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57/R/CG/1 and 57/W/CG/1 Sugar Beet - Dung N P K and Salt

Rothamsted Research

Rothamsted Research (1958) *57/R/CG/1 and 57/W/CG/1 Sugar Beet - Dung N P K and Salt* ; Yields Of The Field Experiments 1957, pp 104 - 113 - DOI: <https://doi.org/10.23637/ERADOC-1-177>

57/Cg/1.1

SUGAR BEET

Dung, N, P, K and Salt - Rothamsted (R) West Barnfield II and Woburn (W)
Great Hill 1957.

Design (each field): 4 randomized blocks of 16 plots each, certain high
order interactions being confounded with block differences.

Area of each plot: 0.0167 acres. Area harvested: 0.0111 acres.

Treatments. All combinations of:

Dung: None; 5; 10; 20 tons per acre ploughed in.
N: None; 0.9 cwt N per acre as sulphate of ammonia.
P: None; 0.75 cwt P_2O_5 per acre as superphosphate.
K: None; 1.5 cwt K_2O per acre as muriate of potash.
Salt: None; 5 cwt per acre agricultural salt.

Basal dressings: None.

Cultivations, etc.:

West Barnfield II (R). Dung applied, ploughed: Jan 8. Salt
applied: Feb 18. Fertilizers applied: Apr 16. Seed drilled at
18 lb per acre: Apr 17. Sprayed with DDT emulsion, 3 pints in
20 gallons per acre: May 29. Singled: July 1 - 9. Sprayed
with methyldemeton, 12 oz in 80 gallons per acre: July 6.
Lifted: Nov 13 - 27. Variety: Klein E. Previous crop: Barley.
Great Hill (W). Salt applied: Feb 5. Dung applied, ploughed:
Feb 6. Fertilizers applied: Apr 12. Seed drilled at 12 lb per
acre: Apr 13. Sprayed with miscible DDT at 3 pints in 20 gallons
per acre: May 22. Singled: June 3 - 6. Sprayed with
methyldemeton at 12 oz in 80 gallons per acre: July 8. Lifted:
Nov 25 - 28. Variety: Klein E. Previous crop: Barley.

Standard errors per plot.

Total sugar.	West Barnfield (R)	4.32 cwt per acre or 11.8% (32 d.f.)
	Great Hill (W)	3.31 cwt per acre or 5.3% (32 d.f.)
Tops.	West Barnfield (R)	1.674 tons per acre or 11.1% (32 d.f.)
	Great Hill (W)	0.697 tons per acre or 6.1% (32 d.f.)

57/Cg/1.2

Summary of Results

Roots (washed): tons per acre

	Dung: tons per acre				Mean
	None	5	10	20	
West Barnfield II (Rothamsted)					
Mean	8.63	10.05	11.08	12.55	10.58
N: cwt per acre					
None	8.29	9.92	10.89	12.62	10.43
0.9	8.96	10.18	11.28	12.48	10.72
Difference	+0.67	+0.26	+0.39	-0.14	+0.29
P ₂₅ ⁰ : cwt per acre					
None	7.49	9.35	10.46	12.34	9.91
0.75	9.77	10.76	11.70	12.75	11.24
Difference	+2.28	+1.41	+1.24	+0.41	+1.33
K ₂ O: cwt per acre					
None	8.06	9.95	11.10	12.57	10.42
1.5	9.20	10.15	11.06	12.52	10.73
Difference	+1.14	+0.20	-0.04	-0.05	+0.31
Salt: cwt per acre					
None	7.36	9.52	10.53	12.07	9.87
5.0	9.89	10.58	11.64	13.02	11.28
Difference	+2.53	+1.06	+1.11	+0.95	+1.41
Great Hill (Woburn)					
Mean	15.99	16.94	17.77	18.67	17.34
N: cwt per acre					
None	14.93	16.80	17.07	18.39	16.80
0.9	17.05	17.03	18.47	18.95	17.89
Difference	+2.12	+0.28	+1.40	+0.56	+1.09
P ₂₅ ⁰ : cwt per acre					
None	16.16	17.02	17.92	18.86	17.49
0.75	15.82	16.86	17.62	18.48	17.19
Difference	-0.34	-0.16	-0.30	-0.38	-0.30
K ₂ O: cwt per acre					
None	15.99	17.03	18.11	18.33	17.36
1.5	15.99	16.85	17.43	19.01	17.32
Difference	0.00	-0.18	-0.68	+0.68	-0.04
Salt: cwt per acre					
None	15.76	16.94	17.42	18.83	17.24
5.0	16.22	16.93	18.13	18.51	17.45
Difference	+0.46	-0.01	+0.71	-0.32	+0.21

57/Cg/1.3

	Sugar percentage				Mean
	Dung: tons per acre				
	None	5	10	20	
West Barnfield II (Rothamsted)					
Mean	17.3	17.3	17.3	17.2	17.3
N: cwt per acre					
None	17.7	17.6	17.6	17.5	17.6
0.9	16.9	16.9	16.9	16.8	16.9
Difference	-0.8	-0.7	-0.7	-0.7	-0.7
P ₂ O ₅ : cwt per acre					
None	17.1	17.2	17.1	17.0	17.1
0.75	17.6	17.4	17.4	17.3	17.4
Difference	+0.5	+0.2	+0.3	+0.3	+0.3
K ₂ O: cwt per acre					
None	17.3	17.4	17.3	17.0	17.2
1.5	17.3	17.2	17.3	17.3	17.3
Difference	0.0	-0.2	0.0	+0.3	+0.1
Salt: cwt per acre					
None	17.1	17.1	17.4	17.3	17.2
5.0	17.5	17.5	17.2	17.0	17.3
Difference	+0.4	+0.4	-0.2	-0.3	+0.1
Great Hill (Woburn)					
Mean	18.2	18.0	17.7	17.7	17.9
N: cwt per acre					
None	18.5	18.2	17.8	18.0	18.1
0.9	17.9	17.7	17.7	17.3	17.7
Difference	-0.6	-0.5	-0.1	-0.7	-0.4
P ₂ O ₅ : cwt per acre					
None	18.1	18.0	17.7	17.6	17.9
0.75	18.2	17.9	17.8	17.7	17.9
Difference	+0.1	-0.1	+0.1	+0.1	0.0
K ₂ O: cwt per acre					
None	18.3	18.0	17.8	17.5	17.9
1.5	18.1	18.0	17.7	17.8	17.9
Difference	-0.2	0.0	-0.1	+0.3	0.0
Salt: cwt per acre					
None	18.0	18.0	17.7	17.9	17.9
5.0	18.4	17.9	17.8	17.5	17.9
Difference	+0.4	-0.1	+0.1	-0.4	0.0

57/Cg/1.4

Total sugar: cwt per acre

Dung: tons per acre

	None	5	10	20	Mean
West Barnfield II (Rothamsted)					
Mean (± 1.08)	30.0	34.8	38.3	43.0	36.5
N: cwt per acre					
None (± 1.53)	29.5	35.0	38.3	44.2	36.8
0.9 (± 1.53)	30.4	34.6	38.2	41.9	36.3
Difference (± 2.16)	+0.9	-0.4	-0.1	-2.3	-0.5 (± 1.08)
P ₂ O ₅ : cwt per acre					
None (± 1.53)	25.6	32.2	35.8	42.0	33.9
0.75 (± 1.53)	34.4	37.3	40.7	44.1	39.1
Difference (± 2.16)	+8.8	+5.1	+4.9	+2.1	+5.2 (± 1.08)
K ₂ O: cwt per acre					
None (± 1.53)	28.0	34.5	38.3	42.8	35.9
1.5 (± 1.53)	32.0	35.0	38.2	43.3	37.1
Difference (± 2.16)	+4.0	+0.5	-0.1	+0.5	+1.2 (± 1.08)
Salt: cwt per acre					
None (± 1.53)	25.3	32.5	36.5	41.7	34.0
5.0 (± 1.53)	34.7	37.0	40.0	44.3	39.0
Difference (± 2.16)	+9.4	+4.5	+3.5	+2.6	+5.0 (± 1.08)
Great Hill (Woburn)					
Mean (± 0.83)	58.1	60.8	63.0	66.0	62.0
N: cwt per acre					
None (± 1.17)	55.1	61.2	60.7	66.3	60.8
0.9 (± 1.17)	61.2	60.4	65.4	65.7	63.2
Difference (± 1.66)	+6.1	-0.8	+4.7	-0.6	+2.4 (± 0.83)
P ₂ O ₅ : cwt per acre					
None (± 1.17)	58.6	61.2	63.3	66.5	62.4
0.75 (± 1.17)	57.7	60.3	62.8	65.5	61.6
Difference (± 1.66)	-0.9	-0.9	-0.5	-1.0	-0.8 (± 0.83)
K ₂ O: cwt per acre					
None (± 1.17)	58.3	61.1	64.4	64.3	62.0
1.5 (± 1.17)	57.9	60.5	61.7	67.7	61.9
Difference (± 1.66)	-0.4	-0.6	-2.7	+3.4	-0.1 (± 0.83)
Salt: cwt per acre					
None (± 1.17)	56.6	60.9	61.7	67.3	61.6
5.0 (± 1.17)	59.7	60.6	64.4	64.6	62.3
Difference (± 1.66)	+3.1	-0.3	+2.7	-2.7	+0.7 (± 0.83)

		57/0g/1.5				
		Tops: tons per acre				
		Dung: tons per acre				
		None	5	10	20	Mean
West Barnfield II (Rothamsted)						
Mean	(±0.418)	12.50	14.75	15.77	17.39	15.10
N: cwt per acre						
None	(±0.592)	10.29	13.98	14.19	15.71	13.54
0.9		14.71	15.52	17.35	19.08	16.66
Difference	(±0.837)	+4.42	+1.54	+3.16	+3.37	+3.12
						(±0.418)
P ₂ O ₅ : cwt per acre						
None	(±0.592)	11.34	12.56	14.54	17.41	13.96
0.75		13.66	16.94	17.00	17.37	16.24
Difference	(±0.837)	+2.32	+4.38	+2.46	-0.04	+2.28
						(±0.418)
K ₂ O: cwt per acre						
None	(±0.592)	11.72	15.43	15.69	17.57	15.10
1.5		13.28	14.07	15.85	17.21	15.10
Difference	(±0.837)	+1.56	-1.36	+0.16	-0.36	0.00
						(±0.418)
Salt: cwt per acre						
None	(±0.592)	11.37	14.22	15.12	16.67	14.34
5.0		13.63	15.28	16.42	18.12	15.86
Difference	(±0.837)	+2.26	+1.06	+1.30	+1.45	+1.52
						(±0.418)
Great Hill (Woburn)						
Mean	(±0.174)	9.60	10.83	11.70	13.53	11.41
N: cwt per acre						
None	(±0.246)	7.38	8.45	9.56	11.68	9.27
0.9		11.83	13.21	13.83	15.37	13.56
Difference	(±0.348)	+4.45	+4.76	+4.27	+3.69	+4.29
						(±0.174)
P ₂ O ₅ : cwt per acre						
None	(±0.246)	10.08	10.53	11.78	13.54	11.48
0.75		9.13	11.13	11.61	13.51	11.34
Difference	(±0.348)	-0.95	+0.60	-0.17	-0.03	-0.14
						(±0.174)
K ₂ O: cwt per acre						
None	(±0.246)	9.44	10.76	11.49	13.17	11.21
1.5		9.77	10.90	11.91	13.88	11.61
Difference	(±0.348)	+0.33	+0.14	+0.42	+0.71	+0.40
						(±0.174)
Salt: cwt per acre						
None	(±0.246)	9.39	10.95	11.45	13.45	11.31
5.0		9.82	10.71	11.95	13.60	11.52
Difference	(±0.348)	+0.43	-0.24	+0.50	+0.15	+0.21
						(±0.174)

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57/Cg/1.7

Roots (washed): tons per acre

		Dung: tons per acre				Mean
		None	5	10	20	
West Barnfield II (Rothamsted)						
K ₂ O: cwt per acre	Salt: cwt per acre					
None	None	6.62	9.45	10.40	11.89	9.59
1.5	None	8.11	9.59	10.66	12.25	10.15
None	5.0	9.50	10.44	11.81	13.26	11.25
1.5	5.0	10.29	10.72	11.47	12.79	11.32

Great Hill (Woburn)

K ₂ O: cwt per acre	Salt: cwt per acre					
None	None	15.81	16.96	18.21	18.57	17.39
1.5	None	15.71	16.93	16.63	19.09	17.09
None	5.0	16.16	17.10	18.01	18.09	17.34
1.5	5.0	16.27	16.76	18.24	18.93	17.55

Sugar percentage

		Dung: tons per acre				Mean
		None	5	10	20	
West Barnfield II (Rothamsted)						
K ₂ O: cwt per acre	Salt: cwt per acre					
None	None	17.2	17.2	17.4	17.1	17.2
1.5	None	17.1	17.0	17.3	17.5	17.2
None	5.0	17.4	17.6	17.1	17.0	17.3
1.5	5.0	17.6	17.4	17.3	17.1	17.3

Great Hill (Woburn)

K ₂ O: cwt per acre	Salt: cwt per acre					
None	None	18.0	18.0	17.7	17.7	17.8
1.5	None	17.9	18.0	17.7	18.1	17.9
None	5.0	18.5	18.0	17.9	17.4	17.9
1.5	5.0	18.3	17.9	17.7	17.5	17.9

57/Cg/1.8

Total sugar: cwt per acre

		Dung: tons per acre				
		None	5	10	20	Mean

West Barnfield II (Rothamsted)

K ₂ O:	Salt:					
cwt per acre	cwt per acre	(±2.16)				(±1.08)
None	None	22.8	32.5	36.2	40.6	33.0
1.5	None	27.8	32.6	36.9	42.9	35.0
None	5.0	33.2	36.6	40.4	45.0	38.8
1.5	5.0	36.2	37.5	39.6	43.7	39.2

Great Hill (Woburn)

K ₂ O:	Salt:					
cwt per acre	cwt per acre	(±1.66)				(±0.83)
None	None	57.0	60.8	64.4	65.7	62.0
1.5	None	56.2	61.0	58.9	68.9	61.3
None	5.0	59.7	61.4	64.4	62.9	62.1
1.5	5.0	59.7	59.9	64.4	66.4	62.6

Tops: tons per acre

		Dung: tons per acre				
		None	5	10	20	Mean

West Barnfield II (Rothamsted)

K ₂ O:	Salt:					
cwt per acre	cwt per acre	(±0.837)				(±0.418)
None	None	9.91	13.82	15.30	16.05	13.77
1.5	None	12.82	14.62	14.94	17.28	14.91
None	5.0	13.53	17.04	16.07	19.09	16.43
1.5	5.0	13.73	13.52	16.77	17.15	15.29

Great Hill (Woburn)

K ₂ O:	Salt:					
cwt per acre	cwt per acre	(±0.348)				(±0.174)
None	None	9.12	10.50	10.79	13.15	10.89
1.5	None	9.65	11.39	12.11	13.75	11.73
None	5.0	9.76	11.02	12.19	13.19	11.54
1.5	5.0	9.89	10.41	11.71	14.01	11.50

Plant number: thousands per acre

		Dung: tons per acre				
		None	5	10	20	Mean

West Barnfield II (Rothamsted)

K ₂ O:	Salt:					
cwt per acre	cwt per acre					
None	None	24.1	24.7	25.2	25.0	24.7
1.5	None	23.7	25.6	25.8	25.7	25.2
None	5.0	25.6	27.2	25.9	26.2	26.2
1.5	5.0	26.0	26.3	29.3	25.0	26.6

Great Hill (Woburn)

Not recorded

57/Cg/1.9

Response to	Responses to treatments cwt per acre							
	N		P ₂ O ₅		K ₂ O		Salt	
	None	0.9	None	0.75	None	1.5	None	5.0
Roots (washed): tons per acre								
West Barnfield II (Rothamsted)								
N	-	-	+0.10	+0.50	+0.45	+0.15	-0.14	+0.74
P ₂ O ₅	+1.13	+1.53	-	-	+1.05	+1.60	+0.97	+1.69
K ₂ O	+0.46	+0.16	+0.04	+0.58	-	-	+0.56	+0.06
Salt	+0.97	+1.85	+1.05	+1.77	+1.66	+1.16	-	-
Great Hill (Woburn)								
N	-	-	+1.15	+1.03	+1.03	+1.15	+0.91	+1.27
P ₂ O ₅	-0.23	-0.35	-	-	-0.60	+0.02	+0.15	-0.73
K ₂ O	-0.10	+0.02	-0.35	+0.27	-	-	-0.29	+0.21
Salt	+0.03	+0.39	+0.65	-0.23	-0.04	+0.46	-	-
Sugar percentage								
West Barnfield II (Rothamsted)								
N	-	-	-0.9	-0.7	-0.9	-0.7	-1.0	-0.6
P ₂ O ₅	+0.2	+0.4	-	-	+0.4	+0.2	+0.3	+0.3
K ₂ O	-0.1	+0.1	+0.1	-0.1	-	-	0.0	0.0
Salt	-0.1	+0.3	+0.1	+0.1	+0.1	+0.1	-	-
Great Hill (Woburn)								
N	-	-	-0.3	-0.7	-0.6	-0.4	-0.5	-0.5
P ₂ O ₅	+0.3	-0.1	-	-	-0.1	+0.3	+0.1	+0.1
K ₂ O	-0.1	+0.1	-0.2	+0.2	-	-	+0.1	-0.1
Salt	0.0	0.0	0.0	0.0	+0.1	-0.1	-	-
Total sugar: cwt per acre								
West Barnfield II (Rothamsted)								
N	-	-	-1.2	+0.2	0.0	-1.0	-2.3	+1.3
P ₂ O ₅	+4.5	+5.9	-	-	+4.5	+5.9	+3.9	+6.5
K ₂ O	+1.7	+0.7	+0.5	+1.9	-	-	+2.0	+0.4
Salt	+3.2	+6.8	+3.7	+6.3	+5.8	+4.2	-	-
Great Hill (Woburn)								
N	-	-	+3.2	+1.4	+1.8	+2.8	+1.7	+2.9
P ₂ O ₅	+0.1	-1.7	-	-	-2.5	+0.9	+1.0	-2.6
K ₂ O	-0.6	+0.4	-1.8	+1.6	-	-	-0.7	+0.5
Salt	+0.1	+1.3	+2.5	-1.1	+0.1	+1.3	-	-

57/Cg/1.10

Response to	Responses to treatments cwt per acre							
	N		P ₂ O ₅		K ₂ O		Salt	
	None	0.9	None	0.75	None	1.5	None	5.0

Tops: tons per acre

West Barnfield II (Rothamsted)

(±0.592)

N	-	-	+2.83	+3.41	+3.55	+2.69	+3.16	+3.08
P ₂ O ₅	+1.99	+2.57	-	-	+2.05	+2.51	+2.11	+2.45
K ₂ O	+0.43	-0.43	-0.23	+0.23	-	-	+1.14	-1.14
Salt	+1.56	+1.48	+1.35	+1.69	+2.66	+0.38	-	-

Great Hill (Woburn)

(±0.246)

N	-	-	+4.23	+4.35	+3.47	+5.11	+4.32	+4.26
P ₂ O ₅	-0.20	-0.08	-	-	-0.52	+0.24	+0.16	-0.44
K ₂ O	-0.42	+1.22	+0.02	+0.78	-	-	+0.84	-0.04
Salt	+0.24	+0.18	+0.51	-0.09	+0.65	-0.23	-	-

Plant number: thousands per acre

West Barnfield II (Rothamsted)

N	-	-	+0.1	+0.3	+0.1	+0.3	0.0	+0.4
P ₂ O ₅	+1.5	+1.7	-	-	+1.3	+1.9	+1.7	+1.5
K ₂ O	+0.4	+0.6	+0.2	+0.8	-	-	+0.5	+0.5
Salt	+1.3	+1.7	+1.6	+1.4	+1.5	+1.5	-	-

Great Hill (Woburn)

Not recorded