ROTHAMSTED RESEARCH

Report for 1934

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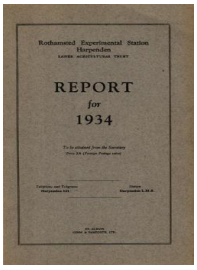

Experiments at Outside Centres

Rothamsted Research

Rothamsted Research (1935) *Experiments at Outside Centres ;* Report For 1934, pp 227 - 255 **- DOI: https://doi.org/10.23637/ERADOC-1-66**

EXPERIMENTS AT OUTSIDE CENTRES

Barley. G. H. Nevile, Esq., Wellingore Hall, Lincs., 1934.

6 × 6 Latin square. Plots : 0.008325.

Treatments : All combinations of

{No N. / 0.2 cwt. N. as sulphate of ammonia. / 0.2 cwt. N. as nitro-chalk.} × {No Super. / Super. (0.4 cwt. P_2O_5)}

Basal Manuring : Nil.

Soil : Light loam. Variety : Spratt Archer. Manures applied : March 21. Seed sown : March 21. Harvested : August 21. Previous crop : Barley.

Special Notes : Plots harvested by sampling method (5 random samples per plot, each consisting of 4 half-metre rows side by side). Rows spaced 6 inches apart.

A gale on Aug. 20 blew off many ears.

Standard Errors per plot ; Grain : 4.80 cwt. per acre or 19.2%. Straw : 3.80 cwt. per acre or 15.4%.

Grain : cwt. per acre (±1.97)

Superphosphate	Nitrogen (0.2 cwt. N) None	Sulph. Amm.	Nitro-Chalk	*Mean (±1.14)*	*Increase (±1.60)*
None	22.4	25.0	24.3	*23.9*	
0.4 cwt. P_2O_5 ..	23.4	27.0	28.0	*26.1*	*+2.2*
Mean (±1.40) ..	*22.9*	*26.0*	*26.2*	*25.0*	
Increase (±1.97) ..		*+3.1*	*+3.3*		

Straw : cwt. per acre (±1.55)

Superphosphate	Nitrogen (0.2 cwt. N) None	Sulph. Amm.	Nitro-Chalk	*Mean (±0.895)*	*Increase (±1.26)*
None	22.6	25.7	24.1	*24.1*	
0.4 cwt. P_2O_5 ..	24.8	26.9	24.3	*25.3*	*+1.2*
Mean (±1.10) ..	*23.7*	*26.3*	*24.2*	*24.7*	
Increase (±1.56) ..		*+2.6*	*+0.5*		

Conclusions

There were no significant effects. The standard errors were high.

Potatoes—G. Major, Esq., Newton Farm, Tydd, Wisbech, 1934

3 randomised blocks of 9 plots each, with two degrees of freedom, representing second order interactions, confounded with block differences. Error estimated from high order interactions. Plots : 1/60 acre.

TREATMENTS : All combinations of :

Sulph. amm. {None / 0.4 cwt. N / 0.8 cwt. N} × Super. {None / 0.7 cwt. P_2O_5 / 1.4 cwt. P_2O_5} × Sulph. pot. {None / 1.0 cwt. K_2O / 2.0 cwt. K_2O}

BASAL MANURING : Nil.

SOIL : Deep silt, rather light. Variety : Sharpes Express. Manures applied : Mar. 29th. Potatoes planted : Apr. 5th. Lifted : July 16th. Previous crop : Potatoes.

STANDARD ERROR PER PLOT : 0.414 tons per acre or 6.14%.

https://doi.org/10.23637/ERADOC-1-66

Main effects—Interactions of sulphate of potash with sulphate of ammonia and superphosphate (±0.239)

Sulphate of potash	Sulphate of ammonia (cwt. N). 0.0	0.4	0.8	Superphosphate (cwt. P_2O_5). 0.0	0.7	1.4	*Mean.* (±0.138)	*Increase* (±0.195)
0.0 cwt. K_2O ..	5.81	7.18	7.04	6.65	6.52	6.86	*6.68*	
1.0 cwt. K_2O ..	5.99	7.29	6.93	6.40	6.85	6.96	*6.74*	*+0.06*
2.0 cwt. K_2O ..	6.15	6.86	7.47	6.44	6.91	7.13	*6.83*	*+0.09*
Mean (±0.138)	*5.98*	*7.11*	*7.15*	*6.49*	*6.76*	*6.98*	*6.75*	
Increase (±0.195)		*+1.13*	*+0.04*		*+0.27*	*+0.22*		

Interaction of superphosphate and sulphate of ammonia (±0.239)

Superphosphate	Sulphate of ammonia (cwt. N) 0.0	0.4	0.8
0.0 cwt. P_2O_5	6.37	6.56	6.55
0.7 cwt. P_2O_5	5.78	7.27	7.23
1.4 cwt. P_2O_5	5.80	7.50	7.65

Conclusions

There were significant responses to sulphate of ammonia and superphosphate, with a significant falling-off in response at the higher level in the case of the former. There was a significant positive interaction between the two effects, each factor having given a response only in presence of the other.

Potatoes—R. Starling, Esq., Little Downham, Ely, 1934

6 randomised blocks of 9 plots each, certain high order interactions being partially confounded with block differences. Plots : 1/80 acre.

TREATMENTS : All combinations of :

Sulph. amm. {None, 0.3 cwt. N, 0.6 cwt. N} × Super. {None, 0.75 cwt. P_2O_5, 1.50 cwt. P_2O_5} × Sulph. pot. {None, 0.75 cwt. K_2O, 1.50 cwt. K_2O}

BASAL MANURING : Nil.

SOIL : Medium black fen. Variety : Scotch Majestic. Manures applied : Apr. 5th. Potatoes planted : Apr. 5th. Lifted : Oct. 8th. Previous crop : Wheat.

SPECIAL NOTE : 30% of the produce of the unmaured plot passed a 2 inch riddle, and only 17% of the produce of the plot with the highest level of the complete dressing.

STANDARD ERROR PER PLOT : 0.868 tons per acre or 5.94%.

Main effects—Interactions of sulphate of potash with sulphate of ammonia and superphosphate (±0.354)

Sulphate of potash.	Sulphate of ammonia (cwt. N). 0.0	0.3	0.6	Superphosphate (cwt. P_2O_5) 0.00	0.75	1.50	*Mean* (±0.204)	*Increase* (±0.288)
0.00 cwt. K_2O	12.32	14.47	15.75	11.26	14.82	16.46	*14.18*	
0.75 cwt. K_2O	13.21	15.38	15.96	12.13	16.03	16.39	*14.85*	*+0.67*
1.50 cwt. K_2O	13.14	14.97	16.40	11.81	15.64	17.06	*14.84*	*−0.01*
Mean (±0.204)	*12.89*	*14.94*	*16.04*	*11.73*	*15.50*	*16.64*	*14.62*	
Increase (±0.288)		*+2.05*	*+1.10*		*+3.77*	*+1.14*		

https://doi.org/10.23637/ERADOC-1-66

Interaction of superphosphate and sulphate of ammonia (±0.354)

Superphosphate.	Sulphate of ammonia (cwt. N). 0.0	0.3	0.6
0.00 cwt. P_2O_5	10.01	12.27	12.92
0.75 cwt. P_2O_5	13.83	15.82	16.85
1.50 cwt. P_2O_5	14.83	16.73	18.35

Conclusions

There were large responses to sulphate of ammonia and superphosphate, and a significant response to sulphate of potash as well. The higher dressing of sulphate of potash produced no additional response.

Potatoes. T. H. Ream, Esq., Portobello Farm, Sutton, Beds, 1934

3 randomised blocks of 9 plots each. Plots : 0.0193 acre.

Treatments : All combinations of the following : No potash, potash early, potash late ; and no phosphate, phosphate early, phosphate late. Sulphate of potash at 0 and 2 cwt. per acre, superphosphate at 0 and 4 cwt. per acre.

Basal Manuring : 20 tons of dung per acre applied in March and 2 cwt. sulphate of ammonia applied on March 14th.

Soil : Sandy, on reddish sandy subsoil. Variety : Ninetyfold. Manures applied : Early : February 15. Late : March. 14. Potatoes planted : March 21. Lifted : June 26. Previous crop : Savoys.

Standard error per plot : 0.302 tons per acre, or 7.98%.

Summary : tons per acre (±0.175)

Superphosphate	Sulphate of potash None	Early	Late	*Mean* (±0.101)	*Increase* (±0.143)
None ..	3.55	3.58	3.94	*3.69*	
Early	3.89	3.81	3.76	*3.82*	*+0.13*
Late	3.79	4.06	3.66	*3.84*	*+0.15*
Mean (±0.101)	*3.74*	*3.82*	*3.79*	*3.78*	
Incr. (±0.143)		*+0.08*	*+0.05*		

Conclusions

No significant effects.

Potatoes—J. Morris, Esq., Honey Farm, Wimblington, Cambs., 1934

4 randomised blocks of eight plots each. Plots : 1/60 acre.

Treatments : All combinations of :

{ No sulph. amm. (O) / Sulph. amm. (0.45 cwt. N) (N) } × { No sulph. pot. (O) / Sulph. pot. (1.12 cwt. K_2O) (K) } × { No dung (O) / 8 tons dung (D) }

Basal Manuring : Nil.

Soil : Light fenland resting on peat. Variety : Scotch King Edward. Manures applied : Apr. 18th Potatoes planted : Apr. 19th. Lifted : Oct. 30th. Previous crop : Seeds.

Standard Error per Plot : ±0.499 tons per acre or 6.39%.

Individual treatments : tons per acre (±0.250)

O	N	K	D	NK	ND	KD	NKD	*Mean.*
2.84	2.85	7.49	8.59	8.06	9.35	11.20	12.10	*7.81*

Responses to fertilisers : tons per acre.

	Mean response (±0.177)	Differential responses (±0.250) Sulphate of Amm. Absent	Present	Sulphate of potash Absent	Present	Dung. Absent	Present
Sulphate of Ammonia ..	*+0.56*	—	—	+0.39	+0.74	+0.29	+0.83
Sulphate of Potash ..	*+3.80*	+3.63	+3.98	—	—	+4.93	+2.68
Dung	*+5.00*	+4.73	+5.27	+6.12	+3.88	—	—

https://doi.org/10.23637/ERADOC-1-66

Conclusions

Sulphate of potash and dung gave large increases in yield, and there was also a small but significant increase to sulphate of ammonia. The increase due to potash was significantly greater in the absence than in the presence of dung.

Potatoes—W. E. Morton, Esq., Australia Farm, March, 1934

3 randomised blocks of 9 plots each, with two degrees of freedom, representing second order interactions confounded with block differences. Error estimated from high order interactions. Plots : 1/60 acre.

TREATMENTS : All combinations of :

Sulph. Amm.		Super.		Sulph. pot.
None 0.3 cwt. N 0.6 cwt. N	×	None 0.75 cwt. P_2O_5 1.50 cwt. P_2O_5	×	None 0.75 cwt. K_2O 1.50 cwt. K_2O

BASAL MANURING : Nil.

SOIL : Fairly strong fen. Variety : Majestic. Manures applied : Apr. 6th. Potatoes planted : April 16th. Lifted : Oct. 23rd. Previous crop : Wheat.

SPECIAL NOTE : 1 cwt. of potatoes from each plot was passed over a 1½ inch riddle to determine the percentage ware.

STANDARD ERRORS PER PLOT : Total produce : 1.21 tons per acre or 13.4%. Percentage ware : 1.97.

Main effects—Interactions of sulphate of potash with sulphate of ammonia and superphosphate

Sulphate of potash	Sulphate of Ammonia (cwt. N) 0.0	0.3	0.6	Superphosphate (cwt. P_2O_5) 0.00	0.75	1.50	*Mean*	*Increase*
Total produce : tons per acre (±0.699. *Means : ±0.403. Increases : ±0.570*).								
0.00 cwt. K_2O	7.07	8.68	10.64	6.65	9.29	10.46	*8.80*	
0.75 cwt. K_2O	7.55	9.12	9.60	6.38	9.33	10.55	*8.76*	*—0.04*
1.50 cwt. K_2O	8.06	9.48	11.22	7.97	9.86	10.94	*9.59*	*+0.83*
Mean ..	*7.56*	*9.09*	*10.49*	*7.00*	*9.49*	*10.65*	*9.05*	
Increase ..		*+1.53*	*+1.40*		*+2.49*	*+1.16*		
Percentage ware (±1.14. *Means : ±0.656. Increases : ±0.928*)								
0.00 cwt. K_2O	92.9	93.2	94.9	92.9	95.2	92.9	*93.7*	
0.75 cwt. K_2O	94.4	94.0	92.9	91.7	94.7	94.9	*93.8*	*+0.1*
1.50 cwt. K_2O	94.9	92.6	95.2	93.5	94.0	95.2	*94.2*	*+0.4*
Mean ..	*94.1*	*93.3*	*94.3*	*92.7*	*94.6*	*94.3*	*93.9*	
Increase ..		*—0.8*	*+1.0*		*+1.9*	*—0.3*		

Interaction of superphosphate with sulphate of ammonia

Superphosphate	Total produce : tons per acre (±0.699) Sulphate of Ammonia (cwt. N) 0.0	0.3	0.6	Percentage ware (±1.14) Sulphate of Ammonia (cwt. N) 0.0	0.3	0.6
0.00 cwt. P_2O_5 ..	6.31	6.86	7.84	93.2	92.0	92.9
0.75 cwt. P_2O_5 ..	7.15	9.50	11.82	95.2	94.3	94.3
1.50 cwt. P_2O_5 ..	9.22	10.92	11.80	93.8	93.5	95.8

Conclusions

There were significant responses in yield to sulphate of ammonia and superphosphate, but not to potash. The increase in percentage ware with superphosphate is not fully significant.

https://doi.org/10.23637/ERADOC-1-66

Potatoes—W. E. Morton, Esq., Gores Farm, Thorney, Peterborough, 1934

3 randomised blocks of 9 plots each, with two degrees of freedom, representing second order interactions, confounded with block differences. Error estimated from high order interactions.
Plots : 1/60 acre.

TREATMENTS : All combinations of :

Sulph. amm.		Super.		Sulph. pot.
None 0.3 cwt. N 0.6 cwt. N	×	None 0.75 cwt. P_2O_5 1.50 cwt. P_2O_5	×	None 0.75 cwt. K_2O 1.50 cwt. K_2O

BASAL MANURING : Nil.

SOIL : Light fen. Variety : Majestic. Manures applied : Apr. 6th. Potatoes planted : Apr. 17th. Lifted : Oct. 30th. Previous crop : Wheat.

SPECIAL NOTE : 1 cwt. of potatoes from each plot was passed over a 1½ inch riddle to determine the percentage ware.

STANDARD ERRORS PER PLOT : Total produce : 1.68 tons per acre or 21.5%. Percentage ware : 4.43.

Main effects—Interactions of sulphate of potash with sulphate of ammonia and superphosphate

Sulphate of Potash	Sulphate of Ammonia (cwt. N) 0.0	0.3	0.6	Superphosphate (cwt. P_2O_5) 0.00	0.75	1.50	*Mean*	*Increase*
Total produce : tons per acre (±0.970. *Means: ±0.560. Increases: ±0.792*).								
0.00 cwt. K_2O ..	5.05	5.86	9.46	6.96	6.49	6.92	*6.79*	
0.75 cwt. K_2O ..	7.86	8.17	8.37	8.03	8.14	8.22	*8.13*	*+1.34*
1.50 cwt. K_2O ..	7.46	8.83	9.47	7.78	8.36	9.62	*8.59*	*+0.46*
Mean	*6.79*	*7.62*	*9.10*	*7.59*	*7.66*	*8.25*	*7.84*	
Increase		*+0.83*	*+1.48*		*+0.07*	*+0.59*		
Percentage ware (±2.56. *Means: ±1.48. Increases: ±2.09*)								
0.00 cwt. K_2O ..	76.5	82.7	90.8	84.2	82.4	83.3	*83.3*	
0.75 cwt. K_2O ..	87.2	88.7	90.8	90.8	88.7	87.2	*88.9*	*+5.6*
1.50 cwt. K_2O ..	88.1	91.4	90.5	89.6	90.5	89.9	*90.0*	*+1.1*
Mean	*83.9*	*87.6*	*90.7*	*88.2*	*87.3*	*86.8*	*87.4*	
Increase		*+3.7*	*+3.1*		*−0.9*	*−0.5*		

Interaction of superphosphate and sulphate of ammonia

Superphosphate	Total produce : tons per acre (±0.970) Sulphate of ammonia (cwt. N) 0.0	0.3	0.6	Percentage ware (±2.56) Sulphate of ammonia (cwt. N) 0.0	0.3	0.6
0.00 cwt. P_2O_5 ..	6.29	7.13	9.34	85.4	86.6	92.6
0.75 cwt. P_2O_5 ..	5.50	8.38	9.11	81.2	90.5	89.9
1.50 cwt. P_2O_5 ..	8.57	7.34	8.86	85.1	85.7	89.6

Conclusions

Sulphate of ammonia and sulphate of potash gave significant increases in both yield and percentage ware. There was a significant interaction between the two effects in percentage ware, each factor having given large increases in the absence of the other, but smaller or negligible increases in its presence.

https://doi.org/10.23637/ERADOC-1-66

Potatoes—H. Luddington, Esq., Wissington, Downham Market, 1934

3 randomised blocks of 9 plots each, with two degrees of freedom, representing second order interactions, confounded with block differences. Error estimated from high order interactions.
PLOTS : 1/60 acre.
TREATMENTS : All combinations of :

Sulph. amm.		Super.		Sulph. pot.
None 0.3 cwt. N 0.6 cwt. N	×	None 0.75 cwt. P_2O_5 1.50 cwt. P_2O_5	×	None 0.75 cwt. K_2O 1.50 cwt. K_2O

BASAL MANURING : Nil.
SOIL : Light peaty fen. Variety : Majestic (once grown). Manures applied : May 3rd. Potatoes planted : May 8th. Lifted : Oct. 26th. Previous crop : Mangolds.
SPECIAL NOTE: 1 cwt. of potatoes from each plot passed over a 1½ inch riddle to determine the percentage ware.
STANDARD ERRORS PER PLOT ; TOTAL PRODUCE : 1.16 tons per acre or 13.1%. Percentage ware : 3.79.

Main effects—Interactions of sulphate of potash with sulphate of ammonia and superphosphate

Sulphate of potash	Sulphate of ammonia (cwt. N) 0.0	0.3	0.6	Superphosphate (cwt. P_2O_5) 0.00	0.75	1.50	*Mean*	*Increase*
TOTAL PRODUCE : tons per acre (±0.668. *Means : ±0.386. Increases : ±0.546*)								
0.00 cwt. K_2O	5.84	6.18	6.10	5.32	6.82	5.97	*6.04*	
0.75 cwt. K_2O	8.67	9.70	10.36	7.94	9.92	10.87	*9.58*	*+3.54*
1.50 cwt. K_2O	10.25	11.32	11.07	7.72	12.26	12.66	*10.88*	*+1.30*
Mean	*8.25*	*9.07*	*9.18*	*6.99*	*9.67*	*9.83*	*8.83*	
Increase		*+0.82*	*+0.11*		*+2.68*	*+0.16*		
PERCENTAGE WARE : (±2.19. *Means : ±1.26. Increases : ±1.78*)								
0.00 cwt. K_2O	81.3	76.5	72.6	80.9	77.4	72.0	*76.8*	
0.75 cwt. K_2O	86.0	86.6	89.3	89.0	87.8	85.1	*87.3*	*+10.5*
1.50 cwt. K_2O	91.4	89.6	89.6	90.2	90.5	89.9	*90.2*	*+2.9*
Mean	*86.2*	*84.2*	*83.8*	*86.7*	*85.2*	*82.3*	*84.8*	
Increase		*−2.0*	*−0.4*		*−1.5*	*−2.9*		

Interaction of superphosphate with sulphate of ammonia

Superphosphate	Total produce : tons per acre (±0.668) Sulphate of ammonia (cwt. N) 0.0	0.3	0.6	Percentage ware (±2.19) Sulphate of ammonia (cwt. N) 0.0	0.3	0.6
0.00 cwt. P_2O_5 ..	6.85	7.91	6.22	87.2	88.1	84.8
0.75 cwt. P_2O_5 ..	8.28	9.80	10.92	86.0	83.3	86.3
1.50 cwt. P_2O_5 ..	9.63	9.49	10.38	85.4	81.2	80.4

Conclusions

Sulphate of potash and superphosphate gave significant increases in yield ; and in both cases there was a significant falling-off in response to the second dressing. There was also a positive interaction between the two effects, the response to either factor being significantly greater with the double dressing of the other than with the zero dressing.

The first dressing of sulphate of potash produced a remarkable increase of 10.5 in the percentage ware. The additional increase of 2.9 to the second dressing was significantly less than that to the first dressing. Superphosphate produced a small but significant decrease in percentage ware.

https://doi.org/10.23637/ERADOC-1-66

Sugar Beet. Tunstall, Suffolk, 1934.
A. W. Oldershaw, Esq., County Organiser.

6×6 Latin square. Plots : 1/125 acre.

TREATMENTS : All combinations of :—

{ No N / 0.6 cwt. N as nitrate of soda / 0.6 cwt. N as sulphate of ammonia } × { No salt / 3 cwt. salt }

BASAL MANURING : 2 cwt. of muriate of potash and 4 cwt. of superphosphate per acre.

SOIL : Deep sand, Variety Kleinwanzleben E. Manures applied : April 30. Seed sown : May 3. Lifted Nov. 30. Previous crop : Wheat.

STANDARD ERRORS PER PLOT : Roots (washed :) 1.08 tons per acre of 9.06% ; tops : 0.626 tons per acre or 10.6% ; sugar percentage : 0.316 ; plant number : 3.34 thousands per acre or 6.22%. Mean dirt tare : 0.1200.

Salt	Nitrogen (0.6 cwt. N per acre) None	S/A	N/S	*Mean*	*Incr.*	Nitrogen (0.6 cwt. N per acre) None	S/A	N/S	*Mean*	*Incr.*
	ROOTS (washed) : tons per acre					TOPS : tons per acre				
None ..	9.79[1]	12.85[1]	13.16[1]	*11.93*[2]		4.26[1]	7.02[1]	6.77[1]	*6.02*[2]	
3 cwt. ..	9.24[1]	13.29[1]	13.11[1]	*11.88*[2]	*−0.05*[4]	3.76[1]	6.83[1]	6.84[1]	*5.81*[2]	*−0.21*[4]
Mean ..	*9.52*[3]	*13.07*[3]	*13.14*[3]	*11.91*		*4.01*[3]	*6.92*[3]	*6.80*[3]	*5.91*	
Incr. ..		*+3.55*[1]	*+3.62*[1]				*+2.91*[1]	*+2.79*[1]		
St. Errors	(1) ±0.441, (2) ±0.255, (3) ±0.312, (4) ±0.360					(1) ±0.256, (2) ±0.148, (3) ±0.181, (4) ±0.209				
	SUGAR PERCENTAGE					TOTAL SUGAR : cwt. per acre				
None ..	18.19[1]	18.02[1]	17.85[1]	*18.02*[2]		35.6	46.3	47.0	*43.0*	
3 cwt. ..	18.40[1]	18.11[1]	17.94[1]	*18.15*[2]	*+0.13*[4]	34.0	48.1	47.0	43.0	0.0
Mean ..	*18.30*[3]	*18.06*[3]	*17.90*[3]	*18.09*		*34.8*	*47.2*	*47.0*	*43.0*	
Incr. ..		*−0.24*[1]	*−0.40*[1]				*+12.4*	*+12.2*		
St. Errors	(1) ±0.129, (2) ±0.074, (3) ±0.091, (4) ±0.105									

PLANT NUMBER : thousands per acre

Salt	Nitrogen (0.6 cwt. N per acre) None	S/A	N/S	*Mean*	*Incr.*
None	53.7[1]	54.1[1]	53.7[1]	*53.8*[2]	
3 cwt.	54.0[1]	53.9[1]	53.4[1]	*53.8*[2]	*0.0*[4]
Mean	*53.8*[3]	*54.0*[3]	*53.6*[3]	*53.8*	
Incr.		*+0.2*[1]	*−0.2*[1]		
St. Error	(1) ±1.36, (2) ±0.785, (3) ±0.962, (4) ±1.11.				

Conclusions

Sulphate of ammonia and nitrate of soda significantly increased the yields of roots and tops. They also decreased the sugar percentage, the decrease due to sulphate of ammonia being, however, not quite significant. There were no significant responses to salt.

https://doi.org/10.23637/ERADOC-1-66

Sugar Beet. Tunstall, Suffolk, 1934.

A. W. Oldershaw, Esq., County Organiser.

5 × 5 Latin square. Plots : 1/56 acre.

TREATMENTS : Third year, no further chalk applied (see 1932 Report p. 208 for first year's dressings).

BASAL MANURING : 3 cwt. superphosphate and 3 cwt. muriate of potash per acre.

SOIL : Acid sand. Variety : Kleinwanzleben E. Basal manures applied : April 23rd. Seed sown : May 3rd. Harvested : Nov. 20th. Previous crop : Sugar beet.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.743 tons per acre or 4.66% ; tops : 0.655 tons per acre or 5.81% ; sugar percentage : 0.371 ; Mean dirt tare : 0.1212.

Chalk tons per acre (1932)	ROOTS (washed) Tons per acre	*Increase*	TOPS Tons per acre	*Increase*	SUGAR PERCENTAGE	*Increase*	TOTAL SUGAR Cwt. per acre	*Increase*
Mean	*15.95*		*11.26*		*17.79*		*56.8*	
0*	Nil		Nil		——		Nil	
1	13.37		10.06		17.78		47.5	
2	16.36	*+2.99*	11.22	*+1.16*	17.70	*−0.08*	57.9	*+10.4*
3	16.81	*+0.45*	11.44	*+0.22*	17.94	*+0.24*	60.3	*+2.4*
4	17.26	*+0.45*	12.33	*+0.89*	17.75	*−0.19*	61.3	*+1.0*
St. error	±0.332	*±0.469*	±0.293	±0.414	±0.166	±0.235		

* NOTE : The plots receiving no chalk in 1932 gave negligible yields.

Conclusions

There was a significant response to the higher dressings both in roots and tops, with a significant falling-off in response in roots though not in tops. The chalk had no apparent effect on sugar percentage.

Sugar Beet. Tunstall, Suffolk, 1934.

A. W. Oldershaw, Esq., County Organiser.

4 × 4 Latin square. Plots : 1/50 acre.

TREATMENTS : Nitrate of soda at the rate of 0, 0.2, 0.4 and 0.6 cwt. N per acre.

BASAL MANURING : 3 cwt. superphosphate and 3 cwt. muriate of potash per acre.

SOIL : Acid sand. Variety : Kleinwanzleben E. Nitrate of soda applied : April 30th. Basal manures applied : April 24th. Seed sown : May 3rd. Lifted : November 22nd. Previous crop : sugar beet.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.556 tons per acre or 3.74% ; tops : 0.446 tons per acre or 6.48% ; sugar percentage : 0.287 ; Mean dirt tare : 0.1140.

Nitrogen cwt. per acre	ROOTS (washed) Tons	*Increase*	TOPS Tons	*Increase*	SUGAR PERCENTAGE	*Increase*	TOTAL SUGAR cwt.	*Increase*
Mean	*14.88*		*6.88*		*18.34*		*54.6*	
None	12.63		5.03		18.41		46.5	
0.2	14.78	*+2.15*	6.14	*+1.11*	18.38	*−0.03*	54.3	*+7.8*
0.4	16.00	*+1.22*	7.42	*+1.28*	18.25	*−0.13*	58.4	*+4.1*
0.6	16.10	*+0.10*	8.93	*+1.51*	18.34	*+0.09*	59.0	*+0.6*
St. error	±0.278	*±0.393*	±0.223	±0.315	±0.143	±0.202		

Conclusions

There was a significant increase in roots to nitrate of soda, with a significant falling-off in response at the higher levels of application, though the additional response to the second dressing was in itself significant. In tops there was a significant response to each dressing of nitrate of soda, and no sign of deviation from proportionality. The effects on sugar percentage were negligible.

https://doi.org/10.23637/ERADOC-1-66

Sugar Beet. H. F. Hall, Esq., Manor Farm, Wood Norton, Guist, Norfolk, 1934. King's Lynn Factory.

4 randomised blocks of 8 plots each. Third order interaction confounded. Plots: 1/40 acre.

Treatments: All combinations of:

Sulph. Amm. { None (O), 0.6 cwt. N (N) } × Super. { None (O), 0.75 cwt. P_2O_5 (P) } × Mur. pot. { None (O), 0.9 cwt. K_2O (K) } × Salt { None (O), 0.89 cwt. Cl. (S) }

Basal manuring: Nil.

Soil: Light sandy loam. Variety: Kleinwanzleben E. Manures applied: April 20th. Seed sown: April 25th. Lifted: November 20th. Previous crop: Sugar beet.

Special notes: Attacks by wireworms made the plots rather gappy. The salt plots were paler in leaf than the potash plots. The salt plots were observed to be moister than the others after rain.

Standard errors per plot: Roots: 1.48 tons per acre, or 10.1 %. Tops: 1.65 tons per acre, or 15.2%. Sugar percentage: 0.415. Plant number: 1.44 thousands per acre, or 6.03%. Percentage purity: 0.765.

Yields of individual treatments.

ROOTS (*washed*) *tons per acre.*

Sub-blocks A							
O	NP	NK	NS	PK	PS	KS	NPKS
13.74	14.52	13.60	15.49	15.11	15.21	14.09	15.65
Sub-blocks B							
N	P	K	S	NPK	NPS	NKS	PKS
13.84	12.62	12.74	12.65	15.96	16.13	16.98	14.48

https://doi.org/10.23637/ERADOC-1-66

Responses to fertilisers

Mean Yields: Roots (washed) : *14.55 tons.* Tops : *10.85 tons.* Sugar Percentage : *17.5.* Total sugar : *50.8 cwt.* Plant number : *23.9 thousands.* Percentage purity : *91.3*

	Mean response	Differential responses							
		Sulphate of Ammonia		Superphosphate		Muriate of Potash		Salt	
		Absent	Present	Absent	Present	Absent	Present	Absent	Present
ROOTS (washed) : tons per acre (±0.740. *Means: ±0.523*)									
Sulphate of Amm.	*+1.44*	—	—	+1.67	+1.21	+1.44	+1.44	+0.93	+1.96
Superphosphate	*+0.82*	+1.05	+0.59	—	—	+0.69	+0.95	+1.07	+0.56
Muriate of potash	*+0.55*	+0.55	+0.55	+0.42	+0.68	—	—	+0.67	+0.43
Salt	*+1.07*	+0.56	+1.56	+1.32	+0.82	+1.19	+0.95	—	—
TOPS : tons per acre (±0.825. *Means: ±0.583*)									
Sulphate of Amm.	*+3.41*	—	—	+3.42	+3.40	+3.36	+3.46	+3.04	+3.79
Superphosphate	*+0.40*	+0.41	+0.39	—	—	+0.01	+0.79	−0.06	+0.86
Muriate of potash	*+0.24*	+0.19	+0.29	−0.15	+0.63	—	—	−0.02	+0.50
Salt	*+0.73*	+0.35	+1.10	+0.26	+1.19	+0.47	+0.98	—	—
SUGAR PERCENTAGE (±0.208. *Means: ±0.147*)									
Sulphate of Amm.	*−0.45*	—	—	−0.42	−0.48	−0.62	−0.28	−0.48	−0.42
Superphosphate	*+0.28*	+0.30	+0.25	—	—	+0.18	+0.38	+0.42	+0.12
Muriate of potash	*+0.48*	+0.30	+0.65	+0.38	+0.58	—	—	+0.38	+0.58
Salt	*+0.22*	+0.20	+0.25	+0.38	+0.08	+0.12	+0.32	—	—
TOTAL SUGAR : cwt. per acre									
Sulphate of Amm.	*+3.8*[1]	—	—	+4.7	+2.9	+3.2	+4.3	+2.0	+5.6
Superphosphate	*+3.6*[1]	+4.5	+2.7	—	—	+2.8	+4.4	+5.0	+2.3
Muriate of potash	*+3.4*[1]	+2.8	+3.9	+2.6	+4.2	—	—	+3.5	+3.3
Salt	*+4.4*[1]	+2.6	+6.2	+5.7	+3.0	+4.5	+4.3	—	—
PLANT NUMBER : thousands per acre (±0.721. *Means: ±0.510*)									
Sulphate of Amm.	*−1.66*	—	—	−1.2	−2.1	−2.6	−0.7	−1.6	−1.7
Superphosphate	*−0.75*	−0.3	−1.2	—	—	−0.2	−1.3	−0.8	−0.7
Muriate of potash	*−0.19*	−1.2	+0.8	+0.3	−0.7	—	—	+1.7	−2.1
Salt	*+2.04*	+2.0	+2.0	+2.0	+2.0	+3.9	+0.1	—	—
PERCENTAGE PURITY (±0.383. *Means: ±0.271*)									
Sulphate of Amm.	*−0.56*	—	—	−0.85	−0.28	−1.30	+0.18	−0.88	−0.25
Superphosphate	*−0.11*	−0.40	+0.18	—	—	+0.25	−0.48	−0.08	−0.15
Muriate of potash	*+0.44*	−0.30	+1.18	+0.80	+0.08	—	—	+0.92	−0.05
Salt	*+0.16*	−0.15	+0.48	+0.20	+0.12	+0.65	−0.32	—	—

(1) Standard error : ±1.87.

Conclusions

Sulphate of ammonia significantly increased the yields of roots and tops and significantly decreased the sugar percentage and percentage purity, though in the latter case this shows only when applied in the absence of muriate of potash. There were no significant responses to superphosphate. Muriate of potash gave a significant increase in sugar percentage and salt an almost significant increase in roots.

The four fertilisers gave roughly the same increase in total sugar, the increase being in all cases significant or nearly so.

Plant number was significantly decreased by sulphate of ammonia and significantly increased by salt, the increase taking place, however, only in the absence of muriate of potash.

https://doi.org/10.23637/ERADOC-1-66

EXPERIMENTS CARRIED OUT BY LOCAL WORKERS

Hay. 2nd Season. Hertfordshire Farm Institute, St. Albans, 1934

5 randomised blocks of 6 plots each. Plots : 1/50 acre.

TREATMENTS : No phosphate, basic slag (15% P_2O_5, 85% citric solubility) and Gafsa rock phosphate (90% through 120 sieve) both at the rate of 1 cwt. P_2O_5 per acre, alone and with 0.5 cwt. K_2O per acre in the form of 30% potash salt.

BASAL MANURING : Nil.

SOIL : Heavy flinty loam, well supplied with chalk. Manures applied : Jan. 7, 1933, cut : June 8.

STANDARD ERROR PER PLOT : 2.63 cwt. per acre or 7.91%.

Cwt. per acre (±1.18)	No phosphate	Basic slag	Mineral phosphate	*Mean (±0.681)*	*Increase (±0.963)*
No potash ..	31.0	33.1	32.5	*32.2*	
Potash ..	32.6	35.4	35.2	*34.4*	*+2.2*
Mean (±0.835)	*31.8*	*34.2*	*33.8*	*33.3*	
Incr. (±1.18)		*+2.4*	*+2.0*		

Conclusions

There was a significant response to potash of 2.2 cwt. per acre. The average response to phosphate was significant but there was no sign of any difference between basic slag and mineral phosphate.

Hay. 4th Season. Lady Manner's School, Bakewell, 1934.

3 randomised blocks of 8 plots each. Plots : 1/161 acre.

TREATMENTS : All combinations of :—

{None / 2 cwt. nitrate of soda} × {None / 3 cwt. superphosphate} × {None / 1 cwt. 30% potash salt}

BASAL MANURING : Nil.

SOIL : Limestone. Manures applied : Mar. 27. Hay cut : July 2.

STANDARD ERROR PER PLOT : 4.99 cwt. per acre or 13.0%.

Yields of Individual Treatments : cwt. per acre.

O	N	P	K	NP	NK	PK	NPK	*Mean*
31.9	39.3	32.0	29.1	41.4	46.5	32.6	54.3	*38.4*

Responses to Fertilisers : cwt. per acre.

Fertiliser	*Mean Response (±2.04)*	Differential responses (±2.88)					
		Nitrate of Soda		Superphosphate		Potash Salt	
		Absent	Present	Absent	Present	Absent	Present
Nitrate of Soda ..	*+14.0*	—	—	+12.4	+15.6	+8.4	+19.6
Superphosphate ..	*+3.4*	+1.8	+5.0	—	—	+1.1	+5.6
Potash salt	*+4.5*	−1.1	+10.0	+2.2	+6.8	—	—

Conclusions

Large response to nitrate of soda, the response being significantly greater in presence of potash salt than in its absence. There was also a significant response to potash salt in presence of nitrate of soda.

https://doi.org/10.23637/ERADOC-1-66

Meadow Hay. 3rd Season. Lady Manner's School, Bakewell, 1934.

3 randomised blocks of 9 plots each. Plots : 1/216 acre.

TREATMENTS : All combinations of :—

{No manure / 8 tons compost / Mixed artificials} Applied in 1933 × {No Manure / 8 tons compost / Mixed artificials} Applied in 1932 and 1934

Mixed artificials consisted of 2 cwt. nitrate of soda, 3 cwt. superphosphate and 1 cwt. 30% potash salt per acre.

BASAL MANURING : Nil.

SOIL : Limestone. Manures applied : Mar. 27. Hay cut : July 5.

STANDARD ERROR PER PLOT : 8.45 cwt. per acre or 19.6%.

Summary : cwt. per acre (±4.89)

1932 and 1934 treatments	1933 treatments			*Mean* (±2.82)	*Increase* (±3.99)
	None	NPK	Compost		
None	31.8	41.6	53.5	*42.3*	
NPK	40.3	50.9	43.6	*44.9*	*+2.6*
Compost	36.3	41.9	48.5	*42.2*	*−0.1*
Mean (±2.82) ..	*36.1*	*44.8*	*48.5*	*43.1*	
Incr. (±3.99) ..		*+8.7*	*+12.4*		

Conclusions

The residual effects of the artificials and compost applied in 1933 were both significant and did not differ significantly. The 1934 treatments did not, however, produce any significant effects. In the same experiment in 1933, the 1933 treatments gave significant increases in yield, whereas there were no apparent residual effects of the 1932 treatments.

Hay. 2nd Season. Haileybury College Farm, 1934. H. W. Gardner, Esq., Hertfordshire Farm Institute, St. Albans

6 × 6 Latin square. Plots : 1/50 acre.

TREATMENTS : No phosphate, basic slag (15% P_2O_5, 85% citric solubility) and ground mineral phosphate (28% P_2O_5, 90% through 120 sieve) both at the rate of 1.0 cwt. P_2O_5 per acre, alone and with 30% potash salt at 0.5 cwt. K_2O per acre.

BASAL MANURING : Nil.

SOIL : Clay loam. Manures applied : Jan. 4, 1933. Cut : June 21.

STANDARD ERROR PER PLOT : 3.80 cwt. per acre or 9.60%.

Cwt. per acre (±1.55)	No phosphate	Basic slag	Mineral phosphate	*Mean* (±0.895)	*Increase* (±1.27)
No potash	35.8	38.1	42.7	*38.9*	
Potash ..	38.6	37.5	45.2	*40.4*	*+1.5*
Mean (±1.10)	*37.2*	*37.8*	*44.0*	*39.6*	
Incr. (±1.55)		*+0.6*	*+6.8*		

Conclusions

The response to mineral phosphate was significant and significantly greater than that to basic slag, the latter being negligible. The response to potash was not significant.

https://doi.org/10.23637/ERADOC-1-66

Hay. Rowley Green Farm, Arkeley, Barnet, Herts., 1934. H. W. Gardner, Esq., Hertfordshire Farm Institute.

6 randomised blocks of 6 plots each. Certain interactions partially confounded with block differences. Plots : 1/50 acre.

TREATMENTS : All combinations of :—

$$\left\{\begin{matrix}\text{None}\\ \text{High soluble slag (1 cwt. } P_2O_5)\\ \text{Gafsa phosphate (1 cwt. } P_2O_5)\end{matrix}\right\} \times \left\{\begin{matrix}\text{None}\\ \text{30\% potash salt (0.5 cwt. } K_2O)\end{matrix}\right\} \times \left\{\begin{matrix}\text{None}\\ \text{75 cwt. chalk}\end{matrix}\right\}$$

BASAL MANURING : Nil.

SOIL : Acid clay. Chalk applied : Jan. 30. Minerals applied : Feb. 6. Hay cut : June 25.

STANDARD ERROR PER PLOT : 1.61 cwt. per acre or 10.0%.

Responses to Fertilisers : cwt. per acre.

MEAN YIELD : 16.1 cwt.

Fertiliser	*Mean Response*	Differential responses						
		Chalk		Potash		No Phos.	Slag	Gafsa Phos.
		Absent	Present	Absent	Present			
Chalk	*+1.7*[1]	—	—	+1.6[3]	+1.8[3]	+0.8[4]	+1.4[4]	+3.1[4]
Potash	*+0.1*[1]	0.0[3]	+0.2[3]	—	—	+0.2[4]	−0.4[4]	+0.4[4]
Slag	*−1.0*[2]	−1.3[4]	−0.7[4]	−0.8[4]	−1.2[4]	—	—	—
Gafsa phosphate	*−1.0*[2]	−2.2[4]	+0.2[4]	−1.1[4]	−0.8[4]	—	—	—

Standard errors : (1) ±0.537, (2) ±0.657, (3) ±0.806, (4) ±0.930.

Conclusions

Significant response to chalk.

Barley. South-Eastern Agricultural College, Wye, Kent, 1934

6×6 Latin square. Plots : 1/120 acre.

TREATMENTS : Sulphate of ammonia and nitro-chalk at the rate of 0 and 0.2 cwt. N alone and with superphosphate at the rate of 0 and 0.4 cwt. P_2O_5 per acre.

BASAL MANURING : Nil.

SOIL : Medium loam. Variety : Plumage Archer. Manures applied : Feb. 14. Seed sown : Feb. Harvested : Aug. 2. Previous crop : Barley.

SPECIAL NOTES : Plots harvested by sampling method (4 random samples per plot each consisting of 4 quarter-metre rows side by side). Rows spaced 7 ins. apart.

STANDARD ERRORS PER PLOT : Grain : 3.47 cwt. per acre or 11.2%. Straw : 4.31 cwt. per acre or 15.8%.

Grain : cwt. per acre (± 1.42)

Superphosphate per acre	Nitrogen (0.2 cwt. N per acre) None	Sulph. Amm.	Nitro-Chalk	*Mean (±0.820)*	*Increase (±1.16)*
None ..	29.4	30.2	33.3	*31.0*	
0.4 cwt. P_2O_5	28.4	31.7	33.2	*31.1*	*+0.1*
Mean (±1.00)	*28.9*	*31.0*	*33.2*	*31.0*	
Incr. (±1.42)		*+2.1*	*+4.3*		

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Straw : cwt. per acre (± 1.76)

Superphosphate per acre	Nitrogen (0.2 cwt. N per acre) None	Sulph. Amm.	Nitro-Chalk	*Mean* (±1.02)	*Increase* (±1.44)
None ..	26.3	26.8	30.1	*27.7*	
0.4 cwt. P_2O_5	24.1	27.5	29.2	*26.9*	*−0.8*
Mean (±1.24)	*25.2*	*27.2*	*29.6*	*27.3*	
Incr. (±1.76)		*+2.0*	*+4.4*		

Conclusions

The responses to nitro-chalk were significant both in grain and straw, but those to sulphate of ammonia were not. The responses to nitro-chalk and sulphate of ammonia did not, however, differ significantly. There was no sign of a response to superphosphate.

Oats. Cavendish Lodge, Clipstone, Mansfield, 1934.

R. N. Dowling, Esq., County Organiser.

6 randomised blocks of 9 plots each. Plots : 1/50 acre.

TREATMENTS : All combinations of :

Mur. pot. { None, 1½ cwt., 3 cwt. } × Limestone { None, 30 cwt., 60 cwt. }

BASAL MANURING : Nil.

SOIL : Sandy gravel from Bunter Drift, very acid. Variety : Victory. Manures applied : April 12, 1933. Seed sown : March 27. Harvested : July 27. Previous crop : Sugar beet.

SPECIAL NOTES : Plots harvested by sampling method (8 random samples per plot each consisting of 4 half-metre rows side-by-side). Samples bulked for each plot. Rows 7 ins. apart.
Frit fly had damaged the experimental area in large patches.

STANDARD ERRORS PER PLOT : Grain 2.29 cwt. per acre or 20.6%. Straw : 2.36 cwt. per acre or 17.9%.

Grain ; cwt. per acre (±0.935)

Muriate of potash	Limestone (cwt. per acre) None	30	60	*Mean* (±0.540)	*Increase* (±0.764)
None ..	11.9	10.7	13.0	*11.9*	
1½ cwt. ..	9.4	12.5	9.5	*10.5*	*−1.4*
3 cwt. ..	10.1	12.1	10.8	*11.0*	*+0.5*
Mean (±0.540)	*10.5*	*11.8*	*11.1*	*11.1*	
Incr. (±0.764)		*+1.3*	*−0.7*		

Straw : cwt. per acre (±0.964)

Muriate of potash	Limestone (cwt. per acre) None	30	60	*Mean* (±0.557)	*Increase* (±0.788)
None ..	14.6	12.0	14.8	*13.8*	
1½ cwt. ..	11.6	14.4	12.3	*12.8*	*−1.0*
3 cwt. ..	11.9	14.4	12.4	*12.9*	*+0.1*
Mean (±0.557)	*12.7*	*13.6*	*13.2*	*13.2*	
Incr. (±0.788)		*+0.9*	*−0.4*		

Conclusions

No significant effects.

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Potatoes. Midland Agricultural College, Loughborough, 1934.

4 randomised blocks of 9 plots each. Plots : 0.0205 acre.

TREATMENTS : All combinations of :—

$$\left\{\begin{matrix}\text{None}\\ 1\tfrac{1}{2}\text{ cwt. sulph. amm.}\\ 3\text{ cwt. sulph. amm.}\end{matrix}\right\} \times \left\{\begin{matrix}\text{None}\\ 1\tfrac{1}{2}\text{ cwt. sulph. pot.}\\ 3\text{ cwt. sulph. pot.}\end{matrix}\right\}$$

BASAL MANURING : 12 tons dung in the autumn, 1 ton lime and 6 cwt. basic slag per acre.

SOIL : Light loam. Variety : King Edward VII (Scotch). Manures applied : April 18. Potatoes planted : Apr. 19. Lifted : Oct. 6. Previous crop : Seeds.

SPECIAL NOTES : The field was subsoiled in January and was in a high state of fertility. The crop was limited by the abnormally dry season.

STANDARD ERROR PER PLOT : 0.640 tons per acre or 11.6%.

Summary : tons per acre (±0.320)

Sulphate of potash (cwt.)	Sulphate of Ammonia (cwt.) None	1½	3	*Mean* (±0.185)	*Increase* (±0.262)
None	5.62	5.36	5.14	*5.37*	
1½	5.64	5.52	5.57	*5.58*	*+0.21*
3	5.80	5.74	5.41	*5.65*	*+0.07*
Mean (±0.185) ..	*5.69*	*5.54*	*5.37*	*5.53*	
Incr. (±0.262) ..		*−0.15*	*−0.17*		

Conclusions

No significant effects.

Potatoes. Midland Agricultural College, Loughborough, 1934.

4×4 Latin square. Plots : 0.0205 acre.

TREATMENTS : 4 levels of a mixed fertiliser containing 1 part of sulphate of ammonia, 3 parts of superphosphate and 1 part of sulphate of potash.

BASAL MANURING : 12 tons farmyard manure, 1 ton lime and 6 cwt. basic slag per acre.

SOIL : Light loam. Variety : Scotch King Edward. Manures applied : April 18. Potatoes planted : April 19-20. Lifted : Oct. 6. Previous crop : seeds.

SPECIAL NOTE: The land was in a high state of fertility but the crop was limited by the abnormally dry season.

STANDARD ERROR PER PLOT : 0.316 tons per acre or 6.12%.

Artificials	Yield tons per acre	*Increase for each dressing*
Mean	*5.16*	
None	5.10	
4 cwt.	5.40	*+0.30*
8 cwt.	5.27	*−0.13*
12 cwt.	4.88	*−0.39*
St. error	±0.158	*±0.223*

Conclusions

No significant effects.

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Potatoes. F. W. Bygrave, Esq. Lower Green Farm, Ickleford, Hitchin, 1934. H. W. Gardner, Esq., Hertfordshire Farm Institute, St. Albans

4×4 Latin square. Plots : 0.00755 acre.
TREATMENTS : Sulphate of ammonia (N) at the rate of 4¾ cwt. per acre, superphosphate (P) at the rate of 8 cwt. per acre, muriate of potash (K) at rate of 3 cwt. per acre in the combinations NP, NK, PK, NPK.
BASAL MANURING : Nil.
SOIL : loam. Variety : King Edward. Manures applied : May 3. Potatoes planted : May 3. Lifted : Oct. 23. Previous crop : Wheat.
STANDARD ERRORS PER PLOT : Total produce : 0.543 tons per acre or 7.14%. Percentage ware : 6.13.

	Total produce Tons per acre	*Decrease*	Percentage ware	*Decrease*
Mean ..	*7.60*		*71.78*	
NPK ..	9.38		81.89	
NP ..	7.12	*2.26*	72.44	*9.45*
NK ..	7.77	*1.61*	77.04	*4.85*
PK ..	6.11	*3.27*	55.76	*26.13*
St. error	±0.272	*±0.385*	±3.07	*±4.34*

Conclusions

The omission of nitrogen from the complete fertiliser gave a definitely significant decrease both in yield and percentage ware. The decreases in yield due to the omission of potash or phosphate were also significant, but those in percentage ware were not ; and these decreases (for both yield and percentage ware) were significantly less than those due to the omssion of nitrogen.

Potatoes. T. Chapman, Esq., Amcotts, Scunthorpe, 1934 A. McVicar, Esq., County Organiser

4×4 Latin square. Plots : 1/80 acre.
Treatments : Increasing levels of sulphate of potash as shown.
Basal manuring : Sulphate of ammonia and superphosphate each at the rate of 3¼ cwt. per acre.
Soil : Warp. Variety : Majestic. Manures applied : Apr. 3. Potatoes planted : Apr. 3. Lifted : Oct. 17. Previous crop : Peas.
Standard error per plot : 0.555 tons per acre or 4.91%

Sulphate of potash (per acre)	Yield tons per acre	*Increase for each dressing*
Mean ..	*11.30*	
None ..	10.47	
1 cwt. ..	11.64	*+1.17*
2 cwt. ..	11.65	*+0.01*
3 cwt. ..	11.46	*—0.19*
St. Error ..	±0.278	*±0.393*

Conclusions

There was a significant increase of 1.17 tons per acre for the first dressing (1 cwt. per acre) of potash, but no further increase for the higher dressings.

Potatoes. H. W. Gardner, Esq., Hertfordshire Farm Institute, St. Albans, 1934

6×6 Latin square. Plots : 0.00729 acre.
Treatments: Sulphate of ammonia (N) at the rate of 4.75 cwt., superphosphate (P) at the rate of 8.0 cwt., sulphate of potash (K) at the rate of 3.0 cwt. and chalk (Ca) at the rate of 70 cwt. per acre in the combinations specified in the table.
Basal manuring : Nil.
Soil : Loamy, very acid. Variety : Scotch King Edward. Manures applied : Apr. 7. Chalk : Apr. 9. Potatoes planted : Apr. 11. Lifted : Sept. 19. Previous crop : Rough woodland.
Standard error per plot : 0.414 tons per acre or 9.92%.

Fertiliser	Yield tons per acre	*Increase over no dressing*
Mean	*4.17*	
None	1.89	
NP	4.74	*+2.85*
NK	1.15	*—0.74*
PK	4.65	*+2.76*
NPK	5.81	*+3.92*
NPKCa ..	6.80	*+4.91*
St. Error ..	±0.169	*±0.239*

Conclusions

There was a significant decrease in yield on the plots receiving sulphate of ammonia and potash, but no phosphate. All other combinations of treatments gave definitely significant increases. All three fertilisers gave significant additional increases in the presence of the other two, and chalk showed a further significant increase.

https://doi.org/10.23637/ERADOC-1-66

Potatoes. A. E. Singleton, Esq., Oxton, Notts, 1934
R. N. Dowling, Esq., County Organiser

4 × 4 Latin square. Plots : 1/40 acre.
Treatments : No manure, 10 cwt. fish manure, 8 cwt. soot, and 2 cwt. sulphate of ammonia, the plots receiving soot and sulphate of ammonia also receiving 2½ cwt. superphosphate, 1 cwt. steamed bone flour and 2 cwt. muriate of potash per acre.
Basal manuring : Farmyard manure 12-15 loads per acre.
Soil : Flaggy sandstone and marl. Variety : King Edward. Manures applied : Apr. 19-20. Potatoes planted : Apr. 23. Lifted : Sept. 27-28. Previous crop : seeds for grazing.
Standard error per plot : 0.884 tons per acre or 9.33%.

Fertiliser	Yield tons per acre	*Increase over no dressing*
Mean	*9.48*	
No manure ..	9.18	
Fish manure ..	9.91	*+0.73*
Soot and minerals	9.35	*+0.17*
Sulph. Amm. and minerals ..	9.49	*+0.31*
St. Error ..	±0.442	*±0.625*

Conclusions
No significant effects.

Sugar Beet. R. W. Goodhand, Esq., Redbourne, Kirton-Lindsey, Lincs, 1934
A. McVicar, Esq., County Organiser

4 randomised blocks of 8 plots each. Second order interaction confounded. Plots : 1/50 acre.

TREATMENTS : All combinations of :

Mixed artificials		Nitrate of soda (top dressing)		Time of lifting
None 4 cwt. 8 cwt. 12 cwt.	×	None 1 cwt.	×	Early (Oct. 9th and 10th) Late (November 22nd-23rd)

The mixed artificials consisted of 3½ parts sulphate of ammonia, 3 parts nitrate of soda, 8 parts superphosphate, 4 parts muriate of potash and 1 part steamed bone flour.

BASAL MANURING : Nil.

SOIL : Limestone. Variety : Strube. Manures applied : March 28th. Seed sown : April 3rd. Previous crop : oats.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.818 tons per acre or 6.05% ; tops : 0.816 tons per acre or 10.52% ; sugar percentage : 0.243 ; mean dirt tare : 0.0928.

Nitrate of soda	ROOTS (washed) : tons per acre				TOPS : tons per acre				SUGAR PERCENTAGE			
	Early	Late	*Mean*	*Incr.*	Early	Late	*Mean*	*Incr.*	Early	Late	*Mean*	*Incr.*
None ..	12.69[1]	14.05[1]	*13.37*[2]		7.96[1]	7.11[1]	*7.54*[2]		18.3[1]	18.1[1]	*18.2*[2]	
1 cwt. ..	13.07[1]	14.27[1]	*13.67*[2]	*+0.30*[1]	8.11[1]	7.83[1]	*7.97*[2]	*+0.43*[1]	18.3[1]	18.0[1]	*18.2*[2]	*0.0*[1]
Mean ..	*12.88*[2]	*14.16*[2]	*13.52*		*8.04*[2]	*7.47*[2]	*7.75*		*18.3*[2]	*18.0*[2]	*18.2*	
Incr. ..	*+1.28*[1]				*−0.57*[1]				*−0.3*[1]			
Standard errors ..	([1]) ±0.289, ([2]) ±0.204.				([1]) ±0.288, ([2]) ±0.204				([1]) ±0.085, ([2]) ±0.060			

Nitrate of soda	TOTAL SUGAR : cwt. per acre				PLANT NUMBER : thous. per acre			
	Early	Late	*Mean*	*Incr.*	Early	Late	*Mean*	*Incr.*
None ..	46.4	50.9	*48.7*		23.6	23.1	*23.4*	
1 cwt. ..	47.8	51.4	*49.6*	*+0.9*	24.6	23.0	*23.8*	*+0.4*
Mean ..	*47.1*	*51.2*	*49.1*		*24.1*	*23.0*	*23.6*	
Incr. ..	*+4.1*				*−1.1*			

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	Mixed artificials : cwt. per acre 0	4	8	12	Mixed artificials : cwt. per acre 0	4	8	12
	ROOTS (washed) : tons per acre ($\pm$0.409)				TOPS : tons per acre			
No N/S ..	12.84	13.01	14.00	13.63	6.10	6.59	8.35	9.08
N/S	12.92	14.05	13.48	14.23	6.74	7.47	9.08	8.59
Early	12.32	12.84	13.46	12.90	7.00	6.98	9.43	8.72
Late	13.45	14.23	14.02	14.95	5.84	7.08	8.00	8.96
Mean ($\pm$0.289)	*12.88*	*13.53*	*13.74*	*13.93*	*6.42*	*7.03*	*8.72*	*8.84*
Increase ($\pm$0.409)		*+0.65*	*+0.21*	*+0.19*		*+0.61*	*+1.69*	*+0.12*
	SUGAR PERCENTAGE				TOTAL SUGAR : cwt. per acre			
No N/S ..	18.1	18.2	18.4	18.2	46.5	47.4	51.5	49.6
N/S	18.2	18.1	18.0	18.2	47.0	50.9	48.5	51.8
Early	18.2	18.4	18.4	18.2	44.8	47.2	49.5	47.0
Late	18.0	18.0	18.0	18.1	48.4	51.2	50.5	54.1
Mean	*18.1*	*18.2*	*18.2*	*18.2*	*46.7*	*49.2*	*50.0*	*50.6*
Increase ..		*+0.1*	*0.0*	*0.0*		*+2.5*	*+0.8*	*+0.6*

PLANT NUMBER : thousands per acre

	Mixed artificials : cwt. per acre 0	4	8	12
No N/S	22.3	23.4	23.0	24.7
N/S	23.7	23.4	23.7	24.3
Early	23.0	24.1	24.3	25.0
Late	23.0	22.6	22.5	24.1
Mean	*23.0*	*23.4*	*23.4*	*24.5*
Increase		*+0.4*	*0.0*	*+1.1*

Conclusions

There was a significant response in both roots and tops to mixed artificials, the deviations of the response from proportionality to the amount of dressing not being significant. Late lifting gave a significant increase in roots, but the increase due to nitrate of soda was not significant.

The manurial treatments had no effect on sugar percentage, but late lifting gave a significant reduction in sugar percentage.

Sugar Beet. County Farm Institute, Moulton, Northampton, 1934

4 randomised blocks of 8 plots each. Plots : 1/48 acre.

TREATMENTS : All combinations of :

Sulp. Amm. { None (O) / 0.6 cwt. N (N) } × Spacing { 18 ins. (R_1) / 22½ ins. (R_2) } × Singling { 6 ins. (S_1) / 10 ins. (S_2) }

BASAL MANURING : 6 cwt. per acre of a mixture of superphosphate, steamed bone flour and potash salt.

SOIL : Medium loam. Variety : Kleinwanzleben E. Manures applied : May 2. Seed sown : May 3. Lifted : November 19th and 20th. Previous crop : wheat.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.968 tons per acre 6.21% ; tops : 0.882 tons per acre or 8.75% ; sugar percentage : 0.440 ; mean dirt tare : 0.1200.

https://doi.org/10.23637/ERADOC-1-66

Yields of separate treatments

Roots (washed): tons per acre

OR_1S_1	NR_1S_1	OR_2S_1	OR_1S_2	NR_2S_1	NR_1S_2	OR_2S_2	NR_2S_2
15.63	16.17	15.76	15.27	15.97	15.58	15.22	14.97

Responses to treatments

Mean Yields: ROOTS (washed): *15.57* tons. TOPS: *10.08* tons. SUGAR PERCENTAGE: *18.15*. TOTAL SUGAR: *56.5* cwt. PLANT NUMBER: *29.4* thousands.

Treatment	*Mean response*	Differential responses					
		Sulphate of ammonia		Spacing (ins.)		Singling (ins.)	
		Absent	Present	18	22½	6	10
ROOTS (washed): tons per acre (±0.484. *Means:* ±*0.342*)							
Sulphate of ammonia ..	*+0.20*	—	—	+0.43	−0.02	+0.38	+0.03
Spacing (22½ ins.-18 ins.) ..	*−0.18*	+0.04	−0.41	—	—	−0.04	−0.33
Singling (10ins.-6ins.) ..	*−0.62*	−0.45	−0.80	−0.48	−0.77	—	—
TOPS: tons per acre (±0.441. *Means:* ±0.312)							
Sulphate of ammonia ..	*+2.42*	—	—	+2.17	+2.66	+2.44	+2.40
Spacing (22½ ins.-18 ins.) ..	*+1.33*	+1.08	+1.58	—	—	+1.46	+1.21
Singling (10 ins.-6 ins.) ..	*−0.94*	−0.92	−0.96	−0.82	−1.06	—	—
SUGAR PERCENTAGE (±0.220. *Means:* ±*0.156*)							
Sulphate of ammonia ..	*−0.53*	—	—	−0.64	−0.42	−0.34	−0.72
Spacing (22½ ins.-18 ins.) ..	*−0.08*	−0.19	+0.03	—	—	−0.24	+0.08
Singling (10 ins.-6 ins.) ..	*+0.24*	+0.43	+0.05	+0.08	+0.40	—	—
TOTAL SUGAR: cwt. per acre							
Sulphate of ammonia ..	*−0.9*	—	—	−0.4	−1.4	+0.3	−2.1
Spacing (22½ ins.-18 ins.) ..	*−0.9*	−0.4	−1.4	—	—	−0.9	−0.9
Singling (10 ins.-6 ins.) ..	*−1.5*	−0.3	−2.7	−1.5	−1.5	—	—
PLANT NUMBER: thousands per acre							
Sulphate of ammonia ..	*+0.4*	—	—	+1.0	−0.2	−0.2	+1.1
Spacing (22½ ins.-18 ins.) ..	*−5.4*	−4.8	−6.0	—	—	−5.6	−5.3
Singling (10 ins.-6 ins.) ..	*−8.2*	−8.8	−7.5	−8.3	−8.0	—	—

Conclusions

Sulphate of ammonia significantly increased the yield of tops and significantly decreased the sugar percentage. The wider spacing (22½ ins.) gave a significantly higher yield of tops, and the greater width of singling (10 ins.) a significant decrease in tops.

https://doi.org/10.23637/ERADOC-1-66

Sugar beet. E. Addison, Esq., Riby, Lincs, 1934
A. McVicar, Esq., County Organiser

4 × 4 Latin square. Plots : 1/50 acre.

TREATMENTS : 4 times of lifting as indicated in the table.

BASAL MANURING : 8 cwt. per acre of a compound manure containing 4.95% N., 5.7% soluble P_2O_5 and 10.0% K_2O.

SOIL : Medium Wold. Variety : Kleinwanzleben E. Manures applied : April 4. Seed sown : April 23. Previous crop : Wheat.

STANDARD ERRORS PER PLOT : Roots (washed) : 1.55 tons per acre or 12.5% ; tops : 1.59 tons per acre or 17.4% ; sugar percentage : 0.486 ; plant number : 1.20 thousands per acre or 4.3% ; percentage purity : 0.619. Mean dirt tare : 0.0882.

Crop lifted	ROOTS (washed) Tons	*Increase*	TOPS Tons	*Increase*	SUGAR PERCENTAGE	*Increase*
Mean ..	*12.37*		*9.12*		*17.32*	
Sept. 27	11.24		9.63		17.19	
Oct. 18	10.79	*−0.45*	7.84	*−1.79*	18.00	*+0.81*
Nov. 15	13.68	*+2.89*	10.76	*+2.92*	17.62	*−0.38*
Dec. 13	13.77	*+0.09*	8.23	*−2.53*	16.46	*−1.16*
St. error	±0.774	*±1.09*	±0.795	±1.12	±0.243	±0.344

Crop lifted	TOTAL SUGAR cwt.	*Increase*	PLANT NUMBER Thousands	*Increase*	PERCENTAGE PURITY	*Increase*
Mean	*42.7*		*27.9*		*90.2*	
Sept. 27	38.6		28.0		90.1	
Oct. 18	38.8	*+0.2*	28.2	*+0.2*	90.6	*+0.5*
Nov. 15	48.2	*+9.4*	27.5	*−0.7*	89.8	*−0.8*
Dec. 13	45.3	*−2.9*	27.8	*+0.3*	90.2	*+0.4*
St. error			±0.600	±0.848	±0.310	±0.438

Conclusions

The mean yield of roots at the last two liftings was significantly above the mean yield at the first two, the differences between the yields at the last two liftings being small and not significant. The variations in yield of tops with time of lifting were not significant. Sugar percentage was significantly higher at the second time of lifting than at the first and showed a significant fall between the third and fourth times of lifting. The mean yield of total sugar at the last two times of lifting showed an increase of 8.1 cwt. per acre, or 21 per cent., over the mean yield at the first two times.

https://doi.org/10.23637/ERADOC-1-66

Sugar beet. Col. Ellwood, Mareham-le-Fen, Lindsey, 1934
A. McVicar, Esq., County Organiser

4×4 Latin square. Plots : 1/50 acre.

TREATMENTS : 4 times of lifting, as indicated in the table.

BASAL MANURING : Artificials.

SOIL : Loam. Variety : Kleinwanzleben E. Artificials applied : April 22. Seed sown : April 22. Previous crop : Sugar beet.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.571 tons per acre or 4.15% ; tops : 0.668 tons per acre or 5.77% ; sugar percentage : 0.274 ; plant number : 1.02 thousands per acre or 4.02%. Mean dirt tare : 0.1054.

Crop lifted	ROOTS (washed) tons	*Increase*	TOPS tons	*Increase*	SUGAR PERCENTAGE	*Increase*	TOTAL SUGAR cwt.	*Increase*	PLANT NUMBER Thousands	*Increase*
Mean ..	*13.76*		*11.57*		*16.88*		*46.4*		*25.2*	
Sept. 26	11.62		12.70		16.58		38.5		24.9	
Oct. 26	13.56	*+1.94*	11.18	*−1.52*	19.02	*+2.44*	51.6	*+13.1*	26.0	*+1.1*
Nov. 22	14.93	*+1.37*	13.45	*+2.27*	16.42	*−2.60*	49.0	*−2.6*	25.7	*−0.3*
Dec. 22	14.94	*+0.01*	8.96	*−4.49*	15.50	*−0.92*	46.3	*−2.7*	24.4	*−1.3*
St. error	±0.285	*±0.403*	±0.335	±0.474	±0.137	±0.194			±0.510	±0.721

Conclusions

Late lifting produced a significant increase in the yield of roots, with a significant smaller increase at the two latest liftings. The yield of tops was significantly decreased at the last lifting with some earlier irregularity. Sugar percentage was highest at the second time of lifting, Oct. 26, being then 2.44 per cent. above that a month before. There was a significant fall in sugar percentage at each of the two later liftings. The second time of lifting gave the greatest amount of sugar.

Sugar beet. F. W. Temperton and Sons, Kelfield, Owston Ferry, Doncaster, 1934
A. McVicar, Esq., County Organiser

4×4 Latin square. Plots : 1/50 acre.

TREATMENTS : Kleinwanzleben E, ordinary and acid treated. Dippe E, ordinary and decorticated.

SOIL : Warp. Seed sown : April 25. Lifted : November 7. Previous crop : Potatoes.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.624 tons per acre or 3.87% ; tops : 0.573 tons per acre or 4.01% ; sugar percentage : 0.406 ; plant number : 1.06 thousands per acre or 4.05%. Mean dirt tare : 0.1585.

	ROOTS (washed) tons per acre	TOPS tons per acre	SUGAR PERCENTAGE	TOTAL SUGAR cwt. per acre	PLANT NUMBER thous. per acre
Mean	*16.12*	*14.27*	*17.69*	*57.0*	*26.3*
Klein E. Ordinary ..	16.31	14.71	17.66	57.6	23.5
Klein E. Acid treated	16.30	13.50	17.40	56.7	26.9
Dippe E. Ordinary	15.82	14.51	17.85	56.5	25.9
Dippe E. Decorticated	16.05	14.37	17.84	57.3	28.8
Standard errors ..	±0.312	±0.286	±0.203		±0.530

Conclusions

No significant effects in roots, tops or sugar percentage. Treatment with acid significantly increased the plant number of Kleinwanzleben E. and decortication that of Dippe E.

https://doi.org/10.23637/ERADOC-1-66

Sugar beet. C. C. Walter, Esq., Edlington, Lindsey, 1934
A. McVicar, Esq., County Organiser

4×4 Latin square. Plots : 1/40 acre.

TREATMENTS : Kleinwanzleben E, ordinary and acid treated. Dippe E, ordinary and decorticated.

SOIL : Light loam. Seed sown : April 24. Lifted : Oct. 11. Previous crop : Oats.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.868 tons per acre or 7.45% ; tops : 0.877 tons per acre or 9.86% ; sugar percentage : 0.363 ; plant number : 1.70 thousands per acre or 6.60%. Mean dirt tare : 0.0988.

	ROOTS (washed) tons per acre	TOPS tons per acre	SUGAR PERCEN-TAGE	TOTAL SUGAR cwt. per acre	PLANT NUMBER thous. per acre
Mean	*11.64*	*8.90*	*17.7*	*41.2*	*25.7*
Klein. E. Ordinary	11.53	8.68	17.8	41.0	24.5
Klein. E. Acid treated	11.92	8.77	17.6	42.0	26.2
Dippe E. Ordinary	11.82	9.16	17.6	41.6	24.8
Dippe E. Decorticated	11.28	8.97	17.9	40.4	27.3
Standard errors ..	±0.434	±0.438	±0.181		±0.850

Conclusions

No significant effects.

Sugar beet. J. G. Wright, Esq., Wragby, Brigg, Lincs., 1934
A. McVicar, Esq., County Organiser

5×5 Latin square. Plots : 1/50 acre.

TREATMENTS : 5 times of application of a mixture containing 2½ cwt. sulphate of ammonia, 3 cwt. superphosphate and 3 cwt. 30% potash salt per acre.

BASAL MANURING : Nil.

SOIL : Wold. Variety : Kleinwanzleben E. Seed sown : May 2. Lifted : October 31 and November 1. Previous crop : Wheat.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.400 tons per acre, 2.50% ; tops : 0.662 tons per acre or 4.34% ; sugar percentage : 0.403 ; plant number : 1.23 thousands per acre or 4.47%. Mean dirt tare : 0.1641.

Manures applied	ROOTS (washed) Tons	*Increase*	TOPS Tons	*Increase*	SUGAR PERCENTAGE	*Increase*	TOTAL SUGAR cwt.	*Increase*	PLANT NUMBER Thous-ands	*Increase*
Mean ..	*16.00*		*15.26*		*17.42*		*55.7*		*27.6*	
March 28	16.01		15.37		17.54		56.2		28.0	
April 4	16.08	*+0.07*	15.10	*−0.27*	17.35	*−0.19*	55.8	*−0.4*	27.9	*−0.1*
April 11	15.75	*−0.33*	15.48	*+0.38*	17.49	*+0.14*	55.1	*−0.7*	27.8	*−0.1*
April 18	16.24	*+0.49*	14.66	*−0.82*	17.49	*0.00*	56.8	*+1.7*	26.4	*−1.4*
April 25	15.92	*−0.32*	15.68	*+1.02*	17.21	*−0.28*	54.8	*−2.0*	27.7	*+1.3*
St. error	±0.179	*±0.253*	±0.296	±0.418	±0.180	±0.254			±0.550	±0.778

Conclusions

No significant effects.

https://doi.org/10.23637/ERADOC-1-66

Sugar beet. W. N. Fillingham, Esq., Laughton, Gainsborough, 1934
A. McVicar, Esq., County Organiser

4 randomised blocks of 4 plots each. Plots : 1/40 acre.

TREATMENTS : Rows spaced 8, 10, 12 and 14 inches apart.

BASAL MANURING : 4 cwt. kainit, 4 cwt. superphosphate, 2 cwt. sulphate of ammonia and 1 cwt. nitrate of soda.

SOIL : Sand. Variety : Kleinwanzleben E. Manures applied : March 27. Seed sown : April 9. Lifted : October 29. Previous crop : Wheat.

STANDARD ERRORS PER PLOT : Roots (washed) : 1.87 tons per acre or 15.0% ; Tops : 0.989 tons per acre or 14.4% ; sugar percentage : 0.230. Mean dirt tare : 0.1155.

Spacing Inches	ROOTS (washed) Tons	*Increase*	TOPS Tons	*Increase*	SUGAR PERCENTAGE	*Increase*	TOTAL SUGAR Cwt.	*Increase*	PLANT NUMBER Thousands	*Increase*
Mean ..	*12.53*		*6.86*		*19.8*		*49.5*		*28.6*	
8	12.71		6.88		19.7		50.1		35.7	
10	12.86	*+0.15*	7.05	+0.17	19.8	*+0.1*	50.9	*+0.8*	29.6	*−6.1*
12	11.72	*−1.14*	6.62	−0.43	19.8	*0.0*	46.4	*−4.5*	25.6	*−4.0*
14	12.82	*+1.10*	6.89	+0.27	19.7	*−0.1*	50.5	*+4.1*	23.4	*−2.2*
St. Error	±0.935	±1.32	±0.494	±0.699	±0.115	±0.163				

Conclusions

No significant effects in roots, tops or sugar percentage.

Sugar beet. A. Saul, Esq., Thorpe St. Peter, Wainfleet, Lincs, 1934
A. McVicar, Esq., County Organiser

4 × 4 Latin square. Plots : 1/100 acre.

TREATMENTS : All combinations of :—

Superphosphate { None, 4 cwt. } × 30% potash salt { None, 3 cwt. }

BASAL MANURING : Nil.

SOIL : Silt. Variety : Kuhn. Manures applied : May 3rd. Seed sown : May 10th. Lifted : September 24th. Previous crop : Potatoes.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.556 tons per acre or 3.43% ; tops : 1.13 tons per acre or 4.47% ; sugar percentage : 0.349 ; plant number : 0.839 thousands per acre or 3.45%.

Potash salt	Superphosphate None	4 cwt.	*Mean*	*Increase*	Superphosphate None	4 cwt.	*Mean*	*Increase*
	ROOTS (washed) : tons per acre				TOPS : tons per acre			
None	16.83[1]	16.17[1]	*16.50*[2]		25.27[1]	24.96[1]	*25.12*[2]	
3 cwt.	15.87[1]	16.02[1]	*15.94*[2]	*−0.56*[1]	24.89[1]	25.90[1]	*25.40*[2]	*+0.28*[1]
Mean	*16.35*[2]	*16.10*[2]	*16.22*		*25.08*[2]	*25.43*[2]	*25.26*	
Increase ..	*−0.25*[1]				*+0.35*[1]			
St. Errors ..	([1]) ±0.278, ([2]) ±0.197				([1]) ±0.565, ([2]) ±0.400			
	SUGAR PERCENTAGE				TOTAL SUGAR : cwt. per acre			
None	14.7[1]	14.5[1]	*14.6*[2]		49.5	46.9	*48.2*	
3 cwt.	14.9[1]	14.7[1]	*14.8*[2]	*+0.2*[1]	47.3	47.1	*47.2*	*−1.0*
Mean	*14.8*[2]	*14.6*[2]	*14.7*		*48.4*	*47.0*	*47.7*	
Increase ..	*−0.2*[1]				*−1.4*			
St. Errors ..	([1]) ±0.174	([2]) ±0.123						

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PLANT NUMBER : thousands per acre

Potash salt	Superphosphate None	Superphosphate 4 cwt.	*Mean*	*Increase*
None ..	25.1[1]	24.1[1]	*24.6*[2]	
3 cwt. ..	23.8[1]	24.4[1]	*24.1*[2]	*— 0.5*[1]
Mean ..	*24.5*[2]	*24.2*[2]	*24.4*	
Increase ..	*— 0.3*[1]			
St. Errors	([1]) ±0.420, ([2]) ±0.297			

Conclusions

Potash salt produced an almost significant decrease in yield of roots.

Sugar beet. A. Graves, Esq., East Heckington, Lincs, 1934
F. Wakerley, Esq., County Organiser, in co-operation with Bardney Beet Sugar Factory

4 × 4 Latin square. Plots : 1/40 acre.

TREATMENTS : Four widths of singling : 6, 9, 12 and 15 inches.

BASAL MANURING : 1 cwt. nitrate of soda per acre, applied as a top dressing.

SOIL : Silty loam. Variety : Marsters. Nitrate of soda applied : June 28. Seed sown : Apr. 25. Lifted : Oct. 12. Previous crop : Potatoes.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.576 tons per acre or 3.16% ; tops : 0.825 tons per acre or 6.19% ; sugar percentage : 0.736. Mean dirt tare : 0.0731.

Singling	ROOTS (washed) Tons	*Increase*	TOPS Tons	*Increase*	SUGAR PERCENTAGE	*Increase*	TOTAL SUGAR Cwt.	*Increase*	PLANT NUMBER Thousands	*Increase*
Mean ..	*18.26*		*13.32*		*18.40*		*67.3*		*30.2*	
6 inches	17.91		14.44		18.58		66.6		39.8	
9 inches	18.62	*+ 0.71*	13.98	*— 0.46*	18.60	*+ 0.02*	69.3	*+ 2.7*	31.6	*— 8.2*
12 inches	18.30	*— 0.32*	12.66	*— 1.32*	18.25	*— 0.35*	66.8	*— 2.5*	27.3	*— 4.3*
15 inches	18.23	*— 0.07*	12.20	*— 0.46*	18.18	*— 0.07*	66.4	*— 0.4*	22.2	*— 5.1*
St. error	±0.288	*±0.407*	±0.412	±0.582	±0.368	±0.520				

Conclusions

The effects of varying the width of singling upon roots and sugar percentage were not significant. The yield of tops showed a steady and significant decrease with increasing width of singling.

Sugar beet. Home Grown Sugar, Ltd., Kelham Estate, Notts, 1934
Kelham Beet Sugar Factory

4 × 4 Latin square. Plots : 1/40 acre.

TREATMENTS : No manure, 5 cwt. salt, 8 cwt. mixed artificial fertiliser (containing 3 parts sulphate of ammonia, 3 parts superphosphate and 2 parts 30% potash salt) and 3 cwt. salt plus 8 cwt. mixed artificial fertiliser per acre.

BASAL MANURING : Nil.

SOIL : Deep uniform light sandy loam. Variety : Kuhn E. Salt applied : Mar. 28. Artificials applied : Apr. 13. Seed sown : Apr. 19. Harvested : Oct. 10. Previous crop : Potatoes (with dung and artificials).

STANDARD ERRORS PER PLOT : Roots (washed) : 0.782 tons per acre or 5.32% tops : 1.68 tons per acre or 11.05% ; sugar percentage : 0.233. Mean dirt tare : 0.0257.

https://doi.org/10.23637/ERADOC-1-66

	ROOTS (washed) Tons	*Increase*	TOPS Tons	*Increase*	SUGAR PERCENTAGE	*Increase*	TOTAL SUGAR cwt.	*Increase*	PLANT NUMBER Thousands	*Increase*
Mean ..	*14.69*		*15.23*		*17.96*		*52.8*		*29.3*	
None ..	14.05		13.56		18.02		50.6		29.1	
5 cwt. salt	14.82	*+0.77*	15.51	*+1.95*	18.30	*+0.28*	54.2	*+3.6*	29.2	*+0.1*
Artificials	14.86	*+0.81*	14.25	*+0.69*	17.68	*−0.34*	52.5	*+1.9*	29.2	*+0.1*
3 cwt. salt and artificials ..	15.04	*+0.99*	17.60	*+4.04*	17.85	*−0.17*	53.7	*+3.1*	29.8	*+0.7*
St. error	±0.391	*±0.553*	±0.840	±1.19	±0.116	±0.164				

Conclusions

The increases in yield of roots due to the treatments were not significant. Salt produced a significant increase in tops and artificials significantly decreased sugar percentage.

Sugar Beet. J. Aukland, Esq., Scrooby Top, Doncaster, 1934
Brigg Beet Sugar Factory

4 × 4 Latin square. Plots : 1/40 acre.

TREATMENTS : No manure, 2½ cwt. salt, 3 cwt. muriate of potash and 1½ cwt. salt, and 1½ cwt muriate of potash per acre.

BASAL MANURING : 3 cwt. sulphate of ammonia, 5 cwt. superphosphate and 1 ton burnt lime per acre.

SOIL : Medium sandy loam. Variety : Kleinwanzleben E. Manures applied : April 13th. Seed sown : April 17th. Lifted : October 19th-20th. Previous crop : wheat.

STANDARD ERRORS PER PLOT : Roots (washed) : 0.394 tons per acre or 4.80% ; tops : 0.592 tons per acre or 8.32% ; sugar percentage : 0.401 ; mean dirt tare : 0.0832.

	ROOTS (washed) Tons	*Incr.*	TOPS Tons	*Incr.*	SUGAR PERCENTAGE	*Incr.*	TOTAL SUGAR Cwt.	*Incr.*	PLANT NUMBER Thousands	*Incr.*	PERCENTAGE PURITY	*Incr.*
Mean	*8.21*		*7.12*		*16.91*		*27.8*		*29.7*		*88.7*	
None	7.26		6.04		16.29		23.7		29.0		88.7	
Salt	8.77	*+1.51*	7.60	*+1.56*	17.04	*+0.75*	29.9	*+6.2*	29.8	*+0.8*	88.8	*+0.1*
Mur. pot.	8.21	*+0.95*	7.31	*+1.27*	17.03	*+0.74*	28.0	+4.3	29.8	*+0.8*	88.5	*−0.2*
Both	8.59	+1.33	7.53	+1.49	17.29	+1.00	29.7	+6.0	30.2	*+1.2*	88.7	*0.0*
St. error	±0.197	*±0.278*	±0.296	±0.418	±0.200	±0.283						

Conclusions

All three treatments produced significant increases in the yields of roots and tops and in the sugar percentage; there being no significant differences between the responses to treatments.

https://doi.org/10.23637/ERADOC-1-66

Sugar Beet. J. J. Davenport, Esq., Cromwell, Notts, 1934
Kelham Beet Sugar Factory

4×4 Latin square. Plots: 1/40 acre.
TREATMENTS: No manure, 5 cwt. salt, 8 cwt. of a mixed artificial fertiliser (containing 3 cwt. sulphate of ammonia, 3 cwt. superphosphate and 2 cwt. 30% potash salt) and 3 cwt. salt plus 8 cwt. mixed artificial fertiliser per acre.
BASAL MANURING: Nil.
SOIL: Light with gravel subsoil. Variety: Kuhn E. Manures applied: April 12th. Seed sown: April 24th. Lifted: November 22nd. Previous crop: wheat.
STANDARD ERRORS PER PLOT: Roots (washed): 0.672 tons per acre or 5.87%; tops: 0.853 tons per acre or 14.3%; sugar percentage: 0.368; mean dirt tare: 0.125.

	ROOTS (washed) Tons	*Incr.*	TOPS Tons	*Incr.*	SUGAR PERCENTAGE	*Incr.*	TOTAL SUGAR Cwt.	*Incr.*	PLANT NUMBER Thousands	*Incr.*
Mean ..	*11.44*		*5.98*		*19.38*		*44.3*		*30.4*	
None ..	10.41		5.00		19.42		40.4		29.2	
5 cwt. salt ..	10.94	*+0.53*	5.22	*+0.22*	19.71	*+0.29*	43.1	*+2.7*	30.7	*+1.5*
Artificials	11.53	*+1.12*	6.55	*+1.55*	19.20	*−0.22*	44.3	*+3.9*	30.6	*+1.4*
3 cwt. salt and artificials ..	12.87	*+2.46*	7.16	*+2.16*	19.21	*−0.21*	49.4	*+9.0*	31.2	*+2.0*
St. error ..	±0.336	*±0.475*	±0.426	±0.602	±0.184	±0.260				

Conclusions

Artificials significantly increased the yields of roots and tops and salt significantly increased the yield of roots. The effects on sugar percentage were not significant.

Sugar beet. W. Grayson, Esq., Harmston, Lincs, 1934
Kelham Beet Sugar Factory

4×4 Latin square. Plots: 1/40 acre.
TREATMENTS: No manure, 5 cwt. salt, 8 cwt. mixed artificial fertiliser (containing 3 parts sulphate of ammonia, 3 parts superphosphate and 2 parts 30% potash salt) and 3 cwt. salt plus 8 cwt. mixed artificial fertiliser per acre.
BASAL MANURING: 4 cwt. kainit and 10 loads farmyard manure per acre.
SOIL: Loam on Lincoln Heath. Variety: Kuhn P. Manures applied: April 19th. Seed sown: May 4th. Harvested: October 18th. Previous crop: wheat.
STANDARD ERRORS PER PLOT: Roots (washed): 0.408 tons per acre or 3.41%; tops: 0.423 tons per acre or 6.17%; sugar percentage: 0.516; mean dirt tare: 0.0664.
SPECIAL NOTE: The basal dressing of kainit probably reduced the effect of salt.

	ROOTS (washed) Tons	*Incr.*	TOPS Tons	*Incr.*	SUGAR PERCENTAGE	*Incr.*	TOTAL SUGAR Cwt.	*Incr.*	PLANT NUMBER Thousands	*Incr.*
Mean ..	*11.98*		*6.86*		*18.47*		*44.2*		*23.4*	
None ..	11.43		6.02		18.51		42.3		23.5	
5 cwt. salt ..	11.24	*−0.19*	5.86	*−0.16*	18.64	*+0.13*	41.9	*−0.4*	23.5	*0.0*
Artificials	12.65	*+1.22*	7.81	*+1.79*	18.39	*−0.12*	46.5	*+4.2*	23.4	*−0.1*
3 cwt. salt and artificials	12.58	*+1.15*	7.76	*+1.74*	18.34	*−0.17*	46.1	*+3.8*	23.3	*−0.2*
St. error ..	±0.204	*±0.288*	±0.212	*±0.300*	±0.258	*±0.365*				

Conclusions

Mixed artificials significantly increased the yields of roots and tops. The effect of salt on yields was negligible. There were no significant effects on sugar percentage.

https://doi.org/10.23637/ERADOC-1-66

Sugar Beet. J. Parr, Esq., North Scarle, Lincoln, 1934
Kesteven Agricultural Committee and Bardney Beet Sugar Factory

4 × 4 Latin square. Plots : 1/40 acre.
TREATMENTS : All combinations of :—
{None / 5 cwt. salt} × {None / 2 cwt. muriate of potash}
BASAL MANURING : 2½ cwt. superphosphate and 2½ cwt. sulphate of ammonia per acre.
SOIL : Sand. Variety : Kuhn P. Manures applied : April 18th. Seed sown : April 23rd. Lifted : October 1-7. Previous crop : Beet, tops ploughed in.
STANDARD ERRORS PER PLOT : Roots (washed) : 0.782 tons per acre or 7.54% ; tops : 0.557 tons per acre or 9.66% ; sugar percentage : 0.331 ; percentage purity : 1.59. Mean dirt tare : 0.0647.

	ROOTS (washed) : tons per acre				TOPS : tons per acre			
Muriate of potash (cwt.)	Salt (cwt.) None	5	*Mean*	*Increase*	Salt (cwt.) None	5	*Mean*	*Increase*
None	10.17[1]	10.28[1]	*10.22*[2]	*+0.30*[1]	5.32[1]	5.98[1]	*5.65*[2]	*+0.23*[1]
2	9.99[1]	11.06[1]	*10.52*[2]		5.52[1]	6.23[1]	*5.88*[2]	
Mean	*10.08*[2]	*10.67*[2]	10.38		*5.42*[2]	*6.10*[2]	5.76	
Increase ..	*+0.59*[1]				*+0.68*[1]			
St. Errors ..	([1]) ±0.391, ([2]) ±0.276				([1]) ±0.278, ([2]) ±0.197			
	SUGAR PERCENTAGE				TOTAL SUGAR : cwt. per acre			
None	18.62[1]	19.80[1]	*19.21*[2]	*+0.54*[1]	37.9	40.7	*39.3*	*+2.4*
2	19.30[1]	20.20[1]	*19.75*[2]		38.6	44.7	*41.7*	
Mean	*18.96*[2]	*20.00*[2]	19.48		*38.2*	*42.7*	*40.5*	
Increase ..	*+1.04*[1]				*+4.5*			
St. Errors ..	([1]) ±0.166, ([2]) ±0.117							
	PLANT NUMBER : thousands per acre				PERCENTAGE PURITY			
None	31.0	30.8	*30.9*	*+0.7*	87.8[1]	87.6[1]	*87.7*[2]	*+1.1*[1]
2	31.2	32.0	*31.6*		88.9[1]	88.7[1]	*88.8*[2]	
Mean	*31.1*	*31.4*	31.2		*88.4*[2]	*88.2*[2]	88.3	
Increase ..	*+0.3*				*−0.2*[1]			
St. Errors ..					([1]) ±0.794, ([2]) ±0.562			

Conclusions

Salt gave a significant increase in yield of tops, but not of roots. The increases due to muriate of potash were not significant for either roots or tops. Both manures gave significant increases in sugar percentage, the difference between the increases in favour of salt being almost significant.

Mangolds. Oakerthorpe, Derbyshire, 1934. G. Limb, Esq., Derbyshire Education Committee.

4 randomised blocks of 8 plots each. Plots 1/93 acre.
TREATMENTS : All combinations of :
Sulph. amm. {None (O) / 0.6 cwt. N (N)} × 30% potash salt. {None (O) / 1.2 cwt. K_2O (K)} × Dung. {None (O) / 15 tons (D)}
BASAL MANURING : 4 cwt. superphosphate per acre.
SOIL : Medium strong loam on clay subsoil. Variety : Yellow Globe. Manures applied : May 1. Seed sown : May 2. Lifted : October 10 and 11. Previous crop : Wheat.
SPECIAL NOTES: The plants on plots receiving the basal dressing and sulphate of ammonia only were poor and were infested heavily by aphids. The plants on the potash plots were good and were scarcely attacked by aphids.
STANDARD ERRORS per plot: Roots: 2.42 tons per acre or 12.4%. Tops: 0.739 tons per acre or 18.4%.

https://doi.org/10.23637/ERADOC-1-66

Yields of Individual Treatments

ROOTS : tons per acre.

O	N	K	D	NK	ND	KD	NKD
9.16	10.96	17.19	22.17	21.44	22.33	25.32	27.94

Responses to Fertilisers

Mean yields : ROOTS : *19.56 tons.* TOPS : *4.01 tons.*

	Mean Response	Differential Responses					
		Sulphate of ammonia		Potash Salt		Dung	
		Absent	Present	Absent	Present	Absent	Present
ROOTS : tons per acre (±1.21. *Means : +0.856*).							
Sulphate of Ammonia ..	*+2.21*	—	—	+0.98	+3.44	+3.02	+1.39
Potash Salt	*+6.82*	+5.59	+8.04	—	—	+9.26	+4.38
Dung	*+9.75*	+10.57	+8.94	+12.19	+7.32	—	—
TOPS : tons per acre (±0.370. *Means : ±0.262*).							
Sulphate of ammonia ..	*+0.51*	—	—	+0.26	+0.76	+0.66	+0.37
Potash Salt	*+0.60*	+0.35	+0.85	—	—	+0.34	+0.86
Dung	*+0.70*	+0.84	+0.55	+0.44	+0.96	—	—

Conclusions

All three fertilisers gave significant increases in the yield of roots. The response to dung was 66% of the yield in the absence of dung.

The response to potash salt was significantly higher in the absence of dung than in its presence, the yields on plots receiving neither dung nor potash salt being very poor, as mentioned in the special note above.

Potash salt and dung also gave significant increases in the yield of tops, but the increase to sulphate of ammonia was not quite significant.

Kale. Midland Agricultural College, Loughborough, 1934.

4 randomised blocks of 6 plots each. Plots : 0.0205 acre.

TREATMENTS : All combinations of :

{None, 3 cwt. Nitro-chalk, 6 cwt. Nitro-chalk} × {Unthinned, Thinned}

BASAL MANURING : 12 tons of dung, 8 cwt. basic slag, and 2 cwt. 30% potash salt per acre.

SOIL : Light loam. Variety: Marrow stem. Manures applied : May 18. Seed sown: April 25.

Harvested : November 5-18. Previous crop : Wheat.

STANDARD ERROR per plot : 2.63 tons per acre or 7.98 %.

Tons per acre (±1.32)	Nitro-chalk (cwt.)			*Mean (±0.762)*	*Increase (±1.08)*
	None	3	6		
Unthinned ..	30.27	32.94	35.00	*32.74*	
Thinned ..	31.11	33.32	35.30	*33.24*	*+0.50*
Mean (±0.934)	*30.69*	*33.13*	*35.15*	*32.99*	
Incr. (±1.32)		*+2.44*	*+2.02*		

Conclusions

There was a significant response to nitro-chalk with no apparent falling-off in response at higher level. Thinning produced a slight, tuough not signifcant increase in yield.

https://doi.org/10.23637/ERADOC-1-66

Brussels sprouts. Bowman's Farm, London Colney, 1934

H. W. Gardner, Esq., Hertfordshire Farm Institute

A semi-Latin square with 3 complete replications. This type of design leads to a biased estimate of error and should not be used. Plots : 1/100 acre.

TREATMENTS : All combination of :

{ None, 2 cwt. sulph. pot., 4 cwt. sulph. pot. } × { None, 3 cwt. sulph. amm. } × { None, 5cwt. super. }

BASAL MANURING : Nil.

SOIL : Gravelly loam. Variety : Farmer's own selection. Manures applied : July 5. Planted : June 7. Picked : October 25, January 3, February 14. Previous crop : Cereals.

SPECIAL NOTE : Owing to the mild autumn and low prices the picking of sprouts was not sufficiently rapid to prevent a great deal of rotting. Accordingly about three-quarters of the sprouts were wasted at the second picking which should have been much earlier.

STANDARD ERROR PER PLOT (total of all pickings) : 6.29 cwt. per acre or 10.7%.

Individual treatments

Graded produce: cwt. per acre

Mean Yield: 58.7.

Pickings	O	K_1	K_2	N	K_1N	K_2N	P	K_1P	K_2P	NP	K_1NP	K_2NP
1st ..	32.7	37.4	39.0	35.1	37.5	48.2	34.8	35.7	35.4	33.9	44.3	47.4
2nd ..	8.8	6.0	8.9	14.2	9.4	11.9	6.8	4.5	4.4	10.1	9.5	4.4
3rd ..	12.3	12.0	10.2	13.1	13.1	13.8	11.5	11.1	10.2	13.9	12.8	10.5
Total	53.8	55.4	58.1	62.4	60.0	73.9	53.1	51.3	50.0	57.9	66.6	62.3

Summary of results: total of all pickings

Mean Yield: 58.7 cwt.

Fertiliser	*Mean response*	Differential responses : cwt. per acre.						
		Sulphate of Ammonia		Superphosphate		Sulphate of potash (cwt.)		
		Absent	Present	Absent	Present	None	2	4
Sulphate of Amm.	*+10.2*	—	—	+9.7	+10.8	+6.7	+10.0	+14.0
Superphosphate	−3.7	−4.3	−3.2	—	—	−2.6	+1.2	−9.8
St. Errors ..	*±2.10*	±2.97				±3.63		

Sulphate of potash cwt. per acre	Sulphate of Ammonia Absent	Sulphate of Ammonia Present	Superphosphate Absent	Superphosphate Present	*Mean*	*Increase*
0	53.4	60.2	58.1	55.5	*56.8*	
2	53.4	63.3	57.7	59.0	*58.4*	*+1.6*
4	54.0	68.1	66.0	56.2	*61.0*	*+2.6*
St. errors	±2.56				*±1.81*	*±2.56*

Conclusions

Sulphate of ammonia significantly increased the total yield of graded produce. Sulphate of potash gave a significant increase in yield at the first picking, but had little effect at later pickings, the response to it in total yield of graded produce not being significant. The decrease in total yield of graded produce due to superphosphate was not significant.

https://doi.org/10.23637/ERADOC-1-66