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The Sugar Beet

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Dakota Agricultural College

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DAKOTA
AGRICULTURAL COLLEGE
AND
EXPERIMENT STATION,
BROOKINGS, DAKOTA.


APRIL, 1889.

DEPARTMENT OF CHEMISTRY.

THE SUGAR BEET.

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OFFICERS OF THE

Experiment Station.

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Correspondence is invited upon any question relating to farm interests. Questions relating to farm crops or stock should be addressed to Professor Foster; questions relating to tree culture or to gardening should be addressed to Professor Keffer; questions relating to insects should be addressed to Professor Orcutt; questions concerning the chemical composition of soils or waters should be addressed to Professor Shepard, and questions about the diseases of animals and their treatment should be addressed to Dr. Alloway—all at Brookings, Dakota.

LEWIS McLOUTH, Director.
THE SUGAR BEET.

During the preceding year seven varieties of sugar beets have been cultivated on the college farm under the supervision of Professor Foster who has furnished the data concerning the preparation of the soil and the care of the crop.

In the spring the ground was manured with well rotted barn-yard manure at the rate of 100 cubic yards per acre. In May the ground was plowed 9 inches deep without subsoiling. Before the beets were sown the land was thoroughly pulverized by means of the harrow and after sowing the ground was rolled. The beets were not planted in ridges but the ground was left as nearly level as possible.

The seed of three varieties, Vilmorin’s Improved, Lane’s Improved and the White Sugar beet was purchased of J. C. Vaughn & Co., Chicago. The seed of the other four varieties was obtained from the Sioux City Seed and Nursery Co.

June 8th, the seed was sown by means of a garden hand seeder, in drills two feet six inches apart. It is needless to add that the time of sowing was altogether too late. Moreover it was very dry till the 26th of the same month. July 7th, the beets were hoed and thinned to eight inches in the row as nearly as possible. The stand in all cases was thin and bunchy.

July 16th, the ground was cultivated with a spring tooth cultivator. August 4th, the beets were again hoed. In all the crop was hoed three times and cultivated three times.

October 15th, the beets were harvested and topped by hand at the time of harvesting. The samples which were subsequently submitted...
to analysis were stored in the cellar under the stock barn and covered to a depth of about forty inches.

It is but just to this department to state that the work in analysis was unavoidably delayed through waiting for the Saccharimeter to be shipped from the German makers. The samples were analyzed in March, the first analysis being made March 9th, and the last March 16th.

All the samples were treated uniformly as far as possible. The beets were first washed, after which the small roots were trimmed and then each beet was thoroughly dried and weighed. A longitudinal quadrilateral prism as large as possible was taken from each beet, thoroughly grated to a pulp, and then the pulp from the several beets used was intimately mixed and a definite quantity was weighed out for extraction. The pulp was extracted by Scheibler's process, the juice clarified by the addition of the smallest possible quantity of lead solution and the sugar content determined by polarization.

Following are the preliminary notes on each sample. The percent of sugar and of marc (dry woody fibre) and the yield per acre are given farther on.

SAMPLE I.

Villmoran’s White Sugar beet. Five beets taken. Weights 3lb. 3/4 oz.; 3lb. 2oz.; 3lb. 2 1/4 oz.; 3lb. 2 1/2 oz.; 3lb. 1 1/4 oz. Nos. 1 and 4 were slightly withered. The pulp was very watery.

SAMPLE II.

White Sugar Beet. Five beets taken. Weights 1lb. 15 1/2 oz.; 2lb. 3 3/4 oz.; 2lb. 9 1/4 oz.; 2lb. 6 1/2 oz.; 2lb. 12 oz. No. 1 was withered slightly and No. 5 was somewhat pithy. Pulp watery.

SAMPLE III.

Lane’s Imperial Sugar Beet. Three beets taken. Weights 2lb. 6 1/2 oz.; 1lb. 12 1/2 oz.; 2lb. 6 3/4 oz. All these were slightly flecked with decayed spots. Of the remaining specimens saved for analysis it was deemed unsafe to take the remaining two necessary to make the number five employed in the preceding samples. Pulp dry.

SAMPLE IV.

Excelsior Sugar Beet. Four beets taken. Weights 2lb. 2 3/4 oz.; 3lb. 8 1/2 oz.; 2lb. 6 3/4 oz.; 3lb. 1 1/4 oz. These were good samples but it
was impossible to select one more at this late date that was at all fairly representative. Pulp wet.

**SAMPLE V.**

Improved Imperial Sugar Beet. Five beets taken. Weights 4 lb. 6½ oz.; 4 lb. 2½ oz.; 3 lb. 11 oz.; 2 lb. 10½ oz.; 1 lb. 13½ oz. All these were sprouted. Pulp wet.

**SAMPLE VI.**

Villmorin's Improved White Sugar Beet. Four beets taken. Weights 1 lb. 13½ oz.; 1 lb. 12½ oz.; 1 lb. 15¾ oz.; 2 lb. 9 oz. All slightly sprouted. Remaining specimens not at all representative. Pulp dry.

**SAMPLE VII.**

Lane's Improved Sugar Beet. Four beets taken. Weights 2 lb. 8½ oz.; 3 lb. 11½ oz.; 3 lb. 5½ oz.; 2 lb. 12½ oz. Samples slightly sprouted and all had lost some small roots. Other specimens badly damaged by loss of roots and by sprouting. Pulp moderately wet.

For the purposes required it was deemed sufficient to make two determinations upon each sample, the per cent of sugar and the per cent of marc. These determinations and the yield per acre are shown in the following table:

<table>
<thead>
<tr>
<th>NAME OF VARIETY</th>
<th>PER CENT SUGAR</th>
<th>PER CENT MARC</th>
<th>YIELD PER ACRE IN POUNDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Villmorin's W. S. B.</td>
<td>7.6</td>
<td>3.1</td>
<td>30,615</td>
</tr>
<tr>
<td>White S. B.</td>
<td>7.3</td>
<td>2.14</td>
<td>27,500</td>
</tr>
<tr>
<td>Lane's Imperial S. B.</td>
<td>10.5</td>
<td>3.43</td>
<td>12,625</td>
</tr>
<tr>
<td>Excelsior S. B.</td>
<td>7.4</td>
<td>2.03</td>
<td>15,875</td>
</tr>
<tr>
<td>Improved Imperial W. S. B.</td>
<td>7.6</td>
<td>2.69</td>
<td>22,750</td>
</tr>
<tr>
<td>Villmorin's Improved W. S. B.</td>
<td>10.2</td>
<td>3.21</td>
<td>21,250</td>
</tr>
<tr>
<td>Lane's Improved S. B.</td>
<td>6.5</td>
<td>2.43</td>
<td>23,750</td>
</tr>
</tbody>
</table>

In conclusion it might be well to state that owing to the wide spread and ever increasing interest in sugar bearing plants and their adaptability to different climatic conditions, the foregoing experiments with sugar beets were undertaken. Of course the primary object was to ascertain if sugar beets were adapted to our soil and climate. The fact that all root crops grow to perfection and afford enormous yields in this Territory was an encouragement to undertake the work. And perhaps it may be permissible to state that if we may take into consideration the reported yield in per cent. of sugar in countries where the sugar beet industry is carried on successfully, the experiments have been very encouraging. Especially is this true when the extremely unfavorable conditions under which the experiments were conducted
are taken into consideration. In the first place the Station work at
the time of planting had barely been commenced and the beets were
sown at least three weeks too late; again the ground on which the beets
were sown, and this was the only ground available at the time, had
been cropped with wheat for four years and with oats three years
without any return having been made to the soil; and then the seed
did not germinate well owing to the fact that the spring rains were
nearly over before the seeds were sown. The yield per acre would
have been much greater had the seed germinated properly. Moreover
the samples at the time of analysis were in bad condition.

The experiments will be repeated this season under more favor­
able conditions so far as culture is concerned and it is to be hoped that
farmers in different parts of the territory will undertake to raise small
quantities (say one-fourth to one-half acre) of those varieties of beets
that give the greatest yields of sugar. Of course such work can not
be undertaken with the expectation of making a directly profitable in­
vestment in sugar, since that can only be accomplished after large and
expensive sugar factories have been established. [But if it can be
demonstrated that sugar beets may be grown successfully in different
sections of this Territory the factories will be quick and sure to follow.

It has been and is the aim of this Station to aid the farmer in
adding to the number of crops that may be grown at a profit; and in
furtherance of this line of policy the Station hereby offers to analyze
free of charge any samples of sugar beets that may be grown in the
Territory. It is desirable that the data of the treatment of crops and
soil shall accompany each sample, for thus may we determine just what
treatment yields the best returns. Moreover it must be remembered
that the beets so grown are valuable for feeding purposes. This fact
makes it easier for the Station to ask for the co-operation of farmers
in this line of investigation, since under no possible circumstances
would they incur any risk of loss greater than in raising any other root
crops. All correspondence in reference to methods of cultivation
should be addressed to Professor Foster, while correspondence in
reference to analysis should be addressed to the Chemist of the Station.