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Report for 1927-28

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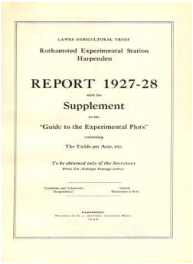
LAWES AGRICULTURAL TRUST
Rothamsted Experimental Station
Harpenden

REPORT 1927-28

Supplement

"Guide to the Experimental Plots"

The Yields per Acre, etc.

To be obtained only of the Secretary

Replicated Experiments

Rothamsted Research

Rothamsted Research (1928) *Replicated Experiments ;* Report For 1927-28, pp 131 - 175 **- DOI: https://doi.org/10.23637/ERADOC-1-85**

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Second Series: Replicated Experiments.

EXPERIMENTS ON CEREALS.

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

Effect of Superphosphate.

Great Harpenden, 1927.

NE

A				B			
2U P	2M P	2C	0(*b*)	0(*a*)	0(*b*) P	2S P	1S P
1M P	1C	2S	1S	1U	2C P	2U	2M
0(*a*) P	0(*d*) P	1U P	0(*c*)	1M	1C P	0(*c*) P	0(*d*)
2U	0(*a*)	0(*d*)	2(*c*) P	0(*a*) P	2C	2S	0(*d*) P
0(*b*) P	0(*c*) P	1S P	1M	1S	2U P	0(*b*)	1M P
1U	1C P	2S P	2M	2M P	1C	1U P	0(*c*)
C				D			

System of Replication.—4 randomised blocks of 12 plots each.

Area of plot $\frac{1}{40}$ acre.

O.—No Nitrogen.

U, C, S, M.—Nitrogen in form of Urea, Cyanamide, Sulphate and Muriate of Ammonia.

1, 2.—Single and double dressings at the rate of 1 and 2 cwts. per acre. S/Amm or its equivalent.

P.—Superphosphate at the rate of 3 cwts. per acre.

Manures applied March 28-29.

Barley sown April 4-6, harvested Sept. 6-7.

Actual Weights in lb.—Total Grain.

Blocks.	0(*a*)	0(*b*)	0(*c*)	0(*d*)	1U	1C	1S	1M	2U	2C	2S	2M
A	35.5	23.25	32.5	39.125	42.0	45.625	35.125	53.875	60.0	46.625	36.625	67.75
B	33.5	37.125	31.25	29.875	42.875	51.5	58.875	45.75	62.25	55.375	67.0	65.25
C	34.375	43.0	34.625	30.25	50.125	53.625	44.875	46.0	59.375	49.375	58.0	67.75
D	30.5	32.375	33.375	28.5	48.563	51.125	51.625	56.625	64.0	49.5	50.0	63.0

Actual Weights in lb.—Total Straw.

A	45.5	29.0	43.5	45.5	56.5	50.0	46.5	59.5	69.0	52.0	52.0	73.5
B	41.0	45.5	47.5	46.5	50.0	56.0	69.5	49.5	70.5	66.0	72.0	80.5
C	40.5	51.0	51.5	36.5	55.0	59.0	56.5	53.0	66.0	57.0	70.0	74.5
D	38.5	48.0	46.5	34.5	63.0	68.5	55.5	61.5	67.0	57.0	55.0	74.0

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Barley, 1927 (cont.)

(1) Summary of Average Yields, Separate Treatments.

Average Yield in cwts. per acre.		No Nitrogen.	Single Dressing.				Double Dressing.				Stand'rd Error.
			S/Amm.	M/Amm.	Cyan.	Urea.	S/Amm.	M/Amm.	Cyan.	Urea.	
Grain	without phosphate	11.1	15.5	16.4	17.3	16.6	15.5	23.8	17.2	21.7	1.21
	with phosphate	12.5	18.5	19.7	18.8	16.2	22.3	23.3	18.7	22.1	
Straw	without phosphate	14.8	18.2	18.3	21.2	18.8	19.1	27.7	19.5	24.4	1.50
	with phosphate	16.0	22.5	21.6	20.5	21.3	25.4	26.3	22.0	24.3	

NOTE.—The phosphate differences are increased in the case of the sulphate and cyanamide plots, and decreased in the case of the muriate and urea plots, by soil differences.

(2) Summary of Significant Results.

Average of all Nitrogenous Treatments.	Without Super.	With Super.	Mean.	Standard Error.
Grain, cwts. per acre ...	15.7	17.5	16.6	0.35
Grain, per cent. ...	94.7	105.3	100.0	2.10
Straw, cwts. per acre ...	18.9	20.7	19.8	0.43
Straw, per cent. ...	95.4	104.6	100.0	2.19

Average of plots with and without Super.		Grain, cwts. per acre.				Grain, per cent.			
		S/Amm.	M/Amm.	Cyan.	Urea.	S/Amm.	M/Amm.	Cyan.	Urea.
Quantity of Nitrogen	0	11.8				71.2			
	1	17.0	18.1	18.0	16.4	102.5	108.9	108.7	98.8
	2	18.9	23.5	17.9	21.9	113.9	142.0	108.1	132.2
		Straw, cwts. per acre.				Straw, per cent.			
Quantity of Nitrogen	0	15.4				77.9			
	1	20.4	20.0	20.8	20.0	103.9	98.2	103.2	102.3
	2	22.2	27.0	20.7	24.3	113.4	137.8	105.7	124.1

Standard Errors.—Grain 0.85 cwts. or 5.15 per cent.; Straw 1.06 cwts. or 5.37 per cent.

Significant response to Superphosphate in both Grain and Straw. Big response to single and double nitrogen. No differences between the equivalent nitrogenous manures appear in the single dressing, but the double dressing gives no further increase with Cyanamide and very little with sulphate.

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

Effect of Superphosphate.

Long Hoos, 1928.

W.N.W.

A															B							
1S	0 (a)	1U	0 (c)	0 (b)	1C	2C	2U	2M	1M	2S	0 (d)	1M	2S	2M	1S	0 (c)	2C	0 (a)	0 (b)	0 (d)	1U	1C	2U
P			P		P	P				P	P	P		P		P				P	P		P

C																D							
2M	0 (c)	0 (a)	2U	2C	1U	1C	0 (b)	0 (d)	1M	1S	2S	2U	0 (a)	1M	1S	1U	0 (c)	1C	2S	0 (b)	2C	2M	0 (d)
P	P		P		P			P	P						P		P	P	P		P		P

E																F							
2M	0 (a)	0 (b)	1U	0 (c)	2C	2U	1C	1M	1S	2S	0 (d)	2M	1S	2C	0 (c)	0 (d)	0 (a)	2S	2U	1C	0 (b)	1U	1M
				P	P		P		P	P	P		P	P	P	P		P		P			

G																H							
0	1M	2C	0	2M	1U	0	2S	2U	1S	0	1C	0	1C	2U	1U	0	2M	1S	0	2C	1M	0	2S
P	P		P	P	P			P				P		P	P	P	P				P		

SYSTEM OF REPLICATION.—8 Randomised Blocks of 12 plots each. Area of plot $\frac{1}{40}$ acre. 0=No Nitrogen ; U, C, S, M= Nitrogen in form of Urea, Cyanamide, Sulphate and Muriate of Ammonia ; 1, 2=Single and double dressings at the rate of 1 and 2 cwt. per acre, S/Amm. or its equivalent ; P=Superphosphate at the rate of 3 cwt. per acre. Variety : Spratt Archer. Manures applied March 28. Barley sown March 28, harvested August 24.

Actual Weights in lb.—Total Grain.

	Without Phosphate.		With Phosphate.									
Block.	0(a)	0(b)	0(c)	0(d)	1U	1C	1S	1M	2U	2C	2S	2M
A	47.5	43.5	47.0	32.75	53.25	49.0	64.5	44.25	58.25	58.5	45.75	46.25
B	29.5	32.5	28.0	32.75	41.25	41.25	36.25	37.5	38.0	47.5	35.0	43.0
C	36.75	38.25	53.5	42.25	48.75	43.0	53.5	56.75	37.0	45.5	57.25	54.0
D	42.0	44.0	43.25	40.75	56.0	48.25	53.75	49.5	56.5	52.75	56.0	49.5
E	44.75	45.75	49.25	36.75	57.5	57.75	56.25	54.5	63.75	66.5	55.75	65.5
F	35.5	40.0	40.5	41.0	43.0	46.5	45.25	45.5	45.25	51.5	45.5	54.5
G	40.0	35.0	44.0	36.25	50.0	42.75	45.0	51.25	53.0	47.0	46.5	53.75
H	39.25	40.75	37.25	41.25	42.75	46.0	43.5	48.0	49.75	51.0	46.0	53.5

Actual Weights in lb.—Total Straw.

	Without Phosphate.		With Phosphate.									
Block.	0(a)	0(b)	0(c)	0(d)	1U	1C	1S	1M	2U	2C	2S	2M
A	76.5	65.5	71.0	64.75	85.75	81.0	106.5	90.25	111.25	107.0	100.75	112.25
B	53.5	59.0	51.0	61.75	67.25	68.25	75.75	78.0	77.5	93.0	87.5	83.0
C	58.75	58.25	90.5	64.25	78.25	69.5	80.0	86.75	61.0	76.0	94.25	92.0
D	55.5	66.0	68.75	59.25	91.5	71.25	86.25	77.0	88.5	86.75	92.5	85.0
E	79.25	70.75	74.75	74.75	89.0	97.25	96.75	89.5	97.25	99.5	104.25	112.0
F	59.5	76.0	76.0	67.5	89.5	93.0	97.25	86.5	96.25	106.5	94.0	109.5
G	81.0	70.5	84.0	67.25	107.0	80.75	90.5	105.75	106.25	99.5	107.0	106.25
H	67.75	69.75	65.75	76.25	88.25	84.5	87.0	88.0	97.5	89.5	92.5	112.0

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Barley, 1928 (cont.)

(1) Summary of Average Yields, Separate Treatments.

Average Yield in cwt. per acre.		No Nitrogen	Single Dressing.				Double Dressing.				Mean.	Standard Error.
			S/Am.	M/Am.	Cyan.	Urea.	S/Am.	M/Am.	Cyan.	Urea.		
Grain	without phosphate	14.2	15.9	17.3	15.4	18.7	16.5	19.3	17.1	20.0	16.4	0.84
	with phosphate	14.4	19.6	17.3	18.0	16.3	18.1	18.2	20.5	15.9	16.8	
Straw	without phosphate	23.8	29.8	30.6	27.1	31.8	34.0	37.4	32.0	35.1	29.4	1.32
	with phosphate	24.9	34.5	32.0	30.6	30.4	35.0	35.1	35.7	30.6	30.3	

NOTE.—The phosphate differences are increased in the case of the sulphate and cyanamide plots, and decreased in the case of the muriate and urea plots, by soil differences.

(2) Summary of Significant Results.

Average of all Nitrogenous Treatments.	Without Super.	With Super.	Mean.	Standard Error.
Grain, cwts. per acre ...	16.4	16.8	16.6	0.24
Grain, per cent. ...	98.8	101.2	100.0	1.46
Straw, cwts. per acre ...	29.4	30.3	29.9	0.38
Straw, per cent. ...	98.5	101.5	100.0	1.28

Average of plots with and without Super.		Grain, cwts. per acre.				Grain, per cent.			
		S/Amm.	M/Amm.	Cyan.	Urea.	S/Amm.	M/Amm.	Cyan.	Urea.
Quantity of Nitrogen	0	14.3				86.1			
	1	17.8	17.3	16.7	17.5	107.0	104.1	100.7	105.5
	2	17.3	18.7	18.8	17.9	104.3	112.9	113.0	107.9
Mean ...		16.6				100.0			
Standard error		0.59				3.58			
		Straw, cwts. per acre.				Straw, per cent.			
Quantity of Nitrogen	0	24.4				81.7			
	1	32.1	31.3	28.8	31.1	107.6	104.9	96.5	104.1
	2	34.5	36.2	33.8	32.8	115.5	121.4	113.3	110.0
Mean ...		29.9				100.0			
Standard error		0.94				3.14			

Significant response in both grain and straw to the single dressing, and a further response to the double dressing in the case of muriate and cyanamide. There are no differences between the equivalent nitrogenous manures in the case of grain, but with straw the cyanamide plots are significantly below the sulphate and muriate plots. The response to superphosphate is not significant, but there is evidence that it improved the yield of straw, and that the muriate plots responded better than the urea plots.

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Nitrogenous Fertilisers as Top Dressings :

Sulphate of ammonia.
Muriate of ammonia.

Each in single and double dressings (1 and 2 cwt. per acre Solidus Amm.).
Applied : (*a*) Early (April 11th) ; (*b*) Late (May 30th).

Wheat : Great Knott, 1927.

NW

P | Q

1ML	2ME	0A	2ME	0A	0B
0B	2SL	1SE	1ML	1SE	2SL
1ME	0C	2SE	1ME	1SL	0C
0D	2ML	1SL	2ML	0D	2SE
1SE	2SL	0A	0A	2SL	1ML
0B	1ML	2ME	2ME	1SE	0B
0C	2ML	1SL	1SL	2SE	2ML
1ME	2SE	0D	0C	0D	1ME

R | S

SYSTEM OF REPLICATION.—48 plots in 8 randomised blocks of 6 plots each.

Plots $\frac{1}{40}$ acre.

0.—No top dressing.

1, 2.—Dressing of 1 and 2 cwt. Sulphate of Ammonia (S) or equivalent Muriate of Ammonia (M) per acre.

E.—Early. 50 per cent. plants tillered (April 11).

L.—Late. Shoot number reached maximum (May 30).

Wheat sown Oct. 7, 1926 ; harvested Aug. 24-25, 1927.

Actual Weights in lb.—Total Grain.

Blocks.	0A	0B	0C	0D	1SE	1SL	1ME	1ML	2SE	2SL	2ME	2ML
P	71.375	63.5	47.625	42.5	61.25	56.5	57.0	71.125	59.875	68.125	70.25	58.375
Q	79.0	67.25	50.375	68.0	74.5	54.375	47.375	62.5	74.875	59.125	71.0	76.75
R	71.5	56.0	65.375	71.25	71.75	63.875	70.125	71.5	76.875	75.25	86.5	72.375
S	64.75	82.5	84.0	76.125	89.5	89.125	89.75	90.625	94.375	97.0	72.875	86.25

Actual Weights in lb.—Total Straw.

P	118.5	118.5	107.0	88.0	147.0	123.5	118.5	135.5	124.5	132.0	147.0	120.0
Q	137.0	126.5	98.0	118.0	131.0	107.0	106.5	123.0	144.5	113.0	147.5	131.5
R	133.0	126.0	129.5	154.5	132.5	152.5	160.5	147.5	174.0	139.5	169.5	155.5
S	122.5	168.5	161.5	143.0	165.0	161.5	157.0	154.0	181.5	163.0	155.5	143.0

(1) Summary of Average Yields, Separate Treatments.

Average Yield per acre.	No Top Dressing	Single S/Amm. early.	Single S/Amm. late.	Single M/Amm. early.	Single M/Amm. late.	Double S/Amm. early.	Double S/Amm. late.	Double M/Amm. early.	Double M/Amm. late.
Grain,cwt.	23.7	26.5	23.6	23.6	26.4	27.3	26.7	26.8	26.2
Straw,cwt.	45 8	51.4	48.6	48.4	50.0	55.8	48.9	55.3	49.1

ERRATUM :

On line 4 for "Solidus Amm." read "Sulphate of Ammonia."

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Wheat, 1927 (cont.)

(2) Summary of Significant Results.

Average Yield per acre.	O	Single.	Double.	Mean.	Standard Error. (a)	Early Sulphate.	Early Muriate.	Late Sulphate.	Late Muriate.	Single Early.	Double Early.	Single Late.	Double Late.	Standard Error. (b).
Grain, cwt. ...	23.7	25.0	26.8	25.2	0.73	26.9	25.2	25.2	26.3	25.1	27.1	25.0	26.5	1.03
Grain, per cent. ...	94.1	99.4	106.4	100.0	2.90	107.0	100.2	100.0	104.6	99.6	107.6	99.3	105.3	4.09
Straw, cwt. ...	45.8	49.6	52.3	49.2	1.05	53.6	51.9	48.8	49.6	49.9	55.5	49.3	49.0	1.49
Straw, per cent. ...	93.0	100.8	106.2	100.0	2.14	108.9	105.4	99.1	100.7	101.4	112.9	100.2	99.6	3.02

(a) Refers to means of 16 plots.
(b) Refers to means of 8 plots.

Significant response to double top dressing in the grain, and to both dressings in the straw. With straw the double dressing produced no further increase when applied late.

Wheat : Pastures Field, 1928.

S.E.

Yeoman II **Squareheads Master** **Swedish Iron**

A 1st								D 3rd								G 3rd							
4	2	8	5	6	1	7	3	6	7	3	8	4	1	5	2	4	5	8	2	7	3	6	1

B 2nd								E 2nd								H 1st							
7	8	2	3	4	1	6	5	6	5	1	4	8	2	3	7	1	6	2	4	8	7	3	5

C 3rd								F 1st								J 2nd							
5	6	4	3	8	7	1	2	4	3	2	8	7	6	5	1	8	7	3	1	6	2	5	4

System of Replication : 9 randomised blocks (3 to each variety) of 8 plots each.
Plots $\frac{1}{40}$ acre.
Sulphate of Ammonia at the rate of 1 cwt. per acre. Muriate of Ammonia equivalent to Sulphate.
1, 2=No Top Dressing.
3=Sulphate Early.
4=Muriate Early.
5=Sulphate Late.
6=Muriate Late.
7=Sulphate Early and Late.
8=Muriate Early and Late.
7 and 8 thus had double the amount of Nitrogen given to 3, 4, 5 and 6.
1st, 2nd, 3rd : Time of application of Top Dressing.
1st Early : Applied March 7.
2nd Early : Applied March 14.
3rd Early : Applied March 21st.
Late Dressings applied 6 weeks after Early.
Wheat sown October 21, 1927; harvested August 17, 1928.

Actual Weights in lb.—Total Grain.

Variety.	Block.	Time.	1	2	3	4	5	6	7	8	Average in cwt. per acre.	
Yeoman II.	A	1st	77.25	80.25	94.75	87.0	82.0	86.0	87.75	90.75	30.6	27.7
	B	2nd	79.0	79.5	80.0	80.0	75.5	66.0	83.25	85.25	28.1	
	C	3rd	60.75	68.5	60.75	64.75	92.0	86.75	50.75	65.75	24.6	
Squareheads Master	D	3rd	79.75	67.5	60.75	74.5	75.75	72.0	57.25	77.0	25.2	24.6
	E	2nd	61.25	67.0	73.75	66.75	62.75	69.25	77.75	79.75	24.9	
	F	1st	60.5	55.5	50.5	66.5	75.75	75.25	71.25	74.5	23.6	
Swedish Iron	G	3rd	58.25	64.0	63.25	88.75	83.75	60.25	64.0	79.75	25.1	22.9
	H	1st	48.0	49.25	55.75	50.0	68.0	69.0	62.25	61.25	20.7	
	J	2nd	55.25	58.5	59.5	76.75	68.25	64.5	66.5	66.5	23.0	
Average in cwt. per acre ...			23.2		23.8	26.0	27.1	25.8	24.6	27.0	25.1	

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Actual Weights in lb.—Total Straw.

Variety.	Block	Time.	1	2	3	4	5	6	7	8	Average in cwt. per acre.	
Yeoman II.	A	1st	96.75	97.75	125.25	114.0	108.5	114.0	114.25	116.25	39.6	35.7
	B	2nd	107.0	96.0	100.0	99.5	97.0	74.5	112.75	111.25	35.6	
	C	3rd	67.25	89.5	89.25	75.25	133.0*	117.25	60.25	84.25	32.0	
Squareheads Master	D	3rd	95.75	97.0	92.25	101.5	100.25	105.0	95.75	139.0	36.9	35.2
	E	2nd	84.75	92.0	119.25	97.25	87.75	101.75	100.75	114.25	35.6	
	F	1st	88.5	73.0	67.0*	100.5	107.25	94.75	107.75	103.0	33.1	
Swedish Iron	G	3rd	71.25	70.0	81.75	102.25	107.25	77.75	103.0	107.25	32.2	28.8
	H	1st	48.5	50.25	68.75	52.5	87.5	77.0	85.25	76.75	24.4	
	J	2nd	71.0	73.0	76.5	97.25	96.25	86.5	84.5	80.5	29.7	
Average in cwt. per acre			29.2		32.5	33.3	36.7	33.7	34.3	37.0	33.2	

* Estimated Figures.

(1) Summary of Average Yields, Separate Treatments.

	Variety.	No Top Dressing.	Sulphate of Amm'nia Early.	Muriate of Amm'nia Early.	Sulphate of Amm'nia Late.	Muriate of Amm'nia Late.	Sulphate of Amm'nia Early and Late.	Muriate of Amm'nia Early and Late.
Grain, cwt. per acre	Yeoman II ...	26.5	28.0	27.6	29.7	28.4	26.4	28.8
	Squareheads Master	23.3	22.0	24.7	25.5	25.8	24.6	27.5
	Swedish Iron ...	19.8	21.2	25.7	26.2	23.1	22.9	24.7
Straw, cwt. per acre	Yeoman II ...	33.0	37.4	34.4	40.3	36.4	34.2	37.1
	Squareheads Master	31.6	33.2	35.6	35.1	35.9	36.2	42.4
	Swedish Iron ...	22.9	27.0	30.0	34.6	28.7	32.5	31.5

(2) Summary of Significant Results, averaging varieties.

Average Yield per acre.	No Top Dressing.	Early Top Dressing.	Late Top Dressing.	Early and Late Top Dressing.	Mean.	Standard Error.
Grain, cwt. ...	23.2	24.9	26.4	25.8	25.1	0.74
Grain, per cent.	92.5	99.2	105.4	102.9	100.0	2.94
Straw, cwt. ...	29.2	32.9	35.2	35.6	33.2	1.22
Straw, per cent.	87.7	99.1	105.9	107.3	100.0	3.67

The late dressing produced a significant response in grain and straw, while the difference between the muriate and sulphate plots is not significant. There is evidence that the straw responded to some extent to the early dressing. The experiment does not permit of valid conclusions being drawn as to differences between varieties nor between the three dates of the early dressing.

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Barley : Nitrogenous Top Dressing, Sulphate and Muriate of Ammonia.

Great Harpenden, 1927.

S.S.W.

	Plot 1.	Plot 2.	Plot 3.	Plot 4.	Plot 5.	Plot 6.
Area in acres... ...	1.28	2.40	2.12	2.18	2.10	2.16
Yield of grain in lbs.	920	2292	1983	2187	1359	1631
Yield in cwt./acre ...	6.42	8.53	8.35	8.96	5.78	6.74

Barley sown April 4-6 ; harvested September 6-7.
Plots 1 and 5=No manure.
Plots 2 and 4=Sulphate of Ammonia at the rate of 1 cwt. per acre } applied June 10-11.
Plots 3 and 6=Muriate of Ammonia equivalent of above }
No straw weights taken.

Summary of Results.

Average Yield of Grain.	Control.	Muriate.	Sulphate.	Mean.
lb. per acre	682.94	845.24	979.10	835.76
cwt. per acre	6.10	7.55	8.74	7.46
Per cent.	81.7	101.1	117.2	100.0

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Barley : Nitrogenous Top Dressing, Nitrochalk.

Long Hoos, 1928.

E.S.E.

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

TREATMENTS :
A = No Top Dressing.
B = Early Top Dressing of Nitrochalk, May 22nd.
C = Middle Top Dressing of Nitrochalk, June 4th.
D = Late Top Dressing of Nitrochalk, June 19th.
Rate of application = 2 cwt. per acre.

SYSTEM OF REPLICATION :—4 randomised blocks of 4 plots each.
Area of each plot = $\frac{1}{40}$ acre.
Barley sown, March 28 ; harvested August 24, 1928.
Variety : "Standwell."

Actual Yields in lb.

Block.	Grain.				Straw.			
	A	B	C	D	A	B	C	D
I. ...	36.0	35.5	39.0	41.25	91.0	96.5	94.0	90.75
II. ...	43.5	41.75	39.25	39.0	85.5	88.25	82.75	77.5
III. ...	45.5	51.5	51.75	48.0	73.5	92.5	96.25	77.0
IV. ...	49.0	43.5	54.75	47.75	87.0	79.5	86.25	85.25

Summary of Results.

Average Yield.	No Top Dressing.	Early Top Dressing.	Middle Top Dressing.	Late Top Dressing.	Mean.	Standard Error.
Grain, cwt. per acre	15.5	15.4	16.5	15.7	15.8	0.61
Grain, per cent. ...	98.4	97.5	104.5	99.6	100.0	3.85
Straw, cwt. per acre ...	30.1	31.9	32.1	29.5	30.9	1.11
Straw, per cent. ...	97.4	103.1	103.9	95.6	100.0	3.59
Per cent. Nitrogen in dry matter of grain ...	2.075	2.118	2.110	2.160	2.116	0.0264

No significant response to treatment in grain and straw. Late top dressing gave significantly higher percentage of nitrogen in dry matter of grain than the control.

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POTATOES.

Nitrogenous Fertiliser : Sulphate of Ammonia.
Potassic Fertilisers : Sulphate of Potash.
Muriate of Potash.
30 per cent. Potash Manure Salts.
Each in single and double dressings.

Long Hoos, 1927.

W.N.W

	A		B			C			
	N4 0	N2 0	N2 P4	N2 0	N4 P2	0 0	N2 0	0 P4	N2 M2	
	0 M4	N2 S2	N4 M2	N4 P4	N4 0	N2 S4	N2 M4	N4 S4	0 0	
	N4 S4	0 0	0 P2	0 S2	N2 M2	0 M4	N4 0	N4 S2	0 P2	
	N2 P2	0 S2	N4 0	N2 P2	N4 S2	N4 0	N4 S4	N2 S2	0 M2	
D	N4 M2	N2 P4	0 S4	N2 P4	N2 0	0 M2	0 P4	N2 0	N2 M4	F
	N4 M4	N2 0	0 0	N4 M4	0 0	0 S4	0 0	N4 0	N4 P2	
	0 0	0 M2	N4 0	N2 0	N2 M4	N4 P4	0 P4	N2 S4	N4 M2	
	0 M4	N2 0	N2 S2	N4 S2	0 P2	N4 0	0 0	0 S2	N4 0	
	N4 P4	N4 P2	N2 S4	N2 M2	0 0	0 S4	N2 P2	N2 0	N4 M4	
		G			H			J		

VARIETY : Arran Comrade.

SYSTEM OF REPLICATION : 9 randomised blocks of 9 plots each.

Area of plot $\frac{1}{40}$ acre.

QUANTITIES : Sulphate of Ammonia at the rate of 2 and 4 cwt. per acre. Potash at the rate of 2 and 4 cwt. per acre as Sulphate or its equivalent as Muriate or Potash Manure Salts.

O = No artificial manure.
N = Nitrogen as Sulphate of Ammonia.
S = Sulphate of Potash.
M = Muriate of Potash.
P = Potash Manure Salts.

All plots had 10 tons F.Y.M. applied May 14-16

Artificials applied May 17-18.

Potatoes planted May 23-25 ; Lifted October 6-24.

Actual Weight in lb.

Nitrogen	Potash	A	B	C	D	E	F	G	H	J
Quantities										
0	0	356.5	382.0	348.5	395.0	366.5	349.5	337.5	411.5	351.5
0	2	365.0	401.0	354.0	357.0	360.5	361.0	345.0	395.5	344.0
0	4	308.5	364.0	335.5	362.5	395.5	319.0	302.0	401.5	333.0
2	0	379.5	379.0	380.5	394.5	409.5	402.5	377.0	446.5	389.5
2	2	421.0	420.0	389.0	404.5	408.5	411.0	467.5	474.0	400.5
2	4	382.5	424.5	409.5	323.5	403.5	369.5	463.5	455.0	405.0
4	0	333.5	413.5	399.0	412.5	428.0	400.5	440.0	411.5	369.0
4	2	430.5	381.0	408.0	440.0	438.5	358.5	388.0	473.0	390.5
4	4	403.0	396.0	436.0	436.5	465.5	412.0	356.5	405.5	436.0

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(1) Summary of Average Yields, Separate Treatments.

Average Yield in tons per acre.		No Nitrogen.			2 cwt. S/Amm.			4 cwt. S/Amm.		
Quality of Potash.		Sulphate	Muriate	P.M.S.	Sulphate	Muriate	P.M.S.	Sulphate	Muriate	P.M.S.
Quantity of Potash in cwt. per acre S/Pot.	0		6.54			7.06			7.16	
	2	6.56	6.35	6.63	7.74	7.64	7.22	7.85	7.51	6.71
	4	6.90	5.80	5.88	7.70	7.35	6.60	7.45	7.96	6.89

Standard Error 0.245 tons.

(2) Summary of Significant Results.

(a) **Effect of Potassium Salts.**

		Average Yield in tons per acre.			Average Yield, per cent.		
		Sulphate.	Muriate.	Potash Manure Salts.	Sulphate.	Muriate.	Potash Manure Salts.
Amount of Potash in cwt. per acre S/Pot. ...	0		6.92			98.9	
	2	7.38	7.16	6.86	105.5	102.3	98.0
	4	7.35	7.04	6.46	105.0	100.5	92.2

Standard Error 0.141 tons, or 2.02 per cent.

(b) **Effect of Sulphate of Ammonia.**

		Average Yield in tons per acre.			Average Yield, per cent.		
		Amount of Nitrogen.			Amount of Nitrogen.		
		0	2	4	0	2	4
Amount of Potash	0	6.54	7.06	7.16	93.5	100.9	102.2
	2	6.51	7.53	7.36	93.0	107.6	105.1
	4	6.19	7.22	7.43	88.5	103.1	106.2

Standard Error 0.141 tons or 2.02 per cent.

Average Yield.	Quantity of S/Am.			Quantity of Potash.			Mean Yield.	(a) Standard Error.	Sulphate.	Muriate.	Potash Manure Salts.	(b) Standard Error.
	0	2	4	0	2	4						
Tons per acre	6.42	7.27	7.32	6.92	7.13	6.95	7.00	0.082	7.37	7.10	6.66	0.100
Per cent. ...	91.7	103.8	104.5	98.9	101.9	99.2	100.0	1.17	105.2	101.4	95.1	1.43

(*a*) Refers to means of 27 plots. (*b*) Refers to means of 18 plots.

The Potash Manure Salts depress the yield slightly in the single dressing and significantly in the double dressing ; a similar but slighter effect appears with Muriate. In both cases the effect is least on the high Nitrogen plots. The Sulphate of Potash causes no depression, although the higher dressing gives no further increase in yield.

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POTATOES.

Nitrogenous Fertiliser : Sulphate of Ammonia.
Potassic Fertiliser : Sulphate of Potash.
Each in single and double dressings.

Superphosphate.

Great Harpenden, 1928.

N.E.

A			B			C		
3O	6P	9O	9P	6P	5O	2O	9P	4O
3P	6O	9P	9O	6O	5P	2P	9O	4P
1O	7O	2O	8O	4O	1O	7O	8P	5P
1P	7P	2P	8P	4P	1P	7P	8O	5O
4O	8P	5O	7O	2P	3O	1P	3O	6P
4P	8O	5P	7P	2O	3P	1O	3P	6O

SYSTEM OF REPLICATION : Experiment laid down as in 1927. The portion harvested consisted of 3 randomised blocks of 9 plots each divided into 2 sub-plots.

Area of whole plot : $\frac{1}{45}$ acre.

O, P=No Phosphate and Superphosphate at the rate of 3 cwt. per acre. Sulphate of Ammonia at the rate of 0, $1\frac{1}{2}$ and 3 cwt. per acre, and Potash at the rate of 0, 1 and 2 cwt. per acre Sulphate of Potash in all combinations. All plots received 10 tons F.Y.M. per acre.

VARIETY : Ally.

Artificial Manures applied April 16-17.

Potatoes planted April 17-19 ; lifted October 19.

Key to Treatments.

Treatment No.	1	2	3	4	5	6	7	8	9
S/Amm. ...	0	$1\frac{1}{2}$	3	0	$1\frac{1}{2}$	3	0	$1\frac{1}{2}$	3
Potash	0	0	0	1	1	1	2	2	2

Actual Weights in lb. Phosphate Sub-plots.

Block.	1	2	3	4	5	6	7	8	9
A	139.0	219.0	200.5	145.0	193.5	260.5	174.5	213.0	246.5
B	197.5	205.0	206.0	182.5	254.5	282.0	143.0	213.5	265.5
C	156.0	229.5	210.0	245.5	226.5	282.5	210.0	229.5	281.5

Actual Weights in lb. No Phosphate Sub-plots.

Block.	1	2	3	4	5	6	7	8	9
A	142.0	197.5	195.5	141.5	205.5	201.0	149.5	185.0	240.0
B	168.5	180.0	210.0	180.5	227.0	256.0	159.0	192.0	224.5
C	144.5	251.5	191.5	247.0	251.0	271.5	182.5	230.0	263.0

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(1) Summary of Average Yields, Separate Treatments.

Tons per acre.		Without Superphosphate.			With Superphosphate.		
		No S/Amm.	1½ cwt. S/Amm.	3 cwt. S/Amm.	No S/Amm.	1½ cwt. S/Amm.	3 cwt. S/Amm.
Quantity of Potash in cwt. per acre S/Pot. ...	0	6.09	8.42	8.00	6.60	8.75	8.26
	1	7.62	9.15	9.76	7.67	9.03	11.05
	2	6.58	8.13	9.74	7.06	8.79	10.63

(2) Summary of Significant Results.

Average Yield.	Without Super.	With Super.	Mean.	Standard Error.
Tons per acre ...	8.17	8.65	8.41	0.11
Per cent. ...	97.1	102.9	100.0	1.29

Average Yields tons per acre.					Per cent.		
		Quantity of S/Amm.			Quantity of S/Amm.		
		0	1½	3	0	1½	3
Quantity of Potash in cwt. per acre S/Pot.	0	6.34	8.59	8.13	75.5	102.2	96.7
	1	7.65	9.09	10.40	91.0	108.2	123.7
	2	6.82	8.46	10.19	81.1	100.6	121.1
		Standard error 0.32 tons			Standard error 3.84 per cent.		

Significant response to all three manures. No further response to the higher dressing of Potash, or to the higher nitrogenous dressing in the absence of Potash.

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SUGAR BEET.

Nitrogenous Fertilisers : Sulphate of Ammonia applied with seed.
Nitrate of Soda as top dressings at rates of 1, 2 and 3 cwt. per acre.
Cyanamide, applied 1 week before sowing at three rates.

Potassic Fertilisers : Muriate of Potash.
Potash Manure Salts.

Spacing of Plants.

Long Hoos, 1927

(a) **Manuring Experiment.**

N.W.

A				B				C			
S, N2 L	C4 K	S, 0 L	C3 K	S, N5 L	O, N3 L	O, 0 K	S, N1 K	C2 K	O, N1 L	S, 0 L	C4 K
S, N3 K	C1 L	O, N1 K	O, N3 L	O, N1 K	S, 0 K	C3 L	C2 L	C1 L	S, N1 K	S, N3 K	O, 0 L
O, 0 L	S, N1 K	C2 L	O, N2 K	O, N2 K	S, N2 K	C1 L	C4 L	O, N2 L	S, N2 K	C3 K	O, N3 L
S, N2 K	S, N3 L	C2 K	C3 L	S, N2 L	O, 0 L	C4 K	S, N3 K	O, N3 K	S, N1 L	S, N3 L	O, N1 K
O, N1 L	O, N2 L	O, N3 K	S, 0 K	S, N1 L	O, N2 L	O, N1 L	S, 0 L	S, N2 L	O, N2 K	O, 0 K	C3 L
O 0 K	C1 K	C4 L	S, N1 L	C2 K	O, N3 K	C1 K	C3 K	C1 K	C2 L	C4 L	S, 0 K
D				E				F			

SYSTEM OF REPLICATION :
Six randomised blocks of 12 plots each.
Area of plot = .024 acre.
O, : No basal dressing.
, O : No top dressing.
S : Basal dressing of 1 cwt. per acre Sulphate of Ammonia.
C (1, 2, 3, 4) : Basal dressings of Cyanamide equivalent to 1, 2, 3 and 4 cwts per acre Sulphate of Ammonia.
, N (1, 2, 3) : Top dressings of Nitrate of Soda equivalent to 1, 2 and 3 cwt. per acre Sulphate of Ammonia.
Each adjoining pair of plots allotted at random to receive 2 cwt. per acre Muriate of Potash (K) or equivalent Potash Manure Salts (L).
All plots had 8 tons per acre (approx.) of London Refuse.
Cyanamide applied June 1. Other Basal Manures June 8-9. Top Dressing August 10. Seed sown June 16. Pulled November 21—December 10.

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Blocks.	Roots—Actual Weights in lb.											
	0,0	C1	S,0	O,N1	O,N2	O,N3	C2	C3	C4	S,N1	S,N2	S,N3
A	153.5	207.25	199.25	193.75	197.25	204.5	216.0	204.75	227.25	208.0	228.0	200.0
B	159.5	177.75	144.5	152.75	149.75	185.5	199.25	202.5	214.5	197.0	178.25	174.5
C	157.75	173.75	159.0	200.75	167.0	183.25	198.75	132.0	200.25	177.75	163.0	164.25
D	203.5	211.25	189.0	229.0	222.75	198.5	243.25	245.25	208.5	217.25	220.25	245.25
E	180.0	147.5	121.0	153.75	197.5	196.25	197.75	165.25	203.75	215.25	211.75	177.0
F	117.5	118.5	108.5	151.25	137.25	151.75	117.0	155.75	112.5	151.75	141.25	152.0
	Tops—Actual Weights in lb.											
A	479.0	542.0	547.0	564.5	646.0	666.5	656.5	584.5	719.5	612.0	831.0	836.0
B	437.0	451.0	415.5	503.0	596.0	715.5	548.5	565.5	649.5	621.5	559.0	734.5
C	455.0	465.0	544.5	664.0	564.0	634.5	578.5	455.0	644.5	596.0	580.0	597.0
D	605.0	566.0	506.0	766.0	737.5	738.5	703.0	716.5	735.0	678.5	739.5	822.5
E	473.0	382.5	419.5	424.5	655.5	738.5	643.5	548.0	597.0	711.0	774.0	652.0
F	357.5	358.0	366.5	477.5	455.0	542.5	372.0	496.5	369.0	482.5	475.5	547.0

Summary of Results, averaging the Nitrogenous Treatments.

Average Yield.	Muriate of Potash.	Potash Manure Salts	Mean.	Standard Error.
Roots, tons per acre ...	3.30	3.45	3.38	0.05
Roots, per cent.	97.7	102.3	100.0	1.48
Tops, tons per acre ...	10.60	11.04	10.82	0.161
Tops, per cent.	98.0	102.0	100.0	1.49

Summary of Results, averaging the Potash Equivalents.

		Average Yield in tons per acre.				Average Yield per cent.			
		Top Dressing in cwt. per acre S/Amm.*				Top Dressing in cwt. per acre S/Amm.			
		0	1	2	3	0	1	2	3
Roots	No Basal	3.01	3.35	3.32	3.47	89.2	99.3	98.4	102.8
	Cyanamide	3.21	3.63	3.43	3.62	95.1	107.6	101.5	107.1
	Sulphate of Ammonia ...	2.86	3.62	3.54	3.45	84.6	107.2	104.9	102.2
Tops	No Basal	8.70	10.54	11.33	12.51	80.4	97.4	104.7	115.6
	Cyanamide	8.57	10.86	10.44	11.52	79.2	100.3	96.4	106.4
	Sulphate of Ammonia ...	8.68	11.48	12.27	12.99	80.2	106.0	113.4	120.0

Standard Error : Roots, 0.14 tons or 4.15 per cent ; Tops, 0.48 tons, or 4.45 per cent.

* Cyanamide plots received no Top Dressing, and the columns of the table refer in the case of this manure to dressings equivalent to 1, 2, 3 and 4 cwts. per acre Sulphate of Ammonia.

Potash Manure Salts show significant superiority over Muriate. There is a significant response to single top dressing, only the leaves showing any further response to the highest dressings.

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SUGAR BEET.—(*Cont.*)

Long Hoos, 1927.

(b) Spacing Experiment.

Strip Totals in lb. (left to right).

	Roots.			Tops.		
Strips	N	M	W	N	M	W
1	494.75	361.75	377.75	1780.5	1269.0	1207.0
2	487.00	439.50	395.25	1458.5	1391.0	1150.0
3	493.25	357.75	408.25	1541.5	1203.0	1200.0
4	490.50	392.75	374.75	1537.5	1230.0	1030.5
5	456.50	319.00	326.25	1645.0	1246.0	1071.0
6	411.75	350.25	337.00	1487.5	1272.0	946.0
7	454.75	299.25	290.75	1178.0	883.5	796.0
8	430.75	314.00	312.25	1435.0	877.0	978.5
9	383.75	305.25	262.00	1179.5	936.0	868.0
10	369.25	304.50	273.75	1152.5	1134.0	863.0
11	340.00	264.25	233.00	1257.0	851.5	761.5
12	394.75	292.25	269.75	1143.0	1030.5	901.0

Manuring as on previous page.

System of Replication: 216 plots, each .008 acre, in sets of 3.

N = 14 in. spacing.

M = 18 in. spacing.

W = 22 in. spacing.

Summary of Results.

Average Yield.	Narrow Spacing.	Medium Spacing.	Wide Spacing.	Mean.	Standard Error.
Roots, tons per acre...	4.04	3.10	2.99	3.38	0.062
Roots, per cent. ...	119.5	91.8	88.6	100.0	1.84
Tops, tons per acre ...	13.02	10.33	9.12	10.82	0.249
Tops, per cent. ...	120.3	95.4	84.3	100.0	2.30

The narrow spacing gives a significantly higher yield than the medium and wide spacings, while with tops the medium spacing also does significantly better than the wide.

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SUGAR BEET.

MANURING.

Nitrochalk as top dressing, applied:—(*a*) early; (*b*) early and late.
Superphosphate.
Muriate of potash and potash manure salts.

CULTIVATION.

Subsoiling. Ridging.

Great Harpenden, 1928.

N.W.

	R	F	F	R	R	F	R	F	R	F	F	R	
I	2	6	1	5	10	9	12	11	4	3	7	8	O
II	1	8	5	9	3	7	11	10	6	4	12	2	S
III	6	3	2	11	5	10	4	7	12	8	1	9	O
IV	7	5	9	12	4	8	6	3	2	1	11	10	S
V	12	4	8	3	11	6	5	1	9	10	2	7	S
VI	8	10	11	7	1	12	2	4	3	5	9	6	O
VII	4	2	3	1	9	5	10	6	7	12	8	11	O
VIII	10	7	12	8	2	11	1	9	5	6	3	4	S
IX	3	12	7	4	8	1	9	2	10	11	6	5	S
X	9	1	10	2	6	4	8	12	11	7	5	3	O
XI	5	11	6	10	7	2	3	8	1	9	4	12	O
XII	11	9	4	6	12	3	7	5	8	2	10	1	S

VARIETY: Dippe.

SYSTEM OF REPLICATION: 12×12 Latin Square.

AREA OF PLOT: .014 acre.

TREATMENTS: Muriate of Potash at the rate of 2 cwt. per acre or equivalent Potash Manure Salts (30%). Superphosphate at the rate of 2 cwt. per acre. Top dressing of Nitrochalk at the rate of 2 cwt. per acre, applied early (June 23), and both early and late (July 21). All plots had basal dressing of 10 tons compost in winter, and 2 cwt. per acre Sulphate of Ammonia with other artificials on May 4.

R, F = Pairs of strips one way allotted at random to ridged and flat seed bed.

S, O = Pairs of strips the other way allotted at random to sub-soiling and "not" sub-soiling. The 12 plots of each treatment had 3 allotted to each of the 4 cultivation treatments.

Seed sown May 5; roots lifted October 26–November 3.

Key to Treatments.

Manure.	1	2	3	4	5	6	7	8	9	10	11	12
Mur./Pot. ...	×		×		×		×		×		×	
P.M.S.		×		×		×		×		×		×
Super			×	×			×	×			×	×
Nitrochalk (early)					×	×	×	×	×	×	×	×
Nitrochalk (late)...									×	×	×	×

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SUGAR BEET, 1928 (cont.)

Actual Weights in lb.—Roots.

Row.	1	2	3	4	5	6	7	8	9	10	11	12
I	204.5	238.5	304.5	284.0	289.5	204.0	317.0	364.0	265.5	278.0	236.5	274.0
II	210.5	323.5	327.0	317.5	235.0	286.5	298.5	218.0	336.0	267.5	334.5	292.0
III	239.0	264.5	285.5	333.5	313.5	242.5	293.0	311.0	293.5	295.5	319.0	307.5
IV	303.0	288.5	270.0	264.0	238.5	339.5	253.0	291.5	280.0	336.5	290.0	287.0
V	248.5	279.5	277.0	287.0	302.5	276.5	313.0	281.5	332.0	322.0	252.0	280.0
VI	262.0	340.5	293.0	283.0	279.5	275.0	274.5	284.5	284.5	255.5	272.0	301.0
VII	222.5	207.5	252.5	215.5	290.5	243.0	307.0	292.0	317.0	345.5	291.0	312.0
VIII	302.0	266.5	325.5	361.5	269.5	332.0	180.0	281.0	239.5	232.5	282.5	233.0
IX	256.0	246.5	214.0	273.5	401.0	308.5	231.5	277.0	312.5	290.0	273.5	245.5
X	215.0	305.5	362.0	261.0	365.0	299.5	363.0	369.5	173.0	269.5	324.5	211.5
XI	328.0	290.0	315.0	347.0	270.5	244.0	299.0	281.0	332.5	297.5	244.5	405.5
XII	397.5	335.0	283.5	262.0	272.0	324.5	326.5	311.5	259.5	355.0	272.5	322.5

Actual Weights in lb.—Tops.

Row.	1	2	3	4	5	6	7	8	9	10	11	12
I	304.5	412.0	360.0	324.0	367.0	427.5	380.5	423.0	364.5	360.0	332.5	409.0
II	362.5	331.5	347.0	339.5	390.0	339.0	408.5	412.0	433.0	385.0	432.5	360.5
III	251.5	349.5	344.5	311.5	338.5	389.5	333.0	330.0	340.0	425.0	406.0	353.5
IV	325.0	275.5	306.5	305.5	327.0	355.0	286.5	358.5	430.0	362.0	354.5	367.0
V	273.5	278.0	264.5	389.0	303.5	288.0	304.0	339.0	378.5	348.5	346.5	376.0
VI	311.5	299.0	272.5	239.5	265.0	297.5	341.0	402.0	345.0	388.0	377.0	362.0
VII	298.0	247.0	302.5	330.5	321.0	315.0	330.5	332.5	361.0	385.5	306.5	396.0
VIII	305.5	332.5	358.0	356.5	352.0	359.5	317.0	364.0	333.5	414.5	344.0	397.5
IX	275.5	323.0	319.5	338.5	354.0	345.0	503.5	356.0	325.5	356.0	352.5	441.5
X	335.5	357.0	353.0	275.5	368.5	395.5	357.0	343.0	312.5	467.0	359.5	351.0
XI	358.0	310.5	303.5	300.5	358.5	461.5	396.0	364.5	382.0	473.5	517.5	394.5
XII	409.0	351.0	371.5	433.0	406.5	472.0	459.5	412.5	539.5	387.5	464.0	545.5

(1) Summary of Average Yields—Separate Treatments.

Top Dressing.	0		Early.		Early and Late.	
	Super-phosphate.	No Super-phosphate.	Super-phosphate.	No Super-phosphate.	Super-phosphate.	No Super-phosphate.
Roots, tons per acre.						
Muriate of potash ...	9.33	8.47	9.18	9.37	9.01	9.10
Potash manure salts	9.27	9.00	9.47	8.97	9.22	9.42
Tops, tons per acre.						
Muriate of potash ...	10.37	10.12	11.74	11.03	12.20	12.08
Potash manure salts	10.48	10.27	11.79	11.81	12.63	12.63
Sugar in roots, per cent.						
Muriate of potash ...	17.98	17.82	17.71	17.72	17.20	17.26
Potash manure salts	17.98	17.96	17.58	17.52	17.31	17.30

(2) Summary of Significant Results—Manuring Experiment.

Average Yield.	No Top Dressing.	Early Top Dressing.	Early and Late Top Dressing.	Mean.	Standard Error. (*a*)	Muriate of Potash.	Potash Manure Salts.	No. Super.	Super.	Standard Error. (*b*)
Roots, tons per acre	9.02	9.25	9.19	9.15	0.13	9.08	9.23	9.06	9.25	0.10
Roots, per cent. ...	98.5	101.0	100.4	100.0	1.38	99.2	100.8	99.0	101.0	1.13
Tops, tons per acre	10.31	11.59	12.39	11.43	0.16	11.26	11.60	11.32	11.54	0.13
Tops, per cent. ...	90.2	101.4	108.4	100.0	1.40	98.5	101.5	99.0	101.0	1.14
Sugar percentage	17.94	17.63	17.27	17.61	0.06	17.61	17.61	17.60	17.63	0.05

(*a*) Refers to means of 48 plots. (*b*) Refers to means of 72 plots.

The effect of the nitrogenous top dressing is the only significant result. There was a significant response with tops but not with roots. The application of top dressing depressed the sugar content significantly.

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SUGAR BEET. Great Harpenden—*contd.*

Cultivation Experiment.

Column Totals (left to right).

	R	F	F	R	R	F	R	F	R	F	F	R
Roots, lb.	2887	2840.5	3030	3487.5	3478	3392	3895.5	3092	3622	3785.5	3695	4124
Tops, lb.	4428	4686	4755	4481.5	4395.5	4104.5	4233	3963.5	4111.5	4166	4062	4231.5
Number of plants ...	2965	2936	3070	3422	3246	2897	3162	2544	2896	2770	2835	2970

Row Totals (top to bottom).

	O	S	O	S	S	O	O	S	S	O	O	S
Roots, lb.	3260	3446.5	3498	3441.5	3451.5	3405	3296	3305.5	3329.5	3519	3654.5	3722
Tops, lb.	4464.5	4541	4172.5	4053	3889	3900	3926	4234.5	4290.5	4275	4620.5	5251.5
Number of plants ...	2982	3025	2953	3081	2998	2853	2861	3016	3022	2962	2937	3023

Summary of Results—Cultivation Experiment.

Average Yield.	Ridged.	Flat.	Standard Error.	Not Sub-soiled.	Sub-soiled.	Standard Error.	Mean.
Roots, tons per acre ...	9.52	8.78	0.27	9.14	9.17	0.10	9.15
Roots, per cent. ...	104.0	96.0	2.94	99.8	100.2	1.06	100.0
Tops, tons per acre...	11.46	11.40	0.20	11.23	11.63	0.21	11.43
Tops, per cent. ...	100.3	99.7	1.72	98.3	101.7	1.85	100.0
Roots,number per acre	18513	16917	369.4	17409	18021	80.0	17715
Roots,number per cent.	104.5	95.5	2.09	98.3	101.7	0.45	100.0

Ridged beats flat significantly in the case of roots, an effect due to increased number. Sub-soiling produced a significantly larger number of roots, but this was not reflected in an increased yield.

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Swedes : Comparison of Phosphatic Fertilisers, Phosphate of Ammonia and Superphosphate ; also of Sulphate of Ammonia and Urea.

Long Hoos, 1927.

N.E.

I	3	1	5	2	4
II	5	4	2	3	1
III	4	5	3	1	2
IV	1	2	4	5	3
V	2	3	1	4	5

SYSTEM OF REPLICATION : Latin Square. Plots, $\frac{1}{25}$ acre. Supplying 75 lbs. P_2O_5 and 14.75 lbs. N. per acre.

1. Urea equivalent to 2.
2. Sulphate of Ammonia at the rate of $\frac{5}{8}$ cwt. per acre.
3. Ammonium Phosphate at the rate of 1.1 cwts. per acre.
4. Urea as 1+Superphosphate at the rate of 4 cwts. per acre.
5. Sulphate of Ammonia as 2+Superphosphate at the rate of 4 cwts. per acre.

All plots received 1 cwt. Muriate of Potash per acre.

Manures applied June 20.

Seed sown June 23 ; roots lifted November 25 and 30.

Actual Weights in lb.

Row.	Roots.					Tops.				
	1	2	3	4	5	1	2	3	4	5
I	1236	1488	1196	1428	1280	473.0	497.0	465.5	437.5	498.5
II	1448	1296	1472	1248	1252	428.0	454.0	484.0	478.5	523.0
III	1468	1408	1328	1264	1264	467.0	425.5	482.5	519.0	473.0
IV	1236	1308	1456	1324	1416	481.5	503.0	414.0	478.0	437.0
V	1252	1168	1352	1472	1504	444.5	481.5	495.5	431.0	434.0

Summary of Results.

Average Yield per acre.	No Phosphate.		Phosphate applied.			Mean.	Standard Error.
	Urea.	Sulphate.	Amm'nium Phosphate.	Urea and Super.	Sulphate and Super.		
Roots, tons ...	14.82	14.88	15.19	15.04	14.99	14.98	0.22
Roots, per cent.	98.9	99.3	101.4	100.4	100.1	100.0	1.45
Tops, tons ...	5.12	5.27	5.23	5.23	5.28	5.23	0.12
Tops, per cent.	98.0	100.9	100.0	100.1	101.0	100.0	2.32

The yields on the Phosphate plots appear to be greater than those on the no-Phosphate plots, but the difference is not significant.

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CULTIVATION EXPERIMENT.

Rotary cultivation : method of making a seed bed.
Barley, Sawyers Field, 1927.

S.W.

	S_1
1	C_1
	P_1
	C_2
2	C_2
	P_2
	C_3
3	C_3
	P_3

SYSTEM OF REPLICATION : Triplicate strips. Plots $\frac{11}{40}$ acre.

S = prepared by Simar rototiller, April 14, 1927.

C_2, C_3 = as S in 1926, but treated as C in 1927.

C = Horse cultivated and disc harrowed, May 2.

P = Ploughed, April 5 and 14 ; drag harrowed and rolled, May 6, 1927.

All plots previously ploughed in January, 1927. 3 cwt. Superphosphate, 1 cwt. Muriate of Potash and 1 cwt. Sulphate of Ammonia per acre, applied over whole area, April 19, 1927.

Barley sown, May 7. Harvested October 3–12.

Actual Weights in lb.

Grain.	S *and C*	C	P
1	409.75	282.875	284.125
2	400.5	301.125	345.75
3	383.75	344.75	308.875
Total ...	1194.0	928.75	938.75
Straw.	**S *and C***	**C**	**P**
1	602.0	473.5	439.0
2	698.5	641.5	621.5
3	702.0	601.5	627.0
Total ...	2002.5	1716.5	1687.5

Summary of Results.

	S *and C*	C	P	Mean.	Standard Error.
Grain, cwts. per acre	12.9	10.1	10.2	11.0	0.54
Grain, per cent.	117.0	91.0	92.0	100.0	4.89
Straw, cwts. per acre	21.7	18.6	18.3	19.5	0.46
Straw, per cent.	111.1	95.3	93.6	100.0	2.35

Plots cultivated with the Simar implement in 1926 show a significant superiority over others in both grain and straw in 1927. This was probably a residual effect from previous years, as only one of these plots was in 1927 treated differently from the horse cultivated plots.

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CULTIVATION EXPERIMENT.

Swedes, Great Harpenden, 1928.

S

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

SYSTEM OF REPLICATION: 4 randomised blocks of 4 plots each.
Area of each plot: $\frac{1}{20}$ acre.
No Farmyard Manure, except that plots marked * were dunged in error. All plots had 2 cwt. Sulphate of Ammonia, 2 cwt. Muriate of Potash and 2 cwt. Superphosphate per acre, applied May 5.

A = Ridged Seed bed.
B = Prepared by Simar rototiller, then ridged.
C = Prepared by Simar rototiller, but left flat.
D = Prepared by Simar rototiller, left flat, and Simar implement used again between rows in July.
Special cultivations May 7-9. Seed sown, May 9. Roots lifted November 21-25.

Actual Yields.

Block.	Roots in lb.				Tops in lb.				Number of Roots.			
	A	B	C	D	A	B	C	D	A	B	C	D
I	2804	2886	2529.5	2064	124	126.5	98.5	90	1018	991	903	815
II	2392	2417	2062	1967.5	100	107	85.5	87.5	1011	1022	784	773
III	2395	2437	2039	2046.5	89	103.5	76	90.5	929	899	832	730
IV	2566	2472.5	2381.5	1996	158	131.5	122.5	91.5	954	966	805	776

Summary of Results.

Average Yield.	Ridged.	Simar and Ridged.	Simar and Flat.	Simar, flat and Simar.	Mean.	Standard Error.
Roots, tons per acre ...	22.67	22.80	20.12	18.02	20.90	0.50
Roots, per cent. ...	108.5	109.1	96.2	86.2	100.0	2.39
Tops, cwt. per acre ...	21.03	20.92	17.08	16.05	18.77	1.13
Tops, per cent. ...	112.0	111.4	91.0	85.5	100.0	6.03
Roots, number per acre	19560	19390	16620	15470	17760	338.8
Roots, number per cent.	110.1	109.2	93.6	87.1	100.0	1.91

Significant depression in both roots and tops in the case of the plots simared and left flat. A further significant depression with roots in the case of the doubly simared plots. These depressions are accounted for by the decreased numbers of plants.

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UNIFORMITY TRIAL.

Oats, Sawyers Field, 1927.

S.W.

Plot	A	B	C	D	E	F	G	H
6								
5								
4								
3								
2								
1								

Area of each plot: $\frac{1}{10}$ acre.

Area was dunged in 1926 for Swedes. No other manure.

Sown February 18-19. Harvested August 22, 23, 30.

Actual Weights in lb.

Plot.	A	B	C	D	E	F	G	H	Total.
Total Grain.									
6		274.5	265.375	289.0	282.125	290.375	271.0	261.5	1933.875
5	252.0	263.25	255.375	230.75	313.625	276.625	234.625	258.875	2085.125
4	229.25	249.875	250.375	242.0	310.500	280.625	255.25	229.125	2047.000
3	229.25	251.625	265.75	259.375	262.000	257.000	235.625	268.875	2029.500
2	207.25	244.625	238.0	231.375	215.250	262.875	237.25	225.25	1861.875
1	187.375	212.125	223.75	220.25	210.875	232.125	229.875	242.25	1758.625
Total	1105.125	1496.000	1498.625	1472.750	1594.375	1599.625	1463.625	1485.875	11716.000
Total Straw.									
6		259.5	234.0	272.0	259.0	288.0	255.0	282.5	1850.0
5	252.5	266.0	236.5	236.5	300.0	270.5	277.5	287.5	2127.0
4	241.5	256.0	237.0	237.5	256.5	284.0	250.5	259.5	2022.5
3	256.0	267.5	260.5	252.0	246.0	259.5	252.5	274.0	2068.0
2	248.5	273.0	238.0	228.0	218.0	269.5	257.0	261.0	1993.0
1	225.0	241.0	222.5	235.0	211.0	249.5	242.0	273.0	1899.0
Total	1223.5	1563.0	1428.5	1461.0	1490.5	1621.0	1534.5	1637.5	11959.5

Summary of Results.

	Grain.		Straw.	
	lb.	cwts.	lb.	cwts.
Average Yield per acre	2493	22.3	2545	22.7
Standard deviation	263.9	2.36	195.7	1.75
Standard deviation per cent. ...	10.6		7.7	

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WOBURN.

Barley : Effect of fertilisers on yield and quality.

Butt Close, 1928.

S.

A

N	N K	N P	O	N K P	K	K P	P	O	N K P	K P	K	N P	N	P	N K

B

C

N K	O	N	N K P	P	N P	K P	K	O	K	N P	N K P	N K	P	K P	N

D

SYSTEM OF REPLICATION : 4 randomised blocks of 8 plots each.

Area of plot : $\frac{1}{40}$ acre.

TREATMENTS :

O=No manure.

Sulphate of Ammonia (N) at the rate of 1 cwt. per acre ; Sulphate of Potash (K) at the rate of $1\frac{1}{2}$ cwt. per acre, and Superphosphate (P) at the rate of 3 cwt. per acre, in all combinations.

Manures applied April 19.

Barley sown, March 17 ; Harvested August 9.

VARIETY: "Spratt Archer."

Actual Weights in lb.—Total Grain.

Block.	O	P	N	K	NP	KP	NK	NKP
A	43.25	37.25	61.25	78.75	55.5	43.25	67.25	31.25
B	34.0	61.25	48.0	57.0	38.75	66.0	64.0	57.25
C	42.0	41.5	47.0	55.75	43.75	44.0	45.25	42.5
D	23.25	52.25	77.75	53.75	60.5	59.75	46.5	53.25

Actual Weights in lb.—Total Straw.

Block.	O	P	N	K	NP	KP	NK	NKP
A	59.75	54.0	86.0	93.25	80.75	56.0	94.5	44.75
B	45.75	62.0	55.75	60.75	54.5	79.5	81.0	71.0
C	67.0	52.75	75.5	73.75	70.75	59.0	77.75	65.0
D	40.25	55.5	80.0	68.5	86.0	63.75	54.0	68.5

Summary of Results.

Average Yield.	No Manure.	Super.	S/Amm.	S/Potash	S/Amm. + Super.	S/Potash + Super.	S/Am. + S/Potash	S/Am. + S/Potash + Super.	Mean.	Standard Error.
Grain, cwts. per acre ...	12.7	17.2	20.9	21.9	17.7	19.0	19.9	16.5	18.2	2.05
Grain, per cent.	69.8	94.2	114.7	120.2	97.3	104.4	109.3	90.3	100.0	11.26
Straw, cwts. per acre ...	19.0	20.0	26.5	26.5	26.1	23.1	27.4	22.3	23.9	2.31
Straw, per cent.	79.6	83.9	111.3	110.9	109.3	96.7	115.0	93.3	100.0	9.69
Per cent. Nitrogen in dry matter of grain	1.316	1.296	1.340	1.387	1.398	1.328	1.346	1.372	1.348	0.036

Significant interaction of the nitrogenous and potassic fertilisers. In the absence of one the other increased the yield significantly, but in the presence of one there was no effect due to the adding of the other. With straw there was a direct significant response to Sulphate of Ammonia.

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WOBURN.

Potatoes : Nitrogenous Fertilisers, Sulphate of Ammonia and Cyanamide, each in single and double dressings.

Lansome, 1926.

I	2C	1S	1C	0	2S
II	1S	1C	2C	2S	0
III	2S	2C	0	1C	1S
IV	0	2S	1S	2C	1C
V	1C	0	2S	1S	2C

VARIETY : King Edward.

SYSTEM OF REPLICATION : Latin Square.

Area of each plot 28 ft. × 31 ft. = $\frac{1}{50}$ acre.

TREATMENTS :

0 : Control.

1S : 1 cwt. Sulphate of Ammonia per acre.

2S : 2 cwt. Sulphate of Ammonia per acre.

1C : Single Cyanamide = 1 cwt. S/Amm.

2C : Double Cyanamide = 2 cwt. S/Amm.

All plots had a basal dressing of Farmyard Manure, Sulphate of Potash and Superphosphate, applied with S/Amm. in the bouts on May 10 ; 2C applied April 23 ; 1C on April 30. Dung carted and spread May 3-8.

Potatoes planted May 10-12 ; lifted October 11-12.

Actual Yields in lb.

Rows.	0	1C	1S	2C	2S
I	293	368	370	380	387
II	322	331	320	354	334
III	268	332	321	359	370
IV	292	298	322	347	347
V	282	298	321	295	322

Summary of Results.

Average Yield.	No Nitrogen.	Single Cyanamide	Single Sulphate.	Double Cyanamide	Double Sulphate.	Mean.	Standard Error.
Tons per acre	6.50	7.26	7.38	7.75	7.86	7.35	0.20
Per cent. ...	88.5	98.8	100.4	105.4	106.9	100.0	2.71

Significant response to nitrogen in both single and double dressings. The difference between Sulphate and Cyanamide is insignificant.

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WOBURN.

Potatoes : Effect of Superphosphate.

1927. Butt Close.
Variety: Arran Comrade.

1928. Stackyard.
Variety { Row I, Ally. Rows II, III and IV, Majestic.

S.

I	9	3	6	0
II	6	9	0	3
III	0	6	3	9
IV	3	0	9	6

N.W.

I	6	3	0	9
II	9	0	6	3
III	3	6	9	0
IV	0	9	3	6

System of Replication : 4×4 Latin Square. Area of each plot $\frac{1}{40}$ acre.

Treatments : Superphosphate at the rate of 0, 3, 6 and 9 cwts. per acre.

Basal Dressings—1927 : 10 tons F.Y.M. per acre.
1928 : 14 tons F.Y.M., 1½ cwts. Sulphate of Ammonia and 1½ cwts. Muriate of Potash per acre.

Artificial Manures applied { 1927 : June 15-16. 1928 : May 5-9.

Potatoes planted { 1927 : June 25. 1928 : May 5-9.

Potatoes lifted { 1927 : October 27-28. 1928 : October 24-26.

Actual Weights in lb.

Row.	1927				1928			
	0	3	6	9	0	3	6	9
I	234	231	257	245	713	716	691	779
II	259	244	208	239	708	776	894	837
III	217	245	221	205	743	712	773	867
IV	198	198	200	224	580	804	778	807

Summary of Results.

Year.	Average Yield.	Basal.	Basal +3 cwt. Super.	Basal +6 cwt. Super.	Basal +9 cwt. Super.	Mean.	Standard Error.
1927	Tons per acre	4.06	4.10	3.96	4.08	4.04	0.11
	Per cent. ...	100.2	101.3	97.8	100.7	100.0	2.62
1928	Tons per acre	12.25	13.43	14.00	14.69	13.59	0.27
	Per cent. ...	90.1	98.8	103.0	108.1	100.0	2.00

1927 : No response to Superphosphate on very low yields.
1928 : Significant response to Superphosphate.

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WOBURN.

Potatoes : Nitrogenous Fertilisers, Sulphate of Ammonia, Urea, Cyanamide, each in single and double dressings.

Lansome, 1927.

N.W.

A			B		
0(a)	1U	2S	0(a)	0(b)	2C
2U	1C	1S	0(c)	2U	2S
2C	0(b)	0(c)	1C	1S	1U
1S	2S	1U	2U	2C	0(a)
2U	2C	0(a)	1U	1C	1S
1C	0(b)	0(c)	2S	0(b)	0(c)
C			D		

VARIETY : King Edward.

SYSTEM OF REPLICATION : 4 randomised blocks.

Area of Plots : $\frac{1}{40}$ acre.

0 = Control.

1–2= Nitrogen at the rate of 1½ and 3 cwts. per acre, Sulphate of Ammonia or its equivalent, applied May 19-20.

S = Sulphate of Ammonia.

C = Cyanamide.

U = Urea.

All plots had basal dressing of 3 cwt. Super and 2 cwt. Mur/Pot. per acre applied May 19-20 ; also 10 tons dung per acre, applied May 9-13.
Potatoes planted May 23 ; lifted October 12-18.

Actual Yields in lb.

Block.	0(a)	0(b)	0(c)	1U	1C	1S	2U	2C	2S
A	410	432	411	436	426	399	407	424	362
B	361	361	369	374	376	436	382	352	332
C	372	361	338	399	380	456	381	371	418
D	355	327	289	376	362	315	383	361	329

Summary of Results.

Average Yield.	O	Single Urea.	Single Cyanamide	Single Sulphate.	Double Urea.	Double Cyanamide	Double Sulphate.	Mean.	Standard Error.
Tons per acre	6.53	7.08	6.89	7.17	6.93	6.73	6.43	6.76	0.249
Per cent. ...	96.6	104.7	102.0	106.1	102.6	99.6	95.2	100.0	3.69

Significant response to single dressing of Nitrogen. The double dressing of Urea and Cyanamide produced no further increase, while that of Sulphate of Ammonia reduced the yield.

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WOBURN.

Potatoes : Nitrogenous Fertilisers, Sulphate of Ammonia, Cyanamide (each with and without nitrate of soda), Nitrophoska, Compound " B."

Stackyard, 1928.

N.W.

A

15	16	2	13	9	10	1	17	5	12	4	8	3	6	14	11	18	7

B

17	3	14	13	18	11	6	15	2	1	10	12	7	8	5	9	4	6

C

6	10	3	2	18	7	12	9	1	5	15	4	11	8	13	17	16	14

D

17	3	14	1	6	16	15	5	12	9	4	2	7	8	13	11	18	10

VARIETY : Majestic. Block A sown with " Ally."
SYSTEM OF REPLICATION : 4 randomised blocks of 18 plots each.
AREA OF PLOT : $\frac{1}{40}$ acre.
TREATMENTS : Compound Fertiliser " B " and Nitrophoska equivalent to 1½ cwt. per acre Sulphate of Ammonia ; Sulphate of Ammonia and Cyanamide with and without Nitrate of Soda at the rate of 1½ cwt. S/Amm. or equivalent, together with Sulphate of Potash and Superphosphate* to raise to equivalence with compound fertilisers.

KEY TO TREATMENTS.

NITROGEN = 1½ cwt. S/Amm. Others in cwt. per acre

Treatment.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Nitrogen	"B"	Nitro-phoska.		Cyana-mide.		⅔ Cyanam. ⅓ Nit/Soda		Sulphate of Amm.		⅔ S/Amm. ⅓ Nit/Soda		"B"	Nitro-phoska.		No Nitrogen.			
Potash ...	–	–	¼	2	1¾	2	1¾	2	1¾	2	1¾	–	–	¼	2	2	1¾	1¾
Phosphate	–	–	¼	1	¾	1	¾	1	¾	1	¾	–	–	¼	1	1	¾	¾
Calcium Sulphate												=2P	=1¾P	=2P				

Plots 12 to 14 had Calcium Sulphate added equivalent to that in 2 and 1¾ cwt. Superphosphate as shown.
* Plots 16 and 18 had Phosphate in the form of Potassium Phosphate equivalent to that in Superphosphate.
All plots had 14 tons F.Y.M. per acre. Artificial manures applied May 5-9.
Potatoes planted May 5-9 ; lifted October 24-26.

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Actual Weights in lb.

Block.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	782	724	754	654	743	773	744	845	744	805	766	783	762	702	610	688	634	531
B	850	827	812	645	686	754	769	804	804	757	836	860	821	771	704	565	663	759
C	840	874	834	793	779	697	807	830	757	833	809	808	695	688	685	648	771	775
D	755	783	744	687	706	761	779	771	762	676	694	771	647	731	714	699	624	576
Average, tons per acre	14.4	14.3	14.0	12.4	13.0	13.3	13.8	14.5	13.7	13.7	13.9	14.4	13.1	12.9	12.1	11.6	12.0	11.8

Summary of Significant Results.

					With Potash and Phosphate equivalent to compound fertilisers.					
Average Yield.	No Nitrogen.	Nitro-phoska.	Standard Error(*a*).	Comp'nd "B."	Sulphate of Amm.	S/Am.+ Nit/Soda.	Cyana-mide.	Cyana.+ Nit/Soda.	Mean.	Standard Error(*b*).
Tons per acre	11.88	13.58	0.24	14.40	14.10	13.79	12.71	13.58	13.28	0.33
Per cent.	89.5	102.3	1.77	108.4	106.2	103.4	95.7	102.3	100.0	2.51

(*a*) Refers to means of 16 plots.
(*b*) Refers to means of 8 plots.

Significant response to Nitrogen except where Cyanamide was the only Nitrogenous Manure applied. No significant differences between the other nitrogenous fertilisers, or between the plots receiving Phosphate as a Calcium Salt and in other forms.

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WOBURN.

Sugar Beet : (a) Comparison of Nitrogenous Fertilisers : Sulphate and Muriate of Ammonia and Cyanamide.

(b) Preparation of Seed Bed.

Butt Close, 1927.

S.S.W.

R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F	R	F
2S	0C	0S	1S	1M	2C	0C	1S	1M	2C	2S	0M	2C	1S	0S	2M	1M	0M
0C	1C	1S	2M	2C	0M	1S	2M	2C	0S	0M	1C	1S	0C	2M	1C	0M	2S
1C	2S	2M	0S	0M	1M	2M	0C	0S	1M	1C	2S	0C	2C	1C	0S	2S	1M
		A						B						C			

QUANTITIES : Nitrogen at the rate of 0, 1, 2 cwt. per acre Sulphate of Ammonia or equivalent.

S = Sulphate of Ammonia.
M = Muriate of Ammonia.
C = Cyanamide.
R, F = Alternative Strips with ridged and flat seed bed.

SYSTEM OF REPLICATION : 3 randomised blocks of 18 plots each.

AREA OF EACH PLOT : $\frac{1}{40}$ acre.
Seed sown June 16. Pulled Jan. 5-13, 1928.

All plots received 3 cwt. Super. and 2 cwt. Muriate of Potash per acre, applied with other manures June 10-14. Dung applied February 22-24 (14 loads per acre). Ground chalk April 6 (1 ton per acre).

Actual weights in lb.

Blocks.		0C	0S	0M	1C	1S	1M	2C	2S	2M
ROOTS.										
A	R	100.5	67.5	90.0	95.0	79.0	79.0	114.5	125.0	95.5
	F	100.5	114.5	119.5	127.0	91.0	145.5	99.5	123.5	133.0
B	R	68.0	95.0	101.0	129.5	104.0	92.0	114.0	109.0	124.5
	F	101.5	147.0	148.5	163.5	102.0	143.5	154.5	156.0	126.5
C	R	126.5	135.5	162.0	150.5	131.5	134.5	136.0	171.0	184.0
	F	166.0	121.5	129.5	184.5	186.0	157.0	155.5	192.5	191.0
TOPS.										
A	R	185.0	117.0	164.0	170.0	125.0	131.0	216.0	241.0	192.0
	F	195.0	226.0	218.0	243.0	167.0	286.0	176.0	236.0	276.0
B	R	115.0	131.0	163.0	199.5	157.0	140.0	163.0	175.5	206.0
	F	132.0	229.0	245.0	294.0	179.0	228.0	299.5	262.0	216.0
C	R	181.0	238.0	274.0	211.0	243.0	217.0	234.0	255.0	262.0
	F	250.0	196.0	251.0	270.0	295.5	255.0	250.0	350.0	305.0

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(1) Summary of Results, Manuring Experiment.

ROOTS.

Quantity of Nitrogen.	Average Yield in Tons per acre.			Average Yield per cent.		
	Cyanamide.	Sulphate.	Muriate.	Cyanamide.	Sulphate.	Muriate.
0		2.60			91.1	
1	3.16	2.58	2.80	110.9	90.5	98.1
2	2.88	3.26	3.18	101.0	114.5	111.5
Standard Error		0.16			5.60	

TOPS.

Quantity of Nitrogen.	Average Yield in tons per acre.			Average Yield per cent.		
	Cyanamide.	Sulphate.	Muriate.	Cyanamide.	Sulphate.	Muriate.
0		4.35			90.5	
1	5.16	4.34	4.68	107.3	90.2	97.2
2	4.98	5.65	5.42	103.5	117.5	112.7
Standard Error		0.34			7.02	

(2) Summary of Results, Cultivation Experiment.

Average Yield.	Ridged.	Flat.	Mean.	Standard Error.
Roots, tons per acre	2.57	3.13	2.85	0.08
Roots, per cent. ...	90.3	109.7	100.0	2.77
Tops, tons per acre	4.22	5.40	4.81	0.17
Tops, per cent. ...	87.8	112.2	100.0	3.44

Well marked superiority of flat over ridged seed bed. Significant response to both single and double Nitrogen except in the case of the Sulphate plots (single dressing), while with Cyanamide there was a depression in yield with the higher dressing.

L

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WOBURN.

SUGAR BEET.

Nitrogenous Fertilisers : Sulphate of Ammonia } Each applied
Muriate of Ammonia } with seed.
Nitrochalk as top dressing.

Potassic Fertilisers : Muriate of Potash.
Potash Manure Salts.

Nitrophoska.

Butt Furlong, 1928.

S.

A	12	9	2	4	13	5	3	8	7	1	6	10	11
B	6	7	12	4	13	1	3	10	5	2	8	9	11
C	6	2	12	3	4	8	7	11	1	10	5	9	13
D	9	4	12	2	13	5	11	10	6	7	3	8	1
E	12	5	10	3	13	7	8	6	1	2	4	9	11
F	1	8	2	6	9	12	10	5	4	13	11	7	3

VARIETY : Dippe.

SYSTEM OF REPLICATION : 6 randomised blocks of 13 plots each.

Area of each plot : $\frac{1}{40}$ acre.

TREATMENTS : Sulphate and Muriate of Ammonia alone at the rate of 1½ cwt. S/Amm. per acre or equivalent, also at half this rate combined with equivalent Nitrochalk as Top Dressing. Muriate of Potash and Potash Manure Salts at the rate of 1 cwt. per acre M/Pot. or equivalent. Superphosphate at the rate of 1½ cwt. per acre. Nitrophoska equivalent to 1½ cwt. S/Amm. Basal Manure : 12 tons F.Y.M. per acre March 30–April 4. Artificial Manures applied May 22-23, except top dressing, which was applied July 5.

Seed sown, May 18 ; Roots lifted November 8-13.

Key to Treatments.

	Manure.	1	2	3	4	5	6	7	8	9	10	11	12	13
Potash=1 cwt. M/Pot. Nitrogen=1½ cwt. S/Am.	S/Amm. ...	×		×		×		×		×		×		
	M/Amm. ...		×		×		×		×		×		×	
	Nitro-chalk			×	×			×	×			×	×	
	M/Pot. ...	×	×	×	×									
	P.M.S. ...					×	×	×	×					
Super at 1½ cwt.		×	×	×	×	×	×	×	×	×	×	×	×	
Nitrophoska ...														×

Actual Weights in lb.—Roots.

Block.	1	2	3	4	5	6	7	8	9	10	11	12	13
A	799	861	799	885	785	760	812	820	930	761	789	901	901
B	735	763	649	861	654	881	890	729	726	623	726	881	864
C	772	912	828	861	784	830	811	841	701	735	737	895	757
D	689	911	746	873	880	803	759	752	817	802	872	890	902
E	739	713	957	720	869	717	871	881	708	879	730	911	952
F	806	891	699	764	738	881	663	924	800	815	781	833	764

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Actual Weights in lb.—Tops.

Block.	1	2	3	4	5	6	7	8	9	10	11	12	13
A	706	879	640	840	630	669	820	741	803	679	629	799	848
B	638	535	398	734	421	651	680	521	476	419	570	741	698
C	602	747	937	931	631	859	733	992	565	557	594	883	678
D	552	850	615	710	875	582	631	643	711	610	792	810	859
E	647	667	733	682	622	651	863	863	672	647	683	655	786
F	546	563	729	768	755	736	716	591	710	778	829	797	812

(1) Summary of Average Yields, Separate Treatments.

	Yield in tons per acre.	Sulphate of Ammonia.		Muriate of Ammonia.		Nitro-phoska.
		Top Dressing.	No Top Dressing.	Top Dressing.	No Top Dressing.	
Roots	Muriate of Potash	13.92	13.51	14.77	15.03	15.30
	Potash Manure Salts	14.30	14.02	14.72	14.50	
	No Potash ...	13.79	13.93	15.81	13.74	
Tops	Muriate of Potash...	12.06	10.99	13.88	12.62	13.93
	Potash Manure Salts	13.22	11.71	12.95	12.35	
	No Potash ...	12.19	11.72	13.94	10.98	
Sugar percentage in roots	Muriate of Potash...	18.37	17.80	17.85	17.68	17.63
	Potash Manure Salts	17.60	18.43	17.72	17.98	
	No Potash ...	18.70	17.97	17.72	18.33	

(2) Summary of Significant Results.

Average Yield.	Sulphate Amm.	Muriate Amm.	Sulphate+ Nitrochalk.	Muriate+ Nitrochalk.	Standard Error (*a*).	Nitro-phoska.	Standard Error (*b*).	Mean.
†Roots, tons per acre	13.82	14.42	14.00	15.10	0.32	15.30	0.55	14.41
Roots, per cent. ...	95.9	100.1	97.2	104.8	2.20	106.2	3.80	100.0
Tops, tons per acre	11.47	11.98	12.49	13.59	0.45	13.93	0.77	12.50
Tops, per cent. ...	91.8	95.8	99.9	108.7	3.56	111.4	6.17	100.0
*Sugar percentage ...	18.07	18.00	18.22	17.76	0.18*	17.63	0.31*	17.96

(*a*) Refers to means of 18 plots. (*b*) Refers to means of 6 plots.
* From 45 plots only.
† Roots weighed dirty. Approximately 20% should be subtracted for tare.

Muriate of Ammonia beats Sulphate of Ammonia significantly, while the response to top dressing is significant only in the case of tops. Nitrophoska plots appear to be better than the plots receiving all Nitrogen as basal. No significant differences in sugar content and no response to potash.

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WOBURN : OTHER EXPERIMENTS.

Mangolds and Potatoes : Nitrogenous Fertilisers, Sulphate of Ammonia and Muriate of Ammonia (one half at sowing, one half as top dressing), Muriate of Potash.

Mangolds, Warren Field. Potatoes, Lansome Field, 1926.

All plots received 9 tons F.Y.M. and 2 cwt. superphosphate per acre. Plots 1, 2 and 3 had in addition a basal dressing of 1 cwt. Sulphate of Potash, while Plots 4 and 5 had 2 cwt. Sulphate of Ammonia (one half at sowing, one half as top dressing). Area of each plot ¼ acre.

Plot Number	1	2	3	4	5
Additional Manuring per acre.	Muriate of Amm. equiv. to 2 cwt. S/Amm. ½ sowing, ½ top dressing.	No Nitrogen.	2 cwt. Sulphate of Ammonia, ½ sowing, ½ top dressing	No Potash.	Muriate of Potash equiv. to 1 cwt. Sulphate of Potash
Produce in tons per acre { Mangolds	23.28	17.96	21.8	23.49	23.91
Produce in tons per acre { Potatoes	6.19	5.38	6.07	5.61	6.30

Mangolds : Top Dressings, Sulphate of Ammonia, Nitrate of Soda, Salt.

Road Piece, 1927.

Area of each plot ¼ acre. Basal dressing : 3 cwt. superphosphate, 2 cwt. Kainit and 1 cwt. Sulphate of Ammonia per acre.

Plot Number. Manuring : per acre.	1 No Top Dressing.	2 1 cwt. Sulphate of Ammonia.	3 Nitrate of Soda equiv. to S/Am.	4 1 cwt. S/Amm. 3 cwt. Salt.	5 Nitrate of Soda equiv. to S/Am. 3 cwt. Salt.	6 3 cwt. Salt.
Produce of Roots in tons per acre	14.24	16.91	18.20	19.79	20.05	20.51

LUCERNE, INOCULATION OF.

Mill Dam Close, 1928.

Yield of Lucerne Hay per plot (.15 acre).

Inoculated.

Plot Number.	1	3	5	7	9	11	Total.	Average per acre, cwt.
Yield in lb.	714	658	602	553	644	602	3773	37.4

Not Inoculated.

Plot Number.	2	4	6	8	10	—	Total.	Average per acre, cwt.
Yield in lb.	532	658	504	420	476	—	2590	30.8

Difference in favour of the Inoculated Plots = 6.6 cwts. per acre.
Standard Error of this Difference = 2.6 cwts.
The yield of hay from the Inoculated Plots is significantly greater than that from the not-Inoculated Plots.

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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, 1926-1928.

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 lbs. P_2O_5 per acre in March, 1926.
No manures in 1927 or 1928.

Actual Weights in lb.

	1926				1927				1928			
Row.	C	L	M	H	C	L	M	H	C	L	M	H
I	1194	1187	1367	1583	499	649	963	871	336	621	584	722
II	1154	1230	1227	1224	449	606	735	780	389	420	537	813
III	1317	1439	1086	1523	554	752	809	904	513	522	677	599
IV	1450	1241	1488	1595	607	790	841	999	430	560	680	720

Summary of Results.

Year.	Average Yield in cwts. per acre.						Per Cent.					
	Control.	Low Soluble.	Medium Soluble.	High Soluble.	Mean.	Standard Error.	Control.	Low Soluble.	Medium Soluble.	High Soluble.	Mean.	Standard Error.
1926	45.7	45.5	46.1	52.9	47.6	2.56	96.0	95.7	97.0	111.2	100.0	5.38
1927	18.8	25.0	29.9	31.7	26.4	1.06	71.4	94.7	113.4	120.4	100.0	4.01
1928	14.9	19.0	22.1	25.5	20.4	0.92	73.1	93.1	108.6	125.1	100.0	4.52
Total	79.4	89.5	98.1	110.1	94.4	—	—	—	—	—	—	—

1926. Significant response to high soluble slag only.
1927. Significant progressive increases up to medium soluble slag. The high soluble produced no further increase.
1928. Significant response to all grades of slag, which range themselves in order of citric solubility.
1926-28. Large seasonal falling off in yield. Effect on yield is least with the low soluble slag and greatest with the high soluble.

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Grassland. Old Hay. Effect of Basic Slag.

(Basic Slag Committee.)

Mr. E. Habberfield, Home Farm, Enmore, Somerset, 1926-1928.

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%).
Slags applied at the rate of 100 lbs. P_2O_5 per acre in March, 1926.

Actual Weights in lb.

	1926				1927				1928			
Rows.	C	L	M	H	C	L	M	H	C	L	M	H
I	783	791	942	1149	837	685	906	995	223	244	321	377
II	804	1027	905	875	733	921	983	742	312	412	468	270
III	807	708	959	852	768	767	879	1046	308	304	416	355
IV	667	823	747	556	590	945	870	827	213	295	356	323

Summary of Results.

Year.	Average Yield per acre.						Per Cent.					
	Control.	Low Soluble.	Medium Soluble	High Soluble.	Mean.	Stand'rd Error.	Control.	Low Soluble.	Medium Soluble.	High Soluble.	Mean.	Stand'rd Error.
1926	27.3	29.9	31.7	30.6	29.9	2.15	91.4	100.0	106.1	102.5	100.0	7.20
1927	26.1	29.6	32.5	32.2	30.1	1.08	86.8	98.4	107.8	107.0	100.0	3.60
1928	9.4	11.2	13.9	11.8	11.6	0.86	81.3	96.6	120.1	102.0	100.0	7.38
Total	62.8	70.7	78.1	74.6	71.6	—	—	—	—	—	—	—

1926. No significant response to treatment.
1927. Significant progressive increase up to medium soluble slag. The high soluble produced no further increase in yield.
1928. Medium soluble slag gave significantly greater yield than the others, while all grades of slag did significantly better than Control.
1926-28. Poor yield in 1928. All grades of slag have improved the yield, but medium soluble slag has done rather better than high soluble.

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Basic Slag on Arable Land.

(Basic Slag Committee.)

Mr. Hyatt, Andoversford, Glos., 1926-27.

1926 : Swedes (fed off on land). Sown June 2.

1927 : Oats (carted and weighed green). Harvested September 6.

I	C	S	H	M	L
II	L	C	S	H	M
III	S	H	M	L	C
IV	M	L	C	S	H
V	H	M	L	C	S

Soil : Loam on limestone (Lower Oölite).
SYSTEM OF REPLICATION : Latin Square.
Area of each plot : $\frac{1}{25}$ acre.
TREATMENTS :
C = Control.
L = Low soluble slag (37.3%).
M = Medium soluble slag (60.9%).
H = High soluble slag (86.8%).
S = Superphosphate.
Rate : 100 lbs. P_2O_5 per acre, applied May, 1926.
Basal Manuring : F.Y.M. 12 loads per acre, 1 cwt. Sulphate of Ammonia and 1 cwt. Muriate of Potash per acre for Swedes in 1926. No further Manure applied in 1927.

Actual Weights in lb.

	1926					1927*				
Row.	C	L	M	H	S	C	L	M	H	S
I	724	923	1031	1067	1132	262	245	266	276	283
II	824	915	1037	1053	1123	300	295	284	311	303
III	745	881	977	886	1024	257	258	265	252	242
IV	683	722	879	947	1025	258	237	252	302	246
V	757	877	904	1035	929	262	290	256	264	267

Summary of Results.

	Average Yield.	Control.	Low Soluble.	Med. Soluble.	High Soluble.	Super-ph'sph'te	General Mean.	Standard Error.
1926	Per acre, tons ...	8.33	9.64	10.78	11.13	11.68	10.31	0.26
	Per cent. ...	80.8	93.5	104.5	108.0	113.3	100.0	2.53
1927	Grain, per acre, bush.	40.8	40.4	36.0	45.3	36.9	39.8	1.08
	Grain, per cent.	102.3	101.3	90.2	113.6	92.5	100.0	2.70*
	Straw, per acre, cwt.	15.8	15.2	14.9	17.5	14.8	15.7	0.42
	Straw, per cent. ...	101.1	97.2	95.1	111.8	94.7	100.0	2.70*

* The oats were carted and weighed green, but later samples were dried and threshed. From these the above yields of grain and straw were calculated, but the analysis of variance was performed on the original totals and the standard error thus obtained is appended as above to both grain and straw.

1926. Significant response to all grades of slag. Superphosphate plots did significantly better than medium and low soluble plots.

1927. Significant response to high soluble slag only.

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Basic Slag on Arable Land.

(Basic Slag Committee.)

Mr. Reeves, Matley Hyde, Stalybridge, Cheshire, 1926-28.

1926: Swedes (carted off). Roots and leaves weighed together. Sown May 19. Pulled November 9-13.

1927: Oats (cut as hay and weighed green). Harvested September 8.

1928: Seeds Hay. Cut June 22.

A	B	C	D
H	L	M	C
L	H	C	M
M	C	H	L
C	M	L	H

Block D was badly damaged by stray cow in 1927 and was not weighed. Remainder treated as 3 randomised blocks of 4 plots each.

Soil: Millstone grit.

System of Replication: Latin Square.

Area of each plot: .02875 acre.

Previous manuring: 2 tons per acre lime ashes (70.80% lime), 1 cwt. Sulphate of Ammonia and 4 cwts. Kainit per acre for oats in 1925.

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 lbs. P_2O_5 per acre in April, 1926. Basal Dressing: ½ cwt. Sulphate of Ammonia and ½ cwt. Muriate of Potash per acre in 1926.

No manure in 1927 or 1928.

Actual Weights in lb.

	1926				1927				1928			
Block.	C	L	M	H	C	L	M	H	C	L	M	H
A	1019	918	1298	1069	472	400	365	372	158	155	185	163
B	1271	1246	1422	1327	360	382	427	382	218	190	212	198
C	1166	1175	1232	1378	409	364	448	381	146	189	165	176
D	1143	1164	1123	1313	—	—	—	—	155	184	170	191

Summary of Results.

Average Yield.		Control.	Low Soluble.	Med. Soluble.	High Soluble.	General Mean.	Standard Error.
1926	Swedes.						
	Tons per acre	17.85	17.48	19.70	19.75	18.85	0.52
	Per cent. ...	95.5	93.5	105.4	105.6	100.0	2.78
1927	Green Oats.						
	Cwt. per acre	128.5	118.6	128.4	117.5	123.2	7.41
	Per cent. ...	104.2	96.3	104.2	95.4	100.0	6.01
1928	Seeds Hay.						
	Cwt. per acre	52.6	55.7	56.8	56.5	55.4	1.38
	Per cent. ...	94.9	100.6	102.6	102.0	100.0	2.49

1926. Medium and high soluble slags show significant superiority over low.
1927. No significant response.
1928. Evidence of response to slags, which only approaches significance in the case of the medium soluble slag.

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Potatoes : Effect of Sulphate of Ammonia and Sulphate of Potash, each in single and double dressings.

Mr. J. Luddington, Abbey Farm, Norfolk, 1928.

	A			B			C		
	N4 K0	N2 K0	N2 K4	N2 K0	N4 K2	N0 K0	N2 K0	N0 K4	N2 K2
	N0 K4	N2 K2	N4 K2	N4 K4	N4 K0	N2 K4	N2 K4	N4 K4	N0 K0
	N4 K4	N0 K0	N0 K2	N0 K2	N2 K2	N0 K4	N4 K0	N4 K2	N0 K2
	N2 K2	N0 K2	N4 K0	N2 K2	N4 K2	N4 K0	N4 K4	N2 K2	N0 K2
D	N4 K2	N2 K4	N0 K4	N2 K4	N2 K0	N0 K2	N0 K4	N2 K0	N2 K4 F
	N4 K4	N2 K0	N0 K0	N4 K4	N0 K0	N0 K4	N0 K0	N4 K0	N4 K2
	N0 K0	N0 K2	N4 K0	N2 K0	N2 K4	N4 K4	N0 K4	N2 K4	N4 K2
	N0 K4	N2 K0	N2 K2	N4 K2	N0 K2	N4 K0	N0 K0	N0 K2	N4 K0
	N4 K4	N4 K2	N2 K4	N2 K2	N0 K0	N0 K4	N2 K2	N2 K0	N4 K4
	G			H			J		

VARIETY : Majestic.

Soil : Black fen overlying clay.

SYSTEM OF REPLICATION : 9 randomised blocks of 9 plots each.

Area of each plot : $\frac{1}{80}$ acre.

TREATMENTS :

S/Amm. and S/Pot. at the rate of 0, 2 and 4 cwts. per acre, in all combinations.

Upper figure = amount of S/Amm.

Lower figure = amount of S/Pot.

Basal Manuring 4 cwt. Superphosphate per acre.

Manures applied : April 24.

Planted April 24 ; lifted October 1-2.

Actual Weights in lb.

Quantities of S/Amm.	Quantities of S/Pot.	A	B	C	D	E	F	G	H	J
0	0	157	230	201	246	226	203	286	181	201
0	2	215	219	233	184	209	254	217	162	192
0	4	258	267	209	192	197	217	187	288	180
2	0	329	250	295	270	271	379	254	276	254
2	2	261	301	289	257	281	269	232	228	230
2	4	263	374	180	259	312	240	239	240	204
4	0	273	323	222	271	311	172	300	313	276
4	2	309	286	244	299	327	297	308	286	260
4	4	268	238	265	289	314	248	258	283	306

(1) Summary of Average Yields.

Tons per acre.	No S/Amm.	2 cwt. S/Amm.	4 cwt. S/Amm.
No Potash ...	7.66	10.23	9.77
2 cwt. S/Pot....	7.48	9.32	10.38
4 cwt. S/Pot....	7.92	9.17	9.80

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Potatoes, Abbey Farm, Norfolk (cont.)

(2) Summary of Significant Results.

Average Yield.	No S/Amm.	2 cwt. S/Amm.	4 cwt. S/Amm.	Mean.	Standard Error.
Tons per acre	7.69	9.57	9.98	9.08	0.26
Per cent.	84.7	105.4	109.9	100.0	2.87

Significant response to nitrogenous manure only. Potash produced no additional effect.

Potatoes : Effect of Superphosphate.

Mr. J. H. L. Luddington, Abbey Farm, Norfolk, 1928.

I	8	4	0	2
II	0	2	8	4
III	2	0	4	8
IV	4	8	2	0

Soil : Black fen overlying clay.

VARIETY : Majestic, planted April 24 ; lifted October 1-2.

SYSTEM OF REPLICATION : Latin Square.

Area of each plot : $\frac{1}{32}$ acre.

TREATMENT : Superphosphate at the rate of 0, 2, 4 and 8 cwt. per acre. Basal Manuring : 2 cwts. S/Pot. and 2 cwt. S/Amm. per acre. Manures applied April 24.

Actual Weights in lb.

Rows.	0	2	4	8
I	651	706	743	866
II	520	740	780	901
III	505	674	744	813
IV	593	693	804	940

Summary of Results.

Average Yield.	No Super.	2 cwts. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre	8.10	10.05	10.97	12.57	10.42	0.33
Per cent. ...	77.8	96.4	105.2	120.6	100.0	3.21

Significant response to all applications of Superphosphate.

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Potatoes : Effect of Superphosphate.

Mr. G. Major, Newton Farm, Lincs., 1928.

I	0	2	8	4
II	4	0	2	8
III	8	4	0	2
IV	2	8	4	0

VARIETY : King Edward, planted April 9 ; lifted October 3-4.

SYSTEM OF REPLICATION : Latin Square.

Area of plot : $\frac{1}{32}$ acre.

TREATMENT : Superphosphate at the rate of 0, 2, 4 and 8 cwt. per acre ; Basal Manuring 4 cwt. S/Pot. and 4 cwt. S/Amm. per acre.

Manures applied April 9.

Actual Weights in lb.

Row.	0	2	4	8
I	1225	1259	1225	1271
II	1207	1197	1324	1169
III	1154	1159	1208	1287
IV	1168	1236	1156	1244

Summary of Results.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre	16.98	17.32	17.55	17.75	17.40	0.27
Per cent. ...	97.6	99.6	100.8	102.0	100.0	1.54

The response to Superphosphate is small, only the 8 cwt. showing significant increase over control.

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Sugar Beet : Comparison of Nitrogenous Fertilisers, Sulphate and Muriate of Ammonia.

Col. F. Wilson, Stanway Hall Farm, Colchester, 1927.

E.S.E.

I			II			III			IV		
B	A	C	B	C	A	C	B	A	A	C	B

TREATMENTS :
A = Control.
B = S/Amm. 2 cwt. with seed +1 cwt. Top Dressing per acre.
C = M/Amm. equivalent of S/Amm.
All plots had in addition a dressing of 3 cwts. Superphosphate. and 1½ cwt. Muriate of Potash per acre.

VARIETY : Klein Wanzleben.
SYSTEM OF REPLICATION : 4 randomised blocks.
AREA OF EACH PLOT : $\frac{1}{20}$ acre.

Basal Manures applied May 1.
Top dressing applied second week in June.
Seed sown first week of May.
No farmyard manure.
Soil : Light sandy loam.

Actual Weights in lb.

Blocks.	A	B	C
I	750	896	705
II	935	983	991
III	921	854	753
IV	1008	1033	988

Summary of Results.

Average Yield.	Control.	S/Amm.	M/Amm.	General Mean.	Standard Error.
Tons per acre ...	8.07	8.41	7.67	8.05	0.30
Per cent. ...	100.2	104.5	95.3	100.0	3.47

No significant response to either treatment.

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Sugar Beet : Comparison of Nitrogenous Fertilisers, Sulphate and Muriate of Ammonia, and Cyanamide.

Col. F. Wilson, Stanway Hall Farm, Colchester, 1928.

I	A	B	C	D	E
II	B	E	D	C	A
III	C	D	E	A	B
IV	D	A	B	E	C
V	E	C	A	B	D*

* This plot discarded and a value calculated for it from the other 24.

Soil : Light sandy loam.
VARIETY : Klein Wanzleben.
SYSTEM OF REPLICATION : Latin Square.
Area of each plot : $\frac{1}{40}$ acre.
A = Basal only, 4 cwt. Super and 2 cwt. S/Pot. per acre.
B = Basal+40 Nitrogen as Cyanamide+20 lb. as Nitrate of Soda with seed.
C = Basal+60 lb. of Nitrogen as Cyanamide.
D = Basal+60 lb. of Nitrogen as Muriate of Ammonia.
E = Basal+60 lb. of Nitrogen as Sulphate of Ammonia.
Cyanamide applied May 3. Other manures May 30-31.
Seed sown May 3. Lifted November 15.

Actual Yields in lb.

Row.	A	B	C	D	E
I	306	556	369	332	396
II	325	357	317	358	485
III	275	413	309	467	367
IV	453	389	335	418	324
V	346	397	572	464	503

Summary of Results.

Average Yield.	No Nitrogen.	Cyanamide Nit.Soda	Cyanamide alone.	M/Amm.	S/Amm.	General Mean.	Standard Error.
Tons per acre	6.09	7.54	6.79	7.28	7.41	7.00	0.26
Per cent.	86.7	107.4	96.7	103.7	105.5	100.0	3.74

Significant response to nitrogenous manures, except where all Nitrogen was applied as Cyanamide. This treatment was significantly below the mean of the others.

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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, 1928.

Latin Square : Plots $\frac{1}{40}$ acre. Soil : Light gravelly loam.

Basal Manuring : 8 tons F.Y.M. in Autumn of 1927, 2 cwt. Sulphate of Ammonia and 2 cwt. Sulphate of Potash per acre.

Average Yield.	No Superphosphate.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre	15.78	15.62	16.12	16.03	15.89	0.36
Per cent. ...	99.3	98.3	101.5	100.9	100.0	2.27

No evidence of response to Superphosphate.

Potatoes. Mr. E. Arden, Owmby, Cliff, Lincolnshire, 1928.

Latin square : Plots $\frac{1}{40}$ acre. Soil : Cliff Land (Oölitic Limestone).

Basal Manuring : 2 cwt. Sulphate of Ammonia, 2 cwt. Sulphate of Potash per acre. Manures applied April 23.

Average Yield.	No Superphosphate.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ...	8.18	6.79	7.73	7.25	7.49	0.27
Per cent. ...	109.2	90.6	103.3	96.8	100.0	3.66

Significant depression due to the application of Superphosphate.

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Sugar Beet. County School, Welshpool, Montgomeryshire, 1928.

Plots in triplicate : $\frac{1}{80}$ acre. Soil : School garden.

Basal Manuring : 10 tons F.Y.M. 3 cwt. Superphosphate, 1 cwt. Muriate of Potash per acre.

Manures applied May 10, except Nitrogenous, which were applied after singling (6 in. high) about June 20. Seed sown May 10. Lifted October 16.

Average Yield.	No Nitrogen.	Sulphate of Ammonia 2 cwt.	Muriate of Amm. = 2 cwt. Sulphate.	Mean.	Standard Error.
Roots, tons per acre ...	9.79	11.00	11.89	10.89	0.70
Roots, per cent. ...	89.8	101.0	109.2	100.0	6.45
Tops, tons per acre ...	14.00	18.90	20.67	17.86	1.00
Tops, per cent. ...	78.4	105.9	115.7	100.0	5.60

Significant response to Muriate with roots, and to Muriate and Sulphate with tops. The difference between the Sulphate and Muriate Plots is not significant.

Sugar Beet. South-Eastern Agricultural College, Wye, Kent, 1928.

Basal Manuring : 10 loads F.Y.M. in March, 4 cwt. Kainit (May 9) and 4 cwt. Superphosphate (May 19) per acre. Varieties : Dippe E and Strube's Green Top. Nitrogenous Manures applied May 19. Seed sown May 9. Roots lifted November 8. Plots in quadruplicate, each $\frac{1}{80}$ acre.

Average Yield in tons per acre.

Variety	No Nitrogen.	1 cwt. S/Amm.	Equiv. M/Amm.
Dippe	14.54	14.88	14.71
Strube	12.00	13.18	12.39

Sugar Percentage.

Variety.	No Nitrogen.	1 cwt. S/Amm.	Equiv. M/Amm.
Dippe	16.25	15.70	16.72
Strube	15.27	15.77	15.55