ROTHAMSTED RESEARCH

Report for 1929

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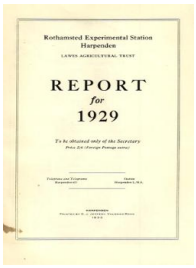

Replicated Experiments

Rothamsted Research

Rothamsted Research (1930) *Replicated Experiments ;* Report For 1929, pp 89 - 123 **- DOI: https://doi.org/10.23637/ERADOC-1-111**

Second Series: Replicated Experiments.

Barley: Comparison of Nitrogenous Fertilisers, Sulphate and Muriate of Ammonia, Urea and Cyanamide, each used in single and double dressings.

Effect of Superphosphate and Sulphate of Potash.

Long Hoos (Section 4), 1929.

A. Single Dressing. W. **B. Double Dressing.**

I.	N	C	O	M	S
II.	O	M	S	C	N
II.	S	O	C	N	M
IV.	M	S	N	O	C
V.	C	N	M	S	O

I.	N	U	M	S	C
II.	S	C	N	M	U
III.	M	S	U	C	N
IV.	C	N	S	U	M
V.	U	M	C	N	S

System of Replication: 2 Latin Squares.
Area of Each Plot: 1/40th acre.
Testing Sulphate (S) and Muriate (M) of Ammonia, Cyanamide (C), Urea (U) and Nitrate of Soda (N).
Rates: 0.2 and 0.4 cwt. of N per acre. Single Urea replaced by No Nitrogen.
Each Plot divided into 4 sub-plots each 1/160th acre, for the treatments—(1) No Potash or Phosphate, (2) Sulphate of Potash (.6 cwt. K_2O per acre), (3) Superphosphate (.4 cwt P_2O_5 per acre), (4) Sulphate of Potash and Superphosphate. Yields of sub-plots estimated by sampling method only.
Barley sown: March 12. Harvested: August 10.
Variety: "Plumage Archer" (3-4 bushels per acre). Manures applied: March 14-16.
Previous Crop: Barley.

Actual Weights in lb. Per Whole Plot.

	Grain.									
	Single Dressing.					Double Dressing.				
Row.	O	S	M	N	C	U	S	M	N	C
I.	51.50	64.50	62.25	75.50	56.75	64.25	59.50	66.00	79.25	63.00
II.	59.00	59.75	57.50	71.25	66.50	69.75	77.00	69.50	77.00	71.75
III.	55.75	66.25	75.25	64.50	69.75	75.50	71.50	82.75	72.75	75.50
IV.	63.00	61.75	66.50	76.50	75.00	66.00	77.50	69.50	80.50	79.25
V.	51.50	71.25	68.75	71.25	63.00	80.25	67.75	78.75	80.25	78.50
	Straw.									
I.	47.25	66.75	60.00	81.50	58.75	57.75	58.50	61.50	74.00	62.50
II.	62.00	57.50	57.25	79.75	65.50	70.25	70.75	71.50	81.75	71.75
III.	51.00	81.50	72.75	65.00	66.25	69.50	68.50	83.00	75.25	76.50
IV.	64.50	57.75	65.25	78.00	75.75	63.00	73.25	68.25	79.75	80.50
V.	59.75	70.75	68.25	70.00	62.75	76.00	77.75	72.75	73.00	67.75

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Barley: Long Hoos, 1929 (contd.)

Summary of Results by the usual Threshing Method.—Nitrogenous Comparisons.

A. Single Dressing.

	No Nitrogen.	Sulphate of Amm.	Muriate of Amm.	Nitrate of Soda.	Cyana-mide.	Mean.	Standard Error.
Grain, cwt. per acre	20.1	23.1	23.6	25.6	23.6	23.2	0.88
Grain, per cent. ..	86.4	99.6	101.6	110.5	101.9	100.0	3.79
Straw, cwt. per acre	20.3	23.9	23.1	26.7	23.5	23.5	1.06
Straw, per cent. ..	86.4	101.6	98.3	113.7	100.0	100.0	4.49

Significant response to all nitrogenous manures with both grain and straw. The yield on the Nitrate of Soda plots was significantly better than the mean yield of the plots receiving the other three dressings.

B. Double Dressing.

	Urea.	Sulphate of Amm.	Muriate of Amm.	Nitrate of Soda.	Cyana-mide.	Mean.	Standard Error.
Grain, cwt. per acre	25.4	25.2	26.2	27.8	26.3	26.2	0.44
Grain, per cent. ..	97.0	96.3	100.0	106.3	100.4	100.0	1.68
Straw, cwt. per acre	24.0	24.9	25.5	27.4	25.6	25.5	0.71
Straw, per cent. ..	94.3	97.7	100.0	107.5	100.6	100.0	2.80

Plots treated with Nitrate of Soda gave significantly higher yield than all the others.

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Summary of Results by Sampling Method.
Table of Separate Yields.

Grain, cwt. per acre.	A. Single Dressing. No Nitrogen.	Sulphate of Ammonia.	Muriate of Ammonia.	Nitrate of Soda.	Cyana-mide.	Standard Errors.
Without Phosphate and Potash	19.5	25.4	24.2	23.5	22.9	1.40
With Superphosphate	21.5	24.3	23.9	26.0	19.1	
With Sulphate of Potash ..	21.5	20.5	22.6	25.2	23.8	
With Potash and Phosphate ..	20.1	24.3	23.4	24.1	22.5	
Mean	20.7	23.6	23.5	24.7	22.1	0.57
Straw, cwt. per acre.						
Without Phosphate and Potash	19.1	25.7	25.7	23.6	23.7	1.57
With Superphosphate	21.6	24.3	23.3	26.4	19.6	
With Sulphate of Potash ..	21.6	20.5	22.6	27.2	24.0	
With Potash and Phosphate ..	20.4	24.3	24.7	25.7	23.1	
Mean	20.7	23.7	24.1	25.7	22.6	1.42

Grain, cwt. per acre.	B. Double Dressing. Urea.	Sulphate of Ammonia.	Muriate of Ammonia.	Nitrate of Soda.	Cyana-mide.	Standard Errors.
Without Phosphate and Potash	25.8	26.0	26.8	28.3	29.6	1.26
With Superphosphate	25.0	29.1	25.5	29.6	27.6	
With Sulphate of Potash ..	23.7	24.2	27.6	26.6	26.5	
With Potash and Phosphate ..	25.1	24.8	25.8	27.2	26.3	
Mean	24.9	26.0	26.4	27.9	27.5	0.83
Straw, cwt. per acre.						
Without Phosphate and Potash	25.5	25.4	25.9	28.9	32.1	1.41
With Superphosphate	25.1	29.3	24.4	29.6	30.9	
With Sulphate of Potash ..	24.0	23.2	27.1	28.3	27.9	
With Potash and Phosphate ..	26.3	24.3	24.3	27.6	27.4	
Mean	25.3	25.6	25.4	28.6	29.6	0.91

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Barley : Long Hoos, 1929 (contd.)

Potassic and Phosphatic Comparisons.—(Yields Estimated by Sampling).

A. Single Dressing (including No Nitrogen).

GRAIN.	Average Yield in cwt. per acre.		Average Yield per cent.	
	Without Phosphate.	With Phosphate.	Without Phosphate.	With Phosphate.
Without Sulphate of Potash	23.1	23.0	100.8	100.2
With Sulphate of Potash	22.7	22.9	99.1	99.9

Mean—22.9.
Standard Error—0.63 or 2.74%

STRAW.	Average Yield in cwt. per acre.		Average Yield per cent.	
	Without Phosphate.	With Phosphate.	Without Phosphate.	With Phosphate.
Without Sulphate of Potash	23.6	23.0	100.8	98.6
With Sulphate of Potash	23.2	23.7	99.2	101.3

Mean—23.4. Standard Error—0.70 or 3.00%.

No significant effects of Phosphate or Potash with grain or straw.

B. Double Dressing.

GRAIN.	Average Yield in cwt. per acre.		Average Yield per cent.	
	Without Phosphate.	With Phosphate.	Without Phosphate.	With Phosphate.
Without Sulphate of Potash	27.3	27.4	102.8	103.0
With Sulphate of Potash	25.7	25.8	96.8	97.3

Mean—26.6. Standard Error—0.57 or 2.13%.

STRAW	Average Yield in cwt. per acre.		Average Yield per cent.	
	Without Phosphate.	With Phosphate.	Without Phosphate.	With Phosphate.
Without Sulphate of Potash	27.6	27.9	102.5	103.6
With Sulphate of Potash	26.1	26.0	97.1	96.8

Mean—26.9. Standard Error—0.63 or 2.34%.

With both grain and straw Potash has depressed the yield significantly, while Phosphate has been ineffective.

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Winter Oats : Comparison of Nitrogenous Fertilisers, Sulphate of Ammonia and Cyanamide, in all combinations of Autumn and Spring dressings.

Long Hoos (Section 2), 1929.

W

A								B								C							
4	2	13	16	3	11	9	1	2	3	4	5	9	1	11	7	5	8	7	13	3	12	10	9
10	7	5	6	14	12	15	8	12	6	10	15	14	13	16	8	2	14	16	6	4	11	15	1

System of Replication :—3 randomised blocks of 16 plots each.

Area of Each Plot : 1/40th acre.

Unit dressing at a rate equivalent to ¾ cwt. Cyanamide per acre.

System of Manuring : All combinations of Sulphate of Ammonia and equivalent Cyanamide, applied in Autumn and Spring, as shown in key to treatments.

Sulphate of Ammonia applied : September 24, March 19.

Cyanamide applied : September 14, March 18.

Variety : Grey Winter.

Sown : September 24.

Harvested : August 7.

Previous Crop : Barley.

Key to Treatments.

Spring Dressings.

Autumn Dressings	None.	Sulphate.	Cyanamide.	Both.
None ..	1	4	5	10
Sulphate	2	6	7	12
Cyanamide	3	9	11	15
Both ..	8	13	14	16

Actual Weight in lb.—Total Grain.

Blocks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	37.75	34.75	34.75	32.50	35.75	37.25	34.50	31.50	43.00	25.00	41.50	26.00	37.00	34.00	32.50	40.50
B	42.50	40.75	39.50	36.75	40.25	30.75	44.50	45.00	38.50	32.50	51.25	31.00	37.25	29.75	41.50	40.50
C	39.25	42.75	34.75	38.25	40.50	30.75	37.50	37.75	31.00	27.00	40.50	31.25	38.00	44.00	32.50	37.25

Actual Weight in lb.—Total Straw.

Blocks.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	63.75	68.75	57.75	53.50	66.25	71.00	74.25	71.00	78.50	62.50	76.75	69.75	86.50	69.75	73.25	83.75
B	66.75	61.50	66.25	68.75	75.00	68.00	87.50	73.25	86.75	73.50	81.25	78.25	79.75	79.25	77.50	81.25
C	58.50	69.75	53.75	71.50	77.50	78.25	68.00	64.75	72.00	62.75	65.75	63.25	73.00	74.25	72.25	76.25

Summary of Results.

		Grain—cwt. per acre.					Grain—per cent.				
	Average Yield.	Spring Dressings.				Mean.	Spring Dressings.				Mean.
		None.	Sulphate.	Cyanamide.	Both.		None.	Sulphate.	Cyanamide.	Both.	
Autumn Dressings.	None ..	14.2	12.8	13.9	10.1	12.7	108.4	97.5	105.7	76.7	97.1
	Sulphate ..	14.1	11.8	13.9	10.5	12.5	107.3	89.6	105.7	80.1	95.7
	Cyanamide ..	13.0	13.4	15.9	12.7	13.7	98.9	102.1	120.9	96.6	104.6
	Both ..	13.6	13.4	12.8	14.1	13.5	103.7	101.8	97.8	107.3	102.6
	Mean ..	13.7	12.8	14.1	11.8	13.1	104.6	97.8	107.5	90.2	100.0

Standard Error—0.84 cwt. or 6.39 per cent.

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Winter Oats : Long Hoos, 1929 (contd.)

Average Yield.		Straw—cwt. per acre.					Straw—per cent.				
		Spring Dressings.				Mean.	Spring Dressings.				Mean.
		None.	Sulphate.	Cyanamide.	Both.		None.	Sulphate.	Cyanamide.	Both.	
Autumn Dressings.	None ..	22.5	23.1	26.0	23.7	23.8	88.1	90.3	102.0	92.6	93.2
	Sulphate ..	23.8	25.9	27.3	25.1	25.5	93.2	101.3	107.1	98.5	100.0
	Cyanamide	21.2	28.2	26.6	26.5	25.6	82.8	110.6	104.3	103.9	100.4
	Both ..	24.9	28.5	26.6	28.7	27.2	97.4	111.5	104.0	112.4	106.4
	Mean ..	23.1	26.4	26.6	26.0	25.5	90.4	103.4	104.3	101.9	100.0

Standard Error—1.16 cwt. or 4.56 per cent.

With grain there was a significant depression where Sulphate of Ammonia was applied in Spring, which was materially less on the plots that had had Autumn Cyanamide. The yield was depressed by the application of Spring Cyanamide to those plots which did not receive Cyanamide in the Autumn; those which had Autumn Cyanamide responded moderately to the Spring Cyanamide.

With straw there were significant responses to all four single dressings, but no further response to the double dressing. The interaction of Autumn Cyanamide and Spring Sulphate was significant, in that the response to Autumn Cyanamide only appeared on the plots that were dressed with Sulphate in the Spring, while on the other hand, the response to Spring Sulphate was only evident on the plots that had been previously dressed with Autumn Cyanamide.

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WHEAT.

VARIETY TRIAL.

Nitrogenous Fertilisers as Top Dressing: Sulphate of Ammonia. Muriate of Ammonia.

Each in single and double dressings.

Long Hoos (Section 6), 1929.

W

	Ml, Sq, Y, Sw	Sw, Y, Sq, Ml	Sq, Y, Ml, Sw	Sq, Sw, Ml, Y	Ml, Sq, Y, Sw	Sw, Ml, Sq, Y	Y, Ml, Sw, Sq	Ml, Y, Sw, Sq
C	S, E & L	O1	O2	M, L	M, E & L	M, E	S, L	S, E
B	M, L	S, E	S, L	S, E & L	M, E	O1	O2	M, E & L
A	S, E	M, E & L	S, L	S, E & L	M, L	M, E	O1	O2

SYSTEM OF REPLICATION: 3 randomised blocks of 32 plots each.
AREA OF EACH PLOT: 6/325th acre.
S=Sulphate of Ammonia } at the rate of 0.2 cwt.
M=Muriate of Ammonia } Nitrogen per acre.
O1, O2=No Top Dressing.
E=Early Application (March 18).
L=Late Application (May 13).
E & L=Early and Late Application, thus giving double dressing.

Strips running across the blocks were allotted to 4 varieties as indicated in plan.
Ml=Million III.
Y=Yeoman II.
Sq=Square-Head's Master.
Sw=Swedish Iron.
Wheat Sown: October 3, 1928.
Harvested: August 26, 1929.
Previous Crop: Barley.

Actual Weights in lb.—Total Grain.

Variety.	Blocks.	O1.	O2.	S.E.	S.L.	M.E.	M.L.	S. E. & L.	M. E & L.
Million III. ..	A	31.25	28.75	51.00	32.75	36.00	34.00	29.25	47.25
	B	29.50	25.75	43.50	35.75	35.75	52.00	32.25	29.00
	C	39.25	31.75	27.00	30.75	35.25	31.00	59.25	30.25
Average in cwt. per acre		15.0		19.6	16.0	17.2	18.9	19.5	17.2
Yeoman II ..	A	29.50	28.00	53.50	40.25	35.25	33.25	31.00	44.25
	B	26.50	25.00	42.50	40.75	33.50	49.75	32.50	33.75
	C	40.50	37.25	28.00	27.00	25.50	30.75	57.00	31.25
Average in cwt. per acre		15.1		20.0	17.4	15.2	18.3	19.4	17.6
Square-Head's Master ..	A	29.75	29.50	44.50	40.25	36.25	32.50	38.25	41.25
	B	25.25	28.00	41.50	39.00	36.25	46.75	37.00	36.75
	C	35.00	37.75	35.75	27.25	22.50	35.50	49.00	32.25
Average in cwt. per acre		14.9		19.6	17.2	15.3	18.5	20.0	17.8
Swedish Iron ..	A	34.00	34.00	54.50	40.00	35.25	31.50	37.50	56.75
	B	32.25	31.50	47.00	43.75	31.25	51.25	36.75	35.25
	C	41.00	35.25	34.00	35.00	32.00	36.75	55.50	25.75
Average in cwt. per acre		16.8		21.8	19.1	15.9	19.3	20.9	19.0

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Wheat : Long Hoos, 1929 (contd.).

Actual Weights in lb.—Total Straw.

Variety.	Blocks.	O1	O2.	S.E.	S.L.	M.E.	M.L.	S. E & L.	M. E & L.
Million III ..	A	43.25	37.25	65.75	48.00	52.50	49.00	52.75	66.50
	B	43.25	36.50	62.25	50.00	54.00	66.75	55.75	48.75
	C	60.75	47.75	43.75	51.50	58.50	51.75	86.25	59.25
Average in cwt. per acre		21.7		27.7	24.1	26.6	27.0	31.4	28.1
Yeoman II ..	A	34.50	37.50	69.00	54.00	51.50	46.00	52.00	46.75
	B	34.50	36.25	56.50	57.50	51.25	62.50	54.50	57.50
	C	55.00	53.00	44.75	43.00	45.00	50.75	84.50	64.75
Average in cwt. per acre		20.2		27.4	24.9	23.8	25.7	30.8	27.2
Square-Head's Master ..	A	41.75	45.25	63.00	56.50	55.75	57.25	63.50	63.00
	B	35.25	40.50	64.75	63.25	54.75	62.75	64.00	57.75
	C	55.25	60.75	62.75	43.75	58.75	61.75	80.00	62.25
Average in cwt. per acre		22.5		30.7	26.4	27.3	29.3	33.4	29.5
Swedish Iron ..	A	45.75	47.25	81.00	55.25	50.00	40.75	61.25	79.75
	B	43.00	41.25	66.50	60.00	48.00	69.50	63.75	58.00
	C	57.25	52.25	54.25	57.25	56.50	59.50	86.50	56.50
Average in cwt. per acre		23.1		32.5	27.8	24.9	27.4	34.1	31.3

Summary of Results.—(a) Effect of Top Dressing.

Grain.	No Nitrogen	Sulphate Early	Sulphate Late.	Muriate Early.	Muriate Late.	Sulphate Early and Late.	Muriate Early and Late.	Mean.	Standard Error.
Cwt. per acre	15.4	20.3	17.4	15.9	18.7	20.0	17.9	17.6	2.29
Per cent. ..	87.6	114.9	98.9	90.2	106.3	113.2	101.4	100.0	12.98
Straw.									
Cwt. per acre	21.9	29.6	25.8	25.6	27.3	32.4	29.0	26.7	2.33
Per cent. ..	81.9	110.8	96.6	96.1	102.4	121.5	108.8	100.0	8.74

Summary of Results.—(b) Varietal Response.

Grain.	Million III.	Yeoman II.	Square-Head's Master.	Swedish Iron.	Mean.	Standard Error.
Cwt. per acre ..	17.3	17.3	17.3	18.7	17.6	0.35
Per cent. ..	98.1	97.9	98.0	106.0	100.0	1.98
Straw.						
Cwt. per acre ..	26.0	25.0	27.7	28.0	26.7	0.54
Per cent. ..	97.5	93.8	103.7	105.0	100.0	2.04

Yield of Swedish Iron significantly greater than that of other varieties in grain, while Square-Head's Master and Swedish Iron are superior in straw. Significant responses to both early and late top dressings in the case of straw, but with grain, while numerically large, the responses are insignificant on account of the high Standard Error. Sulphate appears to do better than Muriate, but the difference is not significant.

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CULTIVATION EXPERIMENT.

Barley, Great Harpenden, 1929.

OLD SET.

E

I.				II.				III.				IV.			
A	B	C	D	B	D	A	C	C	A	D	B	D	C	B	A

TREATMENTS :—
A = Ridged Seed bed.
B = Simar rototiller, then ridged.
C = Simar rototiller, but left flat.
D = Simar rototiller, left flat, and Simar implement used again between rows in July.

SYSTEM OF REPLICATION : 4 randomised blocks of 4 plots each.
Area harvested of each Plot : 1/40th acre.
Barley sown : March 14.
Harvested : August 7-8.
VARIETY : " Standwell," 3-4 bushels per acre.

These were treatments in 1928—no further treatments in 1929. Whole ploughed March 12-13. All plots had dressing of 1 cwt. Sulphate of Ammonia, 2 cwt. Superphosphate and 1 cwt. Muriate of Potash per acre, applied March 27.
Previous Crop : Swedes.

Actual Weights in lb.

Blocks.	Grain.				Straw.			
	A	B	C	D	A	B	C	D
I. ..	74.50	69.75	76.25	79.00	97.50	85.25	102.75	125.00
II. ..	70.75	74.75	59.25	82.50	95.25	109.25	90.75	115.50
III. ..	75.00	75.50	69.25	83.25	97.50	111.50	85.75	114.25
IV. ..	84.50	85.25	73.50	73.25	101.50	111.25	96.50	106.75
Total ..	304.75	305.25	278.25	318.00	391.75	417.25	350.75	461.50

Summary of Results.

Average Yield.	1928 Treatment.				Mean.	Standard Error.
	Ridged.	Simar and Ridged.	Simar and Flat.	Simar flat and Simar.		
Grain, cwt. per acre ..	27.2	27.2	24.8	28.4	26.9	1.11
Grain, per cent. ..	101.1	101.2	92.3	105.5	100.0	4.13
Straw, cwt. per acre ..	35.0	37.2	33.5	41.2	36.7	1.71
Straw, per cent. ..	95.2	101.4	91.3	112.1	100.0	4.67

The plots doubly Simared in 1928 have given a significantly higher yield of straw than the others, but the advantage in grain is not significant.

https://doi.org/10.23637/ERADOC-1-111

CULTIVATION EXPERIMENT.

Barley, Great Harpenden, 1929.

NEW SET.

I.				II.				III.				IV.			
E	F	G	H	F	H	E	G	G	E	H	F	H	G	F	E

TREATMENTS :—
E and G = Ordinary Spring Cultivation, March 11.
F and H = Simar Spring Cultivation, March 11.
All plots had dressing of 1 cwt. Sulphate of Ammonia, 2 cwt. Superphosphate and 1 cwt. Muriate of Potash per acre applied March 27.
Previous Crop : Swedes.

SYSTEM OF REPLICATION :—4 randomised blocks of 4 plots each.
Area harvested of each plot : 1/40th acre.
Barley sown : March 14.
Harvested : August 7-8.
VARIETY : "Standwell," (3-4 bushels per acre).

Actual Weights in lb.

Blocks.	Grain.				Straw.			
	E	G	F	H	E	G	F	H
I. ..	91.75	83.25	80.50	77.75	128.25	134.75	109.00	137.75
II. ..	80.50	90.75	83.00	83.75	143.50	120.25	126.00	127.25
III. ..	84.50	76.50	84.25	85.25	122.00	109.50	111.25	122.75
IV. ..	89.75	86.50	90.75	85.25	124.25	124.00	129.25	116.25
Total ..	346.50	337.00	338.50	332.00	518.00	488.50	475.50	504.50
	683.5		670.5		1006.5		980.0	

Summary of Results.

Average Yield.	Ordinary Spring Cultivation.	Simar Spring Cultivation	Mean.	Standard Error.
Grain, cwt. per acre ..	30.5	29.9	30.2	0.57
Grain, per cent.	101.0	99.0	100.0	1.90
Straw, cwt. per acre ..	44.9	43.7	44.3	1.19
Straw, per cent.	101.3	98.7	100.0	2.69

The difference in yield is not significant.

https://doi.org/10.23637/ERADOC-1-111

POTATOES.

Nitrogenous Fertiliser: Sulphate of Ammonia.

Potassic Fertilisers: Sulphate and Muriate of Potash and Potash Manure Salts (30%).

Each in single and double dressings.

Superphosphate.

Long Hoos (Section 1), 1929.

	G			W D			A		
	— / 5M	9P / —	— / 8S	— / 6M	— / 8P	— / 5P	9S / —	4M / —	— / 7P
	3 / —	— / 2	4P / —	— / 3	9M / —	7S / —	3 / —	— / 1	2 / —
	7M / —	6S / —	— / 1	1 / —	— / 2	4S / —	— / 8M	6P / —	5S / —
	— / 4M	5S / —	— / 6P	— / 6S	9P / —	— / 2	8P / —	— / 4S	3 / —
H	3 / —	— / 9S	8M / —	— / 8S	— / 4P	— / 5M	— / 5P	1 / —	— / 6M
	— / 2	7P / —	1 / —	— / 3	1 / —	7M / —	2 / —	— / 7S	9M / —
	4S / —	— / 1	8P / —	— / 8M	— / 3	— / 6P	— / 5M	8S / —	2 / —
	5P / —	9M / —	6M / —	— / 1	— / 9S	— / 2	1 / —	— / 9P	— / 4P
	— / 7S	— / 2	3 / —	— / 4M	7P / —	5S / —	— / 7M	3 / —	6S / —
		I			F			C	

B

SYSTEM OF REPLICATION: 9 randomised blocks of 9 plots each. Each plot divided into 2 sub-plots.

AREA OF EACH SUB-PLOT: 1/90th acre.

TREATMENTS: Sulphate of Ammonia at the rate of 0, 0.3 and 0.6 cwt. Nitrogen per acre, and Potash at the rate of 0, 0.5 and 1.0 cwt. K_2O per acre in all combinations as shown in Key to Treatments.

S = Sulphate of Potash.

M = Muriate of Potash.

P = Potash Manure Salts (30%).

Superphosphate at the rate of 0.4 cwt. P_2O_5 per acre is applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half.

All plots received Farmyard Manure at the rate of 14 tons per acre, approximately, ploughed in January 5-9.

Artificials applied: April 12-15.

Potatoes planted: April 16-24. Lifted: September 23-25.

VARIETY: Ally.

Previous Crop: Barley.

Key to Treatments.

Treatment No.	1	2	3	4	5	6	7	8	9
S/Ammonia	0	1	2	0	1	2	0	1	2
Potash ..	0	0	0	1	1	1	2	2	2

https://doi.org/10.23637/ERADOC-1-111

Potatoes : Long Hoos, 1929 (contd.)

Actual Weights in lb.—Sub-Plots with Phosphate.

S/Amm.	Potash.	A	B	C	D	E	F	G	H	I
Quantities										
0	0	111.00	121.00	127.00	123.75	106.00	124.75	121.25	105.50	133.25
0	1	105.75	110.75	117.50	140.25	123.00	118.50	128.00	140.50	138.75
0	2	89.25	126.25	109.25	119.25	112.00	153.50	133.50	112.25	141.00
1	0	121.25	138.25	118.00	137.75	155.50	118.75	148.50	154.50	144.00
1	1	140.00	145.50	153.00	121.75	152.50	140.00	170.00	145.50	154.00
1	2	153.25	164.00	145.50	131.25	141.25	152.25	125.75	144.00	136.25
2	0	131.50	150.25	156.00	149.75	125.00	148.75	164.25	155.50	150.00
2	1	159.75	162.00	136.75	131.00	140.50	181.50	164.25	168.25	161.75
2	2	153.75	157.75	162.50	160.50	170.75	158.75	146.25	169.00	178.00

Actual Weights in lb.—Sub-Plots without Phosphate.

S/Amm.	Potash.	A	B	C	D	E	F	G	H	I
Quantities										
0	0	111.50	119.25	115.25	121.75	96.00	111.00	121.50	97.75	117.50
0	1	107.00	118.50	98.75	119.75	126.75	133.25	123.75	125.00	136.75
0	2	84.25	117.00	111.00	123.25	109.50	119.75	116.50	114.25	138.75
1	0	101.00	129.25	113.25	142.25	136.25	113.50	133.75	132.25	141.25
1	1	142.00	141.25	126.50	105.50	131.75	120.25	140.75	125.75	145.00
1	2	142.50	139.25	134.75	126.25	132.75	110.75	121.50	135.00	145.25
2	0	128.00	148.00	119.00	133.75	125.00	128.25	152.50	138.25	132.75
2	1	146.50	135.25	108.00	138.50	122.75	137.50	146.75	137.00	138.50
2	2	131.00	128.25	139.75	134.75	152.50	142.00	136.50	153.25	135.00

Summary of Average Yields.—Separate Treatments.

Tons per acre.		Without Superphosphate.			With Superphosphate.		
		No S/Amm.	Single S/Amm.	Double S/Amm.	No S/Amm.	Single S/Amm.	Double S/Amm.
No Potash		4.52	5.10	5.38	4.79	5.52	5.94
Single Potash	Sulphate	5.02	5.20	5.06	5.22	5.70	5.91
	Muriate	4.89	5.34	5.52	4.89	6.37	6.09
	Potash Salts	4.68	5.25	5.64	4.94	5.64	6.82
Double Potash	Sulphate	5.08	5.21	5.71	5.18	5.52	6.45
	Muriate	4.51	5.20	5.33	4.75	6.02	6.65
	Potash Salts	4.26	5.50	5.74	4.75	5.78	6.42

https://doi.org/10.23637/ERADOC-1-111

Summary of Significant Results.

	Average Yield, tons per acre.						
	Without Superphosphate.			With Superphosphate.			Standard Error.
	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	
No Potash	4.52	5.10	5.38	4.79	5.52	5.94	0.105
Single Potash	4.86	5.26	5.41	5.01	5.90	6.28	
Double Potash ..	4.62	5.30	5.59	4.89	5.77	6.51	

	Average Yield per cent.						
	Without Superphosphate.			With Superphosphate.			Standard Error.
	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	
No Potash	84.1	95.0	100.2	89.2	102.8	110.6	1.96
Single Potash	90.6	98.0	100.6	93.4	109.9	116.9	
Double Potash ..	86.0	98.8	104.2	91.1	107.5	121.1	

Average Yield.	Without Super.	With Super.	Mean.	Standard Error.
Tons per acre ..	5.12	5.62	5.37	0.035
Per cent. ..	95.3	104.7	100.0	0.65

Significant responses to single and double dressings of Sulphate of Ammonia, and to single dressing of Potash. The double dressing of Potash produced no further increase in yield. Significant response to Superphosphate, the benefit being moderate on the plots without Nitrogen and Potash, but large on those plots receiving the highest dressings. No qualitative differences in the kind of Potash supplied.

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SUGAR BEET.

MANURING.

Nitrogenous Fertilisers: Sulphate of Ammonia, Nitrate of Soda.
Chloride Dressings: Muriate of Potash, Salt.
Superphosphate.

VARIETAL TEST.

Klein Wanzleben—Kuhn (Johnson's Perfection).

Long Hoos (Section 5), 1929.

	J	K	J	K	K	N J	K	J	J	K	J	K	
I.	9	10	11	6	8	3	2	7	5	1	12	4	P
II.	3	5	1	12	11	7	9	6	2	4	8	10	O
III.	1	9	7	2	6	10	4	12	3	8	5	11	O
IV.	8	2	12	3	4	6	10	1	7	5	11	9	P
V.	4	3	10	9	1	5	7	8	12	11	2	6	O
VI.	6	4	3	7	5	9	12	2	11	10	1	8	P
VII.	12	8	5	10	2	11	1	9	4	7	6	3	O
VIII.	2	1	4	8	9	12	11	10	6	3	7	5	P
IX.	10	11	8	1	7	4	6	5	9	2	3	12	P
X.	11	7	6	4	10	2	5	3	8	12	9	1	O
XI.	7	12	9	5	3	1	8	11	10	6	4	2	O
XII.	5	6	2	11	12	8	3	4	1	9	10	7	P

SYSTEM OF REPLICATION: Latin Square.

AREA OF EACH PLOT: 1/90th acre.

TREATMENTS: Sulphate of Ammonia and Nitrate of Soda with seed at the rate of 0.4 cwt. N per acre. Muriate of Potash at the rate of 0.8 cwt. Cl, and Salt in equivalent amount, alone and in combination.

J, K = Pairs of strips one way allotted at random to varieties Kuhn (Johnson's Perfection) and Klein Wanzleben respectively.

O, P = Pairs of strips the other way allotted at random to No Superphosphate and Superphosphate at the rate of 0.6 cwt. P_2O_5 per acre.

The 12 plots of each Nitrogenous and Potassic treatment had 6 allotted to each variety, of which half had no Superphosphate and half had Superphosphate.

All plots had Basal dressing of St. Albans refuse (14 tons per acre) applied March 11-13.

Manures applied: May 2-3.

Seed sown: May 4 (13-16 lb. per acre).

Roots lifted: Oct. 29—Nov. 6.

Previous Crop: Barley.

Key to Treatments.

Manure.	1	2	3	4	5	6	7	8	9	10	11	12
S/Amm.		×			×			×			×	
N/Soda			×			×			×			×
M/Potash . .				×	×	×				×	×	×
Salt							×	×	×	×	×	×

Actual Weights in lb.—Roots.

Row.	1	2	3	4	5	6	7	8	9	10	11	12
I.	174.25	193.25	239.75	116.75	214.75	223.75	203.00	229.00	210.50	190.25	240.25	212.75
II.	187.25	200.00	179.25	153.75	197.50	207.00	183.25	200.75	207.00	117.25	220.50	198.75
III.	160.25	214.75	209.50	169.75	184.75	220.50	196.75	180.75	193.50	165.75	123.00	217.00
IV.	203.00	159.25	216.50	178.25	176.00	199.25	208.00	182.75	123.00	166.50	204.25	222.50
V.	169.25	163.00	161.25	142.75	196.25	114.25	184.25	208.25	207.25	190.75	164.25	211.25
VI.	190.00	229.75	229.50	154.50	195.25	181.25	198.00	130.50	211.50	155.25	242.50	218.00
VII.	169.25	183.25	131.25	179.50	194.50	213.00	164.25	167.00	189.50	194.25	184.25	172.00
VIII.	137.50	170.00	171.75	192.00	150.00	200.50	200.50	205.75	180.50	168.00	192.50	194.00
IX.	172.75	188.00	194.25	170.25	175.50	183.00	179.00	195.00	196.50	160.75	167.00	164.25
X.	135.25	198.75	179.25	197.25	164.50	186.75	137.50	195.00	206.00	187.00	185.25	187.50
XI.	149.75	143.25	172.25	194.00	204.00	197.50	191.00	176.50	196.00	172.00	175.25	177.50
XII.	174.25	200.50	169.50	159.50	243.00	183.50	150.00	194.25	179.75	201.00	210.00	188.00

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Actual Weights in lb.—Tops.

Row.	1	2	3	4	5	6	7	8	9	10	11	12
I.	103.75	128.50	172.50	85.75	151.25	158.25	124.50	183.25	156.75	122.00	185.00	172.25
II.	124.75	132.50	136.75	97.75	136.75	140.75	121.75	159.25	125.75	86.75	173.75	165.00
III.	114.00	146.75	156.50	102.00	149.25	170.50	133.75	127.25	170.50	111.50	107.50	148.75
IV.	111.00	114.75	158.75	113.25	113.25	145.50	132.75	142.75	108.50	97.00	149.25	185.00
V.	104.25	122.50	120.25	95.50	143.00	110.00	101.50	134.75	163.50	132.75	117.00	164.25
VI.	121.25	135.50	176.00	99.75	136.75	137.25	132.25	108.75	162.75	93.75	169.50	139.50
VII.	99.25	126.50	115.50	114.50	146.50	159.00	96.75	140.75	133.75	128.50	141.25	138.25
VIII.	97.75	121.25	116.50	130.50	118.25	142.50	124.50	152.00	146.75	97.25	123.50	154.00
IX.	114.75	125.00	145.75	119.00	108.75	148.00	118.50	138.75	146.25	125.25	118.00	143.25
X.	104.25	140.25	134.75	136.75	139.00	154.00	94.25	143.25	160.25	133.00	162.00	157.00
XI.	114.50	110.25	141.00	131.50	148.25	152.75	157.50	150.25	161.00	111.50	133.00	152.25
XII.	103.75	153.75	150.50	98.75	211.75	147.50	112.00	167.00	144.50	127.25	180.50	167.25

Summary of Results.—(a) Separate Treatments.

Klein Wanzleben.—Roots, tons per acre.

		No Nitrogen.		Sulphate of Amm.		Nitrate of Soda.	
		Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.
Without Phosphate	Without Salt ..	6.34	6.97	7.25	7.58	6.22	7.13
	With Salt ..	6.51	6.68	7.02	6.80	8.14	7.55
With Phosphate	Without Salt ..	6.49	6.02	7.24	6.98	7.47	7.91
	With Salt ..	7.06	6.86	7.57	7.63	6.47	7.64
		Standard Error=0.271 tons or 3.65 per cent.*					
		Tops, tons per acre.					
Without Phosphate	Without Salt ..	4.12	4.51	5.14	5.68	5.05	5.80
	With Salt ..	3.92	4.66	5.60	5.33	6.16	6.35
With Phosphate	Without Salt ..	4.24	4.00	4.93	4.93	5.70	6.08
	With Salt ..	4.86	4.19	5.95	5.65	5.35	6.03
		Standard Error=0.162 tons or 2.99 per cent.*					

*For comparisons other than Phosphate *versus* No Phosphate.

Kuhn (Johnson's Perfection).—Roots, tons per acre.

		No Nitrogen.		Sulphate of Amm.		Nitrate of Soda.	
		Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.
Without Phosphate	Without Salt ..	6.66	6.91	7.52	7.71	7.61	8.13
	With Salt ..	7.65	7.08	8.09	7.30	7.92	8.04
With Phosphate	Without Salt ..	7.60	6.99	8.04	8.48	8.89	7.78
	With Salt ..	8.19	7.09	7.66	9.20	8.28	8.43
		Standard Error=0.271 tons or 3.65 per cent.*					
		Tops, tons per acre.					
Without Phosphate	Without Salt ..	4.73	4.57	5.29	5.88	5.73	6.08
	With Salt ..	5.53	4.76	5.86	5.84	6.09	6.04
With Phosphate	Without Salt ..	4.50	4.66	5.50	6.32	6.62	5.70
	With Salt ..	5.11	4.68	6.00	6.75	6.24	6.85
		Standard Error=0.162 tons or 2.99 per cent.*					

*For comparisons other than Phosphate *versus* No Phosphate.

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Sugar Beet : Long Hoos, 1929 (contd.)

Klein Wanzleben.—Sugar Percentage.

		No Nitrogen.		Sulphate of Amm.		Nitrate of Soda.	
		Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.
Without Phosphate	Without Salt ..	18.32	18.54	18.20	18.56	18.05	17.81
	With Salt ..	18.82	18.51	18.42	18.09	18.43	18.35
With Phosphate	Without Salt ..	18.64	18.57	18.20	18.04	18.03	18.29
	With Salt ..	18.77	18.95	18.10	18.38	17.91	18.24
		Standard Error=0.103.*					
Kuhn.—Sugar Percentage.							
Without Phosphate	Without Salt ..	18.45	18.55	17.92	18.32	18.35	18.28
	With Salt ..	18.63	18.71	17.97	18.53	18.16	18.51
With Phosphate	Without Salt ..	18.42	18.58	18.62	18.54	18.34	18.33
	With Salt ..	18.52	18.62	18.40	18.17	18.42	18.00
		Standard Error=0.103.*					

*For comparisons other than Phosphate *versus* No Phosphate.

(b) Effect of Nitrogenous Dressing, averaging for variety, Phosphate and Chloride.

Average Yield.	No Nitrogen.	Sulphate of Ammonia.	Nitrate of Soda.	Mean.	Standard Error.
Roots, tons per acre ..	6.94	7.63	7.72	7.43	0.068
Roots, per cent. ..	93.4	102.6	103.9	100.0	0.91
Tops, tons per acre ..	4.57	5.67	5.99	5.41	0.040
Tops, per cent. ..	84.4	104.8	110.8	100.0	0.75
Sugar percentage in Roots	18.60	18.28	18.22	18.36	0.026

Significant response to both Nitrogenous dressings in the case of roots and tops. The plots treated with Nitrate of Soda gave a significantly higher yield of tops. The application of a Nitrogenous dressing depressed the sugar percentage in the roots significantly, but this was more than offset by the increased yield. The net increases in sugar per acre were 7.6 per cent. for Sulphate of Ammonia plots and 8.5 per cent. for Nitrate of Soda plots.

(c) Effect of Chloride and Phosphatic Dressings, averaging for Variety and Nitrogen.

Average Yield.—Roots, tons per acre.

	Without Phosphate.		With Phosphate.		Standard Error.
	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	
Without Salt	6.93	7.41	7.62	7.36	0.111
With Salt	7.55	7.24	7.54	7.81	

https://doi.org/10.23637/ERADOC-1-111

Average Yield.—Tops, tons per acre.

	Without Phosphate.		With Phosphate.		Standard Error.
	Without Mur./Pot.	With Mur./Pot.	Without Mur./Pot.	With Mur./Pot.	
Without Salt	5.01	5.42	5.25	5.28	0.066
With Salt	5.53	5.50	5.59	5.69	

The increases due to Muriate of Potash and Salt applied separately were 6.4 per cent. and 8.3 per cent. respectively in roots, with a standard error of 2.11; for tops 7.6 per cent. and 9.6 respectively, with a standard error of 1.73. For superphosphate alone the increase was 9.3 per cent. in roots, with a standard error of 3.76, this last being based on only 5 degrees of freedom. This increase should not be regarded as significant. There was no significant response to superphosphate in tops. No further increase was obtained when the Salts were applied in pairs, but the best yield of all resulted from an application of all three together.

(d) **Effect of Phosphatic Dressing in Relation to Variety; averaging for Nitrogen and Chloride.**

Average Yield.—Roots.

	Tons per acre.		Standard Error.	Per cent.		Standard Error.
	Kuhn.	Klein Wanzleben		Kuhn.	Klein Wanzleben	
Without Phosphate ..	7.55	7.02	0.078	101.6	94.4	1.05
With Phosphate ..	8.05	7.11		108.3	95.7	
Mean	7.80	7.06	0.283	105.0	95.0	3.81

Average Yield.—Tops.

	Tons per acre.		Standard Error.	Per cent.		Standard Error.
	Kuhn.	Klein Wanzleben		Kuhn.	Klein Wanzleben	
Without Phosphate ..	5.53	5.19	0.047	99.8	93.6	0.84
With Phosphate ..	5.74	5.16		103.6	93.0	
Mean	5.64	5.18	0.162	104.3	95.7	2.99

Of the varieties, only the Kuhn responded significantly to the dressing of Superphosphate, Klein Wanzleben showing on the average no significant response.

In addition to the simpler results already described, certain other significant results appeared. A significant depression followed an application of Muriate of Potash in the absence of a nitrogenous dressing, but only on the plots of Kuhn treated with Superphosphate. The crop, however, responded significantly to Muriate of Potash in the presence of the nitrogenous dressings and Superphosphate (*a*) on the plots of Kuhn treated with Sulphate of Ammonia, and (*b*) on the plots of Klein Wanzleben treated with Nitrate of Soda. Again, on the plots without a Nitrogenous dressing the beneficial effect of Salt appeared on Kuhn without Superphosphate, and on Klein Wanzleben with Superphosphate. No response to Salt occurred on the plots receiving Sulphate of Ammonia, but on those receiving Nitrate of Soda the yield of Klein Wanzleben was improved significantly by Salt in the absence of Superphosphate but depressed in presence of Superphosphate.

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REPLICATED EXPERIMENTS AT WOBURN:
MALTING BARLEY.

Nitrogenous Fertilisers: Sulphate and Muriate of Ammonia.
Potassic Fertiliser: Sulphate of Potash.
Superphosphate.

Butt Furlong, 1929.

S

B				D			
M K	M K P	K	S K P	M K P	K P	K	M K
P	M	S	S K	S K	S	S P	S K P
O	S P	K P	M P	M	O	M P	P
S K P	S	M	M K P	M K P	K P	K	S
S P	K P	K	O	M K	S K	O	M
P	M P	M K	S K	M P	S P	S K P	P
A				C			

SYSTEM OF REPLICATION : 4 randomised blocks of 12 plots each.

AREA OF EACH PLOT : 1/60th acre.

O = No Manure.

Sulphate (S) or Muriate (M) of Ammonia at the rate of 0.2 cwt. of Nitrogen per acre ; Sulphate of Potash (K) at the rate of 0.6 cwt. K_2O per acre, and Superphosphate (P) at the rate of 0.4 cwt. Phosphoric acid per acre, in all combinations.

Manures applied : March 22.

Barley sown : March 21. Harvested : Aug. 1-3.

VARIETY : Plumage Archer (3 bushels per acre).

Previous Crop : Sugar Beet.

Actual Weights in lb.—Total Grain.

Blocks.	O	P	K	K+P	S	S+P	S+K	S+K+P	M	M+P	M+K	M+K+P
A	47.75	52.75	53.00	55.50	60.50	54.50	56.50	52.00	60.75	64.50	64.75	54.50
B	52.50	51.00	68.00	66.75	63.25	54.25	60.00	60.50	59.50	59.50	63.50	67.25
C	35.75	40.00	43.00	41.75	34.50	43.75	47.25	44.50	37.25	50.00	47.25	51.00
D	52.50	35.75	62.00	62.75	59.50	59.00	62.50	43.00	54.25	53.25	58.75	62.00

Actual Weights in lb.—Total Straw.

Blocks.	O	P	K	K+P	S	S+P	S+K	S+K+P	M	M+P	M+K	M+K+P
A	59.50	67.00	65.75	75.25	81.00	82.00	72.25	81.50	79.75	82.25	85.00	68.25
B	80.00	71.75	89.00	89.75	89.50	91.75	84.25	84.50	86.00	74.25	87.00	86.75
C	51.25	50.25	54.50	53.75	47.25	60.75	67.00	62.75	54.75	70.25	63.75	64.25
D	68.50	45.75	93.50	72.50	78.50	74.25	81.00	56.50	71.25	71.00	76.25	103.25

https://doi.org/10.23637/ERADOC-1-111

(a) **Summary of Results.—Separate Treatments.**

Average Yield per acre.	No P or K	P	K	P+K	Sulph. Amm.	S+P	S+K	S+ P+K	Mur. Amm.	M+P	M+K	M+ P+K
Grain (cwt.) ..	25.2	24.0	30.3	30.4	29.2	28.3	30.3	26.8	28.4	30.4	31.4	31.4
Straw (cwt.) ..	34.7	31.4	40.5	39.0	39.7	41.4	40.8	38.2	39.1	39.9	41.8	43.2

(b) **Summary of Significant Results.—Averaging for Phosphate.**

	Grain—cwt. per acre.			Grain—per cent.		
	No Nitrogen.	S/Amm.	M/Amm.	No Nitrogen.	S/Amm.	M/Amm.
No Potash ..	24.6	28.7	29.4	85.4	99.7	101.9
Sulphate of Potash	30.3	28.5	31.4	105.1	99.0	108.9

Mean—28.8 cwt. Standard Error—0.98 cwt. or 3.39 per cent.

	Straw—cwt. per acre.			Straw—per cent.		
	No Nitrogen.	S/Amm.	M/Amm.	No Nitrogen.	S/Amm.	M/Amm.
No Potash	33.1	40.5	39.5	84.5	103.5	100.9
Sulphate of Potash ..	39.8	39.5	42.5	101.6	100.9	108.6

Mean—39.1 cwt. Standard Error—1.70 cwt. or 4.33 per cent.

Significant responses to Nitrogenous and Potassic fertilisers, but no response to Phosphate. The interaction of Nitrogen and Potash was significant in the case of grain and suggestive with straw—in the absence of one fertiliser the other increased the yield significantly, but in the presence of one, no further effect was produced by adding the other. The grain appears to respond better to Muriate than to Sulphate, but the difference falls short of significance.

https://doi.org/10.23637/ERADOC-1-111

POTATOES.

Nitrogenous Fertiliser : Sulphate of Ammonia.
Potassic Fertilisers : Sulphate and Muriate of Potash and Potash Manure Salts (30%.)

Each in single and double dressings.

Superphosphate.

Butt Close, 1929.

	G			N D			A		
	3 —	— 9P	— 4S	7S —	— 5S	— 1	— 3	— 1	4M —
	— 1	— 2	8S —	2 —	3 —	8P —	— 7P	5P —	— 2
	— 6P	5M —	— 7M	9M —	— 6M	4P —	— 9S	6S —	8M —
	4P —	— 8P	5S —	8M —	— 3	— 7P	3 —	8S —	— 4S
H	6M —	— 7S	3 —	1 —	5P —	— 2	9P —	— 5M	2 — B
	1 —	— 9M	— 2	— 9S	— 6S	4M —	— 6P	7M —	1 —
	8M —	— 5P	9S —	— 1	9P —	— 8S	4P —	— 9M	— 3
	4M —	— 2	1 —	— 4S	— 7M	— 2	— 7S	— 5S	— 8P
	6S —	— 7P	— 3	5M —	— 6P	3 —	— 6M	— 1	— 2
	I			F			C		

SYSTEM OF REPLICATION : 9 randomised blocks of 9 plots each. Each plot divided into 2 sub-plots.

AREA OF EACH SUB-PLOT : 1/80th acre.

TREATMENTS : Sulphate of Ammonia at the rate of 0, 0.3 and .6 cwt. Nitrogen per acre, and Potash at the rate of 0, 0.5 and 1.0 cwt. K_2O per acre, in all combinations as shown in Key to Treatments.

S = Sulphate of Potash.

M = Muriate of Potash.

P = Potash Manure Salts (30%).

Superphosphate at the rate of .4 cwt. P_2O_5 per acre is applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half. All plots received 2 tons Lime per acre, applied in January, and 12 tons Bedford Corporation Manure per acre applied April 20-21. Artificials applied : April 29-30.

Potatoes planted May 1-6. Lifted : September 14-18.

VARIETY : Ally. Blocks C, F, I, once grown.

Previous Crop : Barley.

Key to Treatments.

Treatment No.	1	2	3	4	5	6	7	8	9
S/Ammonia	0	1	2	0	1	2	0	1	2
Potash ..	0	0	0	1	1	1	2	2	2

Actual Weights in lb.—Sub-Plots with Phosphate.

S/Amm.	Potash	A	B	C	D	E	F	G	H	I
Quantities										
0	0	165.25	120.75	67.00	154.50	132.50	115.50	164.50	156.50	120.50
0	1	176.75	130.50	94.50	148.00	141.00	118.50	211.75	130.50	122.25
0	2	182.00	161.50	85.75	181.75	162.50	99.00	162.75	184.25	111.00
1	0	198.00	146.50	90.50	187.00	130.00	96.75	176.00	152.00	79.00
1	1	223.50	165.00	96.00	182.00	132.00	103.00	164.00	157.50	117.50
1	2	157.50	130.50	89.00	163.75	161.00	89.00	164.25	162.50	97.75
2	0	201.25	133.00	99.50	190.50	134.50	75.50	149.75	159.00	104.75
2	1	183.00	150.00	79.00	147.00	127.50	85.00	166.00	146.00	115.00
2	2	160.50	174.75	120.00	198.00	160.25	93.50	205.00	98.00	141.25

https://doi.org/10.23637/ERADOC-1-111

Actual Weights in lb.—Sub-Plots without Phosphate.

S/Amm.	Potash	A	B	C	D	E	F	G	H	I
Quantities										
0	0	160.75	121.00	53.00	148.00	136.50	129.50	141.75	107.00	96.00
0	1	136.00	119.00	98.50	123.00	118.00	123.00	186.25	155.50	118.00
0	2	198.50	154.50	99.00	171.75	114.00	114.25	160.00	154.50	90.00
1	0	162.25	152.00	74.00	191.25	128.50	91.50	185.50	179.25	104.50
1	1	206.75	158.50	114.00	167.50	162.50	97.50	184.00	159.50	114.75
1	2	155.00	148.00	94.00	192.00	145.00	68.00	207.00	169.00	103.00
2	0	163.50	150.50	80.00	200.00	122.50	99.00	131.25	195.25	106.00
2	1	154.00	169.00	88.00	182.00	127.50	91.00	170.25	156.50	118.50
2	2	208.00	174.75	130.00	183.50	206.00	95.00	197.50	172.00	142.00

Summary of Average Yields, Separate Treatments.

Tons per acre.		Without Superphosphate.			With Superphosphate.		
		No S/Amm.	Single S/Amm.	Double S/Amm.	No S/Amm.	Single S/Amm.	Double S/Amm.
No Potash		4.34	5.03	4.95	4.75	4.98	4.95
Single Potash	Sulphate	5.10	5.25	4.76	5.49	5.18	5.07
	Muriate	4.43	5.24	5.08	5.24	5.14	4.43
	Potash Salts	4.49	5.76	5.12	4.44	5.63	4.77
Double Potash	Sulphate	5.06	5.04	6.62	5.38	4.57	5.50
	Muriate	5.10	4.80	5.78	5.04	4.96	4.95
	Potash Salts	4.79	5.42	5.56	5.42	4.94	5.63

Summary of Significant Results.

	Average Yield in tons per acre.						Standard Error.
	Without Superphosphate.			With Superphosphate.			
	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	
No Potash	4.34	5.03	4.95	4.75	4.98	4.95	
Single Potash	4.67	5.42	4.99	5.05	5.32	4.76	0.181
Double Potash.. ..	4.99	5.08	5.99	5.28	4.82	5.36	

https://doi.org/10.23637/ERADOC-1-111

Potatoes : Butt Close, 1929 (contd.)

	Average Yield per cent.						
	Without Superphosphate.			With Superphosphate.			Standard Error.
	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm	No Sulph. Amm.	Single Sulph. Amm.	Double Sulph. Amm.	
No Potash	86.1	99.9	98.2	94.2	98.9	98.2	
Single Potash	92.7	107.5	98.9	100.3	105.5	94.3	3.60
Double Potash ..	98.9	100.8	118.8	104.7	95.7	106.4	

General Mean—5.04 tons.

Significant response on the average of all Nitrogenous and Superphosphate comparisons to both dressings of Potash. Evidence of response to Sulphate of Ammonia, which, however, was masked by lower plant numbers. No qualitative differences in the kind of Potash supplied. No response to Superphosphate, an apparent benefit in the case of the plots without Nitrogen being offset by a depression on those plots receiving high dressings of Sulphate of Ammonia and of Potash.

POTATOES : Effect of Potash.

Butt Close, 1929.

S

K	S	O
O	K	S
S	O	K

SYSTEM OF REPLICATION : Latin Square.
AREA OF EACH PLOT : 1/40th acre.
TREATMENTS : Testing Potash Mineral (K) and an equivalent dressing of Sulphate of Potash (S) at the rate of 0.5 cwt. of K_2O per acre. Basal Dressing, 12 tons of Bedford Corporation Manure per acre, applied April 19-21.
Artificials applied : April 29-30.
VARIETY : Majestic.
Potatoes planted : May 1-5. Lifted : September 14-18.
Previous Crop : Barley.

Actual Yield in lb.

Row.	O	S	K
I.	276.50	239.00	236.00
II.	223.50	235.00	203.75
III.	188.75	174.00	216.25

Summary of Results.

	No Potash.	Sulphate of Potash.	Potash Mineral.	Mean.	Standard Error.
Tons per acre ..	4.10	3.86	3.90	3.95	0.076
Per cent.	103.7	97.6	98.8	100.0	1.93

No response to either dressing of Potash on very low yield.

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SUGAR BEET.

Effect of Nitrogenous Fertilisers:

Sulphate of Ammonia, with seed.
Nitrate of Soda (*a*) with seed.
(*b*) as top dressing.

Lansome, 1929.

N.W.

A				B				C			
Ns+Nt	S+Ns +Nt	O	S+Nt	O	S+Ns +Nt	Ns+Nt	Nt	Ns	Ns+Nt	S	S+Ns
S	Nt	Ns	S+Ns	S+Ns	S+Nt	Ns	S	S+Nt	O	Nt	S+Ns +Nt
S+Ns +Nt	Ns	S+Nt	Ns+Nt	Nt	S	S+Ns +Nt	Ns	S	Ns+Nt	O	Ns
Nt	S+Ns	S	O	S+Nt	Ns+Nt	S+Ns	O	S+Nt	S+Ns	Nt	S+Ns +Nt
D				E				F			

System of Replication : 48 plots in 6 randomised blocks.
Area of Each Plot : 1/40th acre.
Treatments :
S=Sulphate of Ammonia with seed
Ns=Nitrate of Soda with seed
Nt=Nitrate of Soda as top dressing
} in all combinations.
Rate : 0.4 cwt. Nitrogen per acre in all cases.
Basal Manure : Bedford Corporation Manure (10 tons per acre).
Applied : February 3—March 10. Artificials Applied : Basal, May 21-22. Top Dressing : July 10.
Variety : " Klein Wanzleben."
Beet sown : May 23 (16 lb. per acre). Lifted : October. 24-26.
Previous Crop : Clover and Grasses.

Actual Yield in lb.—Roots.

Block.	O	S	Ns	Nt	S+Ns	S+Nt	Ns+Nt	S+Ns +Nt
A	359.0	140.0	377.0	251.0	492.5	477.5	176.5	340.0
B	433.0	448.0	461.0	301.5	530.0	469.5	410.5	460.5
C	470.0	456.5	322.5	522.5	343.0	530.0	354.0	448.5
D	560.5	512.0	444.5	364.5	527.5	513.5	516.5	241.0
E	501.0	565.0	562.0	535.5	620.0	554.0	550.5	602.0
F	491.5	468.0	413.5	517.5	570.5	503.5	510.5	478.5

Actual Yield in lb.—Tops.

Block.	O	S	Ns	Nt	S+Ns	S+Nt	Ns+Nt	S+Ns +Nt
A	389	220	218	345	530	460	237	502
B	405	463	451	190	562	557	410	502
C	307	416	318	398	231	572	483	406
D	455	504	392	341	480	485	507	255
E	535	504	555	511	513	481	542	548
F	476	419	448	524	465	540	578	526

https://doi.org/10.23637/ERADOC-1-111

Sugar Beet : Lansome, 1929 (contd.)

Summary of Results.

ROOTS.	Average Yield—tons per acre.				Average Yield—per cent.			
	Without S/Amm.		With S/Amm.		Without S/Amm.		With S/Amm.	
	Without N/Soda with seed.	With N/Soda with seed.	Without N/Soda with seed.	With N/Soda with seed.	Without N/Soda with seed.	With N/Soda with seed.	Without N/Soda with seed.	With N/Soda with seed.
Without Top Dressing ..	8.38	7.68	7.71	9.18	103.8	95.1	95.5	113.7
With Top Dressing ..	7.42	7.50	9.07	7.65	91.9	92.9	112.4	94.8

Mean—8.07 tons. Standard Error—0.592 tons or 7.34 per cent.

TOPS.	Average Yield —tons per acre.				Average Yield—per cent.			
	Without S/Amm.		With S/Amm.		Without S/Amm.		With S/Amm.	
	Without N/Soda with seed.	With N/Soda with seed.	Without N/Soda with seed.	With N/Soda with seed.	Without N/Soda with seed.	With N/Soda with seed.	Without N/Soda with seed.	With N/Soda with seed.
Without Top Dressing ..	7.64	7.09	7.52	8.28	97.1	90.1	95.5	105.2
With Top Dressing ..	6.87	8.21	9.21	8.15	87.3	104.3	117.0	103.6

Mean=7.87 tons. Standard Error=0.676 tons or 8.58 per cent.

Sugar Percentage.

	Average Sugar Percentage.			
	Without Sulphate of Ammonia.		With Sulphate of Ammonia.	
	Without N/Soda with seed.	With N/Soda with seed.	Without N/Soda with seed.	With N/Soda with seed.
Without Top Dressing	16.91	16.42	16.68	16.63
With Top Dressing ..	15.98	16.30	16.33	16.00

Mean—16.41. Standard Error—0.261 or 1.59 per cent.

There is evidence of a response to Sulphate of Ammonia on those plots which were also treated with Nitrate of Soda, either with the seed or as a top dressing, but on the plots which had all three dressings there was no response. Application of top dressing of Nitrate of Soda has depressed the sugar percentage significantly, while the Nitrogenous dressings applied at time of sowing had no effect.

https://doi.org/10.23637/ERADOC-1-111

SUGAR BEET.

Potassic Fertilisers : Muriate of Potash, Potash Manure Salts, Potash Mineral.

Phosphatic Fertilisers : Slag, Superphosphate.

Lansome, 1929.

A				B				C			
Sl K	S M	S O	O O	Sl O	S O	O P	Sl P	S M	O O	O M	S P
Sl P	S P	O M	Sl M	O O	S M	S K	S P	O K	Sl O	Sl P	Sl K
Sl O	O K	S K	O P	Sl M	Sl K	O M	O K	S K	S O	O P	Sl M

Upper letters refer to dressings of Phosphate.
Lower letters refer to dressings of Potash.

SYSTEM OF REPLICATION : 36 plots in 3 randomised blocks.
AREA OF EACH PLOT : 1/40th acre.
TREATMENTS : (*a*) No Potash (O) and Potash in the form of Muriate of Potash (M), Potash Manure Salts (P), and Potash Mineral (K). (Rate 0.8 cwt. K_2O per acre). (*b*) No Phosphate (O), and Phosphate in the form of Slag (Sl), and Superphosphate (S). (Rate 0.6 cwt. P_2O_5 per acre.) (*a*) and (*b*) in all combinations.
Basal Manure : Bedford Corporation Manure, 10 tons per acre, February 3–March 10.
Artificials applied : May 21-22.
Beet sown : May 23 (16 lb. per acre).
Singled : June 20-24.
Lifted : October 23-24.
Previous Crop : Clover and Grasses.

Actual yield in lb.—Roots.

Blocks.	No Potash.			Muriate of Potash.			Potash Manure Salts.			Potash Mineral.		
	No Phosphate.	Slag.	Super.	No Phosphate.	Slag.	Super.	No Phosphate.	Slag.	Super.	No Phosphate.	Slag.	Super.
A	490.5	422.5	490.0	469.5	467.5	455.5	527.0	453.5	506.5	439.0	474.5	497.0
B	432.0	476.5	432.5	482.0	523.0	402.5	480.0	495.0	428.5	506.0	460.0	418.5
C	462.5	438.5	519.0	492.0	473.5	414.5	517.5	409.5	458.5	371.5	343.5	468.5

Actual yield in lb.—Tops.

Blocks.	No Potash.			Muriate of Potash.			Potash Manure Salts.			Potash Mineral.		
	No Phosphate.	Slag.	Super.	No Phosphate.	Slag.	Super.	No Phosphate.	Slag.	Super.	No Phosphate.	Slag.	Super.
A	450	483	409	462	496	452	493	524	500	403	436	495
B	418	356	455	412	441	390	529	441	693	391	342	428
C	458	431	452	420	178	175	378	539	175	376	233	420

Summary of Results.—Roots.

	Average Yield in tons per acre.				Average Yield per cent.			
	No Potash.	Muriate of Potash.	Potash Manure Salts.	Potash Mineral.	No Potash.	Muriate of Potash.	Potash Manure Salts.	Potash Mineral.
No Phosphate ..	8.24	8.59	9.07	7.84	100.1	104.4	110.2	95.2
Slag	7.96	8.71	8.08	7.61	96.7	105.8	98.2	92.4
Superphosphate	8.58	7.57	8.29	8.24	104.2	92.0	100.7	100.1

Mean—8.23 tons. Standard Error—0.422 tons or 5.13 per cent.

https://doi.org/10.23637/ERADOC-1-111

Sugar Beet: Lansome, 1929 (contd.)

Tops.

	Average Yield in tons per acre.				Average Yield per cent.			
	No Potash.	Muriate of Potash.	Potash Manure Salts.	Potash Mineral.	No Potash.	Muriate of Potash.	Potash Manure Salts.	Potash Mineral.
No Phosphate ..	7.89	7.70	8.33	6.96	105.1	102.6	111.0	92.8
Slag	7.56	6.64	8.95	6.02	100.7	88.4	119.3	80.2
Superphosphate	7.83	6.05	8.14	7.99	104.3	80.6	108.5	106.5

Mean—7.51 tons. Standard Error—0.996 tons or 13.27 per cent.

Sugar Percentage.

	No Potash.	Muriate of Potash.	Potash Manure Salts	Potash Mineral.	Mean.
No Phosphate ..	17.88	17.72	17.66	17.74	17.75
Slag	17.50	17.53	17.84	17.42	17.57
Superphosphate ..	17.89	18.28	17.92	17.57	17.91

Mean—17.74 Standard Error—0.251 or 1.41 per cent.

There has been no response whatever to the Phosphatic dressing, while the effect of Potash was insignificant, there being only a slight indication of a depression due to Potash Mineral in the case of roots and tops, and also a depression due to Muriate of Potash with tops only. The plots treated with Superphosphate have given a significantly higher sugar percentage than those treated with Slag. No significant differences in sugar percentage due to the Potassic treatments.

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REPLICATED EXPERIMENTS AT OUTSIDE CENTRES.

Grassland. New Hay. Effect of Basic Slag.

(Basic Slag Committee.)

Mr. B. W. H. Pratt, Brooke, Norfolk, 1929.

S

I.	L	H	C	M
II.	H	C	M	L
III.	C	M	L	H
IV.	M	L	H	C

Seed sown : 1925.
SYSTEM OF REPLICATION : Latin Square.
AREA OF EACH PLOT : ¼ acre.
Soil : Calcareous boulder clay.
TREATMENTS :
C = Control.
L = Low soluble slag (37.3%).
M = Medium soluble slag (60.9%).
H = High soluble slag (86.8%).
Slags applied at the rate of 100 lb. P_2O_5 per acre in March, 1926.
All plots received 1 cwt. Sulphate of Ammonia and 2 cwt. 20% Potash Manure Salts.

Actual Weights in lb.

Row.	C	L	M	H
I.	273	355	464	386
II.	283	387	348	392
III.	318	344	333	395
IV.	344	330	378	385

Summary of Results.

Average Yield.	Control.	Low Soluble.	Medium Soluble.	High Soluble.	Mean.	Standard Error.
Cwt. per acre.. ..	10.9	12.6	13.6	13.9	12.8	0.45
Per cent.	85.2	99.1	106.6	109.0	100.0	3.52

Significant response to all grades of Slag. The average yield of the plots treated with medium and high soluble Slags is significantly greater than the average of the low soluble plots.

https://doi.org/10.23637/ERADOC-1-111

Grassland. Old Hay. Effect of Basic Slag.

(Basic Slag Committee).

Mr. E. Habberfield, Home Farm, Enmore, Somerset, 1929.

I.	L	C	H	M
II.	H	M	L	C
III.	M	H	C	L
IV.	C	L	M	H

System of Replication : Latin Square.
Area of Each Plot : ¼ acre.
Soil : Red clay loam on sandstone.
Treatments :
C = Control.
L = Low soluble slag (37.3%).
M = Medium soluble slag (60.9%).
H = High soluble slag (86.8%).
All plots received 1 cwt. Sulphate of Ammonia and 2 cwt. 20% Potash Manure Salts.
Slags applied at the rate of 100 lb. P_2O_5 per acre in March, 1926.

Actual Weights in lb.

Row.	C	L	M	H
I.	602	537	817	787
II.	618	707	629	395
III.	622	610	520	661
IV.	394	670	662	631

Summary of Results.

Average Yield.	Control.	Low Soluble.	Medium Soluble.	High Soluble.	Mean.	Standard Error.
Cwt. per acre.. ..	20.0	22.5	23.5	22.1	22.0	0.99
Per cent.	90.7	102.4	106.6	100.3	100.0	4.51

The response to the treatment is not significant, but there is evidence that the yield of hay was better on the plots treated with Slag in 1926 than on the plots not so treated. All the Slags seem to give equivalent results.

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Potatoes. Effect of Superphosphate

G. Major, Esq., Newton Farm, Lincs., 1929

	A	B	B	A	B	A	A	B
I.	5	5	0	0	2½	2½	10	10
II.	10	10	2½	2½	0	0	5	5
III.	2½	2½	10	10	5	5	0	0
IV.	0	0	5	5	10	10	2½	2½

VARIETIES : British Queen (A) and King Edward (B) in random strips.

SYSTEM OF REPLICATION : Latin Square.

AREA OF EACH SUB-PLOT : 1/50th acre.

TREATMENT : Superphosphate at the rate of 0, 2½, 5 and 10 cwt. per acre. Basal Manuring : 4 cwt. Sulphate of Ammonia and 4 cwt. Sulphate of Potash per acre.

Potatoes set : April 11.

Lifted : October 15-16.

Actual Weights in lb.

Row.	British Queen.				King Edward.			
	0	2½	5	10	0	2½	5	10
I.	509	512	498	563	560	613	614	623
II.	457	524	564	503	582	584	663	640
III.	497	503	538	592	568	569	577	601
IV.	461	553	541	553	548	614	599	624

Summary of Results.

(a) **Separate Varieties.**

Average Yield in tons per acre.	No Superphosphate.	2½ cwt. Superphosphate.	5 cwt. Superphosphate.	10 cwt. Superphosphate.
British Queen ..	10.74	11.67	11.95	12.34
King Edward ..	12.60	13.28	13.69	13.88

(b) **Varietal Difference.**

Average Yield.	British Queen.	King Edward.	Mean.	Standard Error.
Tons per acre ..	11.67	13.36	12.52	0.189
Per cent.	93.3	106.7	100.0	1.51

(c) **Effect of Superphosphate.**

Average Yield.	No Super.	2½ cwt. Super.	5 cwt. Super.	10 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	11.67	12.48	12.82	13.11	12.52	0.147
Per cent.	93.2	99.7	102.4	104.7	100.0	1.17

King Edwards yielded significantly better than British Queen in both yield and size (as observation in field showed). Significant response to Superphosphate with both varieties, but no differential response.

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Sugar Beet: Effect of Nitrogenous Fertilisers.

Col. F. Wilson, Stanway Hall Farm, Colchester, 1929.

I.	A	C	D	B
II.	C	A	B	D
III.	D	B	A	C
IV.	B	D	C	A

Soil : Light sandy loam.
VARIETY : Kuhn P.
SYSTEM OF REPLICATION : Latin Square.
AREA OF EACH PLOT : 1/50th acre.
TREATMENT : 0.4 cwt. of N per acre in the forms Sulphate of Ammonia, Nitrate of Soda with seed and as a top dressing.
Basal Dressing : Dung, Superphosphate at the rate of 0.4 cwt. P_2O_5 per acre and Muriate of Potash at the rate of 0.8 cwt. K_2O per acre.
Artificials applied : Basal, March 10. Top Dressing, June 13.
Beet sown : April 22. Lifted : December 9.

Actual Yields in lb.

Row.	Roots.				Tops.			
	A O	B S/Amm.	C N/Soda (seed).	D N/Soda (T.D.)	A O	B S/Amm.	C N/Soda (seed).	D N/Soda (T.D.)
I.	296.0	312.5	361.0	326.5	229	207	284	313
II.	317.0	369.0	389.0	390.5	229	306	304	313
III.	298.5	370.5	384.5	385.0	242	280	299	333
IV.	346.5	377.0	362.5	382.0	224	277	333	327

Summary of Results.

Average Yield.	No Nitrogen.	Sulphate of Ammonia.	Nitrate of Soda (seed).	Nitrate of Soda (T.D.)	Mean.	Standard Error.
Roots, tons per acre.. ..	7.02	7.97	8.35	8.28	7.91	0.213
Roots, per cent.	88.8	100.8	105.6	104.7	100.0	2.69
Roots, sugar percentage ..	18.03	17.86	17.78	17.81	17.87	0.078
Tops, tons per acre	5.16	5.97	6.81	7.18	6.28	0.167
Tops, per cent.	82.1	95.1	108.4	114.3	100.0	2.66

Significant response to all forms of Nitrogenous dressing. Nitrate of Soda significantly better than Sulphate of Ammonia in the case of tops—with roots the difference, while moderately large, is not significant. The difference between the application of Nitrate of Soda with seed, and as a top dressing, is not significant. The Nitrogenous dressings appear to have depressed slightly the percentage of sugar in the roots.

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Sugar Beet: Effect of Chloride Dressings

Col. F. Wilson, Stanway Hall Farm, Colchester, 1929

I.	A	B	C	D
II.	D	C	B	A
III.	C	D	A	B
IV.	B	A	D	C

Soil: Light sandy loam.

VARIETY: Kuhn P.

SYSTEM OF REPLICATION: Latin Square.

AREA OF EACH PLOT: 1/50th acre.

TREATMENTS: Muriate of Potash at the rate of 0.8 cwt. K_2O per acre, Potash Manure Salts (20%) equivalent in Potash to KCl, and Salt equivalent in Chloride to Potash Manure Salts.

Basal Dressing: Superphosphate at the rate of 0.4 cwt. P_2O_5 per acre and Sulphate of Ammonia at the rate of 0.4 cwt. N pe acre.

Artificials applied: March 10.

Beet sown: April 22. Lifted: December 6.

Actual Yields in lb.

Row.	A O	B M/Pot.	C P.M.S.	D Salt.
I.	288.0	285.5	337.0	279.5
II.	233.0	302.0	326.0	311.0
III.	294.0	305.5	364.0	347.5
IV.	246.0	270.5	338.5	293.5

Summary of Results.

Average Yield.	No Potash or Salt	Muriate of Potash.	Potash Manure Salts.	Salt.	Mean.	Standard Error.
Roots, tons per acre..	5.92	6.49	7.62	6.87	6.73	0.256
Roots, per cent.	88.0	96.5	113.3	102.2	100.0	3.80
Roots, sugar percentage	17.64	17.63	18.00	17.84	17.78	0.161
Ratio from 4 plots—100 × roots/tops	83	92	124	87	—	—

Significant response to all manurial treatments. The dressing of Potash Salts gave significantly higher yield than either Muriate or Salt. There was some evidence to show that Potash Salts raised the percentage of sugar in the roots, but the difference was not significant.

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Barley: Effect of Sulphate of Ammonia, Sulphate of Potash and Superphosphate.

(Yields determined by sampling method.)

H. G. Nevile, Esq., Wellingore, 1929.

A	NK	NPK	O	NP	N	PK	P	K
B	O	K	NPK	N	NP	P	NK	PK

VARIETY : Plumage Archer.
Soil : Light loam on Lincoln Heath.
SYSTEM OF REPLICATION : 2 randomised blocks of 8 plots each.
AREA OF EACH PLOT : 1/60th acre.
TREATMENTS : Sulphate of Ammonia (N) at the rate of 1 cwt. per acre, Superphosphate (P) at the rate of 3 cwt. per acre, and Sulphate of Potash (K) at the rate of 1½ cwt. per acre, in all combinations.
Manures applied : March 14.
Barley sown : March 12. Harvested : August 22-23.
The plots were harvested by the sampling method, 20 separate metres of drill being selected at random from each plot.

Actual Weights in grams per Sample.

Block.		O	K	N	P	KN	KP	NP	NKP
Grain	A ..	729	807	736	749	822	661	859	911
	B ..	796	873	848	716	852	723	966	1128
Straw	A ..	674	734	674	674	764	580	826	991
	B ..	655	740	785	659	841	620	862	972

Summary of Results.

Grain.	Cwt. per acre.				Per cent.			
	Without S/Pot.		With S/Pot.		Without S/Pot.		With S/Pot.	
	Without S/Amm.	With S/Amm.	Without S/Amm.	With S/Amm.	Without S/Amm.	With S/Amm.	Without S/Amm.	With S/Amm.
Without Super.	18.8	19.5	20.7	20.6	92.7	96.2	102.0	101.6
With Super. ..	18.0	22.4	17.0	25.1	88.9	110.8	84.0	123.8

Mean—20.2 cwt. Standard Error—0.89 cwt. or 4.38 per cent.

Significant response to the Nitrogenous dressing, which, however, only shows up on the plots having Superphosphate. Superphosphate depressed the yield on the plots without Nitrogenous fertiliser, but increased the yield significantly on the plots having a Nitrogenous dressing in addition. There was evidence of a small response in the aggregate to Potash, but the difference was not significant.

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Straw.	Cwt. per acre.				Per cent.			
	Without S/Pot.		With S/Pot.		Without S/Pot.		With S/Pot.	
	Without S/Amm.	With S/Amm.	Without S/Amm.	With S/Amm.	Without S/Amm.	With S/Amm.	Without S/Amm.	With S/Amm.
Without Super.	16.3	17.9	18.1	19.7	88.2	96.9	97.8	106.5
With Super. ..	16.4	20.7	14.7	24.1	88.5	112.0	79.6	130.3

Mean—18.5 cwt. Standard Error—0.59 cwt. or 3.20 per cent.

Significant responses to the Nitrogenous and Potassic fertilisers, the response to the latter only appearing on the plots dressed with Nitrogen. The interaction between the Nitrogenous and Phosphatic fertilisers was significant, alone and in the presence of Potash : without Potash the response to Phosphate occurred only on the plots treated with a Nitrogenous dressing, those without Nitrogen being unaffected : in the presence of Potash there was a significant depression due to the adding of Superphosphate to plots not treated with Nitrogenous fertiliser, but a significant response to Phosphate on the plots also receiving the Nitrogenous dressing.

Experiments at other centres, carried out by the local workers on the lines of those described on the preceding pages.

Potatoes. Mr. E. J. Roberts, College Farm, Aber, Caernarvonshire, 1929

Latin Square : Plots 1/40th acre. Potatoes set March 27, lifted October 10, 14, 15.
Basal Manuring : 12 tons Farmyard Manure (ploughed in), 2 cwt. Sulphate of Ammonia and 3 cwt. 30% Potash Salt in drills.
Variety : Kerr's Pink. Soil : Light gravelly loam.

Average Yield.	No Superphosphate.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre	14.66	14.25	14.53	14.66	14.52	0.177
Per cent. ..	100.9	98.1	100.1	100.9	100.0	1.22

No response to Superphosphate.

Potatoes. Mr. E. Arden, Owmby Cliff, Lincolnshire, 1929.

Latin Square : Plots 1/80th acre. Soil : Cliff Land (Oölitic Limestone).
Basal Manuring : 4 cwt. Sulphate of Ammonia and 3 cwt. Sulphate of Potash per acre.
Variety : King Edward. Potatoes set March 26, lifted September 18.

Average Yield.	No Superphosphate.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	7.42	7.44	7.34	7.30	7.37	0.153
Per cent. ..	100.6	100.8	99.5	99.0	100.0	2.07

No response to Superphosphate.

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Experiments at other Centres (cont.)

Potatoes. Mr. W. W. Ballardie, Midland Agricultural College, Loughborough, 1929.

Latin Square : Plots 1/48th acre. Soil : Light gravelly nature (Old Valley Gravel).
Basal Manuring : 2 cwt. Sulphate of Ammonia and 2 cwt. Sulphate of Potash per acre.
Variety : King Edward. Potatoes set April 28, lifted September 6-11.

Average Yield.	No Super-phosphate.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre	8.00	7.82	7.63	7.97	7.85	0.22
Per cent. ..	101.9	99.6	97.1	101.4	100.0	2.81

No response to Superphosphate on total yield.

Sugar Beet. County School, Welshpool, Montgomeryshire, 1929.

Randomised Blocks : Plots 1/160th acre. Soil : School garden.
Treatment : Nitrogen in the form of Sulphate and Muriate of Ammonia and Cyanamide, at the rate of 0.6 cwt. N per acre.
Basal Manuring : Potash at the rate of 1 cwt. K_2O per acre, and Superphosphate at the rate of 0.8 cwt. P_2O_5 per acre.
Variety : Garton's Warrington. Beet sown May 21, lifted November 5.

Average Yield.	No Nitrogen.	Cyana-mide.	Sulphate of Ammonia.	Muriate of Ammonia.	Mean.	Standard Error.
Roots, tons per acre	11.6	13.8	13.5	12.8	12.9	0.26
Roots, per cent. ..	89.7	106.9	104.2	99.1	100.0	1.98
Tops, tons per acre	16.5	19.2	21.1	20.3	19.3	0.93
Tops, per cent. ..	85.6	99.7	109.2	105.4	100.0	4.81
Sugar percentage in Roots	17.90	18.06	17.21	17.66	17.71	0.298

Significant response to all forms of Nitrogenous dressings in both roots and tops. With roots the response to Cyanamide and Sulphate is better than that to Muriate. No significant differences in sugar percentage.

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Sugar Beet. South-Eastern Agricultural College, Wye, Kent, 1929.

Latin Square : Plots 1/80th acre. (2 discarded). Soil : Loam on chalk.
Basic Dressing : 4 cwt. Superphosphate, 1 cwt. Steamed Bone Flour and 1 cwt. Muriate of Potash. Nitrogenous Manures—1 cwt. per acre Sulphate of Ammonia, and equivalent dressings of Muriate of Ammonia and Nitrate of Soda.
Variety : Kleinwanzleben E. Beet sown May 3rd, lifted October 16-19.

Average Yield.	No Nitrogen.	Sulphate of Ammonia.	Muriate of Ammonia.	Nitrate of Soda.	Mean.	Standard Error.
Roots, tons per acre (unwashed) ..	9.77	8.73	9.85	9.93	9.57	0.583
Roots, per cent. ..	102.1	91.2	102.9	103.8	100.0	6.09

No response to treatment.

Barley. Mr. J. M. Templeton, Farm Institute, Sparsholt, Winchester, 1929.

Latin Square : Plots 1/20th acre. Soil : Thin flinty loam on chalk.
Treatment : Salt at the rate of 100 lb. and 300 lb. per acre and Muriate of Potash at the rate of 1 cwt. per acre.
Variety : Plumage Archer. Barley sown April 5, harvested August 13.

Average Yield.	No Manure.	Salt 100 lb.	Salt 300 lb.	Muriate of Potash.	Mean.	Standard Error.
Grain, cwt. per acre ..	23.9	24.1	24.4	23.5	24.0	0.74
Grain, per cent. ..	99.7	100.4	101.9	98.0	100.0	3.08

No significant differences due to treatments.

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