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Report for 1931

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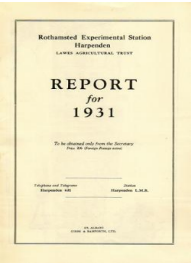
Rothamsted Experimental Station
Harpenden

REPORT
for
1931

Experiments at Outside Centres

Rothamsted Research

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REPLICATED EXPERIMENTS AT OUTSIDE CENTRES

Grassland. Meadow Hay.

(Basic Slag Committee).

W. Eydes, Esq., Walton Lodge Farm, Walton, Chesterfield, Derby, 1931. (DH-). Second Season.

Permanent grass.

I.	H —	L —	— M	— O	— S
II.	M —	H —	— O	S —	L —
III.	S —	O —	— L	M —	— H
IV.	— L	— M	— S	H —	O —
V.	O —	S —	— H	— L	— M

SYSTEM OF REPLICATION: 5x5 Latin Square, plots split for Potash.
AREA OF EACH WHOLE PLOT: 1/15 acre.
Soil: Clay 6 in. deep.
TREATMENTS:
O = No phosphate.
S = Superphosphate.
M = Mineral Phosphate.
L = Low Soluble Slag (Citric solubility 23.0%).
H = High soluble Slag (,, ,, 96.5%).
Muriate of Potash at the rate of 0.5 cwt. K_2O per acre applied to one out of each pair of sub-plots (indicated by the treatment symbol occurring on that half.)
Phosphatic dressings at the rate of 1 cwt. P_2O_5 per acre, applied March 18th.
Hay cut: July 27th.
Hay weighed: August 6-7th.

Actual weights in lb.—Dry Weights.

Row.	Without Muriate of Potash.					With Muriate of Potash.				
	O	S	M	L	H	O	S	M	L	H
I	76.7	94.4	86.3	102.5	104.7	88.5	106.9	98.8	104.7	117.2
II	97.3	108.4	117.2	97.3	107.6	99.5	112.8	123.1	101.0	120.9
III	113.9	111.7	112.1	115.6	107.6	117.2	126.2	120.9	116.1	120.9
IV	97.4	107.2	101.6	100.5	108.0	100.5	115.0	120.3	112.7	110.0
V	110.1	104.0	102.0	91.8	108.7	108.7	132.4	105.3	82.4	105.3

Summary of Results—Dry weights.

Average yield. cwt. per acre	No Phosphate	Mineral Phosphate.	Low Slag.	High Slag.	Super.	Mean.	Standard Error
Without Potash ..	26.5	27.8	27.2	28.8	28.2	27.7	0.789
With Potash	27.6	30.4	27.7	30.8	31.8	29.6	
Mean	27.0	29.1	27.4	29.8	30.0	28.7	0.658
Average yield. per cent.							
Without Potash ..	92.6	97.0	94.9	100.3	98.2	96.6	2.75
With Potash	96.1	106.2	96.6	107.3	110.8	103.4	
Mean	94.3	101.6	95.7	103.8	104.5	100.0	2.29

Significant response to mineral phosphate, to high soluble slag, and to superphosphate. The effect of potash is also significant.

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Grassland. Meadow Hay.

(Basic Slag Committee).

W. H. Limbrick, Esq., Badminton Farm, Badminton, Gloucester—1931. (GH-). Second Season.

I.	A / —	— / B	C / —	D / —	E / —
II.	D / —	— / C	— / E	B / —	A / —
III.	B / —	— / E	— / D	A / —	C / —
IV.	— / E	A / —	— / B	C / —	— / D
V.	— / C	D / —	A / —	— / E	— / B

Permanent grass.

SYSTEM OF REPLICATION: 5 × 5 Latin Square, plots split for Potash.

AREA OF EACH SUB-PLOT: 1/20th acre.

SOIL: Light red loam, 8 ins. deep.

TREATMENTS:

B = No phosphate.
A = Superphosphate.
D = Mineral Phosphate.
C = Low Soluble Slag (Citric solubility 23.0°/₀).
E = High Soluble Slag (,, ,, 96.5°/₀).

Half of each plot received 1 cwt. Muriate of Potash per acre, applied to one out of each pair of sub-plots (indicated by the treatment symbol occurring on that half).

Phosphatic dressings at the rate of 1 cwt. P_2O_5 per acre.

Hay cut: June 29th.

Hay weighed July 4th.

Actual weights in lb. (Green weights).

Row.	A	B	C	D	E	A	B	C	D	E
	With Muriate of Potash.					Without Muriate of Potash.				
I.	365.5	296.5	326.5	335.5	323.0	325.0	257.0	323.0	286.0	307.5
II.	303.0	321.0	327.5	304.5	389.5	323.0	336.5	300.5	337.0	358.0
III.	375.5	360.0	350.5	381.0	354.5	384 5	336.0	335.5	377.0	326.5
IV.	363.5	430.0	329.0	355.0	390.5	387.5	362.0	370.5	368.5	383.0
V.	448.5	426.5	350.0	378.5	434.0	413.5	347.5	351.0	386.5	398.5

Summary of Results (Dry weights).

Average yield cwt. per acre.	No Phosphate.	Mineral Phosphate.	Low Slag.	High Slag.	Super.	Mean.	Standard Error.
Without M/Pot	40.9	44.3	43.1	45.3	46.8	44.1	1.17
With M/Pot ..	45.3	43.1	43.4	47.9	47.1	45.4	
Mean	43.1	43.7	43.2	46.6	47.0	44.7	0.840
Average yield per cent.							
Without M/Pot	91.5	99.1	96.4	101.2	104.7	98.6	2.61
With M/Pot ..	101.3	96.3	96.9	107.2	105.3	101.4	
Mean	96.4	97.7	96.7	104.2	105.0	100.0	1.88

Significant response to high slag and to superphosphate. The response to muriate of potash is also significant. High slag and super are significantly superior to low slag but not to mineral phosphate.

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Barley: Effect of Nitrogenous Fertilisers, and of Sulphate of Potash and Superphosphate.

G. H. Nevile, Esq., Wellingore Hall, Lincs.—1931. (VB-).

Plan and Actual Weights.

Grain (dry weights) lb.								Straw (dry weights) lb.							
O	K	O	P	O	P	K	PK	O	K	O	P	O	P	K	PK
19.4	17.9	17.8	17.7	18.0	15.7	19.0	17.6	19.7	19.3	19.3	21.5	20.9	19.3	20.8	20.9
P	PK	K	PK	PK	K	P	O	P	PK	K	PK	PK	K	P	O
19.1	19.8	18.5	19.0	17.9	17.2	19.1	17.3	21.2	20.6	20.1	21.0	20.9	19.9	19.8	19.4
P	K	PK	O	P	K	K	P	P	K	PK	O	P	K	K	P
21.5	21.5	23.4	20.3	19.3	17.9	18.9	19.2	28.0	22.6	21.9	20.4	20.2	20.0	23.6	20.5
O	PK	K	P	PK	O	PK	O	O	PK	K	P	PK	O	PK	O
16.1	15.7	17.5	15.9	17.2	15.0	18.0	18.4	17.9	17.3	17.7	15.1	17.9	15.2	19.7	17.0
O	PK	P	O	P	K	P	K	O	PK	P	O	P	K	P	K
16.6	15.5	14.5	15.8	15.0	14.7	16.8	13.2	20.2	19.1	20.9	19.9	19.1	17.0	21.6	20.4
P	K	K	PK	PK	O	O	PK	P	K	K	PK	PK	O	O	PK
14.6	16.6	17.8	17.9	13.6	13.2	14.9	13.9	21.6	21.2	19.6	21.2	18.1	12.9	18.8	18.8
O	P	PK	K	K	PK	P	K	O	P	PK	K	K	PK	P	K
15.1	13.4	14.1	15.4	15.9	13.2	12.4	15.4	19.3	18.5	17.5	18.7	19.0	15.6	15.9	17.6
PK	K	O	P	P	O	O	PK	PK	K	O	P	P	O	O	PK
15.4	18.8	15.8	13.3	15.5	14.0	16.7	13.6	18.2	21.2	20.8	20.7	19.8	17.9	18.5	17.5

Straw computed by ratio of grain / total produce.

Plan showing Nitrogenous Treatments applied to whole plots.

O	S	N	C
S	O	C	N
N	C	O	S
C	N	S	O

SYSTEM OF REPLICATION: 4 × 4 Latin Square with plots sub-divided into 4.

AREA OF EACH WHOLE PLOT: 1/50th acre.

Soil: Light loam on Lincoln Heath.

Variety: Plumage Archer.

TREATMENTS:

O = No Nitrogen.
C = Cyanamide.
N = Nitrate of Soda.
S = Sulphate of Ammonia.
} at the rate of 0.2 cwt. N per acre.

Plots sub-divided to receive no Potash or Superphosphate (O), Sulphate of Potash (K), at the rate of 0.6 cwt. K_2O per acre, Superphosphate (P) at the rate of 0.4 cwt. P_2O_5 per acre, and Sulphate of Potash and Superphosphate (PK).

Plots harvested by sampling method.

Manures applied: March 27th.

Barley sown: March 27th.

Barley harvested: September 2nd.

Previous Crop: Oats.

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Summary of Results.

Average yield	Cwt. per acre					Per cent.				
	No Nitrogen	Sulph./ Amm.	Nitrate of Soda	Cyana-mide	Mean	No Nitrogen	Sulph./ Amm.	Nitrate of Soda	Cyana-mide	Mean
Grain—										
No Potash or Super...	31.1	28.0	30.7	28.2	29.5	104.1	94.0	102.9	94.6	98.9
Sulphate of Potash ..	29.2	30.8	30.4	32.8	30.8	98.0	103.4	101.9	110.0	103.3
Superphosphate ..	27.9	31.9	28.0	29.6	29.4	93.4	107.0	94.0	99.2	98.4
Potash and Super. ..	31.4	27.6	29.2	30.4	29.7	105.3	92.5	98.0	101.9	99.4
Mean	29.9	29.6	29.6	30.3	29.8	100.2	99.2	99.2	101.4	100.0
Straw—										
No Potash or Super.	31.9	33.0	35.2	33.0	33.3	91.8	94.8	101.2	94.7	95.6
Sulphate of Potash ..	32.0	36.6	37.2	36.4	35.6	91.9	105.4	107.0	104.7	102.2
Superphosphate ..	31.8	40.6	36.6	35.4	36.1	91.5	116.6	105.4	101.9	103.8
Potash and Super. ..	34.9	32.5	34.5	34.9	34.2	100.2	93.3	99.1	100.4	98.2
Mean	32.6	35.7	35.9	34.9	34.8	93.8	102.5	103.2	100.4	100.0

Standard Errors : Comparisons involving	Grain. cwt. per acre.	Grain. per cent.	Straw. cwt. per acre.	Straw. per cent.
Sub-treatments only, over a single main treatment	1.43 or	4.79	1.71 or	4.92
Sub-treatments only, over all main treatments	0.714 or	2.39	0.857 or	2.46
Main treatments, over a single sub-treatment	1.35 or	4.52	1.55 or	4.47
Main treatments, over the mean of all sub-treatments	0.531 or	1.78	0.460 or	1.32

The response to nitrogen by the straw is significant, but the grain shows no such response. There is no significant difference between the different forms of nitrogen. The superphosphate and potash produce no significant effects.

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Barley: Effect of Nitrogenous Fertilisers, and of Sulphate of Potash and Superphosphate.

H. B. Bescoby, Esq., South-Eastern Agricultural College, Wye, Kent—1931. (ZB-).

Plan and Actual Weights in grammes per sample.

Grain								Straw							
P	PK	P	PK	K	P	P	O	P	PK	P	PK	K	P	P	O
518	533	456	502	544	526	461	398	570	623	429	438	601	568	448	406
O	K	K	O	O	PK	K	PK	O	K	K	O	O	PK	K	PK
473	486	467	485	530	494	504	424	457	520	470	473	536	523	509	399
P	K	O	PK	K	P	P	K	P	K	O	PK	K	P	P	K
474	417	528	484	420	407	424	463	493	395	576	502	417	399	396	465
O	PK	K	P	PK	O	PK	O	O	PK	K	P	PK	O	PK	O
484	454	526	464	367	353	354	414	488	470	589	563	323	371	343	431
K	P	O	PK	O	K	O	PK	K	P	O	PK	O	K	O	PK
418	438	415	496	420	414	466	505	414	432	434	528	433	398	555	547
O	PK	P	K	P	PK	P	K	O	PK	P	K	P	PK	P	K
365	426	490	427	450	426	551	477	335	413	500	402	476	433	682	547
O	PK	PK	P	O	P	K	P	O	PK	PK	P	O	P	K	P
478	422	438	377	462	458	406	505	487	425	431	339	470	482	418	588
K	P	K	O	PK	K	O	PK	K	P	K	O	PK	K	O	PK
446	428	396	362	476	463	446	453	477	403	370	350	528	485	463	462

Plan showing Nitrogenous Treatments applied to whole plots.

N	C	S	O
S	N	O	C
O	S	C	N
C	O	N	S

SYSTEM OF REPLICATION: 4 × 4 Latin Square with plots sub-divided into 4.

AREA OF EACH WHOLE PLOT: 1/50th acre.

Soil: Silty Loam.

Variety: Plumage Archer.

TREATMENTS:

O = No Nitrogen.
C = Cyanamide.
N = Nitrate of Soda.
S = Sulphateof Ammonia
} at the rate of 0.2 cwt. N per acre.

Plots sub-divided to receive no Potash or Superphosphate (O), Sulphate of Potash (K) at the rate of 0.6 cwt. K_2O per acre, Superphosphate (P) at the rate of 0.4 cwt. P_2O_5 per acre, and Sulphate of Potash and Superphosphate (PK).

Plots harvested by sampling method.

Manures applied: March 26th.

Barley sown: March 26th.

Harvested: August 14th.

Previous Crop: Barley.

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Summary of Results.

Average yield	Cwt. per acre					Per cent.				
	No Nitrogen	Sulph./ Amm.	Nitrate of Soda	Cyana-mide	Mean	No Nitrogen	Sulph./ Amm.	Nitrate of Soda	Cyana-mide	Mean
Grain.										
No Potash or Super...	18.4	23.3	24.0	22.4	22.0	81.4	103.3	106.3	99.0	97.5
Sulphate of Potash ..	21.6	22.3	24.3	22.3	22.6	95.8	98.9	107.6	98.6	100.2
Superphosphate ..	20.9	24.8	24.8	21.9	23.1	92.7	109.9	109.7	96.9	102.3
Potash and Super. ..	20.6	23.6	24.9	21.2	22.6	91.2	104.5	110.1	93.9	99.9
Mean	20.4	23.5	24.5	21.9	22.6	90.3	104.2	108.4	97.1	100.0
Straw.										
No Potash or Super.	18.2	23.9	25.6	22.7	22.6	78.2	102.8	110.1	97.6	97.2
Sulphate of Potash ..	21.3	22.6	26.6	22.5	23.3	91.5	97.2	114.6	96.9	100.0
Superphosphate ..	20.1	26.7	28.6	21.2	24.2	86.6	115.0	122.9	91.2	103.9
Potash and Super. ..	19.5	24.7	27.4	20.4	23.0	83.8	106.1	117.7	87.7	98.8
Mean	19.8	24.5	27.0	21.7	23.2	85.0	105.3	116.3	93.3	100.0

Standard Errors : comparisons involving	Grain. cwt. per acre.	Grain. per cent.	Straw. cwt. per acre.	Straw. per cent.
Sub-treatments only, over a single main treatment	0.754 or	3.34	1.140 or	4.92
Sub-treatments only, over all main treatments	0.377 or	1.67	0.570 or	2.46
Main treatments over a single sub-treatment	0.822 or	3.64	1.319 or	5.69
Main treatments over the mean of all sub-treatments	0.499 or	2.21	0.876 or	3.78

The response to nitrogen is definitely significant, the sulphate of ammonia and nitrate of soda being significantly superior to the cyanamide, both on grain and straw. There are no other significant effects.

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Barley: Effect of Nitrogenous Fertilisers, and of Sulphate of Potash and Superphosphate.

J. M. Templeton, Esq., Sparsholt Farm Institute—1931. (SB-).

Plan, and actual weights in grammes per sample.

Grain								Straw							
P 314	PK 323	P 283	K 316	O 288	PK 280	O 284	K 262	P 697	PK 467	P 405	K 586	O 474	PK 381	O 459	K 410
K 297	O 305	O 339	PK 345	K 338	P 297	P 299	PK 317	K 460	O 385	O 550	PK 537	K 471	P 460	P 484	PK 425
PK 406	K 380	PK 337	O 256	O 338	PK 316	PK 328	O 355	PK 633	K 577	PK 388	O 384	O 565	PK 474	PK 449	O 559
O 380	P 384	K 331	P 285	P 313	K 355	K 322	P 362	O 545	P 555	K 481	P 414	P 512	K 581	K 526	P 566
P 344	O 385	O 392	K 336	PK 388	P 367	PK 316	K 352	P 626	O 628	O 687	K 544	PK 748	P 585	PK 486	K 505
PK 457	K 423	P 373	PK 382	K 346	O 326	P 344	O 374	PK 812	K 712	P 572	PK 661	K 633	O 615	P 549	O 800
K 401	O 339	O 359	PK 338	P 358	K 393	O 367	K 367	K 767	O 598	O 618	PK 630	P 517	K 631	O 677	K 669
P 354	PK 347	K 378	P 356	PK 384	O 315	PK 368	P 397	P 694	PK 685	K 618	P 548	PK 661	O 587	PK 705	P 779

System of Replication: 4 × 4 Latin Square, with plots sub-divided into 4.
Area of Each Whole Plot: 1/50th acre.
Soil: Flinty loam on chalk.
Variety: Plumage Archer.
Treatments:
O = No Nitrogen.
C = Cyanamide.
N = Nitrate of Soda
S = Sulphate of Ammonia
} At the rate of 0.2 cwt. N per acre.

Plan showing Nitrogenous Treatments applied to whole plots.

O	N	S	C
S	O	C	N
C	S	N	O
N	C	O	S

Plots sub-divided to receive no Potash or Superphosphate (O), Sulphate of Potash (K) at the rate of 0.6 cwt. K_2O per acre, Superphosphate (P) at the rate of 0.4 cwt. P_2O_5 per acre, and Sulphate of Potash and Superphosphate (PK).

Plots harvested by sampling method.

Manures applied: April 17th. Harvested: August 20th-21st.

Barley sown: April 17th. Previous crop: Oats and Vetches.

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Summary of Results.

Average yield	Cwt. per acre					Per cent.				
	No Nitrogen	Sulph./ Amm.	Nitrate of Soda	Cyana-mide	Mean	No Nitrogen	Sulph./ Amm.	Nitrate of Soda	Cyana-mide	Mean
Grain—										
No Potash or Super	15.6	17.8	16.9	17.0	16.8	90.6	103.5	98.6	99.1	97.9
Sulphate of Potash	17.1	17.7	17.2	17.6	17.4	99.6	103.0	100.4	102.8	101.5
Superphosphate ..	16.2	18.0	17.0	16.3	16.9	94.4	105.2	99.1	95.2	98.4
Potash and Super ..	16.9	17.9	17.5	17.8	17.5	98.6	104.1	102.1	103.6	102.1
Mean	16.4	17.8	17.2	17.2	17.2	95.8	104.0	100.0	100.2	100.0
Straw—										
No Potash or Super	26.8	29.6	28.9	28.2	28.4	94.8	104.7	102.0	99.8	100.3
Sulphate of Potash	25.8	28.1	31.2	28.9	28.5	91.3	99.4	110.4	102.0	100.8
Superphosphate ..	27.1	29.4	28.0	27.0	27.9	95.7	104.0	98.9	95.4	98.5
Potash and Super ..	24.9	29.6	30.1	29.1	28.4	88.0	104.6	106.3	102.9	100.4
Mean	26.2	29.2	29.6	28.3	28.3	92.4	103.2	104.4	100.0	100.0

Standard Errors : comparisons involving :	Grain. cwt. per acre.	Grain. per cent.	Straw. cwt. per acre.	Straw. per cent.
Subtreatments only, over a single main treatment	0.704	4.10	2.04	7.20
Subtreatments only, over all main treatments	0.352	2.05	1.02	3.60
Main treatments, over a single sub-treatment	0.789	4.60	2.04	7.22
Main treatments, over the mean of all sub-treatments	0.501	2.92	1.02	3.62

The straw, but not the grain, shows a significant response to nitrogen, without any difference between the different forms. The response of the grain to potash is not significant, and there are no superphosphate effects.

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Potatoes: Effect of Superphosphate and Sulphate of Ammonia. G. Major, Esq., Newton Farm, Wisbech—1931.

IV.	III.	II.	I.
— / 0	— / 2½	— / 5	10 / —
2½ / —	— / 0	10 / —	5 / —
— / 5	10 / —	— / 0	2½ / —
10 / —	5 / —	— / 2½	— / 0

SYSTEM OF REPLICATION: 4×4 Latin Square, with split plots.
AREA OF EACH WHOLE PLOT: 1/35th acre.
Soil: Deep silt.
Variety: Yorkshire King Edwards.
TREATMENTS: Superphosphate at the rate of 0, 2½, 5 and 10 cwt. per acre, and half of each plot received in addition 2 cwt. Sulphate of Ammonia per acre as single and double dressing. Double Sulphate of Ammonia is indicated by the treatment symbol occurring on that half.
All plots received 4 cwt. Sulphate of Potash and 2 cwt. Sulphate of Ammonia per acre.
Manures applied: April 14th.
Land dunged in autumn of 1930.
Potatoes planted: April 16th.
Potatoes lifted: September 22nd.
Previous crop: Wheat.

Actual weights in lb.

Column	Single Sulphate of Ammonia.				Double Sulphate of Ammonia.			
	0	2½	5	10	0	2½	5	10
I.	353	365	405	363	431	392	369	413
II.	332	351	389	385	348	377	333	355
III.	322	366	349	340	312	356	338	285
IV.	397	371	298	362	366	381	363	360

Summary of Results.

Average yield. (Clean Weights.)	Tons per acre.					Per Cent.				
	No Super.	2½ cwt. Super.	5 cwt. Super.	10 cwt. Super.	Mean.	No Super.	2½ cwt. Super.	5 cwt. Super.	10 cwt. Super.	Mean.
Single S/Amm. ..	10.97	11.35	11.26	11.33	11.23	97.4	100.8	100.0	100.6	99.7
Double S/Amm. ..	11.38	11.76	10.96	11.04	11.29	101.1	104.5	97.4	98.1	100.3
Mean	11.18	11.56	11.11	11.18	11.26	99.3	102.7	98.7	99.3	100.0

Standard Error of Single treatments = 0.386 or 3.43 per cent.
Standard Error Mean of Single and Double S/Amm. = 0.192 or 1.70 per cent.

No significant effects.

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

A. W. Oldershaw, Esq., County Organiser, Tunstall, Suffolk, 1931.

N	NK	NPK	I.
ICI	NP	O	
O	NPK	NK	II.
ICI	NP	N	
N	NPK	NK	III.
NP	O	ICI	
NPK	NP	NK	IV.
O	ICI	N	
NPK	NK	O	V.
N	ICI	NP	
NP	O	NPK	VI.
N	ICI	NK	

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

AREA OF EACH PLOT: 1/85th acre.

Soil: Light sand, very poor.

Variety: Great Scott.

TREATMENTS: I.C.I. complete Fertiliser and Sulphate of Ammonia at the rate of 0.6 cwt. N per acre, Sulphate of Potash at the rate of 1.21 cwt. K_2O per acre and Super at the rate of 0.63 cwt. P_2O_5 per acre. The I.C.I. fertiliser contained N, 10.3 per cent.; P_2O_5, 10.8 per cent.; K_2O, 20.7 per cent.

Blocks 1-3 are on chalked land, blocks 4-6 on unchalked land. The chalked area received 5 tons per acre of lump chalk during winter 1925-6.

Manures applied: April 21st.

Potatoes planted: April 22nd.

Potatoes lifted: October 7th.

Previous crop: Buck wheat.

Actual weights in lb.

Block.	O	N	NP	NK	NPK	I.C.I.
I.	177	286	311	280	312	331
II.	185	278	294	292	322	323
III.	182	258	266	284	319	313
IV.	172	257	297	219	289	334
V.	193	253	291	233	328	319
VI.	214	218	284	259	313	325

Summary of Results.

Average yield	No Nitrogen	S/Amm.	S/Amm. + S/Potash	S/Amm. + Super.	S/Amm. + Super. + S/Potash	I.C.I. Mixture	Mean	S. Error
Tons per acre ..	7.10	9.80	9.91	11.02	11.91	12.30	10.34	0.286
Per cent. ..	68.7	94.8	95.8	106.6	115.2	118.9	100.0	2.77

Definitely significant response to nitrogen. A significant improvement is produced by superphosphate. The difference between the I.C.I. mixture and the balanced dressing is not significant. The chalked half of the field has not given markedly different results from the unchalked.

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

H. Inskip, Esq., Stanford, Biggleswade, 1931.

C			A		
2S 1K —	— 2S 2K	— 1S 2K	— 2S 0K	0S 1K —	1S 1K —
1S 0K —	— 1S 1K	0S 0K —	— 0S 0K	— 1S 2K	— 1S 0K
2S 0K —	0S 1K —	0S 2K —	— 2S 2K	— 2S 1K	0S 2K —
— 0S 1K	— 0S 2K	2S 2K —	— 2S 0K	— 0S 1K	— 2S 2K
— 1S 2K	— 0S 0K	— 1S 0K	1S 2K —	— 2S 1K	0S 2K —
— 2S 1K	2S 0K —	1S 1K —	0S 0K —	1S 1K —	— 1S 0K
D			B		

SYSTEM OF REPLICATION: 4 randomised blocks, each of 9 plots. split for superphosphate.

AREA OF EACH PLOT; 1/100th acre.

Soil: Light gravel.

Variety: Arran Banner.

TREATMENTS: Sulphate of Ammonia (S) at the rate of 0.3 and 0.6 cwt. N per acre, Sulphate of Potash (K) at the rate of 0.75 and 1.5 cwt. K_2O per acre. Superphosphate at the rate of 0.4 cwt. P_2O_5 per acre applied to one out of each pair of sub-plots (indicated by the treatment symbol occurring on that half).

Manures applied: April 13th.

Potatoes planted: April 14th

Potatoes lifted: September 18th-19th.

Previous crop: Sprouts.

Actual weights in lb. (dirty)

Block.	With Superphosphate.								
	0-0	0-1	0-2	1-0	1-1	1-2	2-0	2-1	2-2
A	256	254	201	266	241	288	280	287	275
B	213	238	177	239	247	236	251	224	246
C	259	252	261	250	271	285	252	292	271
D	211	228	221	217	269	262	272	256	267
	Without Superphosphate.								
A	261	245	207	247	250	286	270	304	282
B	182	219	213	218	220	244	265	280	254
C	255	237	240	246	250	285	274	300	295
D	222	231	248	250	234	273	236	263	248

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Summary of Results.

Clean weights		Average yield tons per acre.				Average yield per cent.			
		No Potash.	Single Potash.	Double Potash.	Mean.	No Potash.	Single Potash.	Double Potash.	Mean.
Without Super	No S/Am.	9.81	9.94	9.68	9.81	91.8	92.9	90.6	91.8
	Single S/Am.	10.25	10.17	11.60	10.67	95.8	95.1	108.5	99.8
	Double S/Am.	11.14	12.23	11.50	11.63	104.2	114.4	107.6	108.7
	Mean	10.40	10.78	10.93	10.70	97.3	100.8	102.2	100.1
With Super	No S/Am.	10.01	10.36	9.17	9.85	93.6	96.9	85.8	92.1
	Single S/Am.	10.36	10.96	11.42	10.91	96.9	102.5	106.8	102.1
	Double S/Am.	11.25	11.29	11.29	11.28	105.2	105.6	105.6	105.5
	Mean	10.54	10.87	10.63	10.68	98.6	101.7	99.4	99.9

Standard Error = 0.336 tons or 3.14 per cent.

Mean of Superphosphate and No Superphosphate.

Clean weights	Average yield tons per acre.				Average yield per cent.			
	No Potash.	Single Potash.	Double Potash.	Mean.	No Potash.	Single Potash.	Double Potash.	Mean.
No S/Amm.	9.91	10.15	9.43	9.83	92.7	94.9	88.2	91.9
Single S/Amm.	10.31	10.57	11.51	10.80	96.4	98.8	107.7	101.0
Double S/Amm.	11.20	11.76	11.40	11.45	104.7	110.0	106.6	107.1

Standard Error = 0.259 tons or 2.42 per cent.

The response to sulphate of ammonia is definitely significant. There is a significant response to sulphate of potash in the presence of sulphate of ammonia. No response to superphosphate. The depression of yield shown by superphosphate at the higher levels of nitrogen and potash is not significant.

M

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

R. Starling, Esq., Northfield Farm, Little Downham, Ely, 1931.

C			A		
1P 2K —	1P 0K —	— 2P 0K	— 0P 0K	— 2P 1K	1P 1K —
— 0P 0K	— 2P 2K	— 0P 2K	2P 2K —	1P 2K —	— 1P 0K
— 0P 1K	2P 1K —	1P 1K —	— 2P 0K	— 0P 2K	— 0P 1K
— 1P 1K	2P 0K —	— 2P 2K	— 0P 1K	1P 0K —	— 2P 2K
0P 0K —	— 1P 2K	2P 1K —	1P 2K —	— 2P 1K	2P 0K —
0P 2K —	0P 1K —	— 1P 0K	— 1P 1K	— 0P 0K	— 0P 2K
D			B		

System of Replication: 4 randomised blocks, each of 9 plots, split for Nitrogen.

Area of Each Sub-Plot: 1/100th acre.

Soil: Black Fen.

Variety: Majestic.

Potatoes planted: April 6th.

Potatoes lifted: October 7th-8th.

Previous crop: Oats.

Treatments: Superphosphate (P) at the rate of 0, 5 and 10 cwt. per acre, Sulphate of Potash (K) at the rate of 0, 2 and 4 cwt. per acre. Sulphate of Ammonia at the rate of 0.4 cwt. N per acre, applied to one out of each pair of sub-plots indicated by the treatment symbol occurring on that half.

Manures applied: April 2nd.

Actual weights in lb.

Block.	With Sulphate of Ammonia.								
	0-0	0-1	0-2	1-0	1-1	1-2	2-0	2-1	2-2
A	175	173	239	205	232	230	224	277	229
B	203	167	170	256	224	208	243	283	252
C	213	217	189	261	201	256	266	254	284
D	144	160	163	210	223	207	258	241	238
	Without Sulphate of Ammonia.								
A	194	146	188	158	176	204	177	263	214
B	196	134	146	213	173	178	196	223	188
C	209	185	171	185	195	231	245	230	241
D	122	101	144	149	211	155	193	242	179

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Summary of Results.

		Average yield in tons per acre.				Average yield per cent.			
		No Super	Single Super	Double Super	Mean.	No Super.	Single Super.	Double Super.	Mean.
Without S/Amm.	No Potash	8.05	7.87	9.05	8.32	88.1	86.2	99.1	91.1
	Single Potash	6.32	8.43	10.69	8.48	69.2	92.3	117.1	92.8
	Double Potash	7.24	8.57	9.17	8.33	79.3	93.8	100.4	91.2
	Mean	7.20	8.29	9.64	8.38	78.9	90.8	105.5	91.7
With S/Amm.	No Potash	8.20	10.40	11.06	9.89	89.8	113.9	121.1	108.3
	Single Potash	8.00	9.82	11.77	9.87	87.6	107.5	128.9	108.0
	Double Potash	8.49	10.06	11.19	9.91	93.0	110.1	122.6	108.6
	Mean	8.23	10.09	11.34	9.89	90.1	110.5	124.2	108.3
Mean of no S/Amm. and S/Amm.		7.72	9.19	10.49	9.13	84.5	100.6	114.9	100.0

Standard Error = 0.512 tons or 5.61 per cent.

The response to superphosphate and to sulphate of ammonia are definitely significant. The lower yields of the plots receiving potash only are statistically significant, and there is some evidence that the sulphate of ammonia is more effective in the presence of superphosphate.

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Potatoes: Effect of Sulphate of Potash and Superphosphate.

J. A. Tribe, Esq., Willow Farm, Nr. March, 1931.

N	O	N	O	O	N
0P 1K	2P 0K	0P 0K	1P 0K	1P 1K	2P 1K
1P 1K	0P 0K	2P 1K	2P 0K	1P 0K	0P 1K
1P 0K	0P 1K	2P 0K	2P 1K	0P 0K	1P 1K
2P 1K	1P 1K	1P 0K	0P 1K	2P 0K	0P 0K
2P 0K	2P 1K	1P 1K	0P 0K	0P 1K	1P 0K
0P 0K	1P 0K	0P 1K	1P 1K	2P 1K	2P 0K
1	2	3	4	5	6

SYSTEM OF REPLICATION: 6 × 6 Latin Square.
AREA OF EACH PLOT: 1/70th acre.
Soil: Poor Fenland.
Variety: Arran Chief.
TREATMENTS: Superphosphate (P) at the rate of 0, 5 and 10 cwt. per acre, Sulphate of Potash (K) at the rate of 0 and 2 cwt. per acre, Sulphate of Ammonia at the rate of 0.4 cwt. N per acre.
Manures applied: April 9th.
Potatoes planted: April 13th.
Potatoes lifted: October 22nd.
Previous crop: Wheat.

Actual weights in lb.

Column.		0-0	0-1	1-0	1-1	2-0	2-1
1 and 2	No Nitrogen ..	134	155	228	184	187	233
	Nitrogen	196	186	198	213	245	233
3 and 4	No Nitrogen ..	248	234	222	255	265	290
	Nitrogen	208	242	218	282	272	296
5 and 6	No Nitrogen ..	261	247	250	296	248	273
	Nitrogen	239	253	303	310	294	331

Summary of Results.

Average yield corrected for dirt tare.	Tons per acre.				Per cent.			
	No Super.	Single Super.	Double Super.	Mean.	No Super.	Single Super.	Double Super.	Mean.
No Potash ..	6.38	7.04	7.50	6.97	88.4	97.5	103.9	96.6
Potash	6.53	7.64	8.21	7.46	90.5	105.8	113.8	103.4
Mean	6.46	7.34	7.85	7.22	89.5	101.7	108.8	100.0

Standard Error Means of No Nitrogen and Nitrogen = 0.234 or 3.24 per cent.

The improvement due to superphosphate is definitely significant, both with and without potash. Potash produces a significant effect at all levels of superphosphate. The direct effect of nitrogen is not significant, this comparison being based on only three replications.

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Potatoes: Effect of Nitrate of Soda in various dressings.
T. H. Ream, Esq., Portobello Farm, Nr. Potton, 1931.
In co-operation with R. S. Brieant, Esq.

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

SYSTEM OF REPLICATION: 5 × 5 Latin Square.
AREA OF EACH PLOT: 1/50th acre.
Variety: Ninetyfold.
Soil: Very poor light sand on "Sandy Heath."
TREATMENTS:
A = No Nitrate of Soda.
B = 1 cwt. Nitrate before sowing and 1 cwt. top dressed.
C = 2 cwt. Nitrate before sowing.
D = 3 cwt. Nitrate before sowing.
E = 2 cwt. Nitrate before sowing and 1 cwt. top dressed.
Basal manuring: 3 cwt. Superphosphate and 3 cwt. Sulphate of Potash per acre.
Manures applied: March 25th.
Potatoes planted: April 6th.
Potatoes lifted: July 6th.
Previous crop: Dunged early potatoes followed by sprouts.

Actual weights in lb. (Ware).

Row.	A	B	C	D	E
I.	164	200	196	191	172
II. ..	214	227	192	174	194
III. ..	220	200	174	256	261
IV. ..	186	247	264	203	254
V. ..	228	204	185	256	210

Summary of Results.

Average Yield	No Nitrate of Soda	1 cwt. Nitrate before sowing + 1 cwt. T.D.	2 cwt. Nitrate before sowing	3 cwt. Nitrate before sowing	2 cwt. Nitrate before sowing + 1 cwt. T.D.	Mean	Standard Error
Tons per acre	4.52	4.81	4.51	4.82	4.87	4.71	0.120
Per cent.	96.0	102.2	95.9	102.4	103.5	100.0	2.54

The response to Nitrate of Soda is not significant.

N

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Potatoes: Effect of Superphosphate.

Comparison of Nitrate of Soda and Sulphate of Ammonia.

T. H. Ream, Esq., Portobello Farm, Nr. Potton, 1931.

IV.	III.	II.	I.
— / 0	4 / —	— / 8	2 / —
— / 2	8 / —	— / 4	— / 0
— / 8	2 / —	0 / —	4 / —
— / 4	0 / —	2 / —	8 / —

SYSTEM OF REPLICATION: 4 × 4 Latin Square with split plots.

AREA OF EACH WHOLE PLOT: 1/30th acre.

Soil: Very poor light sand on "Sandy Heath."

Variety: Ninetyfold.

TREATMENTS: Superphosphate at the rate of 0, 2, 4 and 8 cwt. per acre. Half of each plot received Sulphate of Ammonia and the other half received Nitrate of Soda. Nitrate of Soda equivalent to Sulphate of Ammonia. Sulphate of Ammonia at the rate of 2 cwt. per acre. Nitrate of Soda is indicated by the treatment symbol occurring on that half.

Basal Manuring: 2 cwt. Sulphate of Potash per acre.

Potatoes planted: April 6th.

Potatoes lifted: July 6th.

Previous crop: Dunged early potatoes, followed by sprouts.

Actual Weights in lb. (Ware).

Column	Nitrate of Soda.				Sulphate of Ammonia.			
	O	2	4	8	0	2	4	8
I.	153	143	163	129	131	127	147	126
II.	162	148	167	137	147	135	157	156
III.	152	160	164	178	139	153	163	154
IV.	161	156	176	145	164	135	146	123

Summary of Results.

Average yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre—						
S/Ammonia	3.89	3.68	4.10	3.74	3.86	} 0.125
N/Soda	4.21	4.06	4.49	3.94	4.18	
Mean	4.05	3.87	4.30	3.84	4.02	0.124
Per cent.—						
S/Ammonia	96.9	91.7	102.2	93.2	96.0	} 3.11
N/Soda	104.7	101.2	111.7	98.2	104.0	
Mean	100.8	96.5	107.0	95.7	100.0	3.09

Nitrate of Soda significantly superior to Sulphate of Ammonia. No response to Superphosphate.

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Sugar Beet: Effect of Potash Salt, Superphosphate, and Sulphate of Ammonia.

R. Starling, Esq., Northfield Farm, Little Downham, Ely, 1931.

C			A		
— — 2P 2K	2P 1K — —	1P 1K — —	— — 1P 2K	— — 2P 2K	0P 1K — —
1P 2K — —	— — 1P 0K	— — 0P 0K	— — 0P 2K	— — 1P 1K	— — 2P 1K
— — 2P 0K	0P 1K — —	0P 2K — —	1P 0K — —	0P 0K — —	2P 0K — —
1P 1K — —	— — 0P 2K	— — 1P 2K	0P 2K — —	2P 0K — —	— — 0P 1K
— — 2P 1K	— — 2P 0K	1P 0K — —	2P 2K — —	1P 1K — —	— — 0P 0K
— — 0P 1K	— — 0P 0K	— — 2P 2K	2P 1K — —	1P 2K — —	— — 1P 0K
D			B		

System of Replication: 4 randomised blocks, each of 9 plots, split for nitrogen.

Area of Each Whole Plot: 1/50th acre.

Soil: Good black fen near the clay.

Variety: Kleinwanzleben E.

Manures applied: April 15th.

Beet sown: April 15th.

Beet lifted: November 5th-6th.

Treatments: Superphosphate (P) at the rate of 0, 3 and 6 cwt. per acre, Potash Salt (K) at the rate of 0, 1½ and 3 cwt. per acre. Sulphate of Ammonia at the rate of 2 cwt. per acre, applied to one out of each pair of sub-plots, indicated by the treatment symbol occurring on that half.

Previous crop: Oats, not dunged:

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Actual weights in lb.

Block.	0-0	0-1	0-2	1-0	1-1	1-2	2-0	2-1	2-2
	Without Sulphate of Ammonia.								
Roots (unwashed)—									
A	374	371	378	388	375	386	367	385	372
B	375	379	382	378	371	367	391	403	378
C	411	381	407	381	407	377	376	394	380
D	360	370	370	423	388	408	373	365	402
	With Sulphate of Ammonia.								
A	370	384	395	397	400	385	398	380	399
B	384	392	402	361	387	375	388	411	394
C	390	388	404	385	398	379	391	395	389
D	393	379	372	418	382	404	370	383	413
Tops*—	Without Sulphate of Ammonia.								
A	266	274	268	292	253	264	265	244	251
B	265	183	311	264	287	300	242	274	324
	With Sulphate of Ammonia.								
A	290	230	291	260	274	307	246	258	272
B	312	260	287	292	296	303	267	258	297
Sugar percentage—	Without Sulphate of Ammonia.								
A	17.48	18.30	17.31	17.54	17.48	17.48	18.41	17.48	18.30
B	16.33	18.81	17.43	16.62	17.48	17.48	17.48	16.56	16.50
C	16.50	18.52	18.30	17.42	17.65	17.36	17.36	17.77	18.35
D	18.05	16.45	18.75	17.01	16.84	18.18	17.01	17.43	18.30
	With Sulphate of Ammonia.								
A	16.78	17.70	16.42	16.76	16.93	16.96	17.31	18.25	18.30
B	16.73	17.43	16.44	17.36	16.44	16.96	18.05	17.88	16.16
C	16.21	16.79	16.90	17.54	17.88	16.76	17.59	17.54	18.11
D	17.48	17.25	17.70	16.33	18.86	16.73	17.82	15.86	16.84

* Tops weighed on Block A and B only, on area of half plot = 1/100th acre.

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Summary of Results.

Average yield.		Tons per acre. No Super.	Single Super.	Double Super.	Mean.	Per cent. No Super.	Single Super.	Double Super.	Mean.
Roots—(washed) Without S/Amm.	No Potash Salt	15.35	15.86	15.23	15.48	98.3	101.6	97.5	99.1
	Single Potash Salt	15.16	15.57	15.62	15.45	97.1	99.7	100.1	98.9
	Double Potash Salt	15.52	15.53	15.48	15.52	99.4	99.5	99.1	99.3
	Mean	15.35	15.66	15.44	15.48	98.3	100.2	98.9	99.1
With S/Amm.	No Potash Salt	15.52	15.77	15.62	15.64	99.4	101.0	100.1	100.2
	Single Potash Salt	15.59	15.83	15.85	15.76	99.8	101.4	101.5	100.9
	Double Potash Salt	15.90	15.59	16.11	15.87	101.7	99.8	103.2	101.6
	Mean	15.67	15.73	15.87	15.75	100.3	100.7	101.6	100.9
Mean of No S/Amm. & S/Amm.		15.51	15.70	15.65	15.62	99.3	100.5	100.2	100.0
Tops— Without S/Amm.	No Potash Salt	23.70	24.82	22.63	23.72	97.3	101.8	92.9	97.3
	Single Potash Salt	20.40	24.11	23.12	22.54	83.7	98.9	94.9	92.5
	Double Potash Salt	25.85	25.18	25.67	25.56	106.0	103.3	105.3	104.9
	Mean	23.32	24.70	23.81	23.94	95.7	101.4	97.7	98.2
With S/Amm.	No Potash Salt..	26.87	24.64	22.90	24.81	110.3	101.1	94.0	101.8
	Single Potash Salt	21.87	25.45	23.04	23.45	89.8	104.4	94.5	96.2
	Double Potash Salt	25.80	27.23	25.40	26.14	105.9	111.7	104.2	107.3
	Mean	24.85	25.77	23.78	24.80	102.0	105.7	97.6	101.8
Mean of No S/Amm. & S/Amm.		24.08	25.24	23.79	24.37	98.8	103.6	97.6	100.0
Sugar Percentage in Roots— Without S/Amm.	No Potash Salt	17.09	17.15	17.56	17.55				
	Single Potash Salt	18.02	17.36	17.31					
	Double Potash Salt	17.95	17.62	17.86					
With S/Amm.	No Potash Salt	16.80	17.00	17.69	17.19				
	Single Potash Salt	17.29	17.53	17.38					
	Double Potash Salt	16.86	16.85	17.35					

Standard Error : Roots : 0.304 tons or 1.95 per cent.
,, ,, Tops : 1.576 tons or 6.47 per cent.
,, ,, Sugar percentage : 0.348.

The roots show a small but definitely significant response to nitrogen. For the tops the difference, though greater, is not significant owing to the higher standard error. The sugar percentage is significantly depressed by nitrogen. There are no other significant effects.

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Sugar Beet: Effect of Potash Salt and Superphosphate.

J. A. Tribe, Esq., Willow Farm, Nr. March, 1931.

	O	N	O	N	N	O
I.	0P 0K	2P 0K	1P 1K	2P 1K	0P 1K	1P 0K
II.	1P 0K	0P 1K	2P 0K	0P 0K	1P 1K	2P 1K
III.	1P 1K	1P 0K	0P 0K	2P 0K	2P 1K	0P 1K
IV.	2P 0K	2P 1K	0P 1K	1P 1K	1P 0K	0P 0K
V.	2P 1K	1P 1K	1P 0K	0P 1K	0P 0K	2P 0K
VI.	0P 1K	0P 0K	2P 1K	1P 0K	2P 0K	1P 1K

SYSTEM OF REPLICATION: 6×6 Latin Square.
AREA OF EACH PLOT: 1/60th acre.
Soil: Black Fen, about 1-1½ ft. deep, on clay.
Variety: Shrciber.
TREATMENTS: Superphosphate (P) at the rate of 0, 3 and 6 cwt. per acre, Potash Salt (K) at the rate of 0 and 2½ cwt. per acre, and Sulphate of Ammonia at the rate of 0·4 cwt. N. per acre.
Manures applied: April 23rd.
Beet drilled: May 6th.
Beet lifted: December 7th.
Previous crop: Beet.

Actual weights in lb.

Row.	Roots (unwashed).						Tops.					
	0-0	0-1	1-0	1-1	2-0	2-1	0-0	0-1	1-0	1-1	2-0	2-1
I.	385	329	348	415	383*	388	126	143	96	137	172*	133
II.	425	396*	408	428	389	502	159	191*	138	141	156	163
III.	289	414	382*	446	441	438	153	136	173*	144	174	173
IV.	447	386	454	447	466	375	117	134	145	130	164	155
V.	432	433	431	501	499	503	146	132	121	186	141	178
VI.	477	451	442*	454	452	432*	195	182	132*	115	136	157*

*These plots discarded and values calculated from the remaining plots. Tops were weighed on ¼ plots only. Area 1/240th acre.

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Summary of Results.

Roots (unwashed)—	Average yield tons per acre. Nitrogen and No Nitrogen.				Average yield per cent. Nitrogen and No Nitrogen.			
	No Super.	Single Super.	Double Super.	Mean.	No Super.	Single Super.	Double Super.	Mean.
No Potash ..	10.96	11.00	11.74	11.24	96.4	96.7	103.2	98.8
Potash	10.75	12.01	11.78	11.51	94.5	105.6	103.5	101.2
Mean	10.86	11.51	11.76	11.38	95.4	101.2	103.4	100.0
Tops—								
No Potash ..	16.00	14.37	16.84	15.74	100.0	89.9	105.3	98.4
Potash	16.39	15.23	17.12	16.25	102.5	95.2	107.1	101.6
Mean	16.20	14.80	16.98	15.99	101.3	92.6	106.2	100.0

Standard Error : Roots : 0.434 tons or 3.82 per cent.
,, ,, Tops : 0.757 tons or 4.73 per cent.

Roots.	tons per acre.	per cent.
Nitrogen ..	11.34	99.7
No Nitrogen ..	11.41	100.3
Mean	11.38	100.0
Tops—		
Nitrogen ..	16.76	104.8
No Nitrogen ..	15.23	95.2
Mean	15.99	100.0

The effect of superphosphate is not significant. There is no evidence of any potash or nitrogen effects. The experiment was marred by the acidity of certain plots.

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Sugar Beet: Effect of Sulphate of Ammonia and Superphosphate.

Messrs. C. S. & G. M. Wilson, Stanway Hall Farm, Colchester, 1931.

A			B		
1P 1S	2P 0S	0P 0S	0P 1S	1P 0S	0P 2S
0P 1S	1P 2S	2P 2S	1P 2S	2P 0S	1P 1S
0P 2S	2P 1S	1P 0S	2P 2S	2P 1S	0P 0S
0P 0S	0P 2S	1P 2S	0P 1S	2P 1S	0P 2S
2P 2S	2P 0S	1P 1S	2P 2S	1P 0S	0P 0S
1P 0S	2P 1S	0P 1S	2P 0S	1P 1S	1P 2S
C			D		

SYSTEM OF REPLICATION: 4 randomised blocks of 9 plots each.

AREA OF EACH PLOT: 1/60th acre.

Soil: Light sandy gravel.

Variety: Kleinwanzleben

TREATMENTS: Superphosphate (P) at the rate of 0, 2 and 4 cwt. per acre, Sulphate of Ammonia (S) at the rate of 0, 1½ and 3 cwt. per acre.

All plots received 30 per cent. Potash Salt at the rate of 2½ cwt. per acre, and dung, 8 loads per acre.

Manures applied: April 28th.

Beet planted: April 28th.

Beet lifted: November 2nd-4th.

Previous crop: Barley.

Actual weights in lb.

Block.		0-0	0-1	0-2	1-0	1-1	1-2	2-0	2-1	2-2
Roots (unwashed)	A	325	440	463	367	428	424	338	443	460
	B	349	394	334	402	409	459	426	486	458
	C	458	409	447	406	461	454	392	471	471
	D	424	460	444	449	485	498	366	499	477
Tops	A	213	279	360	215	286	327	211	288	310
	B	291	299	396	337	320	381	303	385	400
	C	279	299	390	230	318	372	278	317	367
	D	260	330	421	293	381	431	240	395	367
Sugar percentage	A	19.45	19.92	19.46	19.92	19.68	19.17	19.74	19.92	19.23
	B	19.34	19.00	18.76	19.05	19.28	19.86	19.35	19.51	19.92
	C	19.57	18.64	19.40	19.05	18.76	19.11	19.40	19.12	19.28
	D	19.34	19.74	18.82	18.93	18.47	18.36	19.12	19.05	18.93

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Summary of Results.

Average yield. Roots (clean)—	Tons per acre. No Super.	Single Super.	Double Super.	Mean.	Per cent. No Super.	Single Super.	Double Super.	Mean.
No S/Amm. ..	9.26	9.66	9.05	9.33	90.5	94.4	88.5	91.1
Single S/Amm.	10.13	10.61	11.30	10.68	99.0	103.7	110.4	104.4
Double S/Amm.	10.04	10.92	11.10	10.69	98.2	106.7	108.5	104.5
Mean	9.81	10.39	10.48	10.22	95.9	101.6	102.5	100.0
Tops—								
No S/Amm. ..	6.98	7.20	6.91	7.03	81.1	83.6	80.3	81.7
Single S/Amm. ..	8.08	8.74	9.27	8.70	93.9	101.5	107.7	101.0
Double S/Amm.	10.49	10.12	9.67	10.09	121.9	117.5	112.3	117.3
Mean	8.52	8.68	8.62	8.61	99.0	100.9	100.1	100.0
Sugar percentage—								
No S/Amm. ..	19.42	19.24	19.40	19.36				
Single S/Amm. ..	19.32	19.05	19.40	19.26				
Double S/Amm.	19.11	19.12	19.34	19.19				
Mean	19.29	19.14	19.38	19.27				

Standard Errors : Roots Single treatments : 0.402 tons or 3.92 per cent.
,, Means : 0.232 tons or 2.27 per cent.
Tops Single treatments : 0.330 tons or 3.83 per cent.
,, Means : 0.190 tons or 2.21 per cent.
Sugar percentage Single treatments : 0.187
Means : 0.108.

Definitely significant response to the single dressing of sulphate of ammonia, both for roots and tops, with a further significant response of the tops to the double dressing but no further improvement of the roots. The response to superphosphate for the roots is not significant, and there is no sign of any effect on the tops. No significant effects on sugar percentage.

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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. J. E. Arden, Esq., Owmby Cliff, Lincolnshire, 1931.

J. A. McVicar, Esq., County Organiser.

4 × 4 Latin Square : Plots 1/80th acre. Soil : Limestone.
Basal Manuring : Dung ; 3 cwt. Sulphate of Potash and 4 cwt. Sulphate of Ammonia per acre.
Variety : King Edward. Potatoes planted : April 15th. Lifted : October 6th.
Previous crop : 1 year seeds.

Average yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre	7.01	6.83	6.97	6.60	6.85	0.187
Per cent.	102.3	99.7	101.8	96.3	100.0	2.73

No apparent manurial effects.

Potatoes. Midland Agricultural College, Loughborough, 1931.

4 × 4 Latin Square : Plots 1/60th acre. Soil : Light loam.
TREATMENTS : Fish Manure, I.C.I. Compound Manure, Home-made mixture at the rate of 0.83 cwt. N, 0.83 cwt. P_2O_5, and 1.66 cwt. K_2O per acre.
Variety : King Edward. Potatoes planted : April 17th. Lifted : September 26th.
Previous crop : Seeds hay.

Average Yield.	No Manure	Fish Manure.	I.C.I. Compound Manure.	Home-made Mixture.	Mean.	Standard Error.
Tons per acre	5.68	7.85	8.71	8.26	7.62	0.221
Per cent...	74.5	103.0	114.2	108.3	100.0	2.90

The response to the manures is definitely significant. There is a significant difference between I.C.I. and fish manure, but not between I.C.I. and home-made, or home-made and fish manure. Neither is the difference between the inorganic (taken together) and the fish manures significant.

Potatoes. Midland Agricultural College, Loughborough, 1931.

4 Randomised blocks of 9 plots each. Plots 1/48.8 acre. Soil : Light loam.
TREATMENTS : Sulphate of Ammonia and Sulphate of Potash at the rate of 1½ and 3 cwt. per acre.
Basal Manuring : 3 cwt. Superphosphate per acre. No dung given.
Variety : King Edward. Potatoes planted : April 15th. Lifted : September 24th.
Previous crop : Seeds hay.

Average yield.	tons per acre.			per cent.		
	No Nitrogen.	Single S/Amm.	Double S/Amm.	No Nitrogen.	Single S/Amm.	Double S/Amm.
No Potash	7.55	8.58	10.33	87.0	98.9	119.0
Single Potash	7.86	8.35	9.73	90.6	96.3	112.1
Double Potash ..	7.02	8.69	9.99	80.9	100.1	115.2
Mean	7.48	8.54	10.02	86.2	98.4	115.4
Mean		8.68			100.0	
Standard Error (Single treatments)		0.455			5.24	
,, ,, (means)		0.263			3.02	

The response to Sulphate of Ammonia is definitely significant, the yield being proportional to the quantity of nitrogen supplied. No response to potash.

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Potatoes. County School, Welshpool, Montgomeryshire, 1931.

4 Randomised blocks of 4 plots each. Plots 0.00468 acre. Soil: Medium loam (Wenlock shale).
TREATMENTS: Sulphate of Ammonia, Nitrate of Soda and Cyanamide at the rate of 0.6 cwt. N. per acre.
Basal Manuring: 4 cwt. Superphosphate and 3 cwt. Sulphate of Potash per acre.
Variety: Great Scot. Potatoes planted: May 10th. Lifted: September 22nd-25th.
Previous crop: Potatoes.

Average yield.	No Nitrogen.	Cyana-mide.	Nitrate of Soda.	Sulphate of Amm.	Mean.	Standard Error.
Tons per acre	4.75	7.23	7.49	7.92	6.84	0.323
Per cent...	69.3	105.6	109.4	115.7	100.0	4.72

Definitely significant response to nitrogen. No significant difference between types of nitrogen.

Potatoes. Grammar School, Burford, Oxon, 1931.

2 unequal Randomised blocks of 4 and 12 plots each respectively, with split plots. Sub-plots: 1/200th acre. Soil: Limestone loam.
TREATMENTS: Main Tests, Superphosphate at the rate of 0, 0.3, 0.6, 1.2 cwt. P_2O_5 per acre. Sub-plots: Sulphate of Ammonia and Cyanamide at the rate of 0.6 cwt. N. per acre.
Basal Manuring: Sulphate of Potash at the rate of 1.4 cwt. K_2O per acre.
Variety: King George. Potatoes planted: April 27th. Lifted: October 1st.

Average Yield.	Tons per acre.					Per cent.				
	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.
With S/Amm. ..	3.93	5.45	5.89	5.60	5.22	75.6	104.8	113.4	107.8	100.4
With Cyanamide ..	4.33	5.98	5.40	4.98	5.17	83.4	115.1	104.0	95.8	99.6
Mean	4.13	5.71	5.65	5.29	5.20	79.5	110.0	108.7	101.8	100.0

Standard Error single treatment: 0.431 tons or 8.30 per cent.
Standard Error Mean of S/Amm. and Cyan. = 0.353 tons or 6.80 per cent.
Standard Error Mean of all levels of Super. = 0.176 tons or 3.40 per cent.

There is a significant response to the 2 cwt. dressing of superphosphate, but no additional response to the heavier dressings. There are no significant differences between Sulphate of Ammonia and Cyanamide.

Potatoes. Sailors' Orphan Homes School, Hull, 1931.

4 × 4 Latin Square. Plots 0.00459 acre. Soil: Heavy alluvium.
TREATMENTS: Sulphate of Ammonia, Nitrate of Soda and Cyanamide at the rate of 0.6 cwt. N per acre.
Basal Dressing: 4 cwt. Superphosphate, 3 cwt. Sulphate of Potash per acre.
Variety: Kerr's Pink. Potatoes planted: April 29th. Lifted: Oct. 3rd-7th.

Average yield.	No Nitrogen.	Nitrate of Soda.	Sulphate of Ammonia.	Cyana-mide.*	Mean.	Standard Error.
Tons per acre	7.88	8.46	9.42	7.73	8.37	0.483
Per cent...	94.1	101.1	112.5	92.3	100.0	5.77

The response to treatments is not large enough to be significant.

* One plot of this treatment discarded and a value calculated for it from the remaining plots.

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Potatoes: Messrs. Hickman & Co., Wisbech, 1931.
W. F. Cheal, Esq., Horticultural Organiser.

4 × 4 Latin Square. Plots 0.0207 acre. Soil: Deep silt.
Basal Manuring: 4 cwt. Sulphate of Potash, 4 cwt. Sulphate of Ammonia per acre.
Variety: Baron. Potatoes planted: April 25th. Lifted:
Previous crop - Rhubarb.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	12.30	13.16	13.08	13.03	12.90	0.271
Per cent.	95.4	102.1	101.5	101.1	100.0	2.099

The effect of Superphosphate is just significant. No further response to the higher levels of Superphosphate.

Potatoes. Lady Manner's School, Bakewell, 1931.

4 × 4 Latin Square. Plots 1/120th acre. Soil: Limestone—rather stony.
TREATMENTS: Sulphate of Ammonia, Nitrate of Soda and Cyanamide at the rate of 0.6 cwt. N per acre.
Basal Manuring: 4 cwt. Superphosphate, 3 cwt. Sulphate of Potash per acre.
Variety: King Edward. Potatoes planted: May 8th. Lifted: Sept. 22nd-28th.

Average Yield.	No Nitrogen.	Sulphate of Ammonia.	Cyanamide	Nitrate of Soda.	Mean.	Standard Error.
Tons per acre ..	6.64	8.29	8.04	8.42	7.84	0.196
Per cent.	84.6	105.6	102.4	107.3	100.0	2.50

Definitely significant response to nitrogen. No significant differences between the various forms.

Potatoes: T. Gornall, Esq., Upper Birks Farm, Garstang, Lancs., 1931
J. J. Green, Esq., Director of Agriculture.

4 × 4 Latin Square. Plots 1/57th acre. Soil: Moss.
Basal Manuring: Sulphate of Ammonia and Sulphate of Potash each at the rate of 2 cwt. per acre, and 10 tons farmyard manure per acre.
Variety: King Edward VII. Potatoes planted: May 11th. Lifted: Sept. 22nd.
Previous crop: Spring oats.

Average Yield.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	Standard Error.
Tons per acre ..	2.69	2.67	2.69	2.60	2.66	0.078
Per cent.	101.0	100.3	101.0	97.7	100.0	2.95

Partial failure of crop; no response to manurial treatment.

Potatoes. J. B. Everatt, Esq., Garthorpe, Lincs., 1931.
J. A. McVicar, Esq., County Organiser.

4 × 4 Latin Square. Plots 1/80th acre. Soil: Warp.
Basal Manuring: Sulphate of Ammonia and Superphosphate, each at the rate of 4 cwt. per acre.
Variety: King Edward. Potatoes planted: May 4th. Lifted: Oct. 15th.
Previous crop: Sugar Beet.

Average Yield.	No Sul. of Pot.	1 cwt. Sul. of Pot.	2 cwt. Sul. of Pot.	3 cwt. Sul. of Pot.	Mean.	Standard Error.
Tons per acre ..	11.88	12.39	12.84	12.30	12.35	0.350
Per cent.	96.1	100.3	103.9	99.6	100.0	2.83

No significant manurial effects.

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Potatoes. J. W. Halkon, Esq., Garthorpe, Lincs., 1931.
J. A. McVicar, Esq., County Organiser.

4 × 4 Latin Square. Plots 1/80th acre. Soil: Warp.
Basal Manuring: Sulphate of Ammonia and Superphosphate, each at the rate of 4 cwt. per acre.
Variety: Majestic. Potatoes planted: April 15th. Lifted: Oct. 6th.
Previous crop: Peas.

Average Yield.	No Sul. of Pot.	1 cwt. Sul. of Pot.	2 cwt. Sul. of Pot.	3 cwt. Sul. of Pot.	Mean.	Standard Error.
Tons per acre ..	10.12	10.54	10.29	10.21	10.29	0.312
Per cent.	98.4	102.4	100.0	99.2	100.0	3.04

No apparent manurial effects.

Sugar Beet. South-Eastern Agricultural College, Wye, Kent, 1931.

4 × 4 Latin Square. Plots 1/40th acre. Soil: Silty loam.
TREATMENTS: Muriate of Potash, at the rate of 1.6 cwt. per acre, and Salt at the rate of 1.14 cwt. per acre.
Basal Manuring: 12 tons dung, Sulphate of Ammonia at the rate of 2 cwt. per acre, and Superphosphate at the rate of 4 cwt. per acre.
Variety: Kleinwanzleben E. Beet sown: May 6th. Lifted: Oct. 13th.
Previous crop: Oats.

Average yield.	No Potash.	Muriate of Potash.	Salt.	Muriate of Potash and Salt.	Mean.	Standard Error.
Roots (clean) tons per acre ..	11.18	10.82	11.31	11.12	11.11	0.169
per cent.	100.7	97.4	101.8	100.1	100.0	1.53
Sugar percentage in Roots	18.43	18.68	18.63	18.99	18.68	0.146

No significant effects. The difference of sugar percentage for the various treatments is not significant.

Sugar Beet. South-Eastern Agricultural College, Wye, Kent, 1931.

4 × 4 Latin Square. Plots 1/40th acre. Soil: Silty loam.
TREATMENTS: Sulphate of Ammonia at the rate of 1.33 cwt. per acre, Nitrate of Soda at the rate of 2.06 cwt. per acre, and Cyanamide at the rate of 1.6 cwt. per acre.
Basal Manuring: 12 tons dung, 4 cwt. Superphosphate, and 2 cwt. Muriate of Potash per acre.
Variety: Kleinwanzleben E. Beet sown: May 6th. Lifted: October 13th.
Previous crop: Oats.

Average Yield.	No Nitrogen.	Sulphate of Ammonia.	Cyana-mide.	Nitrate of Soda.	Mean.	Standard Error.
Roots (clean) Tons per acre ..	11.79	11.89	11.77	11.85	11.83	0.145
Per cent.	99.7	100.6	99.5	100.2	100.0	1.22
Tops Tons per acre ..	12.89	13.63	14.13	14.94	13.90	0.452
Per cent.	92.8	98.1	101.7	107.5	100.0	3.25
Sugar Percentage in Roots	18.93	18.48	18.61	18.39	18.60	0.0872

There is a significant improvement due to nitrogen in the yield of the tops, but no significant difference between the different kinds of nitrogen. The roots did not respond to treatment. Significant depression in sugar percentage by nitrogen, but no significant difference between the various forms of nitrogen.

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Sugar Beet. The University of Leeds, Askham Bryan, Yorks, 1931.

4 × 4 Latin Square. Plots 1/80th acre. Soil: Medium loam on gravel.
TREATMENTS: 2 cwt. Sulphate of Ammonia per acre with seed, Nitrate of Soda with seed, and Nitrate of Soda as top dressing equivalent to 2 cwt. Sulphate of Ammonia.
Basal Manuring: 10 tons Farmyard Manure, 2 cwt. Superphosphate, 1 cwt. Steamed Bone Flour, and 1 cwt. 30 per cent. Potash Salt per acre.
Variety: Kleinwanzleben E. Beet sown: May 6th. Lifted: October 30th.
Previous crop: Oats.

Average yield.	No Nitrogen.	Sulphate of Ammonia.	Nitrate of Soda with seed.	Nitrate of Soda top-dressing.	Mean.	Standard Error.
Roots (clean)—						
Tons per acre ..	7.93	9.04	9.27	9.05	8.82	0.250
Per cent.	89.8	102.5	105.0	102.6	100.0	2.84
Tops—						
Tons per acre	9.78	11.43	11.97	11.41	11.15	0.448
Per cent.	87.8	102.5	107.4	102.3	100.0	4.02
Sugar percentage in Roots	16.90	16.58	16.78	16.78	16.76	0.195

Significant response to nitrogen. The difference between the different forms of nitrogen is not significant. No significant differences in sugar percentage.

Sugar Beet. Gregory's Farm, Watton, 1931.
H. W. Gardner, Esq., Hertfordshire Farm Institute.

4 × 4 Latin Square. Plots 0.0223 acre. Soil: Gravelly—rather sour.
TREATMENTS: Dung and Sulphate of Ammonia 2 cwt. per acre, Superphosphate 3.57 cwt. per acre, Potash Salt (30 per cent.) at the rate of 2 cwt. per acre. Lime at the rate of 2 tons per acre, Cyanamide at the rate of 2 cwt. per acre and Slag (14 per cent.) at the rate of 3 cwt. per acre.
Variety: Kleinwanzleben E. Beet sown: May 1st. Lifted: September 12th.
Previous crop: Turnips.

Average yield.	Dung only	Dung, S/Amm., Super and Potash Salts.	Dung, S/Amm., Super, Potash Salts and Lime.	Dung, Cyanamide Slag and Potash Salts.	Mean.	Standard Error.
Roots (dirty)—						
Tons per acre ..	10.04	11.39	12.15	11.37	11.24	0.328
Per cent.	89.4	101.3	108.1	101.2	100.0	2.92
Tops—						
Tons per acre ..	9.57	10.86	12.21	11.27	10.98	0.407
Per cent.	87.2	98.9	111.2	102.7	100.0	3.71

Significant improvement by artificials, with further significant improvement by lime. No appreciable difference between sulphate of ammonia and super, and cyanamide and slag.

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Swedes. County School, Welshpool, Montgomeryshire, 1931.

4 × 4 Latin Square. Plots 1/160th acre. Soil: Medium loam (Wenlock shale).
TREATMENTS: Superphosphate, Rock Phosphate and Slag, providing 1 cwt. P_2O_5 per acre.
Basal Manuring: 2 cwt. Sulphate of Ammonia and 1½ cwt. Sulphate of Potash per acre.
Variety: Lord Derby. Swedes sown: May 20th. Lifted: November 1st-4th.
Previous crop: Sugar Beet.

Average yield.	No Phosphate.	Slag.	Rock phosphate.	Super-phosphate.	Mean.	Standard Error.
Roots—						
Tons per acre ..	16.96	18.21	17.20	18.14	17.63	0.261
Per cent. ..	96.2	103.3	97.5	102.9	100.0	1.48
Tops—						
Tons per acre ..	4.80	6.41	4.93	5.41	5.39	0.093
Per cent.	89.1	119.0	91.5	100.4	100.0	1.73

Significant response to slag and to superphosphate, but not to rock phosphate. There is no significant difference between slag and superphosphate in the case of roots, but for the tops slag is significantly superior.

Swedes. County Farm Institute, Moulton, Northampton, 1931.

5 × 5 Latin Square. Plots 0.02 acre. Soil: Sandy loam.
TREATMENTS: Superphosphate, Mineral Phosphate, High and Low soluble Slag, all providing 1 cwt. P_2O_5 per acre.
Basal Manuring: 1½ cwt. Sulphate of Ammonia and 3 cwt. (30 per cent.) Potash Salts per acre.
Variety: Garton's Superlative. Swedes sown: June 9th. Lifted: November 12th.
Previous crop: Wheat.

Average yield.	No Phosphate.	Mineral Phosphate.	Low Slag.	High Slag.	Super-phosphate.	Mean.	Standard Error.
Roots—							
Tons per acre	28.53	29.01	28.99	27.76	27.54	28.37	0.804
Per cent. ..	100.6	102.3	102.2	97.8	97.1	100.0	2.83
Tops—							
Tons per acre	2.52	2.72	2.60	2.57	2.47	2.57	0.089
Per cent. ..	97.8	105.6	100.9	99.7	96.0	100.0	3.45

No significant results.

Swedes. Oundle School, Northamptonshire, 1931.

5 × 5 Latin Square. Plots 1/50th acre. Soil: Heavy loam on Oxford clay.
TREATMENTS: Superphosphate, Mineral Phosphate, High and Low soluble Slag, all providing 1 cwt. P_2O_5 per acre.
Basal Manuring: 1 cwt. Sulphate of Ammonia per acre.
Variety: Purple Top. Swedes sown: May 27th. Lifted: November 23rd.
Previous crop: Grey Winter Oats.

Average yield.	No Phosphate.	Mineral Phosphate.	Low Soluble Slag.	High Soluble Slag.	Super.	Mean.	Standard Error.
Roots (clean)							
Tons per acre	35.53	33.50	33.86	36.21	34.75	34.77	1.20
Per cent. ..	102.2	96.3	97.4	104.1	99.9	100.0	3.46

No significant effects.

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Cabbages. T. H. Ream, Esq., Portobello Farm, Nr. Potton, 1931. J. W. Dallas, Esq., County Organiser.

5 × 5 Latin Square. Plots 1/50th acre. Soil : Very poor light sand on Sandy Heath.
Basal Manuring for Potatoes : 3 cwt. Superphosphate and 3 cwt. Sulphate of Potash per acre.
Variety : Christmas Drumhead. Cabbages planted : July 21st. Counted : December 7th.
Previous crop : Early Potatoes, to which all the manures were applied.

Average	No Nitrate of Soda	1 cwt. N/Soda before sowing + 1 cwt. top dressed	2 cwt. Nitrate of Soda before sowing	3 cwt. Nitrate of Soda before sowing	2 cwt. N/Soda before sowing + 1 cwt. top dressed	Mean	Standard Error
No. per acre	4760	5670	4870	5750	6260	5462	285

There is a significant average response to nitrogen as measured by the number of cabbages cut. There is some indication that the split dressings are superior to single dressings.

Cabbages. T. H. Ream, Esq., Portobello Farm, Nr. Potton, 1931. J. W. Dallas, Esq., County Organiser.

4 × 4 Latin Square with split plots. Main Plots 1/30th acre. Soil : Very poor, light sand on Sandy Heath.
TREATMENTS : Increasing applications of Superphosphates to previous crop. Plots split for Sulphate of Ammonia at the rate of 2 cwt. per acre, and Nitrate of Soda equivalent to Sulphate of Ammonia.
Basal Manuring : 2 cwt. Sulphate of Potash per acre.
Variety : Christmas Drumhead. Cabbages planted : July 20th. Cut : December 11th—January 11th.
Previous crop : Potatoes, to which all manures were applied.

	Average weight per cabbage.					Average no. of cabbages gathered per acre.				
	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.	No Super.	2 cwt. Super.	4 cwt. Super.	8 cwt. Super.	Mean.
S/Amm.	1.18	1.22	1.20	1.24	1.21	2318	2198	2798	2978	2572
N/Soda ..	1.32	1.33	1.30	1.22	1.29	2865	2790	2948	2925	2882
Mean ..	1.25	1.28	1.25	1.23	1.25	2591	2494	2872	2951	2727
Standard Error : single treatment = 0.038.						259				

The weight per cabbage is signficantly higher on the nitrate of soda plots, and the number of cabbages cut is also higher, though not significantly so. There are no other significant effects.

Kale. Midland Agricultural College, Loughborough, 1931.

4 × 4 Latin Square. Plots 1/50th acre. Soil : Light loam.
TREATMENTS : Increasing applications of Nitrate of Soda.
Basal Manuring : 15 tons Farmyard Manure per acre, 3 cwt. Superphosphate and 3 cwt. Potash Salt per acre.
Variety : Marrowstem. Kale sown April 24th. Cut : September 17th-October 3rd.
Previous crop : Oats.

Average yield	No Nitrogen	1 cwt. Nitrate of Soda	2 cwt. Nitrate of Soda	4 cwt. Nitrate of Soda	Mean	Standard Error.
Tons per acre ..	15.31	18.20	19.06	22.42	18.75	0.677
Per cent.	81.7	97.1	101.7	119.6	100.0	3.61

Definitely significant response to nitrogen, with a significant increase in yield at the higher levels.

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Brussel Sprouts. The Horticultural College, Swanley, 1931.

5 × 5 Latin Square. Plots 1/125th acre. Soil : Light calcareous loam.
TREATMENTS : Super and Potash (no Nitrogen), Poultry Manure, Guano, Artificials full N (0.4 cwt.), and Artificials ½ N (0.2 cwt.) at the rate of 0.4 cwt. N per acre.
Basal Manuring : Superphosphate at the rate of 0.8 cwt. P_2O_5, Sulphate of Potash at the rate of 1.0 cwt. K_2O per acre.
Brussels harvested : September 17th, October 12th, October 29th and November 2nd.

Average yield.	No Nitrogen	Artificials ½ N.	Artificials full N.	Guano.	Poultry Manure.	Mean.	Standard Error.
Cwt. per acre.							
1st Harvesting	10.4	9.8	13.9	13.2	15.7	12.6	1.55
2nd Harvesting	23.7	22.8	20.8	25.4	25.5	23.6	1.16
3rd Harvesting	14.0	13.1	12.5	13.2	12.7	13.1	1.09
4th Harvesting*	14.1	17.1	18.6	19.7	20.6	18.0	1.36
Per cent.							
1st Harvesting	82.4	77.6	110.4	104.6	125.0	100.0	12.33
2nd Harvesting	100.3	96.3	87.8	107.6	107.9	100.0	4.93
3rd Harvesting	106.6	99.8	95.6	100.7	97.3	100.0	8.31
4th Harvesting*	78.3	94.7	103.4	109.3	114.2	100.0	7.55

*Blown sprouts.

The response to poultry manure and guano is significant when the fourth harvesting (blown sprouts) is taken into account. The response to these two manures on the first three harvestings is not itself significant. The high standard error prevents any conclusions on the effects of artificials.

Hay. Haileybury College Farm, 1930.
H. W. Gardner, Esq., Agricultural Chemist, Hertfordshire Farm Institute.

5 × 5 Latin Square. Plots 1/50th acre. Soil : Light loam.
TREATMENTS : Top dressings of Sulphate of Ammonia, Cyanamide, Nitrate of Soda and Nitro-chalk equivalent to 1½ cwt. Sulphate of Ammonia per acre.
Hay cut : July 2nd, 1930.

Average yield.	No Nitrogen.	Sulphate of Ammonia.	Cyana-mide.	Nitrate of Soda.	Nitro-Chalk.	Mean.	Standard Error.
Cwt. per acre	60.6	72.1	69.0	66.1	70.8	67.7	1.75
Per cent...	89.4	106.5	101.9	97.6	104.5	100.0	2.58

Definitely significant response to nitrogen. There are no significant differences between the various forms of nitrogen.

Hay. Haileybury College Farm, 1931.
H. W. Gardner, Esq., Agricultural Chemist, Hertfordshire Farm Institute.

5 × 5 Latin Square. Plots 1/50th acre. Soil : Clay.
TREATMENTS : Top dressings of Sulphate of Ammonia, Cyanamide, Nitrate of Soda, Nitro-chalk equivalent to 1½ cwt. Sulphate of Ammonia per acre.
Hay cut : July 4th.

Average yield.	No Nitrogen.	Sulphate of Ammonia.	Cyana-mide.	Nitrate of Soda.	Nitro-chalk.	Mean.	Standard Error.
Cwt. per acre	35.7	44.6	38.3	44.8	42.5	41.2	1.52
Per cent. ..	86.7	108.4	93.1	108.7	103.2	100.0	3.69

Definitely significant response to nitrogen. Cyanamide is significantly inferior to sulphate of ammonia and nitrate of soda, but scarcely to Nitro-chalk.

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Grass. H. W. Gardner, Esq., Agricultural Chemist, Hertfordshire Farm Institute, 1931.

4 × 4 Latin Square. Plots 6 square yards. Soil: Loam.
TREATMENTS: Single (1 cwt. per acre) Sulphate of Ammonia applied early (March 2nd) and after June grazing, and Double Sulphate of Ammonia applied early (March 2nd). Single I.C.I. Fertiliser provided same amount of N. Plots receiving Sulphate of Ammonia also received the same P_2O_5 and K_2O as was provided by the I.C.I. Fertiliser. Sixty per cent. of the N removed in the crop corresponding to each treatment was returned to the land in the form of poultry manure.
Basal Manuring: 1 ton Lime, 4 cwt. Mineral Phosphate, and 2 cwt. Potash Salt (30 per cent.) per acre.
Grass cut: April 23rd, June 5th, July 20th and September 15th.

Average yield.	No Nitrogen.	S/Amm. Single E. and L.	S/Amm. Double E.	I.C.I. Fertiliser E. and L.	Mean.	Standard Error.
Dry matter—						
Cwt. per acre	70.6	81.0	77.8	78.1	76.9	2.60
Per cent.	91.8	105.4	101.2	101.6	100.0	3.38

The response to nitrogen is significant, but there is no difference between the different forms and times of application.

Hay. Lady Manner's School, Bakewell, 1931.

Three randomised blocks of 8 plots each. Plots 1/161 acre. Soil: Limestone.
TREATMENTS: 2 cwt. Nitrate of Soda (N), 3 cwt. Superphosphate (P) and 2 cwt. Kainit (K) per acre.
Manures applied March 20th.
Hay cut: June 30th.

Average yield.	O	N	P	K	NP	NK	PK	NPK	Mean.	S.E.
Cwt. per acre ..	39.3	49.6	41.4	36.4	49.6	43.1	37.8	60.4	44.7	2.82
Per cent.	87.9	110.9	92.7	81.4	110.9	96.5	84.7	135.0	100.0	6.31

Significant response to nitrate of soda, and to superphosphate in the presence of nitrate and kainit.

Hay. Lady Manner's School, Bakewell, 1931.

5 × 5 Latin Square. Plots 1/198th acre. Soil: Limestone.
TREATMENTS: Low and High Soluble Slag, Rock Phosphate and Superphosphate, providing 1.0 cwt. P_2O_5 per acre.
Manures applied: March 27th.
Hay cut: June 30th.

Average yield.	No Phosphate.	Low Soluble Slag.	High Soluble Slag.	Rock Phosphate.	Super.	Mean.	Standard Error.
Cwt. per acre	31.1	29.5	32.4	30.9	34.1	31.6	1.62
Per cent. ..	98.4	93.3	102.6	97.8	107.9	100.0	5.12

No significant response to manures.