

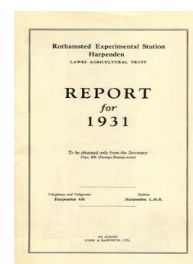
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Experiments at Outside Centres

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EXPERIMENTS AT OUTSIDE CENTRES

Many experiments are made under the direction of H. V. Garner at outside centres where the crop in question is well understood and where therefore proper cultivation and management is assured. These experiments are of great value in showing how far the Rothamsted results are generally applicable and what modifications are caused by differences in soil, climate, or general husbandry conditions. Full accounts are given in H. V. Garner's articles in the Journal of the Ministry of Agriculture.

Broadly speaking the Rothamsted results usually represent pretty well the average results from the outside centres.

POTATOES. *Phosphatic manuring.* The effect of superphosphate on potatoes has been tested at nine of the outside centres. On the ten soils marked increases were obtained not only from a dressing of 5 cwt. superphosphate, but even from the additional 5 cwt. making 10 cwt. in all. A similar big increase was obtained on the oolite limestone at Burford: 4 cwt. super added $1\frac{1}{2}$ tons per acre to the yield which without phosphate had reached only the low figure of 4.1 tons per acre. On the other hand a rich silt at Wisbech, which has been in the past heavily manured with super, responded only to the first dose of 2 cwt. super and not at all to additional dressings. Two centres showed no response: Owmbly and Biggleswade: Owmbly has in all the tests shown a response only once. At Rothamsted the response was this season only slight: 2 cwt. potatoes per cwt. super.

Early potatoes on an acid sand at Potton did not respond to superphosphate. The yields are given in Table VII.

TABLE VII. Effect of superphosphate on potatoes at different outside centres

Centre	Soil	Yield tons per acre No Phosphate	Cwt. per acre increase over No Phosphate			Size of dose of Superphosphate. Cwt.
			1st dose	2nd dose	3rd dose*	
<i>Main Crop.</i>						
March	Peaty Fen.	6.46	18	28	—	5
Ely	Rich Clay Fen	7.72	29	55	—	5
Wisbech (G. Major, Esq.)	Rich Silt	11.18	8	Nil	Nil	$2\frac{1}{2}$
Wisbech (Messrs. Hickman & Co.)	Rich Silt	12.30	17	16	15	2
Burford	Limestone	4.13	32	30	23	2
Owmbly Cliff	Limestone	7.01	—4	—1	—8	2
Biggleswade	Sandy Gravel	10.70	Nil	—	—	$2\frac{1}{2}$
Tunstall	Sand	9.85	32	—	—	4
<i>Earlies.</i>						
Potton	Sand	4.05	—4	5	—4	2

* The third dose is double the second dose.

This year potassic fertilisers had but little effect either at the outside centres or at Rothamsted. March had been sunny but from April onwards till October the months had been much wetter, more

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sunless and colder than usual : in general character the season was not unlike those of 1913 and 1926, yet 1926 had been a good potash year. Information is steadily being accumulated about the relation between character of the season and fertiliser efficiency, but the subject is full of difficulties.

Nitrogenous fertilisers on the other hand were distinctly effective, the increase per cwt. sulphate of ammonia being in cwt. potatoes :

	1st dose.	2nd dose.
Rothamsted.....	18	15
Biggleswade.....	14	10
Midland Agricultural College	14	20
Ely	16	—
March	6	—

These last two were black fen soils on which responses would not usually be expected, though in our earlier experiments on black soils we have obtained quite good responses : they have been, for 2 cwt. Sulphate of Ammonia :

	Cwt. potatoes. additional crop.
1928 Stourbridge	38
1929 Bourne	20

In comparisons with Nitrate of Soda and Cyanamide, Sulphate of Ammonia gave on the whole the best results for main crop potatoes. Nitrate of Soda came next and Cyanamide third.

For early potatoes, on the other hand nitrogenous fertilisers were practically ineffective : only Nitrate of Soda showed any sign of acting : this is the first set of experiments we have made with this crop and we intend to continue them.

Winter cabbages grown immediately after lifting the potatoes however, benefited by the nitrogen.

Organic Manures. On potatoes organic manures have again proved less effective than the standard artificials. The experiment was made this time by the staff of the Midland Agricultural College : fish manure was tested against home mixed artificials and the I.C.I. compounds ; fish manure gave the smallest and I.C.I. compound the largest increase.

BRUSSELS SPROUTS. On Brussels sprouts at the Swanley Horticultural College, however, both poultry manure and high-grade guano proved better than artificials : the results were :

Brussels Sprouts, Cwt. per acre.

	No Nitrogen	Poultry Manure	High Grade Guano	Artificials Full N	Artificials Half N
Sprouts	48.05	53.96	51.79	47.16	45.60
Blown Sprouts ..	14.12	20.59	19.70	18.64	17.08
Total	62.17	74.55	71.49	65.80	62.68

KALE. This important crop has not received much attention from agricultural investigators : we have started several experiments with it which will be developed as the results begin to emerge.

It has great power of utilising added nitrogen. An experiment made at the Midland Agricultural College with marrowstem kale gave marked responses even to 4 cwt. Nitrate of Soda.

Kale, tons	Nitrate of Soda, Cwt.				Standard Error.
	0	1	2	4	
..	15.31	18.20	19.06	22.42	0.677

HAY. *Nitrogenous manures*. The average increased production of hay this year has been 6 cwt. for 1 cwt. Sulphate of Ammonia.

SOIL FERTILITY AND MECHANISATION.

The systematic use of large scale machinery on the farm, called for convenience "mechanisation," is usually combined with a reduction in the number of live stock kept, and hence causes certain modifications in the fertility relationships of the soil. Four important groups of problems are being investigated.

(1) Can fertility be sufficiently maintained by artificial fertilisers alone or is it necessary to return the straw to the land in the form of manure? If the straw must be returned, what is the best way of doing it?

(2) Is it possible to produce, by any cultural process, the same good effects on light land as are obtained by sheep folding?

(3) Green manuring.

(4) Fallowing.

The classical experiments at Rothamsted have shown that soil fertility can be kept at a certain moderate level by the use of artificial fertilisers alone without the use of farmyard manure. In general, however, the growth of the crop has not been enough to keep down weeds, and much expense has been entailed in cleaning. A combination of artificial fertilisers with occasional fallows, however, has proved effective in maintaining yields at low expenditure in labour but with a loss of one year in four or five.

The return of the straw to the land can be effected in several ways; three are under investigation:

(1) It may be converted into farmyard manure in the usual way. In our experiments, about 25 per cent. of the nitrogen in farmyard manure is recovered by the plant as against about 50 per cent from artificial fertilisers.

(2) It may be decomposed by the method developed in these laboratories by H. B. Hutchinson and E. H. Richards and put on a commercial basis by the Adco Syndicate; the straw is treated with the necessary nitrogen compound, phosphate and limestone, to encourage the activity of micro-organisms effecting the decomposition.

(3) It may be ploughed under, and the necessary nitrogen and phosphate given in the form of artificial fertilisers. In the autumn a smaller addition is necessary than in the spring, because the soil already contains some nitrate, which if it were not used by the organisms would probably be washed away in the winter.

If this method proves feasible in practice it has the advantage of economy in labour, for the corn could simply be stripped and the straw ploughed under while the soil was still warm.

These problems are being studied in the four-course rotation experiment (p. 129).