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Yields of the Field Experiments 1978

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78/R/CS/222 Factors Affecting Yield - Beans

Rothamsted Research

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FACTORS AFFECTING YIELD

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

Sponsors: R. Bardner, R.H. Bromilow, 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, J.F. Witty.

The first year, field beans.

Design: Half replicate of 2^8 in 8 blocks of 2 plots split into 8.

Whole plot dimensions: 57.6 x 10.4.

Treatments: Combinations of:-

Whole plots

- | | |
|-------------|--------------|
| 1. IRRIGATN | Irrigation |
| NONE | None |
| FULL | Full (75 mm) |

Sub plots

- | | |
|---------------|---|
| 2. N | Nitrogen fertiliser at flowering (kg N, as 'Nitro-Chalk 26'): |
| 0 | |
| 150 | |
| 3. ALDICARB | Aldicarb to seedbed (kg): 10 Mar, 1978 |
| 0 | |
| 10 | |
| 4. FONOFOS | Fonofos to seedbed (kg): 9 Mar |
| 0 | |
| 5 | |
| 5. BENOMYL(1) | Benomyl to seedbed (kg): 9 Mar |
| 0.0 | |
| 13.5 | |
| 6. PERMETH | Permethrin foliar spray (kg): |
| 0.00 | 0.00 |
| 0.15 | 0.15 on 17 May and 9 June |

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7. PIRIMICA Pirimicarb foliar spray (kg):

0.00	0.00
0.14	0.14 on 31 May

8. BENOMYL(2) Benomyl foliar spray (kg):

0.0	0.0
0.6	0.6 on 20 July and 25 Aug

NOTES: (1) All sprays were applied in 340 l except BENOMYL(2) on 25 Aug which was applied in 220 l.

(2) Irrigation treatments were applied to reduce a deficit of 50 mm to 25 mm before pod set and from 80 mm to 55 mm after pod set (mm water):

1 June	25
19 July	25
28 July	25
TOTAL	<u>75</u>

Basal applications: Manures: FYM at 35 t. Weedkillers: Paraquat at 0.6 kg in 220 l. Simazine at 1.1 kg in 220 l. Insecticide: Pirimicarb at 0.14 kg in 220 l.

Seed: Minden, sown at 200 kg.

Cultivations, etc.: Paraquat applied: 8 Nov, 1977. FYM applied, ploughed: 24 Nov. Spring-tine cultivated: 8 Mar, 1978. Spike rotary cultivated: 10 Mar. Seed sown: 11 Mar. Simazine applied: 30 Mar. Basal insecticide applied: 11 July. Combine harvested: 5 Oct. Previous crops: Wheat 1976 and 1977.

NOTE: Plant counts were made after establishment and again before harvest. Total above-ground dry matter and nitrogen percentages were measured on three occasions. Components of yield were measured before harvest. Amounts of nodular material and nitrogenase activity were measured on two occasions. Ectoparasitic nematodes, root and foliar fungi, aphids, weevils and viruses were counted at intervals during the season. Nitrogen percentages of grain were measured.

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GRAIN TONNES/HECTARE

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

	N	0	150	MEAN
IRRIGATN				
	NONE	5.69	5.92	5.80
	FULL	6.00	5.97	5.99
	MEAN	5.85	5.94	5.89
ALDICARB		0	10	MEAN
IRRIGATN				
	NONE	5.60	6.01	5.80
	FULL	5.89	6.08	5.99
	MEAN	5.74	6.04	5.89
ALDICARB		0	10	MEAN
	N			
	0	5.67	6.02	5.85
	150	5.82	6.07	5.94
	MEAN	5.74	6.04	5.89
FONOFOS		0	5	MEAN
IRRIGATN				
	NONE	5.81	5.80	5.80
	FULL	5.93	6.04	5.99
	MEAN	5.87	5.92	5.89
FONOFOS		0	5	MEAN
	N			
	0	5.82	5.87	5.85
	150	5.92	5.97	5.94
	MEAN	5.87	5.92	5.89
FONOFOS		0	5	MEAN
ALDICARB				
	0	5.69	5.80	5.74
	10	6.05	6.04	6.04
	MEAN	5.87	5.92	5.89
BENOMYL(1)		0.0	13.5	MEAN
IRRIGATN				
	NONE	5.91	5.70	5.80
	FULL	6.28	5.69	5.99
	MEAN	6.09	5.70	5.89
BENOMYL(1)		0.0	13.5	MEAN
	N			
	0	6.06	5.63	5.85
	150	6.13	5.76	5.94
	MEAN	6.09	5.70	5.89

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GRAIN TONNES/HECTARE

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

BENOMYL(1)	0.0	13.5	MEAN
ALDICARB			
0	5.98	5.51	5.74
10	6.21	5.88	6.04
MEAN	6.09	5.70	5.89
BENOMYL(1)	0.0	13.5	MEAN
FONOFOS			
0	6.08	5.66	5.87
5	6.11	5.73	5.92
MEAN	6.09	5.70	5.89
PERMETH	0.00	0.15	MEAN
IRRIGATN			
NONE	5.68	5.93	5.80
FULL	5.85	6.12	5.99
MEAN	5.77	6.02	5.89
PERMETH	0.00	0.15	MEAN
N			
0	5.71	5.98	5.85
150	5.82	6.07	5.94
MEAN	5.77	6.02	5.89
PERMETH	0.00	0.15	MEAN
ALDICARB			
0	5.58	5.90	5.74
10	5.95	6.14	6.04
MEAN	5.77	6.02	5.89
PERMETH	0.00	0.15	MEAN
FONOFOS			
0	5.72	6.03	5.87
5	5.82	6.02	5.92
MEAN	5.77	6.02	5.89
PERMETH	0.00	0.15	MEAN
BENOMYL(1)			
0.0	5.96	6.23	6.09
13.5	5.57	5.82	5.70
MEAN	5.77	6.02	5.89
PIRIMICA	0.00	0.14	MEAN
IRRIGATN			
NONE	5.95	5.66	5.80
FULL	5.92	6.05	5.99
MEAN	5.94	5.85	5.89

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GRAIN TONNES/HECTARE

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

PIRIMICA	0.00	0.14	MEAN
N			
0	5.88	5.81	5.85
150	5.99	5.89	5.94
MEAN	5.94	5.85	5.89
PIRIMICA	0.00	0.14	MEAN
ALDICARB			
0	5.82	5.66	5.74
10	6.05	6.04	6.04
MEAN	5.94	5.85	5.89
PIRIMICA	0.00	0.14	MEAN
FONOFOS			
0	5.83	5.91	5.87
5	6.04	5.80	5.92
MEAN	5.94	5.85	5.89
PIRIMICA	0.00	0.14	MEAN
BENOMYL(1)			
0.0	6.13	6.06	6.09
13.5	5.74	5.65	5.70
MEAN	5.94	5.85	5.89
PIRIMICA	0.00	0.14	MEAN
PERMETH			
0.00	5.83	5.70	5.77
0.15	6.04	6.01	6.02
MEAN	5.94	5.85	5.89
BENOMYL(2)	0.0	0.6	MEAN
IRRIGATN			
NONE	5.61	6.00	5.80
FULL	5.73	6.24	5.99
MEAN	5.67	6.12	5.89
BENOMYL(2)	0.0	0.6	MEAN
N			
0	5.62	6.07	5.85
150	5.72	6.16	5.94
MEAN	5.67	6.12	5.89
BENOMYL(2)	0.0	0.6	MEAN
ALDICARB			
0	5.52	5.96	5.74
10	5.82	6.27	6.04
MEAN	5.67	6.12	5.89

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GRAIN TONNES/HECTARE

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

BENQMYL(2)	0.0	0.6	MEAN
FONOFOS			
0	5.68	6.06	5.87
5	5.66	6.18	5.92
MEAN	5.67	6.12	5.89
BENQMYL(2)	0.0	0.6	MEAN
BENQMYL(1)			
0.0	5.92	6.26	6.09
13.5	5.42	5.97	5.70
MEAN	5.67	6.12	5.89
BENQMYL(2)	0.0	0.6	MEAN
PERMETH			
0.00	5.53	6.00	5.77
0.15	5.81	6.23	6.02
MEAN	5.67	6.12	5.89
BENQMYL(2)	0.0	0.6	MEAN
PIRIMICA			
0.00	5.67	6.20	5.94
0.14	5.67	6.04	5.85
MEAN	5.67	6.12	5.89

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GRAIN TONNES/HECTARE

***** TABLES OF MEANS (INDIVIDUAL VALUES) *****

IRRIGATN	N	ALDICARB	FONOFOS	BENOMYL(1)	PERMETH	PIRIMICA	BENOMYL(2)	GRAIN
NONE	0	0	0	0.0	0.00	0.00	0.0	5.29
NONE	0	0	0	0.0	0.00	0.14	0.6	5.42
NONE	0	0	0	0.0	0.15	0.00	0.6	5.95
NONE	0	0	0	0.0	0.15	0.14	0.0	5.89
NONE	0	0	0	13.5	0.00	0.00	0.6	6.10
NONE	0	0	0	13.5	0.00	0.14	0.0	3.88
NONE	0	0	0	13.5	0.15	0.00	0.0	4.59
NONE	0	0	0	13.5	0.15	0.14	0.6	5.31
NONE	0	0	5	0.0	0.00	0.00	0.6	6.00
NONE	0	0	5	0.0	0.00	0.14	0.0	5.62
NONE	0	0	5	0.0	0.15	0.00	0.0	5.56
NONE	0	0	5	0.0	0.15	0.14	0.6	6.30
NONE	0	0	5	13.5	0.00	0.00	0.0	5.67
NONE	0	0	5	13.5	0.00	0.14	0.6	4.75
NONE	0	0	5	13.5	0.15	0.00	0.6	6.77
NONE	0	0	5	13.5	0.15	0.14	0.0	4.44
NONE	0	0	5	0.0	0.00	0.00	0.6	6.24
NONE	0	10	0	0.0	0.00	0.14	0.0	6.01
NONE	0	10	0	0.0	0.15	0.00	0.0	5.96
NONE	0	10	0	0.0	0.15	0.14	0.6	5.87
NONE	0	10	0	13.5	0.00	0.00	0.0	5.49
NONE	0	10	0	13.5	0.00	0.14	0.6	6.00
NONE	0	10	0	13.5	0.15	0.00	0.6	6.15
NONE	0	10	0	13.5	0.15	0.14	0.0	5.88
NONE	0	10	5	0.0	0.00	0.00	0.0	5.88
NONE	0	10	5	0.0	0.00	0.14	0.6	5.75
NONE	0	10	5	0.0	0.15	0.00	0.6	6.24
NONE	0	10	5	0.0	0.15	0.14	0.0	6.08
NONE	0	10	5	13.5	0.00	0.00	0.6	5.66
NONE	0	10	5	13.5	0.00	0.14	0.0	5.62
NONE	0	10	5	13.5	0.15	0.00	0.0	5.75
NONE	0	10	5	13.5	0.15	0.14	0.6	5.99

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GRAIN TONNES/HECTARE

***** TABLES OF MEANS (INDIVIDUAL VALUES) *****

IRRIGATN	N	ALDICARB	FONOFOS	BENOMYL(1)	PERMETH	PIRIMICA	BENOMYL(2)	GRAIN
NONE	150	0	0	0.0	0.00	0.00	0.6	5.02
NONE	150	0	0	0.0	0.00	0.14	0.0	5.52
NONE	150	0	0	0.0	0.15	0.00	0.0	6.54
NONE	150	0	0	0.0	0.15	0.14	0.6	6.18
NONE	150	0	0	13.5	0.00	0.00	0.0	5.31
NONE	150	0	0	13.5	0.00	0.14	0.6	6.13
NONE	150	0	0	13.5	0.15	0.00	0.6	6.65
NONE	150	0	0	13.5	0.15	0.14	0.0	5.48
NONE	150	0	5	0.0	0.00	0.00	0.0	6.16
NONE	150	0	5	0.0	0.00	0.14	0.6	5.60
NONE	150	0	5	0.0	0.15	0.00	0.6	6.32
NONE	150	0	5	0.0	0.15	0.14	0.0	5.46
NONE	150	0	5	13.5	0.00	0.00	0.6	5.97
NONE	150	0	5	13.5	0.00	0.14	0.0	4.48
NONE	150	0	5	13.5	0.15	0.00	0.0	5.24
NONE	150	0	5	13.5	0.15	0.14	0.6	5.54
NONE	150	10	0	0.0	0.00	0.00	0.0	5.52
NONE	150	10	0	0.0	0.00	0.14	0.6	5.89
NONE	150	10	0	0.0	0.15	0.00	0.6	6.35
NONE	150	10	0	0.0	0.15	0.14	0.0	6.15
NONE	150	10	0	13.5	0.00	0.00	0.6	6.60
NONE	150	10	0	13.5	0.00	0.14	0.0	6.23
NONE	150	10	0	13.5	0.15	0.00	0.0	6.65
NONE	150	10	0	13.5	0.15	0.14	0.6	5.68
NONE	150	10	5	0.0	0.00	0.00	0.6	7.05
NONE	150	10	5	0.0	0.00	0.14	0.0	5.84
NONE	150	10	5	0.0	0.15	0.00	0.0	5.79
NONE	150	10	5	0.0	0.15	0.14	0.6	5.62
NONE	150	10	5	13.5	0.00	0.00	0.0	5.06
NONE	150	10	5	13.5	0.00	0.14	0.6	6.03
NONE	150	10	5	13.5	0.15	0.00	0.6	6.85
NONE	150	10	5	13.5	0.15	0.14	0.0	6.40

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GRAIN TONNES/HECTARE

***** TABLES OF MEANS (INDIVIDUAL VALUES) *****

IRRIGATN	N	ALDICARB	FONOFOS	BENOMYL(1)	PERMETH	PIRIMICA	BENOMYL(2)	GRAIN
FULL	0	0	0	0.0	0.00	0.00	0.6	6.60
FULL	0	0	0	0.0	0.00	0.14	0.0	5.26
FULL	0	0	0	0.0	0.15	0.00	0.0	6.04
FULL	0	0	0	0.0	0.15	0.14	0.6	6.36
FULL	0	0	0	13.5	0.00	0.00	0.0	4.85
FULL	0	0	0	13.5	0.00	0.14	0.6	5.53
FULL	0	0	0	13.5	0.15	0.00	0.6	5.23
FULL	0	0	0	13.5	0.15	0.14	0.0	5.91
FULL	0	0	5	0.0	0.00	0.00	0.0	5.98
FULL	0	0	5	0.0	0.00	0.14	0.6	6.03
FULL	0	0	5	0.0	0.15	0.00	0.6	6.25
FULL	0	0	5	0.0	0.15	0.14	0.0	5.82
FULL	0	0	5	13.5	0.00	0.00	0.6	5.99
FULL	0	0	5	13.5	0.00	0.14	0.0	5.48
FULL	0	0	5	13.5	0.15	0.00	0.0	6.03
FULL	0	0	5	13.5	0.15	0.14	0.6	6.59
FULL	0	10	0	0.0	0.00	0.00	0.0	5.83
FULL	0	10	0	0.0	0.00	0.14	0.6	6.70
FULL	0	10	0	0.0	0.15	0.00	0.6	6.75
FULL	0	10	0	0.0	0.15	0.14	0.0	6.89
FULL	0	10	0	13.5	0.00	0.00	0.6	6.18
FULL	0	10	0	13.5	0.00	0.14	0.0	5.67
FULL	0	10	0	13.5	0.15	0.00	0.0	5.49
FULL	0	10	0	13.5	0.15	0.14	0.6	7.01
FULL	0	10	5	0.0	0.00	0.00	0.6	6.23
FULL	0	10	5	0.0	0.00	0.14	0.0	6.05
FULL	0	10	5	0.0	0.15	0.00	0.0	6.14
FULL	0	10	5	0.0	0.15	0.14	0.6	6.88
FULL	0	10	5	13.5	0.00	0.00	0.0	5.33
FULL	0	10	5	13.5	0.00	0.14	0.6	5.66
FULL	0	10	5	13.5	0.15	0.00	0.6	5.77
FULL	0	10	5	13.5	0.15	0.14	0.0	5.38

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GRAIN TONNES/HECTARE

***** TABLES OF MEANS (INDIVIDUAL VALUES) *****

IRRIGATN	N	ALDICARB	FONOFOS	BENOMYL(1)	PERMETH	PIRIMICA	BENOMYL(2)	GRAIN
FULL	150	0	0	0.0	0.00	0.00	0.0	5.82
FULL	150	0	0	0.0	0.00	0.14	0.6	6.40
FULL	150	0	0	0.0	0.15	0.00	0.6	6.81
FULL	150	0	0	0.0	0.15	0.14	0.0	6.20
FULL	150	0	0	13.5	0.00	0.00	0.6	4.45
FULL	150	0	0	13.5	0.00	0.14	0.0	5.96
FULL	150	0	0	13.5	0.15	0.00	0.0	5.37
FULL	150	0	0	13.5	0.15	0.14	0.6	6.11
FULL	150	0	5	0.0	0.00	0.00	0.6	6.26
FULL	150	0	5	0.0	0.00	0.14	0.0	6.03
FULL	150	0	5	0.0	0.15	0.00	0.0	6.28
FULL	150	0	5	0.0	0.15	0.14	0.6	6.33
FULL	150	0	5	13.5	0.00	0.00	0.0	5.26
FULL	150	0	5	13.5	0.00	0.14	0.6	5.90
FULL	150	0	5	13.5	0.15	0.00	0.6	6.02
FULL	150	0	5	13.5	0.15	0.14	0.0	5.35
FULL	150	10	0	0.0	0.00	0.00	0.6	6.47
FULL	150	10	0	0.0	0.00	0.14	0.0	5.72
FULL	150	10	0	0.0	0.15	0.00	0.0	5.92
FULL	150	10	0	0.0	0.15	0.14	0.6	6.95
FULL	150	10	0	13.5	0.00	0.00	0.0	5.18
FULL	150	10	0	13.5	0.00	0.14	0.6	5.61
FULL	150	10	0	13.5	0.15	0.00	0.6	5.18
FULL	150	10	0	13.5	0.15	0.14	0.0	5.31
FULL	150	10	5	0.0	0.00	0.00	0.0	5.91
FULL	150	10	5	0.0	0.00	0.14	0.6	6.61
FULL	150	10	5	0.0	0.15	0.00	0.6	6.92
FULL	150	10	5	0.0	0.15	0.14	0.0	6.40
FULL	150	10	5	13.5	0.00	0.00	0.6	7.28
FULL	150	10	5	13.5	0.00	0.14	0.0	5.05
FULL	150	10	5	13.5	0.15	0.00	0.0	5.59
FULL	150	10	5	13.5	0.15	0.14	0.6	6.46

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GRAIN TONNES/HECTARE

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

SED 0.079*
 0.112**
 0.158***

* USE ONLY ON MARGINS OF A TWO WAY TABLE, EXCEPT FOR IRRIGATN .

** USE FOR THE BODY OF A TWO WAY TABLE, ONLY WITHIN THE SAME LEVEL OF IRRIGATN (IF APPLICABLE) .

*** USE FOR THREE WAY TABLES (IF CONSTRUCTED FROM INDIVIDUAL VALUES), ONLY WITHIN THE SAME LEVEL OF IRRIGATN (IF APPLICABLE) .

DO NOT USE SED FOR FOLLOWING TABLES

ALDICARB. FONOFOS. PERMETH

N. BENOMYL(1). PERMETH

N. FONOFOS. PIRIMICA

ALDICARB. BENOMYL(1). PIRIMICA

N. ALDICARB. BENOMYL(2)

FONOFOS. BENOMYL(1). BENOMYL(2)

PERMETH. PIRIMICA. BENOMYL(2)

AS NO SED'S ARE AVAILABLE FOR THESE TABLES .

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

STRATUM	DF	SE	CV%
BLOCK.WP.SP	28	0.447	7.6
GRAIN MEAN DM%	80.2		
SUB PLOT AREA HARVESTED	0.00293		