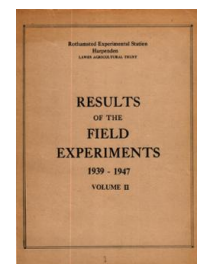


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Yields of the Field Experiments 1939-1947 Volume 2



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M Beans

Rothamsted Research

Rothamsted Research (1948) *M Beans* ; Yields Of The Field Experiments 1939-1947 Volume 2, pp 103 - 114 - DOI: <https://doi.org/10.23637/ERADOC-1-186>

BEANS

M/1

For a discussion of all experiments on beans see
D.A. Boyd, G.W. Cooke, H.V. Garner and J.R. Moffatt,
Rothamsted Experiments on Field Beans, J.R.A.S.E. 113(1952), 55.

Long Hoos III 1939
Long Hoos I and III 1945
Deacon's Field 1946

Effects of dung, nitro-chalk (and its time of application in 1945 and 1946), superphosphate and muriate of potash (and their method of application in 1946) and in 1939 the effect of borax.

Designs;

- 1939: 8 x 8 Latin square. Certain interactions confounded with rows and columns.
- 1945: 4 randomized blocks of 8 plots each. The plots receiving nitro-chalk were split for time of application.
- 1946: 8 randomized blocks of 8 plots each. The plots receiving nitro-chalk were split for time of application. Certain high order interactions confounded with block differences.

Area of each whole plot; 1939 and 1946: 0.0200 acre
1945: 0.0192 acre

Treatments

- All years: Dung: None, 10 tons per acre (D)
Nitro-chalk: None, 0.4 cwt. N per acre (N)
Superphosphate: None, 0.6 cwt. P₂O₅ per acre (P)
Muriate of potash: None, 1.0 cwt. K₂O per acre (K)
- 1939: Borax: None (B₀), 10 lb. (B₁), 20 lb. (B₂)
40 lb. (B₃) per acre.
- 1945: The nitro-chalk was applied to the split plots in autumn and spring.
- 1946: The nitro-chalk was applied to the sub-plots at the time of sowing and in the spring. The superphosphate and muriate of potash were drilled with the seed or broadcast at sowing.

Crop Notes

	1939	1945	1946	
			Early	Late
Seed sown	Nov. 17-18	Sept. 29 - Oct. 10	Oct. 10-11	Mar. 27
Harvested	Aug. 16	July 31- Aug. 1	Aug. 23	Aug. 23
Variety		Garton's Winter		Giant
Previous Crop	Wheat			Wheat
Standard errors (cwt. per acre)	Per whole plot		sub-plot	
1939 Grain	1.70 or 6.6%, 25 d.f.			
1945 Grain	2.34 or 9.8%, 13 d.f.		2.91 or 12.1%, 8 d.f.	
1945 Straw	3.74 or 11.6%, 13 d.f.		2.94 or 9.0%, 8 d.f.	
1946 Grain	2.52 or 17.1%, 31 d.f.		2.87 or 19.5%, 48 d.f.	

M/2
Beans

Long Hoos, 1939

Mean yields: Grain, 26.0 cwt. per acre. Straw, 25.3 cwt. per acre

Differential responses

Mean response	O	D	O	N	O	P	O	K
	Grain: cwt. per acre							
± 0.42	± 0.60							
D 0.41	-	-	3.3	5.0	4.0	4.4	4.7	3.6
N 0.7	-0.2	1.6	-	-	1.4	0.0	0.3	1.0
P -1.1	-1.3	-1.0	-0.4	-1.8	-	-	-1.0	-1.2
K 1.8	2.4	1.3	1.5	2.2	2.0	1.8	-	-

Straw: cwt. per acre

D 2.8	-	-	3.2	2.4	3.0	2.6	2.8	2.8
N 1.4	1.8	1.0	-	-	1.8	1.0	1.6	1.2
P 0.4	0.6	0.2	0.8	0.0	-	-	0.8	-0.1
K 1.2	1.2	1.2	1.4	1.0	1.7	0.8	-	-

Response to borax

	Mean yield	Response to			
		D	N	F*	K
	Grain: cwt. per acre				
	± 0.42	± 0.85			
B ₀	25.5	3.4	1.2	-1.0	2.9
B ₁	26.9	5.4	1.3	-1.4	2.7
B ₂	25.8	4.5	0.3	-1.1	1.9
B ₃	25.6	3.5	0.0	-0.8	-0.1

Straw: cwt. per acre

B ₀	25.0	3.7	1.6	0.2	0.8
B ₁	25.3	3.0	1.0	0.7	2.1
B ₂	25.3	2.0	1.5	0.6	0.7
B ₃	25.6	2.4	1.2	0.1	1.3

* The (B₀ - B₁ + B₂ - B₃) x F interaction was confounded with columns. The figures shown have been adjusted so as to make this interaction zero.

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Long Hoos, 1945

	Mean Resp.	Differential responses							
		Dung Abs. Pres.		Nitrochalk Abs. Pres.		Superphos. Abs. Pres.		Mur.pot. Abs. Pres.	

Grain: Mean yield, 23.9 cwt. per acre

	±0.83			±1.17					
Dung	3.5	-	-	3.3	3.7	4.2	2.8	3.8	3.2
Nitrochalk	0.4	0.2	0.6	-	-	0.2	0.6	1.7	-0.9
Super.	0.4	1.1	-0.3	0.2	0.6	-	-	0.5	0.3
Mur.pot.	1.0	1.3	0.7	2.3	-0.3	1.1	0.9	-	-

Straw: Mean yield, 32.4 cwt. per acre

	±1.32			±1.87					
Dung	2.9	-	-	2.8	3.0	3.0	2.8	3.9	1.9
Nitrochalk	0.6	0.3	0.7	-	-	1.5	-0.3	1.1	0.1
Super.	1.6	1.7	1.5	2.5	0.7	-	-	1.4	1.8
Mur.pot.	0.1	1.1	-0.9	0.6	-0.4	-0.1	0.3	-	-

Responses, Spring minus Autumn application of Nitrochalk

	Mean Resp.	Dung Abs. Pres.		Superphos. Abs. Pres.		Mur.pot. Abs. Pres.	
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Grain: Mean effect, -0.9 cwt. per acre

	±2.06			±2.91			
Dung	-2.3	-	-	-4.4	-0.2	-1.1	-3.5
Super	1.6	-0.5	3.7	-	-	0.9	2.3
Mur.pot.	0.7	1.9	-0.5	0.0	1.4	-	-

Straw: Mean effect, 0.5 cwt. per acre

	±2.08			±2.94			
Dung	-3.2	-	-	-3.8	-2.6	-3.9	-2.5
Super	-3.7	-4.3	-3.1	-	-	-3.1	-4.3
Mur.pot.	2.4	1.7	3.1	3.0	1.8	-	-

M/4
Beans

Deacon's Field, 1946

Grain: cwt. per acre

Mean yield, 14.7

Differential Responses

Mean response	Dung		Nitrochalk		Superphos.		Muriate of Potash		Time of Sowing	
	Abs. Fres.		Abs. Fres.		Abs. Fres.		Abs. Fres.		Spring	Autumn
± 0.63	-		2.6	1.2	± 0.89		2.4	1.4	0.7	3.1
1.9	2.0	0.6	-	-	2.6	1.2	0.0	2.6	1.6	1.0
1.3	0.1	-1.3	0.2	-1.4	2.1	0.5	-1.3	0.1	-0.7	-0.5
-0.6	1.1	0.1	-0.7	1.9	-	-	-	-	0.3	0.9
0.6	1.2	3.6	2.7	2.1	-0.1	1.3	2.1	2.7	-	-
2.4					2.3	2.5				
2.0	0.2	3.8	-	-	0.3	3.7	1.6	2.4	6.4	-2.4
± 0.72					± 1.03					

Phosphate alone Potash alone Phosphate and Potash

Winter beans:

Drilled - Broadcast (± 2.52) 2.6 0.4 3.2

Dung
Nitrochalk
Superphosphate
Muriate of potash
Autumn-Spring sowing
Time of application
of Nitrochalk:
Autumn - Spring

BEANS

Great Harpenden 1944

Effects of spacing, time of sowing, method of sowing and nitrate of soda on two varieties.

Design; 4 randomized blocks of 12 plots each, with certain treatment interactions confounded between blocks.

Area of each plot: 0.0250 acre.

Treatments

Varieties: Garton's Giant Winter and N.I.A.B. No.7 Winter.

Spacing: 9 inch and 18 inch, or broadcast at equivalent rates.

Method of sowing: Drilled, broadcast and covered in by ploughing ('broadcast'), sown in the furrows and covered in by ploughing ('ploughed in').

Time of sowing: Oct. 26 ('early'), Nov. 19 ('late')

Nitrate of soda: None, $2\frac{1}{2}$ cwt. per acre as spring top dressing.

The 16 drilled plots failed and were re-sown with spring beans, for which the treatments tested were spacing, method of sowing and nitrate of soda. The results for winter and spring sowing have been treated as separate experiments.

Basal manuring: Superphosphate: 5 cwt per acre

Muriate of potash: 1.5 cwt per acre

Crop Notes

Harvested: Aug 2-3.

Previous Crop, Wheat and beans

Standard errors per plot:

Winter beans: Grain: 1.61 cwt. per acre or 14.0%, 14 d.f.

Straw: 1.21 cwt. per acre or 11.2%, 12 d.f.

Spring beans: Grain: 0.65 cwt. per acre or 12.7%, 6 d.f.

Straw: 1.40 cwt. per acre or 13.2%, 6 d.f.

M/6

Beans - Great Harpenden 1944

Differential Responses

Winter Beans

	Mean	Garton	N.I.A.B.	Early	Late	Spacing 18" 9"	Ploughing	Broad- cast	Nitrate of soda Abs. Pres.
Grain: Mean yield, 11.5 cwt. per acre									
	±0.57	-	-	-5.1	-3.5	±0.80	-4.6	-4.0	(-2.9 -5.7)
N.I.A.B. - Garton	-4.3	-3.6	-	-	-3.5	-3.4 -5.2	-3.8	-1.8	-2.8 -2.8
Late - Early	-2.8	4.3	2.5	4.3	-	-3.7 -1.9	3.7	3.1	3.5 3.3
9" - 18" spacing	3.4	-1.2	-0.6	-1.9	0.1	-	-	-	0.0 -1.8
Broadcast-Ploughing	-0.9	(2.2)	-0.6	0.8	0.8	-0.6 -1.2	1.7	-0.1	-
Nitrate of Soda	0.8		-0.6			0.9 0.7			
Straw: Mean yield, 10.8 cwt. per acre									
	±0.43	-	-	-3.7	-3.1	±0.60	-3.4	-3.4	(-2.2 -4.6)
N.I.A.B. - Garton	-3.4	-3.0	-2.4	-	-	-2.4 -4.4	-3.4	-2.0	-3.2 -2.2
Late - Early	-2.7	3.8	1.8	2.9	2.7	-2.6 -2.8	3.4	2.2	2.4 3.2
9" - 18" spacing	2.8	-0.3	-0.3	-1.0	0.4	-	-	-	0.5 -1.1
Broadcast-Ploughing	-0.3	(1.9)	-0.5	0.2	1.2	0.3 -0.9	1.5	-0.1	-
Nitrate of Soda	0.7		-0.5			0.3 1.1			

The interaction shown in () is a block difference

Differential Responses
Spring Beans

	Mean	Spacing 18" 9"	Ploughing Broadcast	Nitrate of Soda Absent Present
Grain: Mean yield, 5.1 cwt. per acre				
	±0.32		±0.46	
9" - 18" spacing	2.2	-	2.5	1.9
Broadcast-Ploughing	-1.3	-1.0	-1.6	-
Nitrate of Soda	0.2	0.6	-0.2	0.6
				-0.2
				2.6
				-0.9
				-
				1.8
				-1.7
				-
Straw: Mean yield, 10.6 cwt. per acre				
	±0.70		±0.99	
9" - 18" spacing	3.3	-	4.6	2.0
Broadcast-Ploughing	-0.8	0.5	-2.1	-
Nitrate of Soda	1.2	1.6	0.8	1.5
				0.9
				3.7
				-0.5
				-
				2.9
				-1.1
				-

M/8

BEANS

Long Hoos I and III 1945

Effect of time of sowing, of three seeding rates, of spacing and of method of sowing on two varieties.

Design; 8 randomized blocks of 8 plots each.
Certain interactions confounded with block differences.

Area of each plot: 0.0200 acre

Treatments

Applied to blocks:

Varieties: Garton's Giant Winter and N.I.A.B. No. 7 Winter.

Time of sowing: Sept. 22-29 (early) and Oct. 20 - Nov. 1 (late)

Applied to plots:

Rates and methods of sowing: Broadcast before ploughing, 3 cwt. and $4\frac{1}{2}$ cwt. per acre. Seed dropped in furrow during ploughing at 1.5 cwt. per acre, rows 9 and 18 inches apart, and at 3 cwt. per acre, rows 9 and 18 inches apart.

Basal manuring: Nitro-chalk: 2.5 cwt. per acre
Superphosphate: 3.5 cwt. per acre
Muriate of potash: 2.0 cwt. per acre

Crop Notes

Harvested: Aug. 4

Previous crop, Wheat

Standard errors per plot: Garton's: Grain 2.05 cwt. per acre
or 9.7%, 18 d.f.
N.I.A.B.: Grain 2.11 cwt. per acre
or 15.4%, 8 d.f.

Result of germination test: N.I.A.B. 60%; Garton's 94%
Purity of sample: N.I.A.B. 91%; Garton's 99%
Thousand corn weights: N.I.A.B. 582 grm; Garton's 595 grm.

Method	Seed rate cwt./acre	Row Spacing	Grain: cwt. per acre		N.I.A.B.			
			Early Sown	Late Sown	Mean	Early Sown	Late Sown	
Furrows	1½	9"	±1.45	17.5	15.0	±1.02	±1.50	
"	1½ (hoed)	18"	17.5	18.2 ^a	15.8 ^a	16.2	8.2	
"	3	9"	22.4	23.1	22.8	17.0 ^b	9.0 ^c	
"	3 (hoed)	18"	26.3 ^a	21.6 ^a	24.0 ^b	22.8	15.6 ^c	Failed
Broadcast	3	-	26.2	20.3	23.2	24.0	14.2	
"	4½	-	23.9	24.7	24.3	23.2	20.9	
	Mean		22.4	19.7	21.1	21.1	13.7	

Seed rate per acre in furrow	Garton's		N.I.A.B.	
	(Early and Late) Spacing 9" 18"	Mean	(Early only) Spacing 9" 18"	Mean
cwt.	±1.02	±0.59	±1.50	±0.86
1½	16.2	16.8	8.2	8.7
3	22.8	23.6	15.6	16.0
Mean	19.5 ^b	20.2	11.9 ^c	12.3

Standard errors (a) 1.02 (b) 0.72 (c) 1.06 (d) 0.51 (e) 0.75

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Beans - Long Hoos 1945

Grain: cwt. per acre (continued)

Seed rate per acre	Gartons		Mean	N. I. A. B.	
	Early	Late		Early	Late
cwt.					
1½	18.0f	15.5f	16.8g	8.7h	
3	25.3b	21.6b	23.5d	15.7e	Failed
4½	23.9j	24.7j	24.3a	20.9k	
Standard errors	(a) 1.02 (f) 0.84	(b) 0.72 (g) 0.59	(h) 0.86	(d) 0.51 (j) 1.45	(e) 0.75 (k) 1.49

M/11

BEANS

Long Hoos V 1946

Effects of time of sowing, two seed rates and method of sowing on four varieties.

Design; 4 randomized blocks of 8 plots each, certain interactions being confounded with block differences.

Area of each plot: 0.0286 acre.

Treatments

Applied to blocks:

Time of sowing: Oct. 5-9 (early), Nov. 5-8 (late)

Applied to plots:

Varieties: Giant (once grown), Essex strain, Lincolnshire strain, Fa7 (twice grown from N.I.A.B.)

Method of sowing: Seed broadcast before ploughing or dropped in furrows during ploughing with 18" spacing between rows.

Seed rate: 2 cwt. per acre, 3 cwt. per acre.

Basal manuring: Dung: 10 tons per acre

Superphosphate: 2 cwt. per acre

Muriate of potash: 1 cwt. per acre.

Crop Notes

Harvested: Aug. 9

Previous crop, Barley

Standard errors per plot: Grain: 1.61 cwt. per acre or 7.8%,
10 d.f.

Straw: 2.23 cwt. per acre or 5.3%,
10 d.f.