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Experiments at Outside Centres

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Replicated Experiments at Outside Centres

GRASSLAND. MEADOW HAY

(Basic Slag Committee)

W. H. Limbrick, Esq., Badminton Farm, Badminton, Gloucester, 1932.
(GH). Third Season.

SYSTEM OF REPLICATION : 5 × 5 Latin square. Plots split for muriate of potash. For plan, see 1931 Report.

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

SOIL : Light red loam, 8 ins. deep.

TREATMENTS :

O=No phosphate.

S=Superphosphate.

M=Mineral phosphate.

L=Low soluble slag (citric solubility 23.0 per cent.).

H=High soluble slag (citric solubility 96.5 per cent.).

Phosphatic dressings at the rate of 1 cwt. P₂O₅ per acre, and muriate of potash at the rate of 1 cwt. per acre.

MANURES APPLIED : Phosphates in 1930, potash in 1931.

HAY CUT : June 22nd.

HAY WEIGHED : June 27th-28th.

Actual weights in lb., (green weights).

Row.	O	M	L	H	S	O	M	L	H	S
	With muriate of potash					Without muriate of potash				
I. ..	250	247	264	250	269	255	264	280	255	260
II. ..	246	226	215	211	234	230	208	237	245	216
III. ..	226	236	219	247	235	230	241	208	231	209
IV. ..	224	224	201	245	246	221	182	232	241	261
V. ..	307	295	238	283	280	255	246	254	257	262

SUMMARY OF RESULTS

DRY MATTER

	No phosphate	Mineral phosphate	Low sol. slag	High sol. slag	Super.	Mean	Standard Error
Cwt. per acre							
Without mur. pot.	32.5	31.2	33.1	33.6	33.0	32.7	
With mur. pot. ..	34.2	33.5	31.1	33.8	34.5	33.4	
Mean	33.4	32.3	32.1	33.7	33.8	33.0	0.808
Difference ..	+1.7	+2.3	-2.0	+0.2	+1.5	+0.7	1.341
Per cent.							
Without mur. pot.	98.4	94.3	100.1	101.6	99.9	98.8	
With mur. pot. ..	103.6	101.5	94.0	102.2	104.5	101.2	
Mean	101.0	97.9	97.0	101.8	102.2	100.0	2.44
Difference ..	+5.2	+7.2	-6.1	+0.6	+4.6	+2.4	4.06

CONCLUSIONS

No significant effects.

M

GRASSLAND. MEADOW HAY

(Basic Slag Committee)

W. Eydes, Esq., Walton Lodge Farm, Walton, Chesterfield, Derby, 1932.
(DH). Third Season.

SYSTEM OF REPLICATION : 5 × 5 Latin square. Plots split for muriate of potash. For plan, see 1931 Report.

AREA OF EACH SUB-PLOT : 1/30th acre. Soil : Clay, 6 ins. deep.

TREATMENTS :

O=No phosphate.

S=Superphosphate.

M=Mineral phosphate.

L=Low soluble slag (citric solubility 23.0 per cent.).

H=High soluble slag (citric solubility 96.5 per cent.).

PHOSPHATIC DRESSINGS at the rate of 1 cwt. P₂O₅ per acre, and muriate of potash at the rate of 0.5 cwt. K₂O per acre.

MANURES APPLIED : Phosphate 1930, Potash 1931.

HAY CUT : July 22nd.

Actual weights in lb.—Green weights.

Row.	O	M	L	H	S	O	M	L	H	S
	With Muriate of Potash.					Without Muriate of Potash.				
I.	80	85	99	129	114	73	88	110	127	108
II.	91	122	108	114	124	90	119	106	116	128
III.	129	133	108	118	139	124	124	117	129	146
IV.	103	144	130	109	133	112	124	127	120	120
V.	119	146	112	84	152	121	128	89	108	107

SUMMARY OF RESULTS

DRY MATTER

	No Phosphate.	Mineral Phosphate.	Low Soluble Slag.	High Soluble Slag.	Superphosphate.	Mean	Standard Error.
Cwt. per acre							
Without potash ..	20.1	22.4	21.1	23.2	22.8	21.9	
With potash ..	20.4	24.0	21.5	21.5	25.4	22.5	
Mean	20.2	23.2	21.3	22.4	24.1	22.2	0.78
Difference ..	+0.3	+1.6	+0.4	-1.7	+2.6	+0.6	1.12
Per cent.							
Without potash ..	90.3	100.9	94.8	104.5	102.6	98.6	
With potash ..	91.5	107.8	96.8	96.8	114.1	101.4	
Mean	90.9	104.4	95.8	100.6	108.4	100.0	3.51
Difference ..	+1.2	+6.9	+2.0	-7.7	+11.5	+2.8	5.04

CONCLUSIONS

The response to phosphate is definitely significant, but the differences between the different kinds of phosphate are not significant. The response to potash is not significant.

BARLEY

EFFECT OF NITROGENOUS FERTILISERS, SULPHATE OF POTASH AND SUPERPHOSPHATE

G. H. Nevile, Esq., Wellingore Hall, Lincs, 1932 (VB)

Sample weights in grammes (grain above and straw below).

57	K	PK	PK	O	K	PK	O	PK	64
	458 459	383 340	402 425	521 630	428 442	500 670	414 458	416 464	
56	P	O	K	P	O	P	K	P	49
	391 367	462 470	379 434	462 557	430 490	462 549	440 442	452 548	
41	P	K	O	K	O	PK	P	PK	48
	412 456	508 518	442 384	570 648	441 408	365 394	442 399	412 396	
40	PK	O	P	PK	K	P	O	K	33
	468 490	596 690	546 570	596 564	468 508	410 438	450 394	464 512	
25	K	P	O	PK	PK	K	O	P	32
	562 506	472 467	505 458	529 536	515 600	482 692	426 508	415 429	
24	PK	O	K	P	P	O	K	PK	17
	406 362	456 468	480 472	434 433	443 538	478 600	437 516	472 613	
9	O	P	O	K	K	O	O	PK	16
	478 472	474 481	490 510	462 506	459 469	441 572	444 568	500 574	
8	K	PK	PK	P	P	PK	P	K	1
	540 524	354 347	484 499	584 551	446 408	354 451	479 713	428 432	

Plan showing Nitrogenous Treatments applied to whole plots.

O	N	S	H
N	S	H	O
H	O	N	S
S	H	O	N

SYSTEM OF REPLICATION : 4 × 4 Latin square with plots sub-divided into four for potash, superphosphate, neither, or both.

AREA OF EACH SUB-PLOT : 1/200th acre.

SOIL : Light loam on Lincoln heath. Oolitic limestone.

VARIETY : Plumage-Archer.

TREATMENTS :

O=No nitrogen.

N=Nitrate of soda

S=Sulphate of ammonia

H=Soluble ammonium humate

} At the rate of
0.2 cwt. N per
acre.

K=Sulphate of potash at the rate of 0.6 cwt. K₂O per acre.

P=Superphosphate at the rate of 0.4 cwt. P₂O₅ per acre.

Plots harvested by sampling method (8 metre lengths per sub-plot, drills set 6 ins. apart).

BASAL MANURING : Very light dressing dung.

MANURES APPLIED : March 10th.

BARLEY SOWN : March 10th.

HARVESTED : August 25th.

PREVIOUS CROP : Linseed.

SUMMARY OF RESULTS

	No Nitrogen	Sulph. of Amm.	Nitrate of Soda	Ammonium Humate	Mean
GRAIN					
Cwt. per acre					
No potash or Super	30.3	29.0	33.3	29.4	30.5
Sulphate of Potash	30.4	32.3	29.3	31.6	30.9
Superphosphate	28.0	31.0	29.3	31.3	29.9
Potash and Super.	27.4	31.4	30.8	27.3	29.2
<i>Mean</i>	29.0	30.9	30.7	29.9	30.1
Per cent.					
No Potash or Super	100.7	96.2	110.5	97.6	101.3
Sulphate of Potash	100.9	107.1	97.4	104.8	102.5
Superphosphate	92.8	102.8	97.4	104.0	99.2
Potash and Super.	90.9	104.2	102.2	90.6	97.0
<i>Mean</i>	96.3	102.6	101.9	99.2	100.0
STRAW					
Cwt. per acre					
No potash or Super.	30.9	30.3	40.6	30.1	33.0
Sulphate of Potash	31.2	34.8	33.9	32.0	33.0
Superphosphate	26.2	33.1	37.0	32.7	32.3
Potash and Super.	28.1	35.8	34.1	28.1	31.5
<i>Mean</i>	29.1	33.5	36.4	30.7	32.4
Per cent.					
No potash or Super.	95.3	93.4	125.2	92.8	101.7
Sulphate of Potash	96.3	107.2	104.5	98.7	101.7
Superphosphate	80.9	102.1	113.9	100.8	99.4
Potash and Super.	86.7	110.4	105.1	86.5	97.2
<i>Mean</i>	89.8	103.3	112.2	94.7	100.0

Each yield in the above table is the mean of 4 quarter plots. The standard errors of the yields of single whole plots (appropriate to direct comparisons of nitrogenous dressings) and of single quarter plots (appropriate to comparisons involving potash, superphosphate, and their interactions with nitrogen) are :

Grain. Whole plots : 1.93 cwt., or 6.4 per cent.
 Quarter plots : 3.22 cwt., or 10.7 per cent.
 Straw. Whole plots : 2.40 cwt., or 7.4 per cent.
 Quarter plots : 5.03 cwt., or 15.5 per cent.

CONCLUSIONS

The response to sulphate of ammonia and nitrate of soda is significant in the case of the straw, but not so in the case of the grain, the mean of these two forms of nitrogen being also significantly above ammonium humate for the straw. There are no other significant effects.

BARLEY

EFFECT OF NITROGENOUS FERTILISERS, SULPHATE OF POTASH AND SUPERPHOSPHATE

H. B. Bescoby, Esq., South-Eastern Agricultural College, Wye, Kent, 1932
(ZB)

Sample weights in grammes (grain above and straw below).

8				64			
P 535 661	O 572 704	O 622 717	K 527 673	P 456 573	K 414 454	K 500 608	P 525 681
K 484 561	PK 471 574	P 524 649	PK 491 631	PK 539 710	O 432 520	O 443 555	PK 495 655
PK 418 521	P 554 620	O 594 692	PK 478 564	O 646 919	P 656 842	P 341 403	PK 507 701
O 391 408	K 604 717	P 594 657	K 409 484	K 501 610	PK 558 731	K 525 707	O 514 640
O 485 607	K 620 757	P 577 752	O 597 784	PK 489 599	P 427 504	O 443 540	PK 453 585
P 666 809	PK 529 682	K 500 667	PK 500 624	K 381 441	O 375 393	P 517 623	K 499 621
K 447 543	P 546 661	P 418 475	K 523 611	PK 575 760	P 563 818	O 389 444	PK 454 532
PK 502 657	O 578 706	O 626 737	PK 650 781	K 371 496	O 642 1054	P 626 771	K 475 551
1				57			

Plan showing Nitrogenous Treatments applied to whole plots.

O	N	H	S
H	O	S	N
N	S	O	H
S	H	N	O

SYSTEM OF REPLICATION : 4 × 4 Latin square with plots sub-divided into four for potash, superphosphate, both, or neither.

AREA OF EACH SUB-PLOT : 1/200 acre.

SOIL : Calcareous loam.

VARIETY : Plumage-Archer.

TREATMENTS :

O = No nitrogen.

N = Nitrate of soda

S = Sulphate of ammonium

H = Soluble ammonia humate

K = Sulphate of potash at the rate of 0.6 cwt. K₂O per acre.

P = Superphosphate at the rate of 0.4 cwt. P₂O₅ per acre.

}

At the rate of 0.2 cwt. total N per acre.

Plots harvested by sampling method (8 metre lengths per sub-plot, drills set 7 ins. apart)..

MANURES APPLIED : March 11th.

BARLEY SOWN : March 9th.

HARVESTED : August 11th.

PREVIOUS CROP : Potatoes.

SUMMARY OF RESULTS

	No Nitrogen	Sulph. of Amm.	Nitrate of Soda	Ammonium Humate	Mean
GRAIN					
Cwt. per acre					
No Potash or Super. ..	27.0	31.7	31.7	26.5	29.2
Sulphate of Potash ..	24.5	27.3	28.6	28.6	27.2
Superphosphate ..	30.5	32.2	29.3	27.2	29.8
Potash and Super ..	26.5	28.8	29.4	28.8	28.4
<i>Mean</i>	27.1	30.0	29.8	27.8	28.7
Per cent.					
No Potash or Super. ..	94.2	110.6	110.5	92.4	101.9
Sulphate of Potash ..	85.4	95.1	99.8	99.6	95.0
Superphosphate ..	106.6	112.5	102.3	95.0	104.1
Potash and Super ..	92.4	100.4	102.6	100.6	99.0
<i>Mean</i>	94.6	104.6	103.8	96.9	100.0
STRAW					
Cwt. per acre					
No Potash or Super. ..	31.2	41.5	42.2	30.9	36.5
Sulphate of Potash ..	28.5	34.0	36.8	33.6	33.2
Superphosphate ..	36.3	41.1	37.5	32.1	36.7
Potash and Super. ..	31.8	37.3	38.8	36.4	36.1
<i>Mean</i>	32.0	38.5	38.8	33.2	35.6
Per cent.					
No Potash or Super ..	87.7	116.4	118.6	86.6	102.3
Sulphate of Potash ..	80.0	95.4	103.4	94.4	93.3
Superphosphate ..	101.9	115.3	105.2	90.0	103.1
Potash and Super. ..	89.1	104.8	109.0	102.0	101.2
<i>Mean</i>	89.7	108.0	109.0	93.3	100.0

Each yield in the above table is the mean of 4 quarter plots. The standard errors of the yields of single whole plots (appropriate to direct comparisons of nitrogenous dressings) and of single quarter plots (appropriate to comparisons involving potash, superphosphate, and their interactions with nitrogen) are :

- Grain. Whole plots : 2.63 cwt., or 9.2 per cent.
- Quarter plots : 4.40 cwt., or 15.4 per cent.
- Straw. Whole plots : 4.21 cwt., or 11.8 per cent.
- Quarter plots : 6.47 cwt., or 18.2 per cent.

CONCLUSIONS

The response to sulphate of ammonia and nitrate of soda is just significant in the case of the straw, but not so in the case of the grain. There are no other significant effects.

BARLEY

EFFECT OF NITROGENOUS FERTILISERS, SULPHATE OF POTASH AND SUPERPHOSPHATE

J. M. Templeton, Esq., Sparsholt Farm Institute, 1932 (SB)

Sample weights in grammes (grain above and straw below).

57				64			
P	O	K	P	P	O	PK	P
441	468	373	241	431	542	480	458
433	481	339	221	415	537	497	509
K	PK	O	PK	K	PK	O	K
471	455	222	339	379	433	549	411
475	519	199	303	381	435	584	395
K	O	O	K	K	PK	K	PK
376	461	475	536	568	575	560	381
380	518	551	637	671	633	604	373
PK	P	P	PK	O	P	P	O
362	537	530	482	452	480	532	418
368	549	600	556	592	565	568	442
P	K	P	PK	O	P	PK	O
474	515	348	389	376	473	431	415
510	595	355	399	356	542	541	521
O	PK	O	K	PK	K	P	K
686	560	434	572	382	411	718	400
752	741	423	533	355	443	745	428
O	K	PK	P	O	PK	PK	P
471	668	648	530	521	486	660	497
585	646	624	400	431	499	604	421
PK	P	K	O	K	P	K	O
459	406	356	535	512	586	521	620
581	677	375	597	410	642	541	596
1				8			

Plan showing Nitrogenous Treatments applied to whole plots.

H	O	S	N
O	S	N	H
N	H	O	S
S	N	H	O

SYSTEM OF REPLICATION : 4 × 4 Latin square with plots sub-divided into four for potash, superphosphate, both, or neither.

AREA OF EACH SUB-PLOT : 1/200th acre.

SOIL : Flinty loam on chalk.

VARIETY : Plumage-Archer.

TREATMENTS :

O=No nitrogen.

N=Nitrate of soda

S=Sulphate of ammonia

H=Soluble ammonium humate

K=Sulphate of potash at the rate of 0.6 cwt. K₂O per acre.

P=Superphosphate at the rate of 0.4 cwt. P₂O₅ per acre.

Plots harvested by sampling method (8 metre lengths per sub-plot, drills set 7½ ins. apart).

MANURES APPLIED : March 26th.

BARLEY SOWN : March 19th.

HARVESTED : August 16th.

PREVIOUS CROP : Seeds.

SUMMARY OF RESULTS

	No Nitrogen	Sulph. of Amm.	Nitrate of Soda	Ammonium Humate	Mean
GRAIN					
Cwt. per acre					
No Potash or Super. ..	21.9	24.9	29.0	24.0	25.0
Sulphate of Potash	22.0	25.9	24.2	27.6	24.9
Superphosphate	22.8	27.2	25.4	24.9	25.1
Potash and Super.	22.8	23.6	29.6	22.4	24.6
<i>Mean</i>	22.4	25.4	27.0	24.7	24.9
Per cent.					
No Potash or Super. ..	88.1	99.9	116.6	96.6	100.3
Sulphate of Potash	88.2	104.1	97.1	111.0	100.1
Superphosphate	91.8	109.5	101.9	100.1	100.8
Potash and Super.	91.5	94.8	118.8	89.8	98.7
<i>Mean</i>	89.9	102.0	108.6	99.4	100.0
STRAW					
Cwt. per acre					
No Potash or Super. ..	21.8	28.7	33.0	23.2	26.7
Sulphate of Potash	22.2	27.3	26.6	26.4	25.6
Superphosphate	22.6	31.8	25.9	26.1	26.6
Potash and Super.	21.3	27.6	32.6	23.4	26.2
<i>Mean</i>	22.0	28.9	29.5	24.8	26.3
Per cent.					
No Potash or Super. ..	82.9	109.0	125.5	88.3	101.4
Sulphate of Potash	84.6	104.0	101.2	100.5	97.6
Superphosphate	86.1	121.1	98.6	99.3	101.3
Potash and Super.	81.0	105.0	124.0	88.9	99.7
<i>Mean</i>	83.7	109.8	112.3	94.2	100.0

Each yield in the above table is the mean of 4 quarter plots. The standard errors of the yields of single whole plots (appropriate to direct comparisons of nitrogenous dressings) and of single quarter plots (appropriate to comparisons involving potash, superphosphate, and their interactions with nitrogen) are :

- Grain. Whole plots : 2.67 cwt., or 10.7 per cent.
- Quarter plots : 4.52 cwt., or 18.2 per cent.
- Straw. Whole plots : 2.77 cwt., or 10.5 per cent.
- Quarter plots : 4.54 cwt., or 17.3 per cent.

CONCLUSIONS

The response to sulphate of ammonia and nitrate of soda is significant in the case of the straw, but barely so in the case of the grain. The response to ammonium humate is not significant, and is significantly below the other forms of nitrogen in the case of the straw. There are no other clear significant effects, though the yields of the individual treatments are somewhat more irregular than expectation, particularly in the case of the straw.

POTATOES

EFFECT OF SULPHATE OF AMMONIA AND OF SULPHATE OF POTASH

G. Major, Esq., Newton Farm, Wisbech, 1932

Plan and actual weights in lb.

A			B		
1N 0K 630	0N 0K 620	2N 2K 575	1N 1K 601	2N 0K 583	1N 0K 650
1N 2K 598	0N 2K 554	2N 1K 510	0N 0K 558	2N 2K 575	1N 2K 601
0N 1K 619	2N 0K 579	1N 1K 571	0N 2K 597	2N 1K 618	0N 1K 602
1N 1K 623	2N 0K 613	1N 0K 608	0N 0K 599	0N 1K 637	1N 2K 649
1N 2K 582	0N 2K 619	0N 1K 566	2N 0K 618	1N 0K 644	1N 1K 642
2N 1K 583	0N 0K 555	2N 2K 541	2N 1K 525	0N 2K 558	2N 2K 631
C			D		

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

AREA OF EACH PLOT : 1/60th acre.

SOIL : Deep heavy silt.

VARIETY : King Edward.

TREATMENTS : Sulphate of ammonia (N) at the rate of 0, 0.4 and 0.8 cwt. N per acre, sulphate of potash (K) at the rate of 0, 1.0 and 2.0 cwt. K₂O per acre.

BASAL MANURING : Superphosphate at the rate of 1.0 cwt. P₂O₅ per acre.

MANURES APPLIED : March 18th.

POTATOES PLANTED : March 18th.

POTATOES LIFTED : November 11th.

PREVIOUS CROP : Peas.

SUMMARY OF RESULTS

	No Sulph. Pot.	Single Sulph. Pot.	Double Sulph. Pot.	Mean
Tons per acre				
No Sulph. Amm.	11.75	12.21	11.73	11.90
Single Sulph. Amm.	12.76	12.28	12.24	12.43
Double Sulph. Amm.	12.06	11.26	11.70	11.68
Mean	12.19	11.92	11.89	12.00
Per cent.				
No. Sulph. Amm.	97.9	101.8	97.8	99.2
Single Sulph. Amm.	106.3	102.3	102.0	103.6
Double Sulph. Amm.	100.5	93.9	97.5	97.3
Mean	101.6	99.3	99.1	100.0

Standard error for single entry : 0.318 tons, or 2.65 per cent.

CONCLUSIONS

The single dressing of sulphate of ammonia is followed by a significant rise in yield, but there is an even greater falling off with the double dressing. The decrease following treatment with sulphate of potash is not significant.

POTATOES

EFFECT OF SULPHATE OF AMMONIA, SULPHATE OF POTASH AND SUPERPHOSPHATE

H. Inskip, Esq., Stanford, Biggleswade, 1932

	1					61	
	—	2S 1K	—	—	1S 0K	—	
	0S 0K	—	0S 1K	0S 2K	—	1S 1K	
C	—	2S 0K	1S 0K	0S 0K	—	—	
	1S 2K	—	—	—	1S 2K	2S 2K	A
	0S 2K	—	1S 1K	0S 1K	—	2S 1K	
	—	2S 2K	—	—	2S 0K	—	
	—	—	0S 2K	2S 1K	2S 2K	0S 0K	
	1S 2K	1S 1K	—	—	—	—	
D	—	0S 0K	—	2S 0K	1S 1K	—	
	2S 1K	—	2S 0K	—	—	1S 0K	B
	—	—	1S 0K	1S 2K	—	—	
	0S 1K	2S 2K	—	—	0S 1K	0S 2K	
	12					72	

In each plot the half receiving no superphosphate is left blank, and the dressing of sulphate of ammonia and sulphate of potash applied to the whole plot is indicated by a symbol in the half receiving superphosphate.

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

AREA OF EACH SUB-PLOT : 1/100th acre.

SOIL : Sandy gravel.

VARIETY : Great Scot.

TREATMENTS : Sulphate of ammonia (S) at the rate of 0, 0.3 and 0.6 cwt. N per acre, sulphate of potash (K) at the rate of 0, 0.5 and 1.0 cwt. K₂O per acre, and superphosphate at the rate of 0.5 cwt. P₂O₅ per acre.

BASAL MANURING : 1 ton of shoddy per acre given in early spring on furrow and ploughed in deep.

MANURES APPLIED : March 31st.

POTATOES PLANTED : March 31st.

POTATOES LIFTED : September 20th-21st.

PREVIOUS CROP : Wheat with clover undersown.

Actual weights in lb.

Block.	0S 0K	0S 1K	0S 2K	1S 0K	1S 1K	1S 2K	2S 0K	2S 1K	2S 2K
Without Superphosphate									
A ..	254	276	244	241	250	254	260	280	284
B ..	272	267	266	279	287	291	286	288	269
C ..	270	248	256	272	253	281	290	270	297
D ..	292	259	280	310	334	292	291	283	310
With Superphosphate									
A ..	235	259	247	239	266	270	284	291	296
B ..	283	293	265	279	306	289	275	297	295
C ..	267	266	268	266	286	324	281	278	291
D ..	293	262	272	291	279	281	279	279	314

SUMMARY OF RESULTS

		No Sulph. Pot.	1 cwt. Sulph. Pot.	2 cwt. Sulph. Pot.	Mean
Tons per acre					
Without Super	No Sulph. Amm. ..	12.14	11.72	11.67	11.84
	1½ cwt. Sulph. Amm. ..	12.30	12.54	12.48	12.44
	3 cwt. Sulph. Amm. ..	12.58	12.51	12.95	12.68
	Mean	12.34	12.26	12.37	12.32
With Super	No Sulph. Amm. ..	12.03	12.05	11.74	11.94
	1½ cwt. Sulph. Amm. ..	12.00	12.69	12.99	12.56
	3 cwt. Sulph. Amm. ..	12.49	12.78	13.35	12.87
	Mean	12.17	12.51	12.69	12.46
Per cent.					
Without Super	No Sulph. Amm. ..	98.0	94.6	94.2	95.6
	1½ cwt. Sulph. Amm. ..	99.3	101.2	100.7	100.4
	3 cwt. Sulph. Amm. ..	101.5	101.0	104.5	102.3
	Mean	99.6	98.9	99.8	99.4
With Super	No Sulph. Amm. ..	97.1	97.3	94.8	96.4
	1½ cwt. Sulph. Amm. ..	96.8	102.4	104.8	101.4
	3 cwt. Sulph. Amm. ..	100.8	103.1	107.7	103.9
	Mean	98.2	101.0	102.4	100.5

Each yield in the above table is the mean of 4 half plots. The standard errors of the yields of single whole plots (appropriate to comparisons involving potash and nitrogen) and of single half plots (appropriate to the direct effect of super, and its interactions with potash and nitrogen) are :
 Whole plots : 0.554 tons, or 4.47 per cent.
 Half plots : 0.606 tons, or 4.89 per cent.

MEAN OF SUPERPHOSPHATE AND NO SUPERPHOSPHATE

		No Sulph. Pot.	1 cwt. Sulph. Pot.	2 cwt. Sulph. Pot.	Mean
Tons per acre					
No Sulph. Amm.		12.09	11.89	11.71	11.89
1½ cwt. Sulph. Amm.		12.15	12.62	12.73	12.50
3 cwt. Sulph. Amm.		12.53	12.64	13.15	12.78
Mean		12.26	12.38	12.53	12.39
Per cent.					
No. Sulph. Amm.		97.6	95.9	94.5	96.0
1½ cwt. Sulph. Amm.		98.0	101.8	102.8	100.9
3 cwt. Sulph. Amm.		101.2	102.1	106.1	103.1
Mean		98.9	100.0	101.1	100.0

Standard error of single entry: 0.277 tons, or 2.23 per cent.

CONCLUSIONS

The response to sulphate of ammonia is definitely significant. No other significant effects.

POTATOES

EFFECT OF SULPHATE OF AMMONIA, SULPHATE OF POTASH AND SUPERPHOSPHATE

H. Inskip, Esq., Stanford, Biggleswade, 1932

Plan and actual weights in lb.

	21		24	
IA	NP 217	O 198	PK 277	NK 343
IB	N 128	NPK 316	K 248	P 144
IIB	K 269	P 117	NPK 271	N 135
IIA	O 132	PK 300	NK 313	NP 128
IIIB	N 139	P 137	K 249	NPK 431
IIIA	PK 284	O 168	NK 312	NP 128
	1		4	

SYSTEM OF REPLICATION : 3 randomised blocks each split into 2 sub-blocks, the highest order interaction being confounded with fertility differences.

AREA OF EACH PLOT : 1/60th acre.

SOIL : Gravel, black soil, some shells ; rock close to surface.

VARIETY : Great Scott.

TREATMENTS : Sulphate of ammonia (N) at the rate of 0.6 cwt. N per acre, sulphate of potash (K) at the rate of 1.5 cwt. K₂O per acre and superphosphate at the rate of 0.6 cwt. P₂O₅ per acre.

MANURES APPLIED : March 31st.

POTATOES PLANTED : March 27th.

POTATOES LIFTED : September 19th-20th.

PREVIOUS CROP : Parsnips.

SUMMARY OF RESULTS

INDIVIDUAL TREATMENTS

	Sub-blocks A				Sub-blocks B.				Mean
	No manure	S/Amm. Super.	S/Amm. S/Pot.	Super., S/Pot.	S/Amm.	Super.	S/Pot.	S/Amm. S/Pot., Super.	
Tons per acre ..	4.45	4.22	8.64	7.69	3.59	3.55	6.84	9.09	6.01
Per cent	74.0	70.3	143.8	127.9	59.7	59.1	113.8	151.3	100.0

The second order interaction is confounded with fertility differences ; comparisons involving this interaction will be affected by such differences.

MEAN OF PHOSPHATE AND NO PHOSPHATE

	No Sulph. Amm.	Sulph. Amm.	Mean
Tons per acre			
No potash	4.00	3.91	3.95
Potash	7.26	8.87	8.06
<i>Mean</i>	5.63	6.39	6.01
Per cent.			
No potash	66.6	65.0	65.8
Potash	120.9	147.5	134.2
<i>Mean</i>	93.7	106.3	100.0

Standard error of single entries: 0.389 tons, or 6.47 per cent.

CONCLUSIONS

The response to superphosphate, 0.26 tons per acre or 4.4 per cent., is not significant, that to potash, 4.11 tons per acre or 68.4 per cent., is highly so. The apparent response to sulphate of ammonia of 0.76 tons per acre or 12.6 per cent. cannot by itself be judged significant in view of the exceptionally high standard error ; the significant interaction with potash, however, is evidence of a real manurial effect.

POTATOES

EFFECT OF SULPHATE OF AMMONIA, SULPHATE OF POTASH AND SUPERPHOSPHATE

R. Starling, Esq., Northfield Farm, Little Downham, Ely, 1932

I	1N 1P	0N 1P	1N 2P	—	—	—
	—	—	—	0N 0P	0N 2P	1N 0P
II	0N 1P	0N 2P	1N 0P	1N 1P	—	0N 0P
	—	—	—	—	1N 2P	—
III	0N 0P	—	0N 2P	—	1N 0P	1N 2P
	—	1N 1P	—	0N 1P	—	—
IV	1N 2P	1N 0P	1N 1P	—	—	0N 1P
	—	—	—	0N 2P	0N 0P	—
V	1N 0P	0N 0P	—	—	1N 1P	0N 2P
	—	—	0N 1P	1N 2P	—	—
VI	—	1N 2P	0N 0P	—	—	1N 1P
	0N 2P	—	—	1N 0P	0N 1P	—

In each plot the half receiving no sulphate of potash is left blank, and the dressing of superphosphate and sulphate of ammonia applied to the whole plot is indicated by a symbol in the half receiving sulphate of potash.

SYSTEM OF REPLICATION : 6 × 6 Latin square, plots split for sulphate of potash.

AREA OF EACH SUB-PLOT : 1/100th acre.

SOIL : Good black fenland.

VARIETY : Scotch Majestic.

TREATMENTS : Superphosphate (P) at the rate of 0, 5, and 10 cwt. per acre, sulphate of ammonia (N) at the rate of 0 and 2 cwt. per acre, and sulphate of potash at the rate of 2 cwt. per acre.

MANURES APPLIED : April 4th.

POTATOES PLANTED : April 6th.

LIFTED : Oct. 7th.

PREVIOUS CROP : Wheat.

Actual Weights in lbs.

Row.	Without Potash.						With potash.					
	0N 0K	0N 1P	0N 2P	1N 0P	1N 1P	1N 2P	0N 0K	0N 1P	0N 2P	1N 0P	1N 1P	1N 2P
I ..	191	290	236	211	324	334	199	237	268	205	309	318
II ..	137	226	223	192	236	308	145	263	252	223	252	263
III ..	186	197	226	163	232	319	198	225	257	171	249	327
IV ..	158	187	230	242	240	319	165	197	209	206	265	301
V ..	207	201	245	227	304	296	225	210	221	225	290	321
VI ..	149	171	263	199	196	253	110	155	237	167	224	252

SUMMARY OF RESULTS

		No super.	Single super.	Double super.	Mean
Tons per acre					
Without Sulph. Amm.	{ No Sulph. pot. ..	7.65	9.46	10.59	9.23
	{ Sulph. pot. ..	7.75	9.58	10.74	9.36
With Sulph. Amm.	{ No Sulph. pot. ..	9.18	11.40	13.61	11.40
	{ Sulph. pot. ..	8.91	11.82	13.26	11.33
Per cent.					
Without Sulph. Amm.	{ No Sulph. pot. ..	74.0	91.6	102.5	89.4
	{ Sulph. pot. ..	75.0	92.7	104.0	90.6
With Sulph. Amm.	{ No Sulph. pot. ..	88.9	110.4	131.7	110.3
	{ Sulph. pot. ..	86.2	114.5	128.4	109.7

Each yield in the above table is the mean of 6 half plots. The standard errors of the yields of single whole plots (appropriate to comparisons involving nitrogen and super.) and of single half plots (appropriate to the direct effect of potash and its interactions with nitrogen and super.) are :

Whole plots : 0.872 tons, or 8.44 per cent.
 Half plots : 0.812 tons, or 7.86 per cent.

MEAN OF POTASH AND NO POTASH

		No super.	Single super.	Double super.	Mean
Tons per acre					
No Sulph. amm.		7.70	9.52	10.66	9.30
Sulph. amm.		9.04	11.61	13.44	11.36
Mean		8.37	10.56	12.05	10.33
Per cent.					
No Sulph. amm.		74.5	92.2	103.2	90.0
Sulph. amm.		87.6	112.4	130.0	110.0
Mean		81.0	102.3	116.6	100.0

Standard error of single entry: 0.356 tons, or 3.45 per cent.

CONCLUSIONS

Definitely significant response to sulphate of ammonia and to superphosphate. The response to superphosphate in the presence of sulphate of ammonia is greater than the response in the absence of sulphate of ammonia. Equally the response to sulphate of ammonia appears to increase regularly with increasing dressings of superphosphate. Plots with and without potash give practically equal total yield, with a standard error of only 1.3 per cent.

POTATOES

EFFECT OF SULPHATE OF AMMONIA, SULPHATE OF POTASH AND SUPERPHOSPHATE

J. A. Tribe, Esq., Willow Farm, near March, 1932

Plan and actual weights in lb.

IB		IA		IIB		IIA	
K 156	NPK 219	O 158	NK 195	NPK 243	K 151	NK 164	O 144
P 170	N 128	PK 228	NP 245	N 147	P 177	NP 212	PK 179
NP 160	NK 83	NPK 202	K 134	NK 152	NP 164	P 143	K 96
PK 102	O 66	P 154	N 108	O 125	PK 184	N 99	NPK 203

IIIA IIB IVA IVB

SYSTEM OF REPLICATION : 4 randomised blocks each split into two sub-blocks, the highest order interaction being confounded with fertility differences.

AREA OF EACH PLOT : 1/60th acre.

SOIL : Light peaty fen of poor quality.

VARIETY : King Edward, once grown.

TREATMENTS : Sulphate of ammonia (N) at the rate of 0.4 cwt. N per acre, sulphate of potash (K) at the rate of 1.0 cwt. K₂O per acre and superphosphate (P) at the rate of 1.0 cwt. P₂O₅ per acre.

MANURES APPLIED : April 12th.

POTATOES LIFTED : October 3rd.

POTATOES PLANTED : April 12th.

PREVIOUS CROP : Wheat.

SUMMARY OF RESULTS INDIVIDUAL TREATMENTS

	Sub-blocks A				Sub-blocks B				Mean
	No manure	S/Amm. Super.	S/Amm. S/Pot.	Super. S/Pot.	S/Amm.	Super.	S/Pot.	S/Amm. Super. S/Pot.	
Tons per acre ..	3.30	5.23	3.98	4.64	3.23	4.31	3.60	5.80	4.26
Per cent	77.5	122.7	93.3	108.9	75.7	101.2	84.4	136.2	100.0

The second order interaction is confounded with fertility differences ; comparisons involving this interaction will be affected by such differences.

MEAN OF POTASH AND NO POTASH

	No Sulph. Amm.	Sulph. Amm.	Mean
Tons per acre			
No super.	3.45	3.60	3.52
Super.	4.48	5.52	5.00
Mean	3.96	4.56	4.26
Per cent.			
No super.	80.9	84.5	82.7
Super.	105.0	129.5	117.3
Mean	93.0	107.0	100.0

MEAN OF PHOSPHATE AND NO PHOSPHATE

	No Sulph. Amm.	Sulph. Amm.	Mean
Tons per acre			
No Sulph. Pot.	3.81	4.23	4.02
Sulph. Pot.	4.12	4.89	4.50
Mean	3.96	4.56	4.26
Per cent.			
No Sulph. Pot.	89.3	99.2	94.3
Sulph. Pot.	96.6	114.8	105.7
Mean	93.0	107.0	100.0

MEAN OF NITROGEN AND NO NITROGEN

	No Sulph. Pot.	Sulph. Pot.	Mean
Tons per acre			
No super.	3.26	3.79	3.52
Super.	4.77	5.22	5.00
Mean	4.02	4.50	4.26
Per cent.			
No super.	76.6	88.9	82.7
Super.	112.0	122.6	117.3
Mean	94.3	105.7	100.0

Standard errors for the last three tables. Single entries: 0.120 tons, or 2.83 per cent.

CONCLUSIONS

Significant response to all three fertilisers, superphosphate giving an increase of 1.48 tons per acre or 34.6 per cent., sulphate of ammonia 0.60 tons per acre or 14.0 per cent., sulphate of potash 0.48 tons per acre or 11.4 per cent. The response to superphosphate is greater in the presence than in the absence of the two other nutrients, and the response to these is therefore greater in the presence than in the absence of superphosphate. This interaction is significant in the case of superphosphate and sulphate of ammonia, the two nutrients giving the highest returns.

POTATOES

EFFECT OF NITRATE OF SODA, SULPHATE OF POTASH AND SUPER-PHOSPHATE

T. H. Ream, Esq., Portobello Farm, nr. Potton, 1932

Plan and actual weights in lb.

25

1

NKP 179	KP 146	O 143	N 156
NK 198	K 140	P 143	NP 180
O 138	NKP 181	NP 151	K 150
P 138	NK 172	N 163	KP 151
K 142	N 183	NKP 177	O 137
KP 153	NP 172	NK 182	P 149
NP 174	O 136	K 140	NKP 181
N 193	P 136	KP 129	NK 166

32

8

SYSTEM OF REPLICATION : 4 × 4 Latin square with plots split for superphosphate.

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

SOIL : Light sandy.

VARIETY : Sprouted Eclipse.

TREATMENTS : Sulphate of potash (K) at the rate of 1.0 cwt. K₂O per acre, nitrate of soda (N) at the rate of 0.4 cwt. N per acre in two dressings, and superphosphate (P) at the rate of 0.5 cwt. P₂O₅ per acre.

BASAL MANURING : Dunged on stubble, 20 tons per acre.

MANURES APPLIED : March 17th, April 1st and May 25th.

POTATOES PLANTED : April 1st.

POTATOES LIFTED : July 29th.

PREVIOUS CROP : Oats.

SUMMARY OF RESULTS

	No Potash or Nitrogen	Sulphate of Potash	Nitrate of Soda	Sulphate of Potash, and Nitrate of Soda	Mean
Tons per acre					
Without super. ..	4.95	5.11	6.20	6.41	5.67
With super.	5.05	5.17	6.04	6.41	5.67
Per cent.					
Without super. ..	87.3	90.1	109.5	113.1	100.0
With super.	89.2	91.2	106.6	113.1	100.0

Each yield in the above table is the mean of 4 sub-plots. The standard errors of the yields of single whole plots (appropriate to comparisons involving potash and nitrogen) and of single half plots (appropriate to the direct effect of super, and its interactions with potash and nitrogen) are :

Whole plots : 0.278 tons, or 4.91 per cent.
Half plots : 0.341 tons, or 6.02 per cent.

MEAN OF SUPERPHOSPHATE AND NO SUPERPHOSPHATE

	No Nitrogen	Nitrogen	Mean
Tons per acre			
No potash	5.00	6.12	5.56
Potash	5.14	6.41	5.77
Mean	5.07	6.27	5.67
Per cent.			
No potash	88.2	108.0	98.1
Potash	90.6	113.1	101.9
Mean	89.4	110.6	100.0

Standard error of single entry : 0.139 tons, or 2.45 per cent.

CONCLUSIONS

Significant response to nitrate of soda, but not to potash. There is no evidence of any response to superphosphate.

SUGAR BEET VARIETAL TRIAL

EFFECT OF SULPHATE OF AMMONIA, MURIATE OF POTASH AND SUPERPHOSPHATE

(National Institute of Agricultural Botany).

East Anglian Institute of Agriculture, Good Easter, Chelmsford, 1932.

BLOCK I	C NP	C N	A NK	B K	A K	C KP	C P	B NPK	B O	A N	B NP	C NK
BLOCK II	B NP	A NPK	C O	C N	C KP	A P	B NK	B N	B KP	C NP	A KP	A NK
BLOCK III	A NPK	A O	C O	C P	B NP	C N	A N	A NP	B N	B NPK	B O	C KP
BLOCK IV	A P	B KP	C K	A NPK	B N	B P	A K	B NP	A O	C KP	C NP	A NP

B P	B NK	B N	A O	C O	C NPK	A NPK	A KP	A NP	A P	C K	B KP	BLOCK I
B O	C P	B P	C NPK	A K	A N	A O	B NPK	C NK	B K	C K	A NP	BLOCK II
C NPK	C NK	B NK	A K	C K	A P	B P	B KP	C NP	B K	A KP	A NK	BLOCK III
B K	C P	C N	A NK	B NPK	B O	A N	C NPK	A KP	C O	B NK	C NK	BLOCK IV

The lower half of the plan should in reality be contiguous to and to the right of the upper half.

SYSTEM OF REPLICATION : 4 randomised blocks of 24 plots each.

AREA OF EACH PLOT : .005165 acre.

SOIL : London Clay.

VARIETIES :

A=Kleinwanzleben E.

B=Dippe W.I.

C=Marsters.

TREATMENTS : Sulphate of ammonia at the rate of 0.6 cwt. N per acre, muriate of potash at the rate of 0.75 cwt. K₂O per acre, and superphosphate at the rate of 0.5 cwt. P₂O₅ per acre.

BASAL MANURING : 12 loads dung applied to oat stubble in autumn, 1931.

MANURES APPLIED : May 25th.

BET SOWN : May 20th.

BET LIFTED : November 23rd-December 1st.

PREVIOUS CROP : Spring oats.

Blocks.		O	K	P	N	NK	NP	KP	NKP
ROOTS (washed) lb.									
Kleinwanzleben E.									
I	..	162	152	173	184	112	190	140	175
II	..	162	164	175	178	193	166	158	155
III	..	127	141	142	168	171	157	148	139
IV	..	158	188	162	199	191	193	160	192
Dippe W.I.									
I	..	133	117	140	163	143	168	127	144
II	..	130	137	101	159	144	150	132	160
III	..	138	121	124	166	142	118	132	155
IV	..	128	147	143	174	159	157	139	153
Marsters.									
I	..	122	107	118	118	148	112	140	162
II	..	132	171	142	152	152	175	115	160
III	..	123	142	120	149	147	152	130	173
IV	..	146	151	138	165	136	173	152	195
SUGAR PERCENTAGE.									
Kleinwanzleben E.									
I	..	18.01	18.47	18.35	18.41	18.01	18.13	18.64	18.87
II	..	18.35	18.58	19.04	18.47	18.30	17.90	18.81	18.70
III	..	18.98	18.70	18.81	18.58	18.41	18.81	19.27	18.70
IV	..	18.41	18.07	18.01	17.67	18.30	17.84	19.04	17.90
Dippe W.I.									
I	..	19.27	19.84	20.01	19.84	19.78	19.61	19.49	19.27
II	..	20.29	20.29	20.06	19.89	19.61	18.81	19.84	19.66
III	..	20.06	19.84	20.29	19.72	20.12	19.84	20.12	19.95
IV	..	19.84	19.95	19.49	19.27	19.27	19.04	20.06	19.72
Marsters.									
I	..	19.72	19.49	19.61	18.87	18.92	18.92	19.84	19.49
II	..	20.18	19.15	20.18	19.95	19.49	19.84	19.84	19.78
III	..	19.95	19.49	20.46	19.89	19.84	19.38	20.12	20.29
IV	..	20.06	19.49	19.72	18.81	19.04	19.32	19.84	18.70
NUMBER OF ROOTS.									
Kleinwanzleben E.									
I	..	124	131	115	136	134	132	126	120
II	..	133	161	134	134	156	104	133	147
III	..	114	130	134	127	101	119	106	107
IV	..	127	145	109	139	138	132	132	148
Dippe W.I.									
I	..	145	156	152	124	136	140	137	146
II	..	147	152	138	138	142	142	145	135
III	..	139	107	125	140	133	133	125	138
IV	..	127	147	120	159	148	138	143	140
Marsters.									
I	..	113	91	123	121	126	103	129	120
II	..	138	149	139	141	128	144	126	125
III	..	119	118	127	127	107	102	129	129
IV	..	127	129	124	127	110	143	142	137

SUMMARY OF RESULTS
YIELDS UNADJUSTED FOR PLANT NUMBER

	O	K	P	N	NK	NP	KP	NKP	Mean
ROOTS (washed).									
Tons per acre									
Kleinwanzleben E.	13.16	13.94	14.09	15.75	14.41	15.25	13.09	14.28	14.25
Dippe W. I. ..	11.43	11.28	10.98	14.30	12.70	12.81	11.45	13.22	12.27
Marsters ..	11.30	12.34	11.19	12.62	12.60	13.22	11.60	14.91	12.47
Mean	11.96	12.52	12.08	14.22	13.24	13.76	12.05	14.14	13.00
Per cent.									
Kleinwanzleben E.	101.2	107.2	108.4	121.2	110.9	117.4	100.7	109.9	109.6
Dippe W. I. ..	87.9	86.8	84.4	110.0	97.7	98.6	88.1	101.7	94.4
Marsters ..	86.9	94.9	86.1	97.1	96.9	101.7	89.3	114.7	96.0
Mean	92.0	96.3	93.0	109.4	101.8	105.9	92.7	108.8	100.0
SUGAR PERCENTAGE									
Kleinwanzleben E.	18.44	18.46	18.55	18.28	18.26	18.17	18.94	18.54	18.46
Dippe W. I. ..	19.86	19.98	19.96	19.68	19.70	19.32	19.88	19.65	19.75
Marsters ..	19.98	19.40	19.99	19.38	19.32	19.36	19.91	19.56	19.61
Mean	19.43	19.28	19.50	19.11	19.09	18.95	19.58	19.25	19.27
Per cent.									
Kleinwanzleben E.	95.6	95.7	96.2	94.8	94.7	94.3	98.3	96.2	95.7
Dippe W. I. ..	103.1	103.7	103.6	102.1	102.2	100.3	103.1	101.9	102.5
Marsters ..	103.6	100.7	103.7	100.5	100.2	100.5	103.3	101.5	101.8
Mean	100.8	100.0	101.2	99.2	99.0	98.3	101.6	99.9	100.0

Standard errors single entry—Roots : 0.664 tons, or 5.11 per cent.
 Sugar percentage : 0.149, or 0.773 per cent.

YIELDS ADJUSTED FOR DIFFERENCE IN PLANT NUMBER
ROOTS (Washed)

	O	K	P	N	NK	NP	KP	NKP	Mean
Tons per acre.									
Kleinwanzleben E.	13.46	13.44	14.46	15.61	14.36	15.68	13.40	14.31	14.34
Dippe W. I. ..	11.04	10.84	10.85	13.88	12.30	12.48	11.15	12.82	11.92
Marsters ..	11.61	12.76	11.32	12.71	13.20	13.59	11.58	15.06	12.73
Mean	12.04	12.35	12.21	14.07	13.29	13.92	12.04	14.06	13.00
Per cent.									
Kleinwanzleben E.	103.5	103.4	111.2	120.1	110.4	120.6	103.1	110.1	110.3
Dippe W. I. ..	84.9	83.4	83.5	106.8	94.7	96.0	85.8	98.6	91.7
Marsters ..	89.3	98.2	87.1	97.8	101.6	104.6	89.1	115.8	97.9
Mean	92.6	95.0	93.9	108.2	102.2	107.1	92.7	108.2	100.0

Standard error of single entry : 0.610 tons, or 4.69 per cent.

MAIN EFFECTS
YIELDS UNADJUSTED FOR PLANT NUMBER

<i>All plots with</i>	Kleinw.	Dippe	Marsters	<i>Mean</i>
ROOTS (washed)				
Tons per acre				
No Sulph. Amm.	13.57	11.28	11.61	<i>12.15</i>
Sulph. Amm.	14.92	13.26	13.34	<i>13.84</i>
No Mur. Pot.	14.56	12.38	12.08	<i>13.01</i>
Mur. Pot.	13.93	12.16	12.86	<i>12.98</i>
No Super.	14.31	12.43	12.21	<i>12.98</i>
Super.	14.18	12.12	12.73	<i>13.01</i>
Per cent.				
No Sulph. Amm.	104.4	86.8	89.3	<i>93.5</i>
Sulph. Amm.	114.8	102.0	102.6	<i>106.5</i>
No Mur. Pot.	112.0	95.2	93.0	<i>100.1</i>
Mur. Pot.	107.2	93.6	99.0	<i>99.9</i>
No Super.	110.1	95.6	94.0	<i>99.9</i>
Super.	109.1	93.2	98.0	<i>100.1</i>
SUGAR PERCENTAGE				
Actual				
No. Sulph. Amm.	18.60	19.92	19.82	<i>19.45</i>
Sulph. Amm.	18.31	19.59	19.41	<i>19.10</i>
No. Mur. Pot.	18.36	19.71	19.68	<i>19.25</i>
Mur. Pot.	18.55	19.80	19.55	<i>19.30</i>
No Super.	18.36	19.80	19.52	<i>19.23</i>
Super.	18.55	19.70	19.71	<i>19.32</i>
Per cent.				
No Sulph. Amm.	96.5	103.4	102.8	<i>100.9</i>
Sulph. Amm.	95.0	101.6	100.7	<i>99.1</i>
No Mur. Pot.	95.2	102.2	102.1	<i>99.8</i>
Mur. Pot.	96.2	102.7	101.4	<i>100.1</i>
No Super.	95.2	102.8	101.3	<i>99.8</i>
Super.	96.2	102.2	102.2	<i>100.2</i>

Standard error single entry—Roots : 0.332 tons, or 2.55 per cent.
Sugar percentage : 0.074, or 0.386 per cent.

**YIELDS ADJUSTED FOR DIFFERENCES OF PLANT NUMBER
ROOTS**

<i>All plots with</i>	Klein.	Dippe.	Marsters	<i>Mean</i>
Tons per acre (washed)				
No Sulph. Amm.	13.69	10.97	11.82	<i>12.16</i>
Sulph. Amm.	14.99	12.87	13.64	<i>13.83</i>
No Mur. Pot.	14.80	12.06	12.31	<i>13.06</i>
Mur. Pot.	13.88	11.78	13.15	<i>12.94</i>
No Super.	14.22	12.02	12.57	<i>12.94</i>
Super.	14.46	11.83	12.89	<i>13.06</i>
Per cent.				
No Sulph. Amm.	105.3	84.4	90.9	<i>93.5</i>
Sulph. Amm.	115.3	99.0	105.0	<i>106.4</i>
No Mur. Pot.	113.9	92.8	94.7	<i>100.5</i>
Mur. Pot.	106.8	90.6	101.2	<i>99.5</i>
No Super.	109.4	92.5	96.7	<i>99.5</i>
Super.	111.3	91.0	99.2	<i>100.5</i>

Standard error single entry: 0.305 tons, or 2.34 per cent.

CONCLUSIONS

The yield of Kleinwanzleben E is significantly greater (1.88 tons or 14.4 per cent.) than the yield of the other varieties, but the sugar percentage is significantly lower (1.22 or 6.3 per cent.), though not sufficiently so to counteract the increase in yield, the total sugar being increased by 0.203 tons or 8.1 per cent.

There is a large significant increase of yield with nitrogen (1.69 tons or 13.0 per cent.) the effect of which is only slightly reduced by the (significant) depression of the sugar percentage (0.35 or 1.8 per cent.), the total sugar being increased 0.28 tons or 11.2 per cent.

Neither potash nor phosphate shows any significant average effect on yield, but the varieties show a differential response to potash which, however, only becomes significant when the yields are adjusted for variation in plant number—with Kleinwanzleben E there is a depression of yield and with Marsters an increase in the presence of potash.

Dippe W.I. has a significantly higher plant number than the other two varieties, and the differences for the different varieties between the adjusted yields cannot therefore be taken as being necessarily true measures of the varietal differences under field conditions.

SUGAR BEET VARIETAL TRIAL

EFFECT OF SULPHATE OF AMMONIA, MURIATE OF POTASH AND SUPERPHOSPHATE

(National Institute of Agricultural Botany).

Norfolk Agricultural Station, Sprowston, Norwich, 1932

BLOCK I	A O	C KP	A K	B P	C NK	A NK	B K	B NP	B NPK	A NPK	B O	B N
BLOCK II	A NK	B NP	B P	A KP	C NK	A O	C K	C NPK	B NK	C N	A P	B NPK
BLOCK III	C O	A NK	A NPK	A N	B K	C P	B NPK	C NPK	B P	A KP	B NP	B NK
BLOCK IV	C P	A KP	C NPK	C O	C N	C NP	A NP	A NPK	A O	A K	B NK	C KP

C O	A NP	C NP	B KP	C P	C K	A N	A P	C NPK	A KP	C N	B NK	BLOCK I
C KP	B KP	C P	A K	B O	B N	A N	A NP	C O	C NP	A NPK	B K	BLOCK II
A P	C NK	A O	B O	C K	A NP	B N	B KP	C KP	A K	C N	C NP	BLOCK III
B NP	B O	C NK	A P	B P	A NK	C K	B KP	B K	B NPK	B N	A N	BLOCK IV

The lower half of the plan should in reality be contiguous to and to the right of the upper half.

SYSTEM OF REPLICATION : 4 randomised blocks of 24 plots each.

AREA OF EACH PLOT : 0.005165 acre.

SOIL : Light Loam.

VARIETIES :

A=Kleinwanzleben E.

B=Dippe W.I.

C=Marsters.

TREATMENTS : Sulphate of ammonia at the rate of 0.6 cwt. N per acre, muriate of potash at the rate of 0.75 cwt. K₂O per acre, and superphosphate at the rate of 0.5 cwt. P₂O₅ per acre.

MANURES APPLIED : May 2nd.

BEEET SOWN : May 3rd.

BEEET LIFTED : November 7th-14th.

PREVIOUS CROP : Barley.

Actual weights in lb.

Blocks.	O	K	P	N	NK	NP	KP	NKP
ROOTS (washed)								
Kleinwanzleben E.								
I	134	140	133	148	144	135	159	156
II	78	152	132	111	149	165	136	135
III	164	164	155	155	146	153	150	157
IV	142	157	154	140	181	165	164	190
Dippe W.I.								
I	123	123	124	111	118	130	122	134
II	128	90	131	95	130	121	130	138
III	128	140	133	128	155	122	145	163
IV	124	143	122	132	135	145	130	145
Marsters								
I	99	131	127	116	99	115	105	144
II	138	124	129	114	113	143	123	128
III	130	136	136	135	138	129	140	163
IV	128	143	134	148	147	110	137	141
SUGAR PERCENTAGE								
Kleinwanzleben								
I	16.76	17.33	17.04	17.21	16.99	16.19	17.21	16.64
II	15.90	17.21	17.04	16.59	17.04	16.99	16.47	17.38
III	16.82	17.04	17.38	17.16	16.93	16.36	17.16	17.27
IV	17.38	17.84	17.33	17.21	17.61	17.50	17.04	17.50
Dippe W.I.								
I	18.30	17.90	17.44	18.01	17.67	17.78	17.73	17.61
II	17.73	17.73	17.38	17.16	17.61	17.67	17.38	17.38
III	17.78	18.30	18.41	17.50	17.16	17.38	17.61	17.96
IV	18.64	18.58	18.18	18.07	19.10	18.52	18.98	18.24
Marsters								
I	17.50	18.13	17.73	17.44	16.93	17.73	17.78	17.90
II	17.61	17.80*	17.50	17.04	17.16	17.84	17.73	17.56
III	18.35	17.50	18.13	17.21	17.78	17.61	17.50	17.44
IV	18.75	18.98	18.41	17.84	18.07	17.67	19.10	18.41
NUMBER OF ROOTS								
Kleinwanzleben								
I	120	119	92	92	82	90	92	110
II	64	110	91	90	110	92	100	107
III	113	88	98	73	74	104	78	86
IV	92	89	95	105	103	112	114	113
Dippe W.I.								
I	104	121	116	98	96	109	110	108
II	101	118	112	98	106	116	114	98
III	105	102	91	78	100	74	100	113
IV	98	101	101	101	101	115	94	112
Marsters								
I	66	100	94	70	51	82	84	80
II	72	74	96	82	57	82	78	65
III	91	94	74	99	88	90	85	93
IV	105	107	115	111	100	84	103	96

*Estimated

SUMMARY OF RESULTS
YIELDS UNADJUSTED FOR PLANT NUMBER

	O	K	P	N	NK	NP	KP	NKP	Mean
ROOTS (washed) Tons per acre									
Kleinwanzleben E.	11.19	13.24	12.40	11.97	13.40	13.35	13.16	13.78	12.81
Dippe W. I. ..	10.87	10.72	11.02	10.07	11.62	11.19	11.39	12.53	11.18
Marsters	10.70	11.54	11.36	11.08	10.74	10.74	10.91	12.44	11.19
Mean	10.92	11.83	11.60	11.04	11.92	11.76	11.82	12.92	11.73
Per cent.									
Kleinwanzleben E.	95.4	113.0	105.8	102.1	114.2	113.9	112.2	117.6	109.3
Dippe W. I. ..	92.7	91.4	94.0	85.9	99.1	95.4	97.1	106.9	95.3
Marsters	91.2	98.4	96.9	94.5	91.6	91.6	93.0	106.1	95.4
Mean	93.1	100.9	98.9	94.2	101.6	100.3	100.8	110.2	100.0
SUGAR PERCENTAGE									
Kleinwanzleben E.	16.72	17.36	17.20	17.04	17.14	16.76	16.97	17.20	17.05
Dippe W. I. ..	18.11	18.13	17.85	17.68	17.88	17.84	17.92	17.80	17.90
Marsters	18.05	*18.10	17.94	17.38	17.48	17.71	18.03	17.83	17.82
Mean	17.63	17.86	17.66	17.37	17.50	17.44	17.64	17.61	17.59
Per cent.									
Kleinwanzleben E.	95.0	98.7	97.8	96.9	97.5	95.3	96.5	97.8	96.9
Dippe W. I. ..	103.0	103.1	101.5	100.5	101.7	101.4	101.9	101.2	101.8
Marsters	102.6	*102.9	102.0	98.8	99.4	100.7	102.5	101.4	101.3
Mean	100.2	101.6	100.4	98.7	99.5	99.1	100.3	100.1	100.0

Standard errors single entry—Roots : 0.581 tons, or 5.0 per cent.

Sugar Percentage : 0.168 or 0.957 per cent.

* Sugar percentage of one plot of this treatment estimated.

YIELDS ADJUSTED FOR DIFFERENCE IN PLANT NUMBER
ROOTS (washed)

	O	K	P	N	NK	NP	KP	NKP	Mean
Tons per acre									
Kleinwanzleben E.	11.14	13.04	12.46	12.16	13.51	13.22	13.14	13.50	12.77
Dippe W. I. ..	10.65	10.21	10.70	10.13	11.45	10.92	11.08	12.12	10.91
Marsters	11.11	11.60	11.39	11.26	11.48	11.12	11.19	12.86	11.50
Mean	10.97	11.62	11.52	11.18	12.15	11.75	11.80	12.83	11.73
Per cent.									
Kleinwanzleben E.	95.0	111.2	106.2	103.7	115.2	112.7	112.1	115.1	108.9
Dippe W. I. ..	90.8	87.0	91.2	86.4	97.6	93.1	94.5	103.3	93.0
Marsters	94.7	98.9	97.2	96.0	97.9	94.8	95.4	109.6	98.1
Mean	93.5	99.0	98.2	95.4	103.6	100.2	100.7	109.3	100.0

Standard error : 0.538 tons, or 4.6 per cent.

SUMMARY OF RESULTS
YIELDS UNADJUSTED TO PLANT NUMBER

MAIN EFFECTS
YIELDS UNADJUSTED TO PLANT NUMBER

<i>All plots with</i>	Kleinw.	Dippe	Marsters	<i>Mean</i>
ROOTS (washed) Tons per acre				
No Sulph. Amm.	12.50	11.00	11.13	<i>11.54</i>
Sulph. Amm.	13.13	11.35	11.25	<i>11.91</i>
No Mur. Pot.	12.23	10.79	10.97	<i>11.33</i>
Mur. Pot.	13.40	11.56	11.41	<i>12.12</i>
No Super.	12.45	10.82	11.01	<i>11.43</i>
Super.	13.17	11.53	11.36	<i>12.02</i>
Per cent.				
No Sulph. Amm.	106.6	93.8	94.9	<i>98.4</i>
Sulph. Amm.	111.9	96.8	96.0	<i>101.6</i>
No Mur. Pot.	104.3	92.0	93.6	<i>96.6</i>
Mur. Pot.	114.2	98.6	97.3	<i>103.4</i>
No Super.	106.2	92.3	93.9	<i>97.5</i>
Super.	112.4	98.3	96.9	<i>102.5</i>
SUGAR PERCENTAGE Actual				
No Sulph. Amm.	17.06	18.00	18.03	<i>17.70</i>
Sulph. Amm.	17.04	17.80	17.60	<i>17.48</i>
No Mur. Pot.	16.93	17.87	17.77	<i>17.52</i>
Mur. Pot.	17.17	17.93	17.86	<i>17.65</i>
No Super.	17.06	17.95	17.76	<i>17.59</i>
Super.	17.03	17.85	17.88	<i>17.59</i>
Per cent.				
No Sulph. Amm.	97.0	102.4	102.5	<i>100.6</i>
Sulph. Amm.	96.8	101.2	100.1	<i>99.4</i>
No Mur. Pot.	96.2	101.6	101.0	<i>99.6</i>
Mur. Pot.	97.6	102.0	101.5	<i>100.4</i>
No Super.	97.0	102.1	100.9	<i>100.0</i>
Super.	96.8	101.5	101.6	<i>100.0</i>

Standard error : Roots : 0.291 tons, or 2.5 per cent.
Sugar Percentage : 0.084 or 0.478 per cent.

**YIELD ADJUSTED FOR DIFFERENCES OF PLANT NUMBER
ROOTS (washed)**

<i>All plots with</i>	Kleinw.	Dippe	Marsters	<i>Mean</i>
Tons per acre				
No Sulph. Amm.	12.44	10.66	11.32	11.47
Sulph. Amm.	13.10	11.15	11.68	11.97
No Mur. Pot.	12.24	10.60	11.22	11.35
Mur. Pot.	13.30	11.21	11.78	12.10
No Super.	12.46	10.61	11.36	11.48
Super.	13.08	11.20	11.64	11.97
Per cent.				
No Sulph. Amm.	106.1	90.9	96.6	97.9
Sulph. Amm.	111.7	95.1	99.6	102.1
No Mur. Pot.	104.4	90.4	95.7	96.8
Mur. Pot.	113.4	95.6	100.5	103.2
No Super.	106.3	90.5	96.9	97.9
Super.	111.5	95.6	99.3	102.1

Standard error: 0.269 tons, or 2.3 per cent.

CONCLUSIONS

The yield of Kleinwanzleben is significantly greater than the yield of the other varieties, but the sugar percentage is significantly lower, though not sufficiently so to counteract the increase in yield.

Potash and phosphate both increase the yield significantly. For sugar percentage there is no increase with phosphate and with potash the increase is not quite significant.

The response to nitrogen is significant after allowance has been made for differences of plant number, but nitrogen significantly depresses the sugar percentage.

The magnitudes of these effects are shown in the following table :

	<i>Roots.</i>		<i>Sugar Percentage.</i>		<i>Total Sugar.</i>	
	tons	per cent.	actual	per cent.	tons	per cent.
Kleinw <i>minus</i> other varieties ..	+1.63	+14.0	-0.81	-4.6	+0.194	+9.4
Muriate of Potash	+0.79	+ 6.8	+0.13	+0.7	+0.154	+7.5
Superphosphate	+0.59	+ 5.0	0.00	0.0	+0.104	+5.0
Sulphate of Ammonia	+0.37	+ 3.2	-0.22	-1.3	+0.039	+1.9

Marsters has a significantly lower number of plants than either of the other two varieties, and the differences for the different varieties between the adjusted yields cannot therefore be taken as being necessarily true measures of the varietal differences under field conditions.

There is no evidence that the varieties respond differently to the different manures.

SUGAR BEET

SINGLING TO 7 INCHES AND 12 INCHES.

EFFECT OF SUPERPHOSPHATE AND MURIATE OF POTASH.

R. Starling, Esq., Northfield Farm, Little Downham, Ely, 1932

	I								II								
32	A	A	A	B	B	B	B	A	B	A	B	A	B	A	B	17	
	K	PK	O	P	O	K	PK	P	O	P	P	K	K	PK	O	PK	
1	A	B	A	B	A	B	B	A	B	A	B	A	A	B	B	A	16
	K	K	PK	O	P	PK	P	O	O	K	PK	PK	O	P	K	P	
	III								IV								

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

AREA OF EACH PLOT : 1/60th acre.

SOIL : Medium Fen.

VARIETY : Marsters.

TREATMENTS : Singling to 7 ins. apart (A) or 12 ins. apart (B) ; the rows were 19½ ins. apart.

Muriate of potash (K) at the rate of 0.75 cwt. K₂O per acre and superphosphate (P) at the rate of 0.5 cwt. P₂O₅ per acre.

MANURES APPLIED : April 11th.

BEEF SOWN : April 11th.

BEEF LIFTED : November 22nd.

PREVIOUS CROP : Oats.

Actual weights in lb.

		A				B				
		O	P	K	PK	O	P	K	PK	
ROOTS (unwashed)										
I	814	867	827	827	843	761	798	838
II	795	871	860	804	843	841	843	855
III	850	825	780	816	747	843	842	822
IV	826	824	837	854	848	808	772	810
TOPS*										
I	229	220	253	221	211	197	199	204
II	223	228	241	224	208	199	211	224
III	218	221	247	213	174	217	235	201
IV	233	220	205	247	226	213	219	211
SUGAR PERCENTAGE										
I	15.73	15.45	15.33	15.39	16.24	16.64	16.36	15.96
II	15.45	16.47	16.19	15.79	16.59	15.56	15.79	15.96
III	15.79	15.96	16.24	15.79	16.02	15.73	15.39	16.02
IV	16.47	15.39	16.02	15.73	16.07	16.64	15.10	15.45

* Tops weighed on quarter area of each plot only.

SUMMARY OF RESULTS

	No Minerals	Super.	Potash	Super. Potash	Mean
ROOTS (washed)					
Tons per acre					
Singling to 7 ins. ..	20.48	21.11	20.59	20.57	20.69
Singling to 12 ins. ..	20.45	20.27	20.29	20.72	20.43
Mean	20.46	20.69	20.44	20.64	20.56
Per cent.					
Singling to 7 ins. ..	99.6	102.7	100.2	100.1	100.6
Singling to 12 ins. ..	99.4	98.6	98.7	100.8	99.4
Mean	99.5	100.6	99.4	100.4	100.0
TOPS					
Tons per acre					
Singling to 7 ins. ..	24.19	23.81	25.34	24.24	24.40
Singling to 12 ins. ..	21.94	22.12	23.14	22.50	22.43
Mean	23.06	22.97	24.24	23.37	23.41
Per cent.					
Singling to 7 ins. ..	103.3	101.7	108.2	103.5	104.2
Singling to 12 ins. ..	93.7	94.5	98.8	96.1	95.8
Mean	98.5	98.1	103.5	99.8	100.0
SUGAR PERCENTAGE					
Singling to 7 ins. ..	15.86	15.82	15.94	15.68	15.82
Singling to 12 ins. ..	16.23	16.14	15.66	15.85	15.97
Mean	16.04	15.98	15.80	15.76	15.90
Per cent.					
Singling to 7 ins. ..	99.7	99.5	100.2	98.6	99.5
Singling to 12 ins. ..	102.1	101.5	98.5	99.7	100.4
Mean	100.9	100.5	99.4	99.2	100.0

Standard errors of single entries—Roots: 0.406 tons, or 1.98 per cent.
 Tops: 0.807 tons, or 3.45 per cent.
 Sugar percentage: 0.224 or 1.41 per cent.

CONCLUSIONS

The narrower spacing gives a significantly higher yield of tops, but not of roots or sugar percentage. There are no significant differences due to nutrients applied.

SUGAR BEET
VARIETAL TRIAL
EFFECT OF MURIATE OF POTASH AND SUPERPHOSPHATE

J. A. Tribe, Esq., Willow Farm, near March, 1932

	I								II								
32	A	A	B	A	A	B	B	B	B	A	A	A	B	B	B	A	17
	P	K	PK	PK	O	K	P	O	K	K	PK	O	P	PK	O	P	
	A	A	A	B	A	B	B	B	B	B	B	A	A	A	B	A	
16	O	K	PK	P	P	PK	K	O	P	PK	O	O	PK	K	K	P	1
	III								IV								

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

AREA OF EACH PLOT : 1/60th acre.

SOIL : Peaty Fen.

VARIETIES :

A=Kleinwanzleben E.

B=Marsters.

TREATMENTS : Muriate of potash (K) at the rate of 0.75 cwt. K₂O per acre and superphosphate (P) at the rate of 0.5 cwt. P₂O₅ per acre.

MANURES APPLIED : April 12th.

BEEF SOWN : April 12th.

LIFTED : December 5-6th.

PREVIOUS CROP : Sugar Beet.

Actual weights in lb.

		Kleinwanzleben E.				Marsters.				
		O	K	P	PK	O	K	P	PK	
ROOTS (unwashed)										
I	524	554	542	505	512	484	506	501
II	473	454	506	497	465	455	503	514
III	517	568	493	564	429	452	458	465
IV	492	467	449	514	432	352	497	496
TOPS										
I	394	329	354	379	274	282	275	259
II	403	356	463	407	326	244	284	300
III	343	396	374	365	272	269	280	290
IV	422	401	420	396	299	233	264	299
SUGAR PERCENTAGE										
I	14.48	15.28	14.93	15.68	16.02	16.19	16.19	16.30
II	15.10	14.82	15.10	15.05	15.50	15.85	16.02	15.16
III	15.62	15.05	14.48	15.28	15.22	16.30	15.96	16.59
IV	14.88	14.36	15.16	14.48	16.59	15.79	16.07	15.68

SUMMARY OF RESULTS

	No Minerals	Potash	Super.	Potash, Super.	Mean
ROOTS (washed) Tons per acre					
Kleinwanzleben	12.47	12.70	12.38	12.94	12.62
Marsters	11.43	10.83	12.21	12.29	11.69
Per cent.					
Kleinwanzleben	102.6	104.5	101.8	106.4	103.8
Marsters	94.0	89.1	100.4	101.1	96.2
TOPS Tons per acre					
Kleinwanzleben	20.92	19.85	21.58	20.72	20.76
Marsters	15.68	13.77	14.77	15.37	14.90
Per cent.					
Kleinwanzleben	117.3	111.3	121.0	116.2	116.4
Marsters	87.9	77.2	82.8	86.2	83.6
SUGAR PERCENTAGE Tons per acre					
Kleinwanzleben	15.02	14.88	14.92	15.12	14.98
Marsters	15.83	16.03	16.06	15.93	15.96
Per cent.					
Kleinwanzleben	97.1	96.1	96.4	97.7	96.8
Marsters	102.3	103.6	103.8	103.0	103.2

Standard errors of single entries—Roots : 0.426 tons, or 3.64 per cent.
 Tops : 0.717 tons, or 4.02 per cent.
 Sugar percentage : 0.224 or 1.44 per cent.

MEAN OF BOTH VARIETIES.

	No Super.	Super.	Mean
ROOTS (washed)			
Tons per acre			
No Potash	11.95	12.30	12.12
Mur. Pot.	11.77	12.61	12.19
Mean	11.86	12.45	12.16
Per cent.			
No Potash	98.3	101.1	99.7
Mur. Pot.	96.8	103.7	100.3
Mean	97.6	102.4	100.0
TOPS			
Tons per acre			
No Potash	18.30	18.17	18.24
Mur. Pot.	16.81	18.05	17.43
Mean	17.55	18.11	17.84
Per cent.			
No Potash	102.6	101.9	102.3
Mur. Pot.	94.2	101.2	97.7
Mean	98.4	101.6	100.0
SUGAR PERCENTAGE			
Tons per acre			
No Potash	15.42	15.49	15.46
Mur. Pot.	15.46	15.52	15.49
Mean	15.44	15.50	15.48
Per cent.			
No Potash	99.6	100.1	99.8
Mur. Pot.	99.9	100.2	100.1
Mean	99.8	100.2	100.0

Standard error of single entries—Roots : 0.301 tons, or 2.57 per cent.
 Tops : 0.507 tons, or 2.84 per cent.
 Sugar percentage 0.158 or 1.02 per cent.

CONCLUSIONS

Kleinwanzleben yields significantly higher than Marsters, 0.93 tons or 7.6 per cent. in the case of the roots, and 5.86 tons or 32.8 per cent. in the case of the tops, but this difference is set off by the significantly lower sugar percentage, Kleinwanzleben being 0.98 or 6.4 per cent. less than Marsters.

The roots show a barely significant response to superphosphate, 0.59 tons or 4.8 per cent., the sugar percentage being unaffected (0.06 or 0.4 per cent. increase). Otherwise the mineral manures show no general effects, nor any differential effects on the different varieties.

Actual weight in lb.

Block.	0N 0K	0N 1K	0N 2K	1N 0K	1N 1K	1N 2K	2N 0K	2N 1K	2N 2K
ROOTS (washed)									
Without Salt									
A ..	81	74	92	95	80	93	101	92	99
B ..	106	85	130	111	111	137	129	98	107
C ..	97	88	78	92	88	98	110	126	88
D ..	71	109	107	83	122	94	111	97	114
With Salt									
A ..	83	84	97	104	79	97	111	98	102
B ..	155	103	120	134	105	152	130	131	127
C ..	92	71	80	99	82	99	106	122	96
D ..	93	100	117	90	135	105	110	98	125
TOPS									
Without Salt									
A ..	95	84	103	116	114	117	123	112	118
B ..	99	83	114	158	137	148	131	126	123
C ..	87	77	85	122	119	120	118	160	123
D ..	64	99	86	107	150	109	141	136	140
With Salt									
A ..	90	99	104	100	115	110	131	126	107
B ..	130	93	99	159	108	179	153	129	139
C ..	85	85	83	136	110	113	113	157	124
D ..	85	95	81	110	146	113	129	131	151
SUGAR PERCENTAGE									
Without Salt									
A ..	16.93	16.84	16.47	16.02	16.99	16.42	16.19	16.99	16.19
B ..	16.42	17.10	16.99	16.19	16.59	16.93	15.62	16.87	16.64
C ..	17.33	17.04	17.38	15.90	15.85	16.13	16.59	16.64	16.59
D ..	17.04	16.87	17.33	16.08	16.07	16.76	15.10	16.53	16.02
With Salt									
A ..	16.99	17.04	16.82	16.76	16.42	16.76	16.42	16.13	16.87
B ..	16.47	17.61	16.76	16.99	17.10	15.90	16.24	16.07	16.53
C ..	17.27	17.04	16.88	16.07	15.62	17.33	16.47	15.62	16.47
D ..	17.12	17.44	17.44	17.16	16.47	15.90	15.62	16.53	15.96

SUMMARY OF RESULTS

		No Potash	Single Potash	Double Potash
ROOTS (washed)				
Tons per acre				
No Salt	No Sulph. Amm.	4.75	4.77	5.45
	Single Sulph. Amm.	5.10	5.37	5.65
	Double Sulph. Amm.	6.04	5.53	5.46
Salt	No Sulph. Amm.	5.66	4.79	5.54
	Single Sulph. Amm.	5.72	5.37	6.07
	Double Sulph. Amm.	6.12	6.01	6.03
<i>Mean</i>	<i>5.56</i>	<i>5.30</i>	<i>5.70</i>	
Per cent.				
No Salt	No Sulph. Amm.	86.0	86.3	98.6
	Single Sulph. Amm.	92.4	97.2	102.3
	Double Sulph. Amm.	109.3	100.1	98.9
Salt	No Sulph. Amm.	102.5	86.8	100.4
	Single Sulph. Amm.	103.5	97.2	109.8
	Double Sulph. Amm.	110.8	108.8	109.1
<i>Mean</i>	<i>100.8</i>	<i>96.0</i>	<i>103.2</i>	
TOPS				
Tons per acre				
No Salt	No Sulph. Amm.	4.62	4.59	5.20
	Single Sulph. Amm.	6.74	6.96	6.62
	Double Sulph. Amm.	6.87	7.15	6.75
Salt	No Sulph. Amm.	5.22	4.98	4.92
	Single Sulph. Amm.	6.76	6.41	6.90
	Double Sulph. Amm.	7.04	7.27	6.98
<i>Mean</i>	<i>6.21</i>	<i>6.23</i>	<i>6.22</i>	
Per cent.				
No Salt	No Sulph. Amm.	74.3	73.8	83.5
	Single Sulph. Amm.	108.3	111.9	106.3
	Double Sulph. Amm.	110.4	114.9	108.5
Salt	No Sulph. Amm.	84.0	80.1	79.0
	Single Sulph. Amm.	108.7	103.1	110.8
	Double Sulph. Amm.	113.2	116.9	112.2
<i>Mean</i>	<i>99.8</i>	<i>100.1</i>	<i>100.0</i>	

For standard errors see next page.

SUGAR PERCENTAGE

		No Potash	Single Potash	Double Potash
No Salt	No Sulph. Amm.	16.93	16.96	17.04
	Single Sulph. Amm.	16.05	16.38	16.56
	Double Sulph. Amm.	15.88	16.76	16.36
Salt	No Sulph. Amm.	16.96	17.28	16.98
	Single Sulph. Amm.	16.75	16.40	16.47
	Double Sulph. Amm.	16.19	16.09	16.46
<i>Mean</i>	<i>16.46</i>	<i>16.64</i>	<i>16.64</i>	
Per cent.				
No Salt	No Sulph. Amm.	102.1	102.3	102.8
	Single Sulph. Amm.	96.8	98.7	99.9
	Double Sulph. Amm.	95.7	101.0	98.6
Salt	No Sulph. Amm.	102.3	104.2	102.4
	Single Sulph. Amm.	101.0	98.9	99.3
	Double Sulph. Amm.	97.6	97.0	99.2
<i>Mean</i>	<i>99.2</i>	<i>100.4</i>	<i>100.4</i>	

Each yield in the above table is the mean of 4 half plots. The standard errors of the yields of single whole plots (appropriate to comparisons involving potash and nitrogen) and of single half plots (appropriate to the direct effect of salt, and its interactions with potash and nitrogen) are :

- Roots (whole plots) : 0.707 tons, or 12.8 per cent.
- (half plots) : 0.483 tons, or 8.7 per cent.
- Tops (whole plots) : 0.824 tons, or 13.2 per cent.
- (half plots) : 0.491 tons, or 7.9 per cent.
- Sugar percentage (whole plots) : 0.352 or 2.12 per cent.
- (half plot) : 0.349 or 2.10 per cent.

MEAN OF ALL LEVELS OF POTASH

	ON	1N	2N	Mean
ROOTS (washed)				
Tons per acre				
No salt	4.99	5.37	5.68	5.35
Salt	5.33	5.72	6.05	5.70
Mean	5.16	5.54	5.86	5.53
Per cent				
No Salt	90.3	97.3	102.8	96.8
Salt	96.6	103.5	109.6	103.2
Mean	93.4	100.4	106.2	100.0
TOPS				
Tons per acre				
No salt	4.80	6.77	6.92	6.17
Salt	5.04	6.69	7.10	6.27
Mean	4.92	6.73	7.01	6.22
Per cent				
No Salt	77.2	108.8	111.3	99.1
Salt	81.0	107.6	114.1	100.9
Mean	79.1	108.2	112.7	100.0
SUGAR PERCENTAGE (actual)				
No Salt	16.98	16.33	16.33	16.55
Salt	17.07	16.54	16.24	16.62
Mean	17.02	16.44	16.28	16.58
Per cent				
No Salt	102.4	98.5	98.4	99.8
Salt	103.0	99.7	97.9	100.2
Mean	102.7	99.1	98.2	100.0

Standard errors: see first table.

CONCLUSIONS

The small apparent effects of potash, 1.2 per cent. increase per unit application in roots, 0.1 per cent. increase in tops and 0.6 per cent. increase in sugar percentage, are not significant, and there is no indication of interaction with the other nutrients.

The response to sulphate of ammonia is a significant increase in root weight, 6.4 per cent. per unit application, and 16.8 per cent. in top weight, set off by a significant decrease of 2.2 per cent. in the sugar percentage.

The response to salt is a significant increase of 6.4 per cent. in root weight ; the increases of 1.8 per cent. in top weight, and of 0.4 per cent. in sugar percentage are not significant.

SUGAR BEET

EFFECT OF INCREASING DRESSINGS OF GROUND CHALK

A. W. Oldershaw, Esq., County Organiser, Tunstall, Suffolk, 1932

	21	25			
I	3	1	0	4	2
II	0	2	4	1	3
III	4	3	1	2	0
IV	1	0	2	3	4
V	2	4	3	0	1
	1			5	

SYSTEM OF REPLICATION : 5 × 5 Latin square.
 AREA OF EACH PLOT : 0.0168 acres.
 SOIL : Acid Sand.
 VARIETY : Kleinwanzleben E.
 TREATMENTS : Ground chalk at the rate of 0, 1, 2, 3 and 4 tons per acre.
 MANURES APPLIED : January 12th.
 BEET PLANTED : May 12th.
 BEET LIFTED : November 15th-16th.
 PREVIOUS CROP : Wheat.

Actual weights in lb.

Row.	0	1	2	3	4
ROOTS (unwashed)					
I	89	571	710	702	722
II	82	546	668	676	667
III	126	554	575	612	675
IV	53	636	589	573	583
V	52	475	613	586	606
TOPS *					
I	14	194	229	281	221
II	33	227	218	289	222
III	49	206	183	215	269
IV	16	268	233	214	252
V	24	215	267	272	290
SUGAR PERCENTAGE					
I	19.27	18.35	18.70	18.58	18.70
II	19.38	18.81	18.92	18.92	18.81
III	18.41	19.15	18.64	18.64	18.92
IV	18.30	18.70	18.92	18.52	18.75
V	18.35	18.58	19.04	18.58	18.75

* Tops weighed on half plots only.

SUMMARY OF RESULTS

	No chalk	1 ton chalk	2 tons chalk	3 tons chalk	4 tons chalk	Mean	Standard Error
ROOTS (washed)							
Tons per acre ..	1.82	12.61	14.30	14.27	14.74	11.55	0.432
Per cent. ..	15.8	109.2	123.8	123.6	127.6	100.0	3.75
TOPS							
Tons per acre ..	1.44	11.79	12.01	13.50	13.32	10.41	0.557
Per cent. ..	13.9	113.2	115.3	129.7	127.9	100.0	5.35
SUGAR PERCENTAGE							
Actual	18.74	18.72	18.84	18.65	18.79	18.75	0.114
Per cent. ..	100.0	99.8	100.5	99.5	100.2	100.0	0.61

CONCLUSIONS

A large response to the first dressing of ground chalk ; in the case of the roots there is also a significant response to the second dressing. The sugar percentage does not appear to be affected by chalk.

SUGAR BEET

EFFECT OF MURIATE OF POTASH AND SUPERPHOSPHATE

COMPARISON OF AMMONIUM HUMATE AND SULPHATE OF AMMONIA

A. W. Oldershaw, Esq., County Organiser, Tunstall, Suffolk, 1932 (PS)

	26	50		
I	P —	— K	PK —	O —
II	— K	P —	O —	— PK
III	O —	PK —	— P	K —
IV	PK —	O —	K —	— P
	33	57		

In each plot the half receiving sulphate of ammonia is left blank, and the dressing of super. and potash applied to the whole plot is indicated by a symbol in the half receiving ammonium humate.

SYSTEM OF REPLICATION : 4 × 4 Latin square, plots split for ammonium humate and sulphate of ammonia.

AREA OF EACH SUB-PLOT : .009026 acres.

SOIL : Deep sand.

VARIETY : Kleinwanzleben E.

TREATMENTS : Superphosphate (P) at the rate of 0.5 cwt. P₂O₅ per acre, muriate of potash (K) at the rate of 0.75 cwt. K₂O per acre, ammonium humate at the rate of 0.4 cwt. free N (or 1.12 cwt. total N) per acre and sulphate of ammonia at the rate of 0.4 cwt. total N per acre.

MANURES APPLIED : April 19th and 25th.

BEEET PLANTED : May 12th.

BEEET LIFTED : November 15th.

PREVIOUS CROP : Wheat.

Actual weights in lb.

Row.	Ammonium humate.				Sulphate of ammonia.				
	O	K	P	PK	O	K	P	PK	
ROOTS (unwashed)									
I	377	417	410	425	357	413	415	402	
II	362	397	404	372	368	421	363	378	
III	373	357	396	394	387	372	379	398	
IV	410	400	410	443	402	406	387	449	
TOPS									
I	185	228	252	217	192	209	241	204	
II	191	198	192	190	185	216	168	200	
III	153	155	201	171	189	175	179	188	
IV	207	204	232	207	224	218	194	227	
SUGAR PERCENTAGE									
I	19.61	19.32	19.27	19.38	19.38	19.38	19.04	19.84	
II	19.38	19.72	18.81	19.49	19.27	19.38	19.27	19.32	
III	19.21	19.49	19.32	19.44	19.04	19.84	19.38	19.61	
IV	19.32	18.98	19.38	19.61	19.27	19.72	19.61	19.44	

SUMMARY OF RESULTS

	No Minerals	Super.	Mur. Pot.	Super., Mur. Pot.	Mean
ROOTS (washed)					
Tons per acre					
Ammonium Humate	16.85	17.94	17.39	18.09	17.57
Sulph. Amm.	16.76	17.10	17.85	18.02	17.43
<i>Difference A-S</i>	+0.09	+0.84	-0.46	+0.07	+0.14
Per cent.					
Ammonium Humate	96.3	102.5	99.4	103.4	100.4
Sulph. Amm.	95.8	97.7	102.0	102.9	99.6
<i>Difference A-S</i>	+0.5	+4.8	-2.6	+0.5	+0.8
TOPS					
Tons per acre					
Ammonium Humate	9.10	10.84	9.71	9.71	9.84
Sulph. Amm.	9.77	9.67	10.11	10.13	9.92
<i>Difference A-S</i>	-0.67	+1.17	-0.40	-0.42	-0.08
Per cent.					
Ammonium Humate	92.1	109.8	98.2	98.2	99.6
Sulph. Amm.	98.9	97.9	102.4	102.5	100.4
<i>Difference A-S</i>	-6.8	+11.9	-4.2	-4.3	-0.8
SUGAR PERCENTAGE					
Ammonium Humate	19.38	19.20	19.38	19.48	19.36
Sulph. Amm.	19.24	19.32	19.58	19.55	19.42
<i>Difference A-S</i>	+0.14	-0.12	-0.20	-0.07	-0.06
Per cent.					
Ammonium Humate	99.9	99.0	99.9	100.4	99.8
Sulph. Amm.	99.2	99.6	101.0	100.8	100.2
<i>Difference A-S</i>	+0.7	-0.6	-1.1	-0.4	-0.4

Standard Errors of differences A-S for separate treatments—Roots : 0.338 tons or 1.93 per cent.
 Tops : 0.390 tons or 3.95 per cent.
 Sugar percentage : 0.156 or 0.807 per cent.

MEAN OF AMMONIUM HUMATE AND SULPHATE OF AMMONIA.

	No Super.	Super.	Mean
ROOTS (washed)			
Tons per acre			
No Potash	16.81	17.52	17.16
Potash	17.62	18.05	17.84
Mean	17.21	17.78	17.50
Per cent.			
No Potash	96.0	100.1	98.0
Potash	100.7	103.2	102.0
Mean	98.4	101.6	100.0
TOPS			
Tons per acre			
No Potash	9.43	10.26	9.84
Potash	9.91	9.92	9.92
Mean	9.67	10.09	9.88
Per cent.			
No Potash	95.5	103.8	99.6
Potash	100.3	100.4	100.4
Mean	97.9	102.1	100.0
SUGAR PERCENTAGE			
Tons per acre			
No Potash	19.31	19.26	19.28
Potash	19.48	19.52	19.50
Mean	19.40	19.39	19.39
Per cent.			
No Potash	99.6	99.3	99.4
Potash	100.4	100.7	100.6
Mean	100.0	100.0	100.0

Standard Errors of Single Entries. Roots: 0.175 tons, or 1.00 per cent.
 Tops : 0.338 tons, or 3.42 per cent.
 Sugar percentage : 0.082 or 0.42 per cent.

CONCLUSIONS

For the roots the responses to potash, 0.68 tons or 4.0 per cent., and superphosphate, 0.57 tons or 3.2 per cent., are significant. The potash produces an apparent increase of 0.22 or 1.2 per cent. in the sugar percentage, which, however, is not significant. Superphosphate has shown no effect on the sugar percentage. The increases in the tops with potash and superphosphate are not significant.

There is no significant average difference between ammonium humate and sulphate of ammonia, either for roots, tops, or sugar percentage, though in the case of superphosphate alone the difference is striking.

EXPERIMENTS AT OTHER CENTRES, CARRIED OUT BY THE LOCAL WORKERS ON THE LINES OF THOSE DESCRIBED ON THE PRECEDING PAGES.

Potatoes. County School, Welshpool, Montgomeryshire, 1932.

4 × 4 Latin Square : Plots 1/160th acre.
 Soil : Medium loam (Wenlock shale).
 Variety : Great Scot.
 Treatments : Slag (Citric solubility 96.5%), rock phosphate and superphosphate at the rate of 1 cwt. P₂O₅ per acre, applied to previous crop.
 Basal manuring : Sulphate of potash and sulphate of ammonia each at the rate of 3 cwt. per acre.
 Potatoes planted : May 1st. Lifted : Sept. 26th.
 Previous crop : Swedes.

	Yield. tons per acre.	Yield. per cent.
No phosphate ..	10.43	96.6
Slag	12.02	111.4
Rock phosphate	10.09	93.5
Superphosphate	10.62	98.5
<i>Mean</i>	<i>10.79</i>	<i>100.0</i>
Standard Error	0.285	2.64

CONCLUSIONS

The residual effect of basic slag is significant, but rock phosphate and superphosphate do not appear to produce any such effect.

Potatoes. J. E. Arden, Esq., Owmbly Cliff, Lincolnshire, 1932.
 J. A. McVicar, Esq., County Organiser.

4 × 4 Latin square : Plots 1/80th acre.
 Soil : Limestone. Variety : King Edward.
 Basal manuring : 4 cwt. sulphate of ammonia, and 2 cwt. superphosphate per acre.
 Potatoes planted : Mar. 24th. Lifted : Oct. 11th.
 Previous crop : Seeds.

Sulphate of potash cwt. per acre.	Yield. tons per acre.	Yield. per cent.
None	3.79	69.6
1 cwt.	5.61	102.8
2 cwt.	6.38	117.1
3 cwt.	6.03	110.5
<i>Mean</i>	<i>5.45</i>	<i>100.0</i>
Standard Error	0.183	3.35

CONCLUSIONS

Definitely significant response to the single dressing of potash, and a further significant response to the double dressing.

Potatoes. J. B. Everatt, Esq., Garthorpe, Lincs., 1932.
 J. A. McVicar, Esq., County Organiser.

4 × 4 Latin square : Plots 1/80th acre.
 Soil : Warp. Variety : King Edward.
 Basal manuring : Superphosphate and sulphate of ammonia each at the rate of 4 cwt. per acre.
 Potatoes planted : Mar. 30th-31st. Lifted : Sept. 29th.
 Previous crop : Seeds.

Sulphate of potash cwt. per acre.	Yield. tons per acre.	Yield. per cent.
None	10.84	101.4
1 cwt.	10.64	99.6
2 cwt.	10.94	102.3
3 cwt.	10.33	96.6
<i>Mean</i>	<i>10.69</i>	<i>100.0</i>
Standard Error	0.103	0.96

CONCLUSIONS

The lower yield of the plots receiving the highest dressing of potash is statistically significant, but the reality of this effect is doubtful as the estimate of error seems abnormally small.

Potatoes. H. W. Gardner, Esq., Hertfordshire Farm Institute, 1932.
Farm Department.

5 × 5 Latin square : Plots 1/50th acre.
Soil : Gravelly loam. Variety : King Edward.
Treatments : No artificials, 2½ cwt. and 4½ cwt. No. 2 concentrated complete fertiliser (I.C.I.) per acre, 4 cwt. and 8 cwt. own mixture per acre.
Analysis of concentrated complete fertiliser, 10.4 per cent. N, 10.4 per cent. P₂O₅, 20.8 per cent. K₂O. Analysis of own mixture, 6.1 per cent. N, 6.2 per cent. P₂O₅, 12.4 per cent. K₂O, in the form of sulphate of ammonia, super., and muriate of potash.
Basal manuring : Dung.
Potatoes planted : April 16th. Lifted : Sept. 28th.
Previous crop : Lucerne.

	Yield. tons per acre.	Yield. per cent.
No artificials	11.94	95.9
Single No. 2 C.C.F. ..	12.69	101.8
Double No. 2 C.C.F. ..	12.44	99.9
Single own mix- ture ..	12.64	101.4
Double own mix- ture ..	12.58	101.0
<i>Mean</i>	<i>12.46</i>	<i>100.0</i>
Standard Error	0.205	1.64

CONCLUSIONS

Significant response to the single dressing of artificials, but no further response to the double dressing. No significant difference between the two mixtures.

Potatoes. H. W. Gardner, Esq., Hertfordshire Farm Institute, 1932.
Farm Department.

5 × 5 Latin square : Plots 1/50th acre.
Soil : Gravelly loam. Variety : King Edward.
Treatments : No artificials, 6 cwt. and 12 cwt. own mixture, 8 cwt. organic manure balanced with superphosphate and potash, 6 cwt. concentrated complete fertiliser No. 2. Composition of own mixture : 5 parts sulphate of ammonia, 9 parts superphosphate, 4 parts muriate of potash and 2 parts steamed bone flour. Analysis of own mixture : 5 per cent. N., 6 per cent. soluble phosphoric acid, 3 per cent. insoluble phosphoric acid and 10 per cent. potash. Analysis of concentrated complete fertiliser, 10.4 per cent. N., 10.4 per cent. P₂O₅, 20.8 per cent. K₂O.
Potatoes planted : April 7th. Lifted : Oct. 6th.
Previous crop : Oats.

	Yield. tons per acre.	Yield. per cent.
No artificials ..	10.26	80.0
Single own mixture ..	12.96	101.2
Double own mixture ..	13.33	104.1
Organic manure	13.88	108.3
Concentrated fertiliser No. 2	13.63	106.4
<i>Mean</i>	<i>12.81</i>	<i>100.0</i>
Standard Error	0.185	1.44

CONCLUSIONS

A significant response to all artificials. The further response to the double dressings of own mixture is not significant. The organic fertiliser is significantly superior to both dressings of own mixture, and the concentrated fertiliser No. 2, to the single dressing. There is no significant difference between the organic manure and fertiliser No. 2.

Potatoes. Fakenham School, Norfolk, 1932.

4 × 4 Latin square : Plots 1/302nd. acre.
 Soil : Sandy loam. Variety : King Edward.
 Treatments : Sulphate of potash at the rate of 1.0 cwt. K₂O per acre, superphosphate at the rate of 0.6 cwt. P₂O₅ per acre.
 Potatoes planted : May 18th. Lifted : Sept. 30th.
 Previous crop : Waste grassland.

	Yield. tons per acre.	Yield. per cent.
No potash or superphosphate	3.30	98.2
Sulph. of potash	3.57	106.3
Superphosphate	2.76	82.2
Potash and superphosphate	3.81	113.3
<i>Mean</i>	<i>3.36</i>	<i>100.0</i>
Standard Error	0.271	8.06

CONCLUSIONS

The response to potash is barely significant.
 No apparent response to superphosphate.

Potatoes. Norton New Council School, Doncaster, 1932.

4 × 4 Latin square : Plots 1/306th acre.
 Soil : Medium loam. Variety : Majestic.
 Treatments : Sulphate of potash at the rate of 1.5 cwt. K₂O per acre before planting (Feb. 16th), at planting (April 18th), and top dressed (June 23rd).
 Basal manuring : 3 cwt. sulphate of ammonia, and 4 cwt. superphosphate per acre.
 Potatoes planted : April 18th. Lifted : Aug. 26th-Sept. 15th.
 Previous crop : Old grass.

	Yield. tons per acre.	Yield. per cent.
No potash ..	6.54	70.1
Potash before planting ..	9.87	105.9
Potash at planting	11.39	122.2
Potash top dressed	9.49	101.8
<i>Mean</i>	<i>9.32</i>	<i>100.0</i>
Standard Error	0.758	8.13

CONCLUSIONS

Definitely significant response to potash.
 No significant differences between the different modes of dressing. The standard error is abnormally high.

Potatoes. H. Stewart Sandeman, Esq., The Lawes, Kingennie, Angus, 1932.

4 randomised blocks of 8 plots each. Ordinary cultivations (harrowed twice May 11th and 21st, twice grubbed May 21st and June 25th, once hoed June 28th, and earthed up July 6th) and extra cultivations (as ordinary cultivation plus harrowed and earthed up May 24th, grubbing and subsoiling June 8th).

Plots 1/40th acre. Soil : Medium loam. Variety : Kerr's Pink. Basal manuring : 16 tons of dung, 3 cwt. superphosphate, 1½ cwt. bone flour, 2 cwt. sulphate of potash per acre.

Potatoes planted : April 18th. Lifted : Sept. 29th. Previous crop : Spring oats.

	Tons per acre.					Per cent.				
	Sulphate of ammonia				<i>Mean</i>	Sulphate of ammonia				<i>Mean</i>
	None	1 cwt.	2 cwt.	3 cwt.		None	1 cwt.	2 cwt.	3 cwt.	
Ordinary cultivations	13.93	14.14	14.18	14.55	14.20	98.6	100.1	100.3	102.9	100.5
Extra cultivations ..	13.24	13.76	14.62	14.64	14.06	93.6	97.4	103.4	103.6	99.5
<i>Mean</i>	<i>13.58</i>	<i>13.95</i>	<i>14.40</i>	<i>14.60</i>	<i>14.13</i>	<i>96.1</i>	<i>98.7</i>	<i>101.9</i>	<i>103.3</i>	<i>100.0</i>

Standard Error of single entry : 0.254 tons or 1.80 per cent.

CONCLUSIONS

Significant response to sulphate of ammonia, with no significant difference from proportionality in response to increasing dressings, though nearly the full effect is reached at the second dressing.

There appears to be no difference between the two types of cultivation when averaged over all levels of sulphate of ammonia, but there is some indication that the heavier cultivation becomes relatively more effective with increasing dressings of sulphate of ammonia. This difference does not, however, quite reach the 5 per cent. level of significance.

Potatoes. F. Richardson, Esq., Sansom Wood Farm, Calverton, Notts., 1932.

K. R. Davis, Esq., County Organiser.

4 × 4 Latin square : Plots 1/40th acre.
 Soil : Very light sand, bunter sandstone.
 Variety : King Edward.
 Treatments : Mineral mixture (2.12 cwt. sulphate of ammonia, 3.98 cwt. 16 per cent. superphosphate and 3.28 cwt. 30 per cent. potash salt per acre), I.C.I. concentrated fertiliser No. 1 (12½ per cent. N., 12½ per cent. P₂O₅, 15 per cent. K₂O), and 10 cwt. H.O.P. No. 9 fish manure.
 Basal manuring : 12 loads dung per acre.
 Potatoes planted : April 28th. Lifted : Oct. 12th.
 Previous crop : Ley grazed and sheep fed.

	tons per acre. Yield.	per cent. Yield.
No artificials	4.42	81.8
Mineral mixture	5.75	106.4
I.C.I. fertiliser No. 1 ..	5.40	99.9
H.O.P. No. 9 fish manure	6.04	111.7
<i>Mean</i>	5.40	100.0
Standard Error	0.229	4.24

CONCLUSIONS

Significant response to fertilisers. No significant differences between the different mixtures.

Potatoes. J. Heyes, Esq., Bickerstaffe, Ormskirk, 1932.

Lancashire County Council.

4 × 4 Latin Square : Plots 1/57th acre.
 Soil : Moss. Variety : Majestic.
 Basal manuring : 10-15 tons farmyard manure, 1 cwt. sulphate of ammonia, 2 cwt. sulphate of potash, 10 cwt. ground limestone.
 Potatoes planted : April 26th. Lifted, Sept. 15th.
 Previous crop : Oats.

Super. cwt. per acre.	Yield. tons per acre.	Yield. per cent.
None	10.82	99.7
2 cwt.	10.76	99.2
4 cwt.	11.01	101.5
8 cwt.	10.82	99.7
<i>Mean</i>	10.85	100.0
Standard Error	0.265	2.44

CONCLUSIONS

No significant effects.

Potatoes. Sailors' Orphan Homes School, Hull, 1932.

4 × 4 Latin square : Plots 1/217th acre.
 Soil : Heavy alluvium. Variety : Great Scot.
 Treatments : Sulphate of ammonia at the rate of 0.223 cwt. and 0.6 cwt. N per acre, ammonia humate and sulphate of ammonia and humic acid at the rate of 0.6 cwt. total N (0.223 cwt. ammonia N.) per acre.
 Potatoes planted : April 14th. Lifted : Sept. 20th and 21st.
 Previous crop : Mixed vegetables.

	Yield. tons per acre.	Yield. per cent.
Reduced sulph. amm. ..	11.08	100.8
Full sulph. amm. Ammonium humate ..	11.24	102.3
Sulph. amm. and humic acid	10.90	99.2
	10.75	97.8
<i>Mean</i>	10.99	100.0
Standard Error	0.456	4.15

CONCLUSIONS

No significant effects.

Potatoes. Grammar School, Burford, Oxon, 1932.

4 × 4 Latin square : Plots 1/100th acre.
 Soil : Brashy loam. Variety : King George.
 Treatments : Sulphate of ammonia at the rate of 0.223 cwt. and 0.6 cwt. N. per acre, sulphate of ammonia and humic acid at the rate of 0.6 cwt. total N. (0.223 cwt. ammonia N.) and ammonium humate at the rate of 0.6 cwt. total N. (0.223 cwt. ammonia N.).
 Basal manuring : 4 cwt. superphosphate and 3 cwt. sulphate of potash per acre.
 Potatoes planted : May 5th. Lifted : Oct. 5th.

	Yield. tons per acre.	Yield. per cent.
Reduced sulph. amm. ..	7.61	94.3
Full sulph. amm. Ammonium humate ..	8.47	105.0
Sulph. amm. and humic acid	7.70	95.4
	8.49	105.2
<i>Mean</i> ..	<i>8.07</i>	<i>100.0</i>
Standard Error	0.592	7.33

CONCLUSIONS

No significant effects.

Potatoes. County School, Tonbridge, 1932.

4 × 4 Latin square : Plots 0.0037 acres.
 Soil : Clay. Variety : Great Scot.
 Treatments : Sulphate of ammonia at the rate of 0.223 cwt. and 0.6 cwt. N. per acre, sulphate of ammonia and humic acid at the rate of 0.6 cwt. total N. (0.223 cwt. ammonia N.), and ammonium humate at the rate of 0.6 cwt. total N. (0.223 cwt. ammonia N.).
 Basal manuring : Superphosphate at the rate of 4 cwt. per acre, sulphate of potash at the rate of 3 cwt. per acre.
 Potatoes planted : April 26th. Lifted : Sept. 23rd-30th.
 Previous crop : Turnips.

	Yield. tons per acre.	Yield. per cent.
Reduced sulph. amm. ..	10.04	100.4
Full sulph. amm. Ammonium humate ..	9.76	97.6
Sulph. amm. and humic acid	10.23	102.3
	9.96	99.6
<i>Mean</i> ..	<i>10.00</i>	<i>100.0</i>
Standard Error	0.379	3.79

CONCLUSIONS

The differences between treatments are not significant.

Potatoes. County School, Godalming, Surrey, 1932.

4 × 4 Latin square. Plots 1/290th acre.
 Soil : Sandy. Variety : Arran Chief.
 Treatments : Sulphate of ammonia at the rate of 0.223 cwt. and 0.6 cwt. N. per acre, ammonium humate at 0.6 cwt. total N. (0.223 cwt. ammonia N.), sulphate of ammonia and humic acid together providing 0.6 cwt. total N. (0.223 cwt. ammonia N.).
 Basal manuring : 3 cwt. sulphate of potash and 4 cwt. superphosphate per acre.
 Potatoes planted : April 30th. Lifted : Sept. 17th.
 Previous crop : Turnips.

	Yield. tons per acre.	Yield. per cent.
Reduced sulph. amm. ..	10.11	101.0
Full sulph. amm. Amm. humate ..	10.17	101.6
Sulph. amm. and humic acid ..	10.63	106.2
	9.13	91.2
<i>Mean</i> ..	<i>10.01</i>	<i>100.0</i>
Standard Error	0.324	3.23

CONCLUSIONS

The differences between treatments are not significant.

Sugar Beet. Mr. W. G. Muir, Cheapside, St. Albans, 1932.
H. W. Gardner, Esq., Hertfordshire Farm Institute.

4x4 Latin square: Plots 1/112th acre. Soil: Light loamy gravel. Variety: Klein.E. Treatments: Slag and superphosphate at the rate of 7 cwt. per acre. Chalk at the rate of 3 tons per acre. Basal manuring: 2 cwt. sulphate of ammonia; 4 cwt. potash salt. Beet planted: April 29th. Lifted: Oct. 14th. Previous crop: Winter oats.	ROOTS (washed)		TOPS	
	tons per acre.	per cent.	tons per acre.	per cent.
No phosphate ..	5.25	76.5	6.34	80.0
Slag ..	6.58	95.9	7.53	94.9
Superphosphate	6.68	97.3	7.67	96.7
Super. and Chalk	8.94	130.3	10.19	128.4
<i>Mean</i>	<i>6.86</i>	<i>100.0</i>	<i>7.93</i>	<i>100.0</i>
Standard Error	0.571	8.33	0.614	7.74

CONCLUSIONS

The increase due to the phosphatic dressings is just significant in the case of the roots, but not significant for the tops. There is no significant difference between slag and superphosphate. The plots receiving chalk in addition to superphosphate give a significantly greater yield than those with superphosphate alone.

Sugar Beet. Mr. W. G. Muir, Cheapside, St. Albans, 1932.
H. W. Gardner, Esq., Hertfordshire Farm Institute.

4 randomised blocks of 9 plots each. Plots 1/56th acre. Soil: Light loamy gravel.
Treatments: Sulphate of ammonia, 0, 1½ and 3 cwt. per acre, muriate of potash 0, 1 and 2 cwt. per acre.
Basal manuring: 4 cwt. superphosphate per acre.
Variety: Kleinwanzleben E. Beet sown: April 29th. Beet lifted: Oct. 17th-18th.
Previous crop: Oats.

	Tons per acre.					Per cent.				
	No Sulph. Amm.	Single Sulph. Amm.	D'ble Sulph. Amm.	Mean	Standard Error.	No Sulph. Amm.	Single Sulph. Amm.	D'ble Sulph. Amm.	Mean	Standard Error.
ROOTS (washed)										
No muriate of potash	6.34	6.00	6.02	6.12		86.5	82.0	82.3	83.6	
Single muriate of potash	7.45	7.36	8.15	7.65	0.307	101.8	100.6	111.4	104.6	4.20
Double muriate of potash	7.57	7.90	9.06	8.18		103.5	108.0	123.8	111.8	
<i>Mean</i>	<i>7.12</i>	<i>7.09</i>	<i>7.75</i>	<i>7.31</i>	<i>0.177</i>	<i>97.3</i>	<i>96.9</i>	<i>105.8</i>	<i>100.0</i>	<i>2.42</i>
TOPS										
No muriate of potash	5.54	5.88	6.23	5.89		91.0	96.6	102.4	96.7	
Single muriate of potash	5.62	6.11	6.77	6.17	0.317	92.4	100.3	111.2	101.3	5.20
Double muriate of potash	5.54	5.78	7.33	6.21		90.9	94.8	120.4	102.0	
<i>Mean</i>	<i>5.56</i>	<i>5.92</i>	<i>6.78</i>	<i>6.09</i>	<i>0.183</i>	<i>91.4</i>	<i>97.2</i>	<i>111.3</i>	<i>100.0</i>	<i>3.00</i>
SUGAR PERCENTAGE										
No muriate of potash	18.13	17.87	18.12	18.04		99.0	97.6	99.0	98.5	
Single muriate of potash	18.52	18.26	18.45	18.41	0.166	101.2	99.7	100.8	100.6	0.910
Double muriate of potash	18.38	18.68	18.32	18.46		100.4	102.0	100.1	100.8	
<i>Mean</i>	<i>18.34</i>	<i>18.27</i>	<i>18.30</i>	<i>18.30</i>	<i>0.096</i>	<i>100.2</i>	<i>99.8</i>	<i>100.0</i>	<i>100.0</i>	<i>0.525</i>

CONCLUSIONS

The response to sulphate of ammonia is significant both in the roots (0.32 tons or 4.2 per cent. per unit application) and tops (0.61 tons or 10.0 per cent.), with no appreciable reduction in sugar percentage. The smaller response to the first than to the second dressing of sulphate of ammonia, though striking, is not significant.

The response of the roots to muriate of potash, 1.53 tons or 21.0 per cent. to the first dressing and 0.53 tons or 7.2 per cent to the second dressing, is significant, with a significant difference between the responses to the two dressings. Muriate of potash also increases the sugar percentage 0.37 or 2.1 per cent for the first dressing and 0.05 or 0.2 per cent. for the second ; the first increase is significant. The response of the tops to potash is not significant.

In the case of the roots the response to potash is significantly greater in the present of sulphate of ammonia and equally the response to sulphate of ammonia is significantly greater in the presence of potash.

Sugar Beet. County Farm Institute, Moulton, Northampton, 1932.

4 x 4 Latin square. Plots, 0.01870 acres. Soil : Sandy loam derived from Northampton sand. Variety : Kleinwanzleben E.

Nature of fertiliser mixture used : 5 cwt. sulphate of ammonia, 5 cwt. superphosphate, 2½ cwt. steamed bone flour and 7½ cwt. 30 per cent. potash salt.

Basal manuring : 12 tons farmyard manure.

Beet planted : May 21st. Beet lifted : Nov. 24th-26th. Previous crop : Sugar Beet.

Fertiliser Cwt. per acre	ROOTS (washed)		TOPS		SUGAR PERCENTAGE	
	tons per acre.	per cent.	tons per acre.	per cent.	actual.	per cent.
None ..	9.53	89.7	11.80	83.6	17.27	101.7
5 cwt.	10.84	102.1	13.65	96.7	17.16	101.0
10 cwt.	11.14	104.9	15.25	108.1	16.90	99.5
15 cwt.	10.97	103.3	15.75	111.6	16.61	97.8
<i>Mean</i> ..	<i>10.62</i>	<i>100.0</i>	<i>14.11</i>	<i>100.0</i>	<i>16.98</i>	<i>100.0</i>
Standard Error	0.318	3.0	0.577	4.09	0.206	1.21

CONCLUSIONS

Significant response to fertiliser both by roots and tops. The roots show little additional response to the higher dressings, whereas the tops show a significant additional response to the double dressing. There is a significant depression of sugar percentage with increasing amounts of fertiliser.

Sugar Beet. R. Goodhand, Esq., Redbourne, Kirton-Lindsey, Lincs., 1932. J. A. McVicar, Esq., County Organiser.

5 x 5 Latin square. Plots, 1/50th acre. Soil : Light limestone loam, 8 ins. to 10 ins. deep.

Variety : Kleinwanzleben E.

Analysis of Fertiliser : Sulphate of ammonia providing ammonium nitrogen 3.60 per cent, nitrate of soda providing nitric nitrogen 2.71 per cent, superphosphate providing soluble phosphoric acid 5.15 per cent, steamed bone flour providing insoluble phosphoric acid 1.38 per cent and muriate of potash providing potash 11.25 per cent.

Basal manuring : 7 cwt. fish salt.

Beet planted : April 25th. Beet lifted : Oct. 19th. Previous crop : Oats.

Fertiliser cwt. per acre.	ROOTS (washed)		TOPS		SUGAR PERCENTAGE	
	tons per acre.	per cent.	tons per acre.	per cent.	actual.	per cent.
None ..	13.61	92.8	9.81	75.1	18.27	100.5
4 cwt.	14.64	99.9	11.93	91.3	18.68	102.8
8 cwt.	14.74	100.5	13.54	103.7	18.14	99.8
12 cwt.	15.28	104.3	14.36	109.9	18.19	100.1
16 cwt.	15.02	102.5	15.66	119.9	17.59	96.8
<i>Mean</i> ..	<i>14.66</i>	<i>100.0</i>	<i>13.06</i>	<i>100.0</i>	<i>18.18</i>	<i>100.0</i>
Standard Error	0.242	1.65	0.418	3.20	0.263	1.44

CONCLUSIONS

The roots show a significant response to the single dressing of fertiliser, but no further significant response to the higher dressings. The tops show a significant response to all dressings, there being no significant departure from proportionality. The decrease in sugar percentage is not significant, the error being large.

Sugar Beet. J. C. Mann, Esq., Bridgham, Norfolk, 1932.

4 randomised blocks of 8 plots each. Plots 1/100th acre. Soil : Light blowing sand of Glacial origin, sand and gravel subsoil. Varieties : Marsters and Kleinwanzleben E. Treatments : Sulphate of ammonia at the rate of 0.6 cwt. N per acre, sulphate of potash at the rate of 0.75 cwt. K₂O per acre. Basal manuring : Superphosphate at the rate of 0.5 cwt. P₂O₅ per acre. Beet planted : April 29th. Beet lifted : Nov. 8th-9th. Previous crop : Swedes and Kale folded by sheep.

	Tons per acre.					Per cent.				
	No Artificials.	Sulph. Amm.	Sulph. Pot.	Sulph. Amm., S. Pot.	Mean.	No Artificials.	Sulph. Amm.	Sulph. Pot.	Sulph. Amm., S. Pot.	Mean.
ROOTS (washed)										
Marsters	14.00	13.90	13.54	14.10	13.89	96.5	95.9	93.4	97.2	95.7
Klein E.	14.50	15.33	15.12	15.52	15.12	100.0	105.7	104.3	107.0	104.3
TOPS										
Marsters	10.03	12.64	10.74	11.99	11.35	77.3	97.4	82.8	92.4	87.5
Klein E.	11.98	16.20	13.43	16.78	14.60	92.3	124.9	103.5	129.4	112.5
SUGAR PERCENTAGE										
Marsters	18.90	18.64	19.24	18.94	18.93	102.6	101.2	104.4	102.8	102.8
Klein E.	18.30	17.53	18.06	17.75	17.91	99.3	95.2	98.0	96.4	97.2

Standard errors of single entries : Roots, 0.323 tons or 2.23 per cent.
 Tops, 0.707 tons or 5.45 per cent.
 Sugar Percentage, 0.135 or 0.731 per cent.

MEAN OF BOTH VARIETIES.

	Tons per acre			Per cent.		
	No Nitrogen.	Sulph. of Amm.	Mean.	No Nitrogen.	Sulph. of Amm.	Mean.
ROOTS (washed)						
No Sulph. Pot.	14.25	14.61	14.43	98.3
Sulph. Pot.	14.33	14.81	14.57	98.8
Mean	14.29	14.71	14.50	98.6
TOPS						
No Sulph. Pot.	11.01	14.42	12.72	84.8
Sulph. Pot.	12.09	14.39	13.24	93.2
Mean	11.55	14.40	12.98	89.0
SUGAR PERCENTAGE						
No Sulph. Pot.	18.60	18.08	18.34	101.0
Sulph. Pot.	18.65	18.34	18.50	101.2
Mean	18.62	18.21	18.42	101.1

Standard Errors of single entries : Roots, 0.228 tons or 1.58 per cent.
 Tops, 0.500 tons or 3.86 per cent.
 Sugar Percentage, 0.0952 or 0.517 per cent.

CONCLUSIONS

The yield of roots for Kleinwanzleben is 1.23 tons or 8.6 per cent. greater than for Marsters, the yield of tops 3.25 tons or 25.0 per cent. greater, but the sugar percentage 1.02 or 5.6 per cent. less, all these differences being significant.

The response to nitrogen in the case of the roots, 0.42 tons or 2.9 per cent., is not significant, and there is a significant depression in sugar percentage of 0.41 or 2.2 per cent. The tops show a significantly higher yield, 2.86 tons or 22.0 per cent., with nitrogen.

Potash shows no apparent effects.

Sugar Beet. W. A. Muddell, Thoroton, Notts., 1932.

K. R. Davis, Esq., County Organiser.

5 × 5 Latin Square with plots split for nitro-chalk and sulphate of ammonia.

Sub-plots 1/80th acre. Soil: Medium heavy loam on Keuper Marl.

Variety: Kuhn.

Treatments: High soluble slag (citric solubility 96.5 per cent.), low soluble slag (citric solubility 23.0 per cent.), superphosphate and mineral phosphate providing 1.0 cwt. P₂O₅ per acre.

Basal manuring: 15 loads of dung in autumn, 1931.

Beet sown: May 9th. Beet lifted: Oct. 19-21st. Previous crop: Winter oats (with dung).

	No Manure.	Low Soluble Slag.	High Soluble Slag.	Super-phosphate.	Mineral Phosphate.	Mean.	Standard Error.
ROOTS (washed)							
Tons per acre							
Sulphate of Ammonia ..	9.58	9.71	9.31	9.13	9.39	9.42	
Nitro-Chalk ..	9.02	9.32	9.33	9.03	9.46	9.23	
Mean	9.30	9.52	9.32	9.08	9.43	9.33	0.400
Difference S—N ..	+0.56	+0.39	-0.02	+0.10	-0.07	+0.19	0.612
Per cent.							
Sulphate of Ammonia ..	102.7	104.2	99.8	97.8	100.6	101.0	
Nitro-Chalk ..	96.6	99.9	100.0	96.9	101.4	99.0	
Mean	99.7	102.0	99.9	97.4	101.0	100.0	4.28
Difference S—N ..	+6.1	+4.3	-0.2	+0.9	-0.8	+2.0	6.56
TOPS							
Tons per acre							
Sulphate of Ammonia ..	6.72	6.71	6.19	6.55	6.81	6.60	
Nitro-Chalk ..	7.17	6.44	6.18	6.23	6.50	6.50	
Mean	6.95	6.57	6.19	6.39	6.66	6.55	0.340
Difference S—N ..	-0.45	+0.27	+0.01	+0.32	+0.31	+0.10	0.454
Per cent.							
Sulphate of Ammonia ..	102.6	102.4	94.5	100.0	104.0	100.7	
Nitro-Chalk ..	109.5	98.2	94.4	95.1	99.2	99.3	
Mean	106.0	100.3	94.5	97.5	101.6	100.0	5.20
Difference S—N ..	-6.9	+4.2	+0.1	+4.9	+4.8	+1.4	6.94
SUGAR PERCENTAGE							
Actual							
Mean of Sulphate of Ammonia and Nitro-Chalk ..	19.09	18.70	19.15	19.25	19.24	19.09	0.184
Per cent.							
Mean of Sulphate of Ammonia and Nitro-Chalk ..	100.0	98.0	100.3	100.9	100.8	100.0	0.965

CONCLUSIONS

No significant effects.

Sugar Beet. South-Eastern Agricultural College, Wye, Kent, 1932.

5 × 5 Latin square, with plots sub-divided into four for potash, superphosphate, neither or both.

Sub-plots : 1/200th acre. Soil : Silty loam. Variety : Kleinwanzleben E.

Treatments : Nitrate of soda, sulphate of ammonia and ammonium humate (0.148 cwt. ammonium

N) at the rate of 0.4 cwt. N per acre, sulphate of ammonia at the rate of 0.148 cwt. N per acre.

Sub-plot treatments : Superphosphate at the rate of 0.5 cwt. P₂O₅ per acre, and muriate of potash at the rate of 0.75 cwt. K₂O per acre.

Beet planted : May 17th. Beet lifted : Oct. 6th. Previous crop : Wheat.

	No Nitrogen.	Reduced dressing Sulph. Amm.	Full dressing Sulph. Amm.	Full dressing Nitrate of Soda.	Ammon. Humate	Mean
ROOTS (washed)						
Tons per acre						
No minerals	12.23	13.08	14.00	13.57	12.91	13.15
Muriate of potash ..	11.74	12.08	13.27	14.55	12.81	12.90
Superphosphate ..	12.23	12.73	14.07	13.65	12.77	13.09
Mur. Pot. and Super. ..	11.94	12.73	14.07	14.19	12.69	13.12
Mean	12.04	12.66	13.85	13.99	12.79	13.07
Per cent.						
No minerals	93.6	100.0	107.1	103.8	98.8	100.7
Muriate of potash ..	89.9	92.5	101.6	111.4	98.0	98.7
Superphosphate ..	93.6	97.4	107.7	104.5	97.7	100.2
Mur. Pot. and Super. ..	91.4	97.4	107.7	108.6	97.2	100.4
Mean	92.1	96.8	106.0	107.1	97.9	100.0
TOPS						
Tons per acre						
No minerals	7.98	8.00	10.16	9.89	8.62	8.93
Muriate of Potash ..	7.21	7.78	8.93	10.91	8.39	8.65
Superphosphate ..	7.37	8.59	8.84	10.12	8.36	8.66
Mur. Pot. and Super. ..	7.82	8.68	10.50	10.59	8.30	9.18
Mean	7.60	8.26	9.61	10.38	8.42	8.85
Per cent.						
No minerals	90.2	90.4	114.8	111.7	97.4	100.9
Muriate of potash ..	81.5	87.9	100.8	123.2	94.8	97.7
Superphosphate ..	83.3	97.0	99.8	114.4	94.4	97.8
Mur. Pot. and Super. ..	88.3	98.0	118.6	119.6	93.8	103.7
Mean	85.8	93.3	108.5	117.2	95.1	100.0
SUGAR PERCENTAGE						
Mean of all sub-treatments	17.63	17.31	17.42	17.64	17.55	17.51
Per cent						
Mean of all sub-treatments	100.7	98.9	99.5	100.7	100.2	100.0

Each single entry in the above table (except sugar percentage) is the mean of 5 sub-plots.

The standard errors of the yields of single whole plots (appropriate to direct comparisons of nitrogenous dressings) and of single quarter plots (appropriate to comparisons involving potash, superphosphate and their interactions with nitrogen) are :

Roots : Whole plots : 0.393 tons or 3.01 per cent. Tops : Whole plots : 0.754 tons or 8.52 per cent.

Sub-plots : 1.13 tons or 8.68 per cent. Sub-plots : 1.08 tons or 12.20 per cent.

Sugar Percentage : Whole plots : 0.273 or 1.56 per cent.

CONCLUSIONS

A significant response to nitrogen, both by the roots and tops, this response being proportional to the amount of free nitrogen. No significant differences between the reduced dressing of sulphate of ammonia and the ammonium humate, nor between the full dressings of sulphate of ammonia and nitrate of soda. No significant effects of potash or superphosphate.

Mangolds. Oakerthorpe, 1932.

G. Limb, Esq., Derbyshire Education Committee.

4 × 4 Latin square. Plots split for dung at the rate of 15 tons per acre. Plots 1/160th acre. Soil : Medium loam—coal measures. Variety : Masterpiece.

Treatments : Sulphate of ammonia at the rate of 6 cwt. per acre and potash salt at the rate of 12 cwt. per acre. Basal manuring : 8 cwt. superphosphate per acre.

Mangolds sown : May 12th. Lifted : Oct. 17th. Previous crop : Oats.

		No Sulph. amm.	Sulph. amm.	Mean
ROOTS				
Tons per acre				
<i>Without dung</i>	{ No potash salt ..	15.54	24.43	19.98
	{ Potash salt ..	18.86	33.45	26.16
<i>Mean</i>		17.20	28.94	23.07
<i>With dung</i>	{ No potash salt ..	25.84	31.48	28.66
	{ Potash salt ..	30.77	36.70	33.74
<i>Mean</i>		28.30	34.09	31.20
Per cent.				
<i>Without dung</i>	{ No potash salt ..	57.3	90.0	73.6
	{ Potash salt ..	69.5	123.3	96.4
<i>Mean</i>		63.4	106.6	85.0
<i>With dung</i>	{ No potash salt ..	95.2	116.0	105.6
	{ Potash salt ..	113.4	135.2	124.3
<i>Mean</i>		104.3	125.6	115.0
TOPS				
Tons per acre				
<i>Without dung</i>	{ No potash salt ..	3.98	5.43	4.70
	{ Potash salt ..	5.21	7.57	6.39
<i>Mean</i>		4.60	6.50	5.54
<i>With dung</i>	{ No potash salt ..	5.59	7.05	6.32
	{ Potash salt ..	6.98	8.91	7.94
<i>Mean</i>		6.28	7.98	7.13
Per cent.				
<i>Without dung</i>	{ No potash salt ..	62.8	85.6	74.2
	{ Potash salt ..	82.2	119.3	100.8
<i>Mean</i>		72.5	102.6	87.5
<i>With dung</i>	{ No potash salt ..	88.1	111.2	99.6
	{ Potash salt ..	110.1	140.5	125.3
<i>Mean</i>		99.1	125.8	112.4

Each single entry in the above table is the mean of 4 sub-plots.

The standard errors of the yields of single whole plots (appropriate to direct comparisons of nitrogen and potash) and of single half plots (appropriate to comparisons involving dung and its interactions with nitrogen and potash) are :

Roots : Single whole plots, 0.704 tons or 2.6 per cent.

Single half plots, 1.38 tons or 5.1 per cent.

Tops : Single whole plots, 0.165 tons or 2.6 per cent.

Single half plots, 0.369 tons or 5.8 per cent.

CONCLUSIONS

The roots show significant responses to sulphate of ammonia, potash salt, and dung, the response to sulphate of ammonia being significantly less in the presence of dung, and significantly greater in the presence of potash. This last effect only occurs in the absence of dung. The effects on the tops are similar, with the exception that dung produces no significant changes in the responses to the artificials.

Mangolds. South-Eastern Agricultural College, Wye, Kent, 1932

5 x 5 Latin square. Plots, 1/50th acre.
 Soil : Silty loam. Variety : Golden Tankard.
 Treatments : No nitrogen, sulphate of ammonia at the rate of 0.148 cwt. and 0.4 cwt. N. per acre, ammonium humate and humic acid at the rate of 0.4 cwt. total N. (0.148 cwt. ammonia N.).
 Basal manuring : 12 tons farmyard manure, 4 cwt. superphosphate, and 2 cwt. muriate of potash
 Mangolds sown : April 30th. Lifted : Oct. 11th.
 Previous crop : Wheat.

	Yield. tons per acre.	Yield. per cent.
No nitrogen	13.68	79.5
Reduced sulph. amm.	17.32	100.6
Full sulph. amm. ..	20.87	121.3
Ammonium humate	18.59	108.0
Humic acid	15.58	90.5
<i>Mean</i>	<i>17.21</i>	<i>100.0</i>
Standard error	0.485	2.82

CONCLUSIONS

Significant differences between all treatments except the reduced dressing of sulphate ammonia and ammonium humate.

Mangolds. County School, Welshpool, Montgomeryshire, 1932.

3 randomised blocks of 4 plots each. Plots, 1/200th acre. Soil : Medium loam (Wenlock Shale).
 Treatments : Sulphate of ammonia at the rate of 0.22 cwt. and 0.6 cwt. N. per acre, ammonium humate at the rate of 0.6 cwt. total N. (0.22 cwt. ammonia N.), sulphate of ammonia and humic acid at the rate of 0.6 cwt. total N. (0.22 cwt. ammonia N.).
 Previous crop : Potatoes.

	ROOTS		TOPS	
	tons per acre.	per cent.	tons per acre.	per cent.
Reduced sulph. amm.	12.86	94.9	5.65	104.7
Full sulph. amm. ..	15.60	115.1	6.19	114.6
Ammonium humate	13.54	99.9	5.24	97.0
S/amm. & humic acid	12.20	90.1	4.52	83.7
<i>Mean</i>	<i>13.55</i>	<i>100.0</i>	<i>5.40</i>	<i>100.0</i>
Standard Error	0.584	4.31	0.191	3.54

CONCLUSIONS

Significantly greater response to the full dressing of sulphate of ammonia than to the other treatments, and in the case of the tops only a significantly lower response to the humic acid combination than to all other treatments.

Meadow hay. 2nd Season. Lady Manner's School, Bakewell, 1932.

5 x 5 Latin square. Plots: 1/198th acre.
 Soil : Limestone.
 Treatments : Rock phosphate, low soluble slag (citric solubility 23.0 per cent), high soluble slag (citric solubility 96.5 per cent.), and superphosphate all providing 1 cwt. P₂O₅ per acre.
 Hay cut : July 5th.

	Yield, dry matter. cwt. per acre.	Yield, per cent.
No phosphate	29.4	92.7
Rock Phosphate	30.5	96.3
Low soluble slag	30.0	94.7
High soluble slag	36.9	116.4
Superphosphate	31.6	99.8
<i>Mean</i>	<i>31.7</i>	<i>100.0</i>
Standard Error	1.76	5.54

CONCLUSIONS

The response to treatments is not significant.

Meadow hay. 2nd Season. Lady Manner's School, Bakewell, 1932.

3 randomised blocks of 8 plots each. Plots : 1/161th acre. Soil : Limestone.
 Treatments : 2 cwt. nitrate of soda , 3 cwt. superphosphate, and 2 cwt. kainit per acre.
 Hay cut : June 21st.

		Cwt. per acre.			Per cent.		
		No nitrate of soda.	Nitrate of soda.	Mean	No nitrate of soda.	Nitrate of soda.	Mean
No Kainit	No super. ..	47.1	60.4	53.8	86.2	110.5	98.4
	Super. ..	42.0	61.4	51.7	77.0	112.5	94.8
	Mean ..	44.6	60.9	52.8	81.6	111.5	96.6
Kainit.	No super. ..	39.4	64.3	51.8	72.1	117.7	94.9
	Super. ..	45.9	76.5	61.2	84.0	140.1	112.0
	Mean ..	42.6	70.4	56.5	78.0	128.9	103.4
Mean of Kainit and No Kainit		43.6	65.6	54.6	79.8	120.2	100.0

Standard error of single entry : 3.76 cwt. or 6.89 per cent.

CONCLUSIONS

Definitely significant response to nitrogen. The average responses to phosphate and kainit are not significant, but the response to nitrogen in the presence of kainit is significantly higher than in the absence of kainit. The response to superphosphate in the presence of kainit is barely significant.

Meadow hay. Lady Manner's School, Bakewell, 1932

3 randomised blocks of 9 plots each.
 Plots, 1/216th acre.
 Treatments : 8 tons compost, 2 cwt. nitrate of soda, 3 cwt. superphosphate and 2 cwt. kainit per acre.
 Hay cut : June 28th.

CONCLUSIONS

The effect of manures is definitely significant. The difference between artificials and compost does not reach the 5 per cent. level of significance.

	Yield, cwt. per acre.	Yield, per cent.
None	33.0	75.3
Nit. Soda, Super, kainit	51.7	117.9
Compost	46.8	106.8
Mean	43.8	100.0
Standard Error ..	1.94	4.42

Meadow hay. Haileybury College Farm, 1932.
 H. W. Gardner, Esq., Hertfordshire Farm Institute.

5 x 5 Latin square. Plots 1/50th acre.
 Treatments : Top dressings of nitro-chalk, sulphate of ammonia, cyanamide and nitrate of soda equivalent to 1 1/2 cwt. per acre of sulphate of ammonia.
 Hay cut : June 25th.

CONCLUSIONS

Definitely significant response to nitrogen. No significant differences between the different kinds of nitrogen.

	Yield, cwt. per acre.	Yield, per cent.
None	38.8	83.7
Cyanamide	43.6	94.1
Nitro-chalk	49.3	106.5
Sulphate of ammonia	52.0	112.4
Nitrate of Soda ..	47.8	103.2
Mean	46.3	100.0
Standard Error ..	2.15	4.65

Kale. Midland Agricultural College, Loughborough, 1932.

4 randomised blocks of 6 plots each. Plots 1/50th acre. Soil: Light loam.

Variety: Marrow stemmed.

Treatments: Nitro-chalk at the rate of 0, 2 and 4 cwt. per acre, applied as top-dressing. Kale thinned (12 ins.) and unthinned (4 ins.).

Basal manuring: 12 tons farmyard manure, 8 cwt. slag. and 1 cwt. muriate of potash per acre.

Kale planted: April 12th.

Cut: Mid-end Sept.

Previous crop: Spring Oats.

	Tons per acre (fresh material)				Per Cent			
	No Nitro-chalk.	Single Nitro-chalk.	Double Nitro-chalk.	Mean	No Nitro-chalk.	Single Nitro-chalk.	Double Nitro-chalk.	Mean
Not thinned ..	23.44	25.00	27.03	25.16	95.3	101.7	110.0	102.3
Thinned ..	22.19	23.75	26.09	24.01	90.2	96.6	106.1	97.6
Mean ..	22.81	24.38	26.56	24.58	92.8	99.2	108.0	100.0

Standard error of single entry: 0.809 tons or 3.29 per cent.

CONCLUSIONS

Nitro-chalk produces a significant response, there being no significant deviation from proportionality in response to single and double dressings.

The lower yield of the thinned, as compared with the unthinned plots, is not significant.

Tomatoes. Hertfordshire Farm Institute, 1932, Horticultural Dept.

8 randomised blocks of 4 plots each.

Plots 0.00386 acres. Plants per plot 129, plants weighed 86 (guard rows discarded).

Variety: E.S.I.

Treatments applied in 11 top dressings.

Top dressings providing N at the rate of 4.2 cwt., sol. P₂O₅ at the rate of 5.8 cwt., insol. P₂O₅ at the rate of 2.2 cwt., and K₂O at the rate of 8.0 cwt. per acre.

Basal manuring: 20 tons dung, ½ ton sulphate of potash, ½ ton lime, 2½ cwt. super., and 2½ cwt. steamed bone flour per acre.

	Yield. tons per acre.	Yield. per cent.
Dried blood	54.93	99.8
Hoofs and horns	55.07	100.0
Sulphate of ammonia	54.14	98.3
Fish meal	56.12	101.9
Mean	55.06	100.0
Standard Error	0.879	1.60

CONCLUSIONS

No significant differences between the various kinds of nitrogenous fertiliser.

Apples. G. Ogilvie, Esq. Cox's, Harpenden, Herts, 1932.

Experiment on the effect of manuring on the production of shoots from root stocks.

8 × 8 Latin square. 3 root stocks per plot. Soil: Clay with flints. Variety: E. Malling No. IX. Treatments: Sulphate of ammonia and sulphate of potash at the rate of 3 cwt. per acre and superphosphate at the rate of 4 cwt. per acre, applied June 15th.

Pence per root stock.	No treatment.	Sul. Amm.	Super.	Sul. Pot.	S/Am. Super.	S/Am. S/Pot.	Super. S/Pot.	S/Am. Super. S/Pot.	Mean.	Stand. Error.
Total value of shoots	14.42	13.67	16.38	14.17	13.92	15.62	14.58	14.42	14.65	1.04
Value of roots to shoots ..	0.79	0.67	1.33	1.21	0.75	1.04	0.92	0.71	0.92	0.133

CONCLUSIONS

There is no indication that manuring affects the value of the shoots, except in so far as this is dependent on their roots, but the variability is so great that only large effects would be detectable.

The value of the roots to the shoots is significantly decreased by the application of nitrogen. Phosphate and potash produce no general effects but are significantly less favourable together than when applied separately.