Temperature readings showed no fluctuations within the pile. The temperatures remained uniformly low, around 3° to 7°C.

Isolations from the interior of the rotten tap roots yielded colonies of Rhizopus nigricans. This organism is not pathogenic to beets at ordinary temperatures.

Calculations indicate that the air, by natural circulation under the conditions of this experiment, moved through the pile at the rate of 16 feet a minute.

Since the results obtained in these experiments indicate a sugar loss lower than was expected, and since natural circulation is apparently faster than was suspected, the feasibility of blowing low temperature night air into the pile to cool it merits further investigation.

In order to determine the keeping qualities of beets under more extreme conditions of size, dirtiness, injury and weather, more investigation under controlled conditions will be necessary.

Summary

At 18.5°C. (45°F.) the standard, bruised, dirty and small beets showed no significant difference in respiration or loss in sugar content. At temperatures below 24oC. the standard beets showed a close relationship between temperature and respiration rate or sugar loss. At temperatures of 24° C. and higher, the rate of respiration increased more rapidly in proportion to the temperature rise than at the lower temperatures. This behavior was in close agreement with the condition of the beets at the various temperatures, since observations showed that the lower temperatures retarded or inhibited mold and rot, while rapid decomposition took place at the higher temperatures.

Under the conditions which obtained in this experiment, it may be concluded that wounding, or the presence of reasonable quantities of foreign material mixed with sugar beets, caused no important change in the rate of respiration or sugar loss.

RESULTS OF FIELD TRIALS OF BORON AND TREATED SEED IN THE GREAT LAKES COMPANY TERRITORY

M. W. Sergeant[1]

(a) Field Trials of Boron

General Notes

Beets are among the high boron containing plants, according to the French investigator, G. Bertrand.

When boron is known to be needed, about 20 pounds of borax per acre is a good general recommendation. Since all boron is not used by the first crop subsequent applications of 5 to 8 pounds per acre will suffice when beets are

1/ Great Lakes Sugar Company

again raised on the same ground. Too liberal use is not recommended as high concentrations remaining in the soil are dangerous to the best growth of later crops.

The results from the limited work done this year are inconclusive and the differences insignificant in most cases.

A difference in results was apparent between factory districts. This may be due to different soil conditions but seems more likely to reflect the way in which the work was conducted.

The Boron vs. Check Plot tabulation and the Varying Amounts tabulation marked "Ohio #2" seem most likely to be reliable because they bring out fairly uniform trends rather than a reversal as in the tabulation marked "Ohio #1."

Boron Plots vs. Check Plots*

Results from 12 Fields in 4 Districts

Avg. % Stand		Avg. T. Yield		Avg. % Sugar		Avg. % Purity		Avg. lbs. Sugar/A.	
Boron	Check	Boron	Check	Boron	Check	Boron	Check	Boron	Check
70.9	73.2	12.82	13.36	16.5	16.3	83.5	84.4	3539	3653
	+3.3		+0.54	+0.2			+0.9		+114

*(10, 15 and 20-pound Boron applications compared with checks)

Boron in Varying Amounts

(Mixed with fertilizer - drilled in with the seed)

Ohio #1	Boron Lbs./A	Avg. % Stand	Avg. T. Yield	Avg. % Sugar	Avg. % Purity	Avg. lbs. Sugar/A.
2 plots	0	76.2	14.02	16.4	86.5	3977
3 plots	10	73.0	15.21	18.2	85.2	4716
2 plots	20	77.5	15.30	16.8	86.5	4448
1 plot	25	70.0	12.70	14.4	79.7	2915
2 plots	60	57.5	13.61	18.2	84.5	4186

Ohio #2	Boron Lbs./A	Avg. % Stand	Avg. T. Yield	Avg. % Sugar	Avg. % Purity	Avg. lbs. Sugar/A.
1 plot	0	82	14.87	16.85	83.8	3245
1 plot	10½	73	13.49	17.2	83.0	3851
1 plot	21	67	12.0	16.1	83.4	3222
1 plot	63	39	7.69	15.7	79.1	1908

Note: All Boron used in the form of Borax.

The tabulation indicate that small quantities of Boron may improve yields but that the stand is reduced proportionately, as increasing amounts are used, to the point where yields are seriously reduced also.

The reduced stand may be due to use of Boron in the row with the seed. In another demonstration plot where the Boron and fertilizer were broadcast the stand increased directly with the increased Boron up to 60 pounds but the yields diminished above 25 pounds of Boron.

This year's results suggest caution in the use of this element both as to quantity and as to method of application.

(b) Field Trials of Treated Seed

One of our districts tried treated seed rather extensively in 1938 and felt that some benefit was received. This year they used both ready-treated European seed and seed treated with mercury dusts prior to planting. This was done on a whole field basis, however, and the only information we hope to get is the comparative results of all treated and untreated seed fields.

(16 Fields in 3 Districts)

Avg. % Stand		Avg. T. Yield		Avg. % Sugar		Avg. % Purity		Avg. lbs. Sugar/A.	
Tr.	Check	Tr.	Check	Tr.	Check	Tr.	Check	Tr.	Check
66.8	69.0	12.88	12.61	15.9	16.3	83.9	85.7	3436	3520
	+2.2		-0.27		+0.4		+1.8		+84

(German and Danish treated seed - 1 variety each)

The results tabulated above show insignificant differences between treated and untreated seed and do not indicate that any expense or trouble is warranted in treating seed to prevent blackroot or to increase yields in our area unless new and more efficient treatments are available.

(9 fields in 1 District)

First seedings lost with blackroot (untreated seed).
Reseeded June 23 to July 1, inc. with treated seed.
Seed treated with Cuprocide 54 spray.

Acres reseeded	81.51
Acres lost a second time	28.39
Acres saved from second seeding	53.12
Reseeded fields wholly lost	0
Reseeded fields partially lost	4
Reseeded fields wholly saved	5

Average of Saved acreage	Yield	Sugar content (by refractometer test)
	6.92 T.	16.3%

The yield and sugar content of these fields seem fairly satisfactory in view of the very late planting date.

Warmer weather and better growing conditions may account for the fact that no field was entirely lost a second time. (94% of one field was lost, however).

The question arises as to whether <u>better</u> yield and sugar content might not have been produced by saving the best 53.12 acres of the original stands and carefully working them, at the proper time. Unfortunately no data or proof can be given to support or refute this idea.

Since no check plots were kept in these fields the results are subject to your own interpretation.

PHOSPHOROUS DEFICIENCY BLIGHT OF SUGAR BEETS often called BLACK HEART BLIGHT

R. A. Jones1/

In 1926 A. R. Williams, fieldman in the Wheatland Wyoming Beet District of the Great Western Sugar Company, had in his territory a field of beets that was dying from some unknown cause. The field had been in corn the previous year, and for sixteen years before that had been in alfalfa. In August a good portion of the beets had died except along certain irregular strips. On these strips the beets were normal and it developed that they were exactly on positions where refuse sweet clover had been hauled and burned before the field was plowed for beets.

The facts regarding the case were examined by several observers among whom was Asa C. Maxson, Superintendent of the Great Western Experimental Farm. His conclusions were that it was a nutritional problem, and the missing element had been supplied from the ash of the burned sweet clover. There seemed to be two possibilities, it was either potash or phosphorous or both that had made the difference. The next year tests were made with these two elements and it was definitely proven to be a phosphorous deficiency. Treblesuperphosphate alone corrected the difficulty, which ever since has been known as Black Heart Blight.

A study of the reoccurrence of the so-called Black Heart Blight has been conducted in Montana, Wyoming, Nebraska, and Colorado the past year. The first noticeable symptom in the leaves of beets suffering from a lack of phosphorous is a slight burning around the edge, which in later stages may cause the death of the entire leaf. As the damage progresses the leaf tissue dies between the veins.

In fields where the fertility is high in all respect except for phosphorous, and the leaves are large there often appears the copper colored leaf. This type of leaf is not positively identified with phosphorous deficiency, but always does occur along with the positive symptoms. It may be called the "paralytic" leaf. It is small with edges rolled inward from the sides and also from the top. The leaf thus resembles a paralytic hand with the fingers drawn

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1/Anaconda Sales Co.