM% 80.5 PLOT AREA HARVESTED 0.00293

79/R/BE/12

SPRING BEANS

COMPARISON OF SPRAYERS

Object: To study the performance of an electrostatic spraying system on distribution of spray material and on yield of beans - Summerdells II.

Sponsors: A.J. Arnold, F.T. Phillips, P. Etheridge.

Design: 3 randomised blocks of 6 plots.

Whole plot dimensions: 2.67 x 9.14.

Treatments:

SPRAYER	Sprayer used to apply permethrin:
NONE	None
E D T 2	Electrostatic sprayer, spraying direct-charged particles, using tap water and 2 atomisers
E D D 2	Electrostatic sprayer, spraying direct-charged particles, using distilled water and 2 atomisers
E D T 1	Electrostatic sprayer, spraying direct-charged particles, using tap water and 1 atomiser
E O T 2	Electrostatic sprayer, spraying uncharged particles, using tap water and 2 atomisers
F U T	Standard farm sprayer, spraying uncharged particles, using tap water

- NOTES: (1) Electrostatic sprayer applied permethrin at 0.016 kg in 15.5 l.
(2) Farm sprayer applied permethrin at 0.016 kg in 340 l.
(3) Permethrin was applied as a water-based spray.
(4) Sprays were applied on 18 June, 1979.
(5) Because of machine failure one replicate of treatment 'E O T 1' was not applied. An Estimated value was used in the analysis.
(6) Because of field errors two of the replicates of E O T 2 were in one block and two of the replicates of NONE in another, since there were marked differences between rows of plots, adjustments have been made by covariance, and the original blocking has been ignored.

Basal applications: Manures: Chalk at 7.5 t, FYM at 35 t. Weedkiller: Simazine at 0.84 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 220 l. Desiccant: Diquat at 0.59 kg ion with 'Agral' (a wetting agent) at 0.28 kg in 220 l.

Seed: Minden, sown at 220 kg.

Cultivations, etc.: Chalk applied: 26 Oct, 1978. FYM applied: 14 Nov. Ploughed: 23 Nov. Heavy spring-tine cultivated: 19 Apr, 1979. Rotary harrowed: 20 Apr. Seed sown: 21 Apr. Weedkiller applied: 15 May. Basal insecticide applied: 27 July. Desiccant applied: 24 Sept. Combine harvested: 4 Oct. Previous cropping: Barley 1977 & 1978.

NOTE: Observations were made of charged and uncharged drops on both the upper and lower leaf surfaces, and gross deposition of chemical was assessed. Sitona notch counts were made after treatment sprays.

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GRAIN TONNES/HECTARE

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

SPRAYER	NONE	E D T 2	E D D 2	E D T 1	E O T 2	F U T	MEAN
	0.81	1.25	1.15	0.70	0.58	2.11	1.10

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

TABLE	SPRAYER
-----	-----
SED	0.227

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

STRATUM	DF	SE	CV%
BLOCK.WP	9	0.247	22.4

GRAIN MEAN DM% 63.8

PLOT AREA HARVESTED 0.00244

79/R/BE/13

SPRING BEANS

COMPARISON OF FUNGICIDES

Object: To study the effects of a range of fungicides and methods of application on the incidence of diseases and on the yield of spring beans - Long Hoos V 4.

Sponsors: G.A. Salt, J. McEwen, D.P. Yeoman.

Design: Single replicate of 38 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments: All combinations of:-

1. FUNGCIDE	Fungicides:		
AL TRI	Aluminium tris (ethylphosphonate) 'Aliette'		
BENOMYL	Benomyl		
DL METH	DL-methyl N- (2, 6 dimethylphenyl)-N (2 methoxy-acetyl) alaninate. 'Ridomil'		
THIABEND	Thiabendazole		
2. APP TIME	Application times:		
	Seedbed (as seed dressing)	5 June (as foliar spray)	3 July (as foliar spray)
S	Applied	None	None
EF	None	Applied	None
LF	None	None	Applied
S+EF	Applied	Applied	None
S+LF	Applied	None	Applied
EF+LF	None	Applied	Applied
S+EF+LF	Applied	Applied	Applied
plus four extra treatments:			
EXTRA			
NONE	None (four plots)		
STICKER	Methyl cellulose sticker only to seed (two plots)		
BE TH S	Benomyl + thiram seed dressing + sticker (two plots)		
THI HI S	Thiabendazole high rate seed dressing + sticker (two plots)		

NOTES: (1) Rates of application were as follows (a methyl cellulose sticker was used for seed dressings; foliar sprays were in 500 l for the early and 1000 l for the late application)

Treatment	Seed dressings g a.i. per kg seed	Foliar sprays kg a.i. per ha
'Aliette'	4.0	3.4
Benomyl	8.8	1.0
'CGA48998' ('Ridomil')	0.4	0.3
Thiabendazole	1.8	1.0
Thiabendazole high rate	6.0	-
Benomyl	3.0	-
Thiram	3.0	-

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(2) Seed was sown by hand in rows 51 cm apart, seed spaced 5 cm apart in the row.

Basal applications: Chalk at 2.9 t. Weedkillers: Trietazine and simazine (as 'Rental SC' at 2.9 kg) in 340 l. Insecticides: Permethrin at 0.15 kg in 340 l, pirimicarb at 0.14 kg in 340 l.

Seed: Minden.

Cultivations, etc.: - Chalk applied: 31 Oct, 1978. Ploughed: 22 Jan, 1979. Spring-tine cultivated and rolled: 18 Apr. Seed sown: 19 Apr. Weedkillers applied: 1 May. Permethrin applied twice: 26 June, 4 July. Pirimicarb applied twice: 9 and 26 July. Harvested by hand: 13 Sept. Previous cropping: Potatoes 1977, barley 1978.

NOTE: Plant counts were made in May and June, and root disease was assessed in July and August.

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GRAIN TONNES/HECTARE

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

METHOD	S	EF	LF	S+EF	S+LF	EF+LF	S+EF+LF	MEAN
FUNGCIDE								
AL TRI	4.41	4.83	4.34	4.16	4.27	4.10	4.26	4.34
BENOMYL	4.22	4.15	4.23	4.34	4.31	4.35	4.04	4.23
DL METH	3.64	4.00	3.70	4.39	4.13	3.89	3.79	3.94
THIABEND	4.15	3.83	3.82	3.96	3.75	4.22	3.46	3.88
MEAN	4.10	4.20	4.02	4.21	4.11	4.14	3.89	4.10
EXTRA	NONE	STICKER	BE TH S	THI HI S		MEAN		
	4.08	3.84	4.54	3.74		4.06		

GRAND MEAN 4.09

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

TABLE	FUNGCIDE	METHOD	FUNGCIDE METHOD
SED	0.225	0.297	0.595

SEDS INVOLVING EXTRA PLOTS

NONE V THE REMAINDER 0.365
 BETWEEN THE REMAINDER 0.421
 NONE V FUNGCIDE.METHOD 0.471
 ANY OF REMAINDER V FUNGCIDE.METHOD 0.516

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

STRATUM	DF	SE	CV%
WP	6	0.421	10.3

GRAIN MEAN DM% 85.4

PLOT AREA HARVESTED 0.00015

79/R/BE/14

SPRING BEANS

RED TICK LINES

Object: To compare agronomic characters and yields of two selections of red-seeded field beans, open-pollinated for one or two years following self-pollination for five years, with four white-seeded varieties - Long Hoos V 4.

Sponsor: J. McEwen.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 2.03 x 2.13.

Treatments:

VARIETY	Varieties:-
RT1 OP1	Red tick 1, open-pollinated in 1978 only
RT1 OP2	Red tick 1, open-pollinated in 1977 and 1978
RT3 OP1	Red tick 3, open-pollinated in 1978 only
RT3 OP2	Red tick 3, open-pollinated in 1977 and 1978
BL	Maris Blaze (white-seeded)
HE	Herra (white-seeded)
MI	Minden (white-seeded)
TO	Topless determinant (white seeded ex P.B.I. Cambridge)

NOTE: Seed was sown by hand in rows 51 cm apart, seed spaced 5 cm apart in the row.

Basal applications: Manures: Chalk at 2.9 t. Weedkillers: Trietazine and simazine (as 'Remtal SC' at 3.0 kg) in 340 l. Insecticides: Permethrin at 0.15 kg in 340 l, pirimicarb at 0.14 kg in 340 l.

Cultivations, etc.:- Chalk applied: 31 Oct, 1978. Ploughed: 22 Jan, 1979. Spring-tine cultivated and rolled: 18 Apr. Seed sown: 19 Apr. Weedkillers applied: 1 May. Permethrin applied twice: 26 June, 4 July. Pirimicarb applied twice: 9 and 26 July. Harvested by hand: 13 Sept. Previous cropping: Potatoes 1977, barley 1978.

NOTE: Plant counts were made after establishment and again before harvest. Components of yield were measured at harvest. N in grain was measured.

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GRAIN TONNES/HECTARE

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

VARIETY	
RT1 OP1	3.94
RT1 OP2	4.41
RT3 OP1	4.16
RT3 OP2	4.12
BL	4.37
HE	4.58
MI	4.90
TO	4.04
MEAN	4.32

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

TABLE	VARIETY
-----	-----
SED	0.227

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.278	6.4
GRAIN MEAN DM%	88.0		
PLOT AREA HARVESTED	0.00015		

79/R/BE/15

SPRING BEANS

EFFECTS OF VICIA CRYPTIC VIRUS

Object: To study the effects on growth and yield of field beans of the presence of virus-like particles (provisionally named vicia cryptic virus (VCV)) found in the sap of certain plants - Long Hoos VI/VII 2.

Sponsors: A.J. Cockbain, R.H. Kenten.

Design: 3 randomised blocks of 8 plots.

Whole plot dimensions: 1.52 x 2.43.

Treatments:

LINE V	Line number and VCV infection:
7 V	Line 7, VCV particles present
14 V	" 14, " " "
20 V	" 20, " " "
39 V	" 39, " " "
13 0	" 13, " " absent
15 0	" 15, " " "
17 0	" 17, " " "
38 0	" 38, " " "

NOTE: Seed was sown by hand in rows 51 cm apart seed spaced 30 cm apart in the row.

Basal applications: Manures: Chalk at 2.9 t. Weedkillers: Trietazine and simazine (as 'Rental SC' at 3.0 kg) in 340 l. Aphicide: Permethrin at 0.15 kg in 340 l. Pirimicarb at 0.14 kg in 340 l.

Cultivations, etc.: - Chalk applied: 31 Oct, 1978. Ploughed: 10 Nov. Spring-tine cultivated: 19 Apr, 1979. Rotary cultivated, seed sown: 20 Apr. Weedkillers applied: 1 May. Permethrin applied twice: 26 June and 4 July. Pirimicarb applied twice: 9 and 26 July. Harvested by hand: 21 Sept. Previous cropping: Potatoes 1977, barley 1978.

NOTE: Plant counts were made at emergence. Pest and disease incidence and growth parameters were assessed throughout the season.

79/R/BE/15

GRAIN TONNES/HECTARE

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

LINE V	7 V	14 V	20 V	39 V	13 0	15 0	17 0	38 0	MEAN
	4.56	4.41	3.28	4.99	3.93	4.59	4.53	3.45	4.21

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

TABLE	LINE V
-----	-----
SED	0.339

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

STRATUM	DF	SE	CV%
BLOCK.WP	14	0.415	9.9

GRAIN MEAN DM% 85.8

PLOT AREA HARVESTED 0.00037