ROTHAMSTED RESEARCH

Report for 1930

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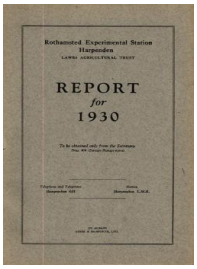

Sugar Beet

Rothamsted Research

Rothamsted Research (1931) *Sugar Beet ;* Report For 1930, pp 33 - 35 **- DOI: https://doi.org/10.23637/ERADOC-1-63**

ganic with organic manuring for potatoes, testing dried blood against sulphate of ammonia and steamed bone flour against superphosphate. On the light land there was no difference in effect, on the heavy soil the organic fertilisers were distinctly inferior, super. giving 1.85 tons more than steamed bone flour, and sulphate of ammonia 0.83 tons more than blood on yields of about 10 tons (Table VI). The organic fertilisers certainly require little knowledge for handling, and they are convenient for garden use, but we have no evidence that they ever act better than, or even as well as, the artificial fertilisers.

The effect of the bulky organic manures, farmyard manure and rotted straw, is shown on pp. 130-1.

SUGAR BEET

The variety grown was again Kuhn (Johnson's Perfection). The average yield of washed roots was the same as last year; the percentage of sugar was slightly higher while the yield of tops was considerably higher. It was a good growing season and the leaves did well but the roots could not keep pace. The results bring out strikingly the variation in efficiency of the tops from season to season, and their low efficiency as compared with that of the mangold. The results of recent years have been :

	Sugar Beet. (*washed*)			*Mangolds.*[1] (*scraped*)		
Year.	Yield of tops in tons per acre.	Yield of roots in tons per acre.	1 part of top makes of root	Yield of tops in tons per acre.	Yield of roots in tons per acre.	1 part of top makes of root
1926	25.23	12.10*a*	0.48	6.05	22.43	6.25
1927	10.82	3.38	0.31	3.89	13.42	3.45
1928	11.43	9.15	0.80	5.01	29.22	5.83
1929	5.41	7.43	1.37	3.94	20.67	5.25
1930	9.15	7.44	0.81	6.23	26.78	4.30
Mean	12.41	7.85	0.75	5.02	22.50	5.02

(*a*) The figures given in the 1926 Report on p. 142 are for unwashed beet.
[1] Barnfield, Plot 4 A.C.

The yields of tops vary a good deal according to season and manuring, but the yields of roots vary much less.[1] The root is able to keep pace with the top up to a certain stage, but then it can do no more, no matter how much the top grows. Mangold roots, on the other hand, can continue growth much further and so keep pace with the better leaf growth of good seasons. This restriction or congestion of the root of the sugar beet may result from its constitution; its sap is so highly concentrated that new soluble material from the leaf may not readily enter so that the process of translocation from leaf to root may be considerably retarded. Increased concentration of the leaf sap might improve matters; this may explain the special value of salt as a fertiliser.

The manurial results show that the leaves behave normally giving their full increase with fertilisers, but the roots do not. Thus in Rotation II the yields for varying dressings of nitrogen were :

[1] Excluding 1927 ,where the failure was due to very late sowing.

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Cwt. N per acre applied as Sulphate of ammonia	0	0.15	0.30	0.45	0.60
Tops, tons per acre	7.3	9.3	7.8	10.5	11.7
Roots, tons per acre	6.3	7.1	6.0	8.0	7.0

Neither phosphate not potash had any important effects on the roots or tops either at Rothamsted or at Woburn. One general result up to the present is that sulphate of ammonia applied with the seed usually gives an increased yield of root which is still further increased by potash manure salts or by muriate of potash and salt (Table VII). Nitrate of soda usually gives a greater increased yield of root, but there is not always a further gain by adding potassic fertiliser and salt; apparently its soda exerts some beneficial effect. The effects at Rothamsted are not very great; a dressing of 23 lb. of nitrogen, the equivalent of 1 cwt. of sulphate of ammonia, or 1⅛ cwt. nitrate of soda, has usually given an additional 6 to 9 cwt. of roots, and 12 to 17 cwt. of tops per acre. At the outside centres the figures are better, the roots having been increased on the average by 12.3 cwt., and the leaves by 23.9 cwt. per acre by a dressing containing 23 lb. nitrogen:

Mean of 17 comparisons at Outside Centres, 1929–30.
Effect of Nitrogenous Manures.
Calculated to basis of 23lb. N. per acre.*

Yield without added Nitrogen.			Increase per 23lb. N.		
Roots, Tons.	Tops, Tons.	Sugar, per cent.	Roots, cwt.	Tops, cwt.	Sugar, per cent.
9.66	11.29	17.87	12.3	23.9	0.05

* The actual rates of application were either 46 or 69lb. N. per acre.

TABLE VII.—The Effect of Potassic Fertilisers and of Salt on Sugar Beet at the outside centres in 1929 and 1930.

	Average Increase per 1 cwt. potash or salt fertilisers.		
	Roots, cwt.	Tops, cwt.	Sugar, per cent.
(*a*) No potash or salt in basal dressing:			
Mean of 4 expts. [1]Muriate of potash ..	9.5	7.5	0.10
,, ,, 3 expts. [2]Salt	14.0	8.5	0.27
,, ,, 3 expts. [1]Muriate and Salt Mixture	6.5	9.5	0.14
1 expt. 20 per cent. Potash Salts	9.5	—	0.10
(*b*) Salt in basal dressing:			
Mean of 2 expts. [2]Muriate of potash ..	0	0	0.10
(*c*) Muriate of potash in basal dressing:			
Mean of 3 expts. [1]Salt	2.0	12.0	0.17

[1]Two only for tops.
[2]One only for tops.

These various points are well illustrated in the experiment made on Messrs. Wilson's farm at Colchester on a good sugar beet soil (pp. 166-7).

It does not always happen, however, that nitrate of soda is superior to sulphate of ammonia; at the County School, Welshpool,

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in 1930, in one of the most accurate experiments yet made, the sulphate of ammonia came out superior (p. 169) as it had done at Rothamsted in 1929, when muriate of potash, salt, and super. were also given. We are not yet in a position to put forward a general recommendation for the manuring of sugar beet. As a basis for experiment we should suggest, per acre :

10 tons farmyard manure applied in autumn.

2 cwt. nitrate of soda.

3 cwt. super.

3 cwt. potash salt all applied at or before seeding.

The effect of 2 cwt. salt should also be tried instead of the potash manure salts. Possibly new varieties will be more responsive than the present ones, but our whole scheme of management may be unsuitable for the crop. It is possible that the additional saline material taken up by the root from the fertilisers, and remaining in solution in the juices of the root, adds to the difficulty of entry of sugar from the leaf, and that the proper way of fertilising sugar beet would be from the exchangeable bases in the soil and not from soluble salts ; this may explain the continental preference for putting on the manures some long time before the seed is sown so that all unwanted ions can be washed away.

The average percentages of sugar at Rothamsted and Woburn have been :

	1926.	1928.	1929.	1930.	Mean.
Rothamsted ..	17.4	17.6	18.4	17.6	17.8
Woburn ..	16.7	18.0	17.1	19.4	17.8

No determinations were made in 1927 owing to lowness of yield.

The sugar content is only slightly affected by phosphatic or potassic manuring ; superphosphate, however, slightly raised it at Woburn, both in 1929 and in 1930, while potassic fertiliser had no effect. At Rothamsted superphosphate did not alter the sugar content in 1929 ; potassic fertilisers slightly raised it except where nitrate of soda was given.

The one result that almost always emerges is the lowering of the percentage of sugar by nitrogenous manures. It is not necessarily large ; in the preceding years the reduction has averaged 0.15 per cent ; in 1930 it was 0.05 per cent only.

The loss of plant was not heavy ; the proportion actually obtained was on the average 98 per cent of the number expected at Rothamsted as compared with 84 per cent of those expected at Woburn.

The figures are, per acre :

	Rothamsted.	Woburn.
Number of plants expected	35,280	32,000
Number of plants harvested	34,534	26,795
Plants obtained as percentage of those expected	98	84

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