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## Report for 1929

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## Experiments at Outside Centres

### Rothamsted Research

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## REPLICATED EXPERIMENTS AT OUTSIDE CENTRES.

Grassland. New Hay. Effect of Basic Slag.  
(Basic Slag Committee.)

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

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

Seed sown : 1925.  
SYSTEM OF REPLICATION : Latin Square.  
AREA OF EACH PLOT :  $\frac{1}{4}$  acre.  
Soil : Calcareous boulder clay.  
TREATMENTS :  
C = Control.  
L = Low soluble slag (37.3%).  
M = Medium soluble slag (60.9%).  
H = High soluble slag (86.8%).  
Slags applied at the rate of 100 lb.  $P_2O_5$  per acre in March, 1926.  
All plots received 1 cwt. Sulphate of Ammonia and 2 cwt. 20% Potash Manure Salts.

### Actual Weights in lb.

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

### Summary of Results.

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

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

## Grassland. Old Hay. Effect of Basic Slag. (Basic Slag Committee).

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

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

SYSTEM OF REPLICATION : Latin Square.

AREA OF EACH PLOT :  $\frac{1}{4}$  acre.

Soil : Red clay loam on sandstone.

TREATMENTS :

C = Control.

L = Low soluble slag (37.3%).

M = Medium soluble slag (60.9%).

H = High soluble slag (86.8%).

All plots received 1 cwt. Sulphate of Ammonia and 2 cwt. 20% Potash Manure Salts.

Slags applied at the rate of 100 lb.  $P_2O_5$  per acre in March, 1926.

### Actual Weights in lb.

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

### Summary of Results.

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

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

## Potatoes. Effect of Superphosphate

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

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

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

SYSTEM OF REPLICATION : Latin Square.

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

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

Potatoes set : April 11.

Lifted : October 15-16.

#### Actual Weights in lb.

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

#### Summary of Results.

##### (a) Separate Varieties.

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

##### (b) Varietal Difference.

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

##### (c) Effect of Superphosphate.

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

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

## Sugar Beet: Effect of Nitrogenous Fertilisers.

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

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

Soil : Light sandy loam.  
 VARIETY : Kuhn P.  
 SYSTEM OF REPLICATION : Latin Square.  
 AREA OF EACH PLOT : 1/50th acre.  
 TREATMENT : 0.4 cwt. of N per acre in the forms Sulphate of Ammonia, Nitrate of Soda with seed and as a top dressing.  
 Basal Dressing : Dung, Superphosphate at the rate of 0.4 cwt. P<sub>2</sub>O<sub>5</sub> per acre and Muriate of Potash at the rate of 0.8 cwt. K<sub>2</sub>O per acre.  
 Artificials applied : Basal, March 10. Top Dressing, June 13.  
 Beet sown : April 22. Lifted : December 9.

### Actual Yields in lb.

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

### Summary of Results.

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

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

## Sugar Beet: Effect of Chloride Dressings

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

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

Soil: Light sandy loam.

VARIETY: Kuhn P.

SYSTEM OF REPLICATION: Latin Square.

AREA OF EACH PLOT: 1/50th acre.

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

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

Artificial applied: March 10.

Beet sown: April 22. Lifted: December 6.

### Actual Yields in lb.

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

### Summary of Results.

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

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

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

(Yields determined by sampling method.)

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

<b>A</b>	NK	NPK	O	NP	N	PK	P	K
<b>B</b>	O	K	NPK	N	NP	P	NK	PK

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

**Actual Weights in grams per Sample.**

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

**Summary of Results.**

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

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

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

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

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

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

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

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

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

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

No response to Superphosphate.

#### Potatoes. Mr. E. Arden, Owmbly Cliff, Lincolnshire, 1929.

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

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

No response to Superphosphate.



**Experiments at other Centres (cont.)**

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

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

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

No response to Superphosphate on total yield.

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

Randomised Blocks : Plots 1/160th acre. Soil : School garden.  
 Treatment : Nitrogen in the form of Sulphate and Muriate of Ammonia and Cyanamide, at the rate of 0.6 cwt. N per acre.  
 Basal Manuring : Potash at the rate of 1 cwt. K<sub>2</sub>O per acre, and Superphosphate at the rate of 0.8 cwt. P<sub>2</sub>O<sub>5</sub> per acre.  
 Variety : Garton's Warrington. Beet sown May 21, lifted November 5.

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

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

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

Latin Square : Plots 1/80th acre. (2 discarded). Soil : Loam on chalk.

Basic Dressing : 4 cwt. Superphosphate, 1 cwt. Steamed Bone Flour and 1 cwt. Muriate of Potash. Nitrogenous Manures—1 cwt. per acre Sulphate of Ammonia, and equivalent dressings of Muriate of Ammonia and Nitrate of Soda.

Variety : Kleinwanzleben E. Beet sown May 3rd, lifted October 16-19.

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

No response to treatment.

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

Latin Square : Plots 1/20th acre. Soil : Thin flinty loam on chalk.

Treatment : Salt at the rate of 100 lb. and 300 lb. per acre and Muriate of Potash at the rate of 1 cwt. per acre.

Variety : Plumage Archer. Barley sown April 5, harvested August 13.

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

No significant differences due to treatments.