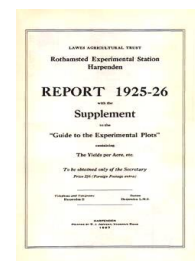


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Report 1925-26 With the Supplement to the Guide to the Experimental Plots



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Results on Potatoes

Rothamsted Research

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Potassic Fertiliser

			1,000 Corn Weight.		Nitrogen in Dry Matter.	
			No Potash.	Complete.	No Potash.	Complete.
1922	...	...	41.4	41.4	1.774	1.767
1923	...	...	39.7	40.0	1.663	1.629
1924	...	...	39.2	39.1	1.451	1.414
1925	...	...	39.8	40.0	1.681	1.649
General Mean	...		40.0	40.1	1.641	1.611

POTATOES.

The potato crop is one of the most important in the country; it occupies about half a million acres and forms a large item in the annual value of British agricultural produce. Potatoes are among the few foods of which we produce practically all that we consume.

Potato growing tends to become highly specialised, and, as in all specialised farming, the growers have a thorough knowledge of the peculiarities of the crop. Ordinary field experiments are rarely accurate enough to give them useful information; we have therefore used the new methods, which are not only in themselves more accurate, but permit of the calculation of the degree of trustworthiness of the results.

The purpose of the experiments is to discover

1. the effect of manures on the yield and quality of potatoes;
2. the relation between the amount of fertiliser and the crop yield.

The fertilisers most studied are the nitrogen and potassium compounds, and these necessitate a large number of plots; there have been very few experiments with superphosphate, although it forms the basis of most potato manures.

The nitrogen fertilisers are usually the most consistent in their action, giving every year, with rare exceptions, an increase of about 20 cwts. of potatoes per cwt. of sulphate of ammonia, whatever the season and whether farmyard manure has been given or not. The increases have been, in cwts. of potatoes per cwt. of sulphate of ammonia applied:—

1922.	1923.	1924.	1925.	1926.
20	22—25	20	20	25

The data suggest that potassic fertilisers are a good insurance against loss by spring droughts. On our farm—we have not the necessary data for others—there is curiously little variation from season to season in the maximum yield of potatoes obtainable by appropriate manuring. Our maximum is 11 to 13 tons per acre and the yields of these plots have been between these limits in each of the four years 1923 to 1926 inclusive. Usually 4 cwts. sulphate of ammonia and 4 cwts. sulphate of potash per acre are necessary to secure the maximum crop. Economy of either ammonia or potash reduces the yield, but the effect depends

on the season; cutting down the ammonia did more harm than cutting down the potash in 1926, but less harm in 1925.

Muriate of potash is cheaper than sulphate of potash and for this reason is used in preference by some growers; it is also put into many potato "compound fertilisers." At Rothamsted it is practically as effective as the sulphate, especially where little or no farmyard manure is given; there is a seasonal factor, and 1923 was especially favourable. The yields have been, in tons per acre :—

	1921.		1922.		1923.		1924.		1925.	1926.
	Farm Yard Man-ure.	No Farm Yard Man-ure.	Farm Yard Man-ure.	No Farm Yard Man-ure.	Farm Yard Man-ure.	No Farm Yard Man-ure.	Farm Yard Man-ure.	No Farm Yard Man-ure.	No Farm Yard Man-ure.	Farm Yard Man-ure.
No Potash	3.48	1.35	9.03	2.47	11.16	9.72	9.18	6.20	5.03	9.45
Sulphate of Potash	3.94	3.76	9.55	8.30	12.45	12.25	8.82	7.28	9.82	11.36
Muriate of Potash	3.51	4.12	9.21	8.32	13.28	12.96	8.70	7.15	9.42	11.52
Low Grade Potash Salts	3.48	3.55	9.49	8.06	10.48	10.62	9.25	7.85	9.36	10.97

The second cwt. of sulphate of ammonia was more effective than the first in 1926, but less effective in 1923 and 1924; the third and fourth cwts. were less effective than the second, but still profitable. For potassic fertilisers the returns are usually less consistent and they are much affected by the season and by farmyard manure. The crop increases per cwt. sulphate of potash have been in cwts. per acre : —

	1922.	1923.	1924.	1925.	1926.
Rothamsted :					
No dung given	58	25	10	40 to 46	—
Dung given ...	20	10	0	—	20 to 23
Outside Centres :					
No dung given	53	16	—	24	—
Dung given ...	38	25	27	—	13

Farmyard manure reduces the effectiveness of potassic fertilisers by about one-half. Seasonal factors cause even greater fluctuations; 1922, 1925 and 1926 were pre-eminently potash years, 1924 was not; 1923 came in between. The ineffective year, 1924, had a very wet spring; in the effective years the spring was dry. In 1923, the year of intermediate effectiveness, the summer was warm and bright; in 1922, 1925 and 1926, the most effective years, it was cold and wet. The rainfall and sunshine data are :—

Year.	Rainfall.		Hours of Sunshine.		Potassic Fertilisers.
	Spring, May & June.	July-Oct. inclusive.	Spring, May & June.	July-Oct. inclusive.	
1922 ...	2.46	10.13	509	519	Effective.
1925 ...	2.45	13.02	464	544	"
1926 ...	4.67	7.79	334	578	"
1923 ...	2.17	12.88	282	768	Less Effective.
1924 ...	6.31	13.66	391	603	Non-Effective.

The effect of manures on quality is difficult to determine. Skilled salesmen have usually been unable to discriminate between potatoes grown with sulphate of potash and those grown with muriate of ammonia or potash. Cooking tests of the 1922 crops were in favour of the sulphate, and there is a common opinion that the sulphate is the better for giving quality.

Chemical examination of the tubers from the various plots has been made each year, but has so far thrown little light on this problem of quality. The percentage of dry matter in the tubers is highest on the unmanured plots; it is lowered by manuring with farmyard manure and still more by adding potassic fertilisers along with the dung. In absence of dung sulphate of potash has usually increased the amount of dry matter while the muriate has decreased it. The proportion of starch in the dry matter is much affected by seasonal factors and no consistent effect of fertilisers can be traced; farmyard manure lowered it in 1922 and 1924, but raised it in 1923, a year when it had but little effect on yield. Potassic fertilisers always increased the percentage of starch in absence of farmyard manure, but somewhat lowered the percentage in presence of farmyard manure; the sulphate was more effective than the muriate in absence of farmyard manure.

THE MANURING OF GRASSLAND.

The experiments on the manuring of grassland with basic slag have been continued both at Rothamsted and at certain outside centres. Three slags of different solubility were compared on new seeds ley, old hay, and grazing land, sheep being the animals used for grazing.

The results show that solubility is a fairly good criterion of effectiveness; the high soluble slag was better than the medium, and this better than the low soluble. Apparently the difference is not simply in the amount of phosphate present; an increase in the dressing of low soluble slag does not make it equal to the high soluble slag; the two slags behave as if they were different substances. The low soluble slag seems to have distinct value in moist conditions, but not in drier districts.

The experiment on new seeds ley was made at Brooke, near Norwich, and the one on old hay at Enmore, in Somerset; both were by the new methods. The results were, in tons per acre:—

Treatment.	New Hay : Norfolk.		Old Hay : Somerset.	
	Tons per acre.	Per cent.	Tons per acre	Per cent.
No Phosphate	2.28	100	1.37	100
Low Soluble Slag	2.28	100	1.49	109
Medium Soluble Slag ...	2.31	101	1.59	116
High Soluble Slag	2.65	116	1.53	112
Standard Error	—	5.4	—	7.1

The grazing experiments are more difficult to carry out, and the new methods cannot be used owing to the great difficulty of setting up an adequate number of replicate plots. The liability to