

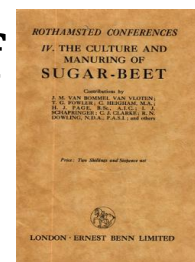
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ROTHAMSTED
RESEARCH

The Culture and Manuring of Sugar-beet

[Full Table of Content](#)



Account of the Discussion

Rothamsted Research

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SUGAR-BEET

49

There was practically no difference in yields. It appears that the additional number of roots per acre does not necessarily mean a greater yield per acre. The difference in the size of the roots was very apparent when the plots were lifted and topped.

| Plot | Date of Singling | Tons | Cwt. | Qrs. | Per cent. Sugar |
|------|------------------|------|------|------|-----------------|
| 1 | June 7th | 13 | 3 | 0 | 20.3 |
| 2 | „ 11th | 12 | 16 | 2 | 19.5 |
| 3 | „ 16th | 12 | 18 | 0 | 19.5 |
| 4 | „ 21st | 12 | 6 | 2 | 20.0 |

The singling on Plot 1 was carried out as early as the plants could be handled—*i.e.* when showing fourth leaf, and the results show an increase of nearly 1 ton over the plot singled last; also the sugar content of the crop from this plot was the highest obtained at this centre.

It is too early to draw definite conclusions, further work being necessary.

THE DISCUSSION

SIR FREDERICK KEEBLE, in opening the discussion, said that he was greatly impressed, or depressed, by the smallness of the average yield of beet in this country.

He was convinced that this could be greatly bettered by more thorough cultivation of the soil.

The difference between farming and gardening was mainly one of soil conditions, and the difference between the yield of the same crops under the two conditions was enormous.

He thought that the first step to better yield should be cultivation, aimed at the making of good soil conditions, and that this might be followed by improved manuring.

He ascribed the very small increases of yield obtained with nitrogen manures in some of the experiments put before the conference to the operation of the law of limiting factors and not to any essential failure of artificial nitrogen as a manure for sugar-beet. Unless the other factors of growth were in balance, no plant could use the manure given to it to advantage.

He mentioned that in the near future large supplies of new types of nitrogenous and mixed manures would be available on the English market as the produce of our own industries; and that these should prove interesting to sugar-beet growers and other intensive farmers.

Sir FREDERICK HIAM said that he had had satisfactory results with beet grown in rows 21 in. apart. He got these by using a 7 ft. drill equipped with four coulter.

Even with rows as far apart as this he had found it very necessary to use a light horse on the hoes as the big shire did a very great deal of damage in kicking up the plants in the rows.

He had found that wireworm was a serious pest to the crop when sown early and he had suffered considerable losses by birds, mostly crows and lapwings, which pulled up the young plants to get at the wireworms. He quite definitely delayed the sowings of his crop to avoid this trouble.

In the matter of manuring he used plenty of farmyard dung, and he had not found that it had had any such depressing effect upon the crop as had some of the heavier artificial dressings mentioned in the papers.

Mr W. F. GILES (Messrs Sutton & Sons), speaking of the production of sugar-beet seed, said that the plant had been grown experimentally by his firm for many years.

During the war, when the import of seed became impossible, Suttons had undertaken a home-grown supply for the Kelham Factory. It was possible to produce satisfactory seed in England in four years out of five, but unfortunately, owing to the high cost of labour here, the cost of production was too great for it to compete with a foreign article of equal, or perhaps greater, germination capacity. The future of sugar-beet seed production in England must depend simply on the cost of production.

In the matter of width of rows and heavy seeding, and their bearing on yield, he recalled an enormous crop of mangolds grown at 16 in. between the rows and with 16 lb. of seed per acre. These yielded 90 tons per acre, and the roots grew practically touching one another. The hoeing on this crop had been done with Planet Junior hoes, pushed by men and therefore without the use of horses. These hoes should be useful to sugar-beet growers using narrow rows.

Mr J. L. LUDDINGTON said that he had grown sugar-beet for a number of years and that now he was growing them on ridges with 24 in. between the rows. He found that he was getting a good crop of 12 tons per acre of washed beet and a sugar content of 16.2 per cent.

The final result of this in the way of net return was satisfactory, and the saving in cost of cleaning and hoeing was very considerable. He believed that ridge growing really served to reduce the cost of production per ton.

He had found in his experience that the factories treated the farmers well and he believed that it would be possible to secure the future of the industry as the subsidy dropped, by the production of a larger crop at a smaller cost to the farmer.

Mr A. W. LING said that in the large series of sugar-beet experiments conducted last year from Bristol University over five Western

SUGAR-BEET

51

Counties, it had been found possible to alter the yield considerably by cultural methods and arrangements, but not the sugar content.

For instance, beet in rows 15 in. apart yielded 22 tons per acre, 18 in. apart, 20 tons per acre, 22 in. apart, 19 tons per acre, without any significant difference in sugar percentage.

This type of result was common among 300 separate experiments under consideration and gave point to the recommendation that the farmer should regard gross yield as the point of paramount importance in his beet crop.

An excess of nitrogen given to the crop either with the seed or as a top dressing was certain to lead to a large leafy growth without an equivalent increase in root. This leafiness was correlated with a delay in maturity which might have serious effects on the crop. As far as he could gather a dressing of $1\frac{1}{2}$ cwt. per acre of sulphate of ammonia or calcium cyanamide before sowing, followed by a single top dressing of nitrate of soda at singling time, gave the best results in the West Country.

Speaking of potash manures, he said that on most light soils the applications of potash to the crop seemed to be profitable, but that on heavy soils—on the old red sandstone, and on the lias and other clays—the plots without potash had often given the best results, and increases of potash had often caused a progressive depression of crop. He thought that the sugar-beet as a plant was particularly well equipped for utilizing reserves of potash already in the soil.

He believed strongly in the necessity for singling at the earliest possible moment, and was curious to know more about the influence of variety on sugar content.

Col. G. H. LONG said that during the last season the W. Suffolk Agricultural Committee had conducted a series of experiments with sugar-beet at some six centres in the county. Among other things they had tried different widths of rows (18 in. and 24 in.), but the yields had come out about the same. Many farmers in the district considered that beet grown on ridges 24 in. to 28 in. apart gave as good yields as those grown on the flat at 18 in., while the saving in cost in growing and cleaning them was considerable.

He had found that on thin-skinned land the number of fanged beet was very large unless the subsoil was well broken at the time of first ploughing. He used a subsoiling tine on his ploughs over the whole 100 acres which he intended to put under beet this next year.

He had found that sulphate of ammonia applied before drilling had tended to produce an improvement in the plant obtained. He suggested to Sir Frederick Hiam that the Suffolk horse was far better suited to work between relatively narrow rows than the shire.

Mr SHORTEN (Howard & Sons) said that his firm was extremely interested in the development of special and improved types of machinery

to help the growers. Recently they had turned out a new sugar-beet lifter, some special types of ploughs, and a hoe which would deal with four rows of beet at a time. He was sure that as improvements in production were outlined the implement makers would be doing all in their power to further them, and to help the growers in their task.

Mr T. THOMSON said that some uncertainty existed in the West Midlands as to the date of sowing and its effect upon the number of bolters produced. In 1925 crops sown on 18th April had practically no bolters, while last year those sown as late as 10th May had many. If late sowing was insisted on as a precaution there was always a difficulty in getting the crop through to maturity.

He was anxious to know how far the beet suffered from exposure on the ridge, as there seemed to be a tendency among growers in Shropshire to turn to ridge cultivation.

Several farmers of his acquaintance who had been accustomed to vegetable growing and who were equipped with Planet Junior hoes had found benefit from the use of these tools in sugar-beet. He thought that there was a critical point of economic balance to be found between the use of horse and man labour in the working and handling of the crop.

It appeared to him that the facts adduced concerning the influence of daylight on sugar formation in the beet supported the opinion that every effort should be made to lengthen the growing season at the beginning.

Mr F. RAYNS said that he had grown sugar-beet last season on the ridge and on the flat with equal distances between the rows on the farm of the Norfolk Agricultural Station. The yield had been practically equal in the two cases, with a very slight difference in sugar content (3 per cent.) in favour of the flat work. This difference was more than counterbalanced by the economy and ease of working on the ridge.

Many successful growers who had used the ridge system in Norfolk last year had earthed up the roots as a final operation, and this had been easy to do. He was convinced that in many circumstances the growing of sugar-beet on the ridge was a sound practical proposition.

Three years' work on the use of nitrogen with sugar-beet had brought him to much the same conclusions as those already mentioned. Increases of yield for the first dressings were soon followed by a check. This year he had applied the whole of the nitrogen by the time of singling and he had got response to a larger total dressings than when the applications had been spread out to a later date. He thought that there was a definite connexion between the use of nitrogen and the number of bolters in the crop.

SUGAR-BEET

53

Sir JOHN RUSSELL, in closing the discussion, first of all thanked the speakers and then stressed the twofold object of the Rothamsted Conferences. They were intended, he said, firstly to get the best information of all kinds bearing upon matters of immediate agricultural interest and to spread that information as widely as possible. Secondly, they were meant to obtain, for the Station, problems from the field that required scientific investigation.

Turning to the subject of discussion he said that the present position with regard to yield was obviously unsatisfactory. There seemed to be three lines of attack in the attempt to better it :

(1) Improvement of varieties to suit situations. Much had been done already, but there was hope of still further progress in this line.

(2) Improvement of cultivation and methods of spacing. In this department there was certainly room for very much more experience and experiment. Preparation of seed bed, depth of sowing, width of rows, ridge or flat—all were important matters requiring exact knowledge and probably local modification.

(3) Manuring might prove to be capable of producing most satisfactory results with sugar-beet as with other things, but great discrepancies were bound to occur until the foundations of cultivation for the crop had been established.

The matter of the time of application of nitrogen and its effect in producing an increase of top rather than root seemed to be bound up with the question of the utilization of the nitrogen by the plant. It was desirable to apply, at the right time, just that quantity of nitrogen which the plant could use in the production of the maximum amount of that type of growth which we might require. The extra nitrogen taken to produce unnecessary leaves in the beet was obviously ill applied even though it might be producing an increase in the total weight of the plant.

SUMMARY OF POINTS

By C. HEIGHAM, M.A.

Rothamsted Experimental Station

Nature and Position of the Crop

(1) The growing of sugar-beet by a farmer and the making of sugar by a factory are to be regarded as parts of a single process of production. It is necessary for the continued success of either party that the two shall work together in close accord and sympathy.

(2) Sugar-beet being a comparatively new crop to this country there is no traditional method of growing it built up on generations of