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The Sugar Beet

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South Dakota Agricultural College

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SOUTH DAKOTA
AGRICULTURAL COLLEGE
AND
EXPERIMENT STATION

BROOKINGS, S. D.

BULLETIN NO. 34.

APRIL 1893.

Chemistry.

THE SUGAR BEET.

DUTCHER, BREED & STORGAARD, BROOKINGS.

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The Bulletins of this Station will be sent free to all citizens of the State who will apply for them.

All letters and other mail matter for the Station should be addressed to the Experiment Station.

THE SUGAR BEET.

JAS. H. SHEPARD, Chemist.

WORK AT THE EXPERIMENT STATION.

SUGAR BEETS FROM HOME GROWN SEED.—Of the six varieties of mother beets planted from seed, three varieties were lost after the seed had fully matured. These beets were planted on the station farm and were destroyed by sheep. The remaining three varieties were planted in my own private garden and the seed obtained were sown last spring. The names of these varieties are Dieppe's Klein Wanzlebener, Pajaro Valley, and Simon Legrand's White Improved.

As already reported in Bulletin No. 27 of this Station the three mother beets selected of the variety Klein Wanzlebener gave respectively 15.70, 17.40, and 15.61 per cent. sugar in the beet after storing in the farm barn cellar until May 11-14.

The two Pajaro Valley mother beets selected gave 15.31 and 15.51 per cent. sugar in the beet under like conditions. The two Simon Legrand mother beets gave 15.11 and 15.61 per cent sugar in the beet under the same conditions.

These percentages are here repeated in order that a comparison between the sugar content of the mother beets and that of their offspring can be more conveniently made.

Owing to the cold and rainy weather during the spring these beets did not germinate until the last of May although the seed was sown April 29. The ground selected for the trial was chosen from the Horticultural garden and was a dark sandy loam situated rather high and sloping towards the east. The rows were 22 inches apart and ran north and south. Before the beets came up a crust was formed over the ground by the hot sun and this crust was broken by means of a garden rake. Nearly a full stand of beets was obtained. The few breaks

which did occur in the rows were caused by the extraordinarily heavy rain which fell in the fore part of May. Streams of water ran across the rows and washed some of the seed out of ground and carried it away notwithstanding the fact that the seed was planted at least two inches deep by means of a garden hand drill.

The seed bed was made by plowing the ground twelve inches deep early in the spring after which it was firmed by repeated dragging. No subsoil plow was used in order that the conditions might be as near like those under which the mother beets were raised. No fertilizer was employed nor had any been used on the plat for the past two years. Corn was the last crop grown.

The beets were first cultivated with a hand cultivator after which they were hoed and thinned by hand to 5 inches in the row. They were subsequently cultivated and hoed twice. The beets of all three varieties were well formed and free from disease and the appended analysis show that for sugar making purposes they were first class in every respect. In column 1 is given the analysis of the Klein Wanzlebener variety. In column 2 that of the Pajaro Valley and in 3 and 4 that of the Simon Legrand. All these analyses were made on Aug. 25, excepting the last which was made Aug. 26. In each analysis six beets were used.

	(1)	(2)	(3)	(4)
Station No.....	389	388	390	420
Weight of beets in grams.....	329	282	253	296
Sugar in beet, per cent.....	18.70	15.50	18.20	18.10
Sugar in juice, per cent.....	19.66	16.23	19.27	19.11
Degree Brix.....	20.00	19.00	21.30	20.10
Purity coefficient.....	98.30	85.42	90.46	95.07
Ash in juice, per cent.....	.76	.70	.43	.59
Marc, per cent.....	4.91	4.48	5.54	5.28
Tons beets per acre.....	18	19.5	18	.....

From an inspection of the foregoing analyses and from a comparison of the sugar content of the mother beets with that of their progeny it will appear that after making due allowance for the unavoidable loss in storing the mother beets, the beets grown from home seed have retained their high standard; and that in case the sugar industry should become established in our midst it would be unnecessary for us to rely upon foreign

importations for our supply of seed. Enough of each variety of these beets to raise seed for one half acre were carefully packed in dirt and stored in the green house cellar, but owing to the gross carelessness of an employee of the Station they were fed to stock and thus much valuable time has been lost.

IMPORTATION OF SEED.—In view of the fact that pedigreed and carefully grown seed is one of the first requisites of successful sugar beet growing, the Station Council voted to import two sacks of the best seed obtainable. Accordingly arrangements were made with Messrs. August Roelker & Sons, 136 & 138 W. 24th St., New York, whereby this Station secured direct from the grower, August Knoche, one sack each, weighing about 110 pounds per sack, of that celebrated grower's strain of the Klein Wanzlenener and Vilmorin types. The sacks were received at this Station with their leaden seals intact and inside of each sack was a tag placed there by the grower. In the Vilmorin sack the grower's tag was marked "No. 1. *Zucker- rieben Samen Knoche's Verbesserte Zuckerreichste Elite, eigene Zuchtug Aug. Knoche, Wallwitz B. Halle a. s.*" In the Klein Wanzleben sack the tag bore the same legend except the grower's name for the variety, "*Knoche's Verbasserte Klein Wanzlebener Elite.*" These varieties will be referred to hereafter simply as of the Vilmorin and Klein Wanzleben types deeming the foregoing explanation as to the origin of the seed sufficiently explicit.

The sugar beet seed thus obtained was distributed to farmers throughout the state. But in order to test this seed beside that grown at this Station a trial plat of each kind was sown immediately beside those previously described in the Horticultural garden and the same treatment was given to all. Consequently the analyses will complete the report.

In the following table are given the analyses of both varieties. Columns 1, 2, and 3 show separate analyses of the Klein Wanzleben variety made respectively on October 13, 18, and 25.

	(1)	(2)	(3)	(4)
Station No.....	382	383	387	386
Average weight of beets in grams.....	346	406	322	378
Sugar in beets, per cent.....	15.40	15.60	15.50	15.30
Sugar in juice, per cent.....	16.20	16.25	16.15	16.09
Degree Brix.....	17.20	17.70	19.40	21.00
Purity coefficient.....	94.20	91.80	83.25	76.66
Ash in juice, per cent.....	.86	.84	.88	.81
Marc.....	4.92	3.97	4.35	4.92
Tons per acre.....	23.5	.....	.....	19

From even a cursory inspection of the foregoing analyses it will appear that these varieties gave good results with some advantage in favor of the Klein Wanzlebener type.

DISTRIBUTION OF SEED.—In the preceding bulletin on sugar beets the announcement was made that seed would be sent to those farmers who applied for it and who would promise to follow directions for cultivation. But the number of applicants who could be furnished with seed would be limited to the first four hundred who applied. Something over four hundred applications were received and as promised four hundred samples of seed were distributed. With each sample sent out was enclosed the following circular of instructions:

BROOKINGS, S. D. March, 1892.

“DEAR SIR:—

Within you will find a sample of the best imported Sugar Beet seed, variety..... This seed is sent out by this Station for the purpose of ascertaining if our state is well adapted to the successful culture of beets sufficiently rich in sugar to warrant the establishing of sugar beet factories as a permanent industry among us.

Over, you will find explicit directions for Sugar Beet culture and you are earnestly urged to follow the directions exactly. All the points noticed are essential and none of them can be safely neglected.

Next fall directions for taking samples of beets for analysis will be sent you in due time. Please do not harvest the beets nor send samples until you receive notice from this Station.

At the time notice is sent a blank, calling for some important information, which you alone can give, will also be sent. Therefore, if you will kindly put down the exact date when the beets are sown and also note from month to month what the prevailing weather for each month during the growing season is, you will be able to fill out the blank correctly in a few minutes time.

Do not mix these seeds with any other variety.”

DIRECTIONS FOR BEET CULTURE.

1. “SELECTION OF SOIL.—Choose rather high sandy soil which has not been manured since the last crop was taken off. Also do not apply any fertilizers this year.

2. PREPARATION OF SEED BED.—Having selected the ground to be used, measure off a plat one rod wide and four rods long; or you may take a plat two rods square. This will give you one fortieth of an acre. Now plow the ground deep, at least twelve inches. Then by means of much dragging, or by means of a roller or plank, make a good, firm seed bed of finely pulverized earth.

3. SOWING THE SEED.—Now lay off on the prepared seed bed rows exactly 22 inches apart. There will be nine rows if the plat is one rod wide, or eighteen rows if it is two rods wide. sow the seed the last week in April or the first week in May, according to the weather. Do not fail to get the seed in this early. Plant the seed from one to two and one-half inches deep depending upon the dampness of the ground. The seed must be in damp earth. The seed may be sown by hand or a garden drill may be used. There is just enough seed in the accompanying package to sow the plat as prepared. Use all the seed on one plat, so the young plants may come up thickly. If the ground is dry at time of seeding it will be well to soak the seed twelve hours before planting, but they must not be allowed to sour or ferment, as this will spoil the seed.

4. THINNING AND CULTIVATION.—When the young plants have four to six leaves, go over the plat with a hoe, hoeing close to the rows. Now go over each row by hand, thinning out the beets so that the plants may stand from four to six inches apart. Also remove all the weeds. From this time on the beets may be cultivated by hoe or horse cultivator to keep free from weeds and to keep the soil mellow. The beets are not to be exactly hilled up, but it is best to work the soil towards the beets. The ground must not be allowed to crust over or to cake and crack.”

Arrangements were also made to have two acres of sugar beets raised, one on the Station farm and one on the farm of Hon. D. W. Diggs of Milbank. The object of this was to ascertain the actual cost of producing the beets under existing circumstances. But the floods which fell in the early part of May nearly ruined both plats. It seems that both plats were on gently sloping

ground and the water washed the seed away. In both cases the cost of production would more than exceed the value of the beets raised.

Owing to the fact that the heavy cold rains in May were followed by clear hot weather the sugar beet plats were soon crusted over to such an extent that it was difficult for the young plants to break through the soil. Under the circumstances it was deemed best to issue a Press Bulletin and give supplementary advice in regard to the treatment of the plats. The Bulletin follows:

SUGAR BEETS.

"It is now time that the various plats of sugar beets throughout the state were thinned and hoed and the ground put in the best possible condition for the growth of the young plants. The thinning may be expedited by hoeing first as close to the row as possible. Then it is absolutely necessary that each row should be gone over separately by hand. The beets are now all to be removed excepting enough to give one plant every four to six inches. In leaving the plants it should always be the aim to leave the thriftiest and most vigorous growers. Great care must be taken that two plants are not left growing side by side, as it often occurs that two plants will grow up together and appear as only one. If they are both left neither will reach perfection.

The late and cold rains during the season have been unfavorable to the beet crop, not only in this state but everywhere. From France, Germany and Russia the same backward condition is reported. The germination of the seed was much delayed by cold rains and in some places where the ground was slightly sloping some of the seed was washed out while other portions were buried too deep. But what was worst of all was the crust that formed over the ground. By digging through the crust the young plants would be found growing around and around in a spiral seeking to emerge into the air above. Any little crack that would afford egress was diligently sought for by the tiny plant struggling to free itself. This was a severe strain on the plant even though it finally did succeed in coming

through. Its vital forces were much awakened. But this same state of affairs is reported everywhere.

The stand in many cases will be irregular. But it does not make any difference about the necessity for thinning. All bunches in these irregular rows must be thinned just as carefully as in full rows.

A little good careful work now with the experimental plats will go far towards making up for the late spring. The ground must be kept mellow and this will go far toward removing the coldness of the soil. Neither must the weeds be allowed to choke out or even to shade the young plants. The beet delights in the sun shine, therefore the ground must be kept clean,

It is probable that the beets will be late in ripening this fall, but as soon as they begin to approach maturity analyses will be made and ample warning will be sent to all growers in the state. One bad mistake in the past year has been made in sending in immature samples. When the sugar beet has made its growth it still needs to stand in the warm sunny ground in order to finish the process of making sugar. There is not much sugar in the beet when it is growing. The sugar is made after growing has ceased. The last few days in the fall are worth more than a month at any other time.

Growers are, therefore, cautioned not to harvest their beets until they receive notice from this Station. Give the plats good care and we may still reach good results."

Notwithstanding the unfavorable out look early in the season the summer and fall proved favorable for the growth of the sugar beet and better results than could have been expected were obtained. The warm dry, bright weather which prevails during the fall months in this climate is most favorable to the ripening of the sugar beet. As a rule damaging frosts do not occur until about the middle of November. The lighter and earlier frosts scarcely seem to effect the tops of the sugar beets. One suggestion however might be useful in this connection and that is low growing varieties of beets that make their growth completely under ground will be found best adapted to this dry climate. Moreover the later hoeing and cultivations should be so carried on as to work the dirt toward the beets in order to

protect the crowns from the bright sun and from any of the earlier frosts. The sugar beets that were saved for seed at this Station were not harvested until the 10th of November. The beets had been ripe for nearly thirty days.

As soon as the beets reached maturity directions for sampling and shipping were sent as follows:

DIRECTIONS FOR TAKING SAMPLE OF SUGAR BEETS FOR ANALYSIS.

"Select an average row, one of the inside rows is best. Measure off exactly 23 feet and 9 inches on that row and harvest all the beets in the distance measured. If so long a piece cannot be found in one row it may be partly taken from two or more rows.

Cut off the tops of the beets and wash the beets. As soon as dry weigh them and divide the weight in pounds by 2. The result will be the tons per acre. This calculation is based on the supposition that you have planted the rows 22 inches apart as instructed. In case you have made the rows a different width you cannot get the tons per acre by dividing by 2. In such case, follow the foregoing directions, (and give the width of rows,) but leave the computation for us to make.

A pair of steelyards or a spring balance will answer for weighing the beets if no scales are handy.

Select five average sized beets, wrap each one in a paper and place them in a sack. Now fill out the blank on the other side of this sheet, place it in an envelope and place in the sack with the beets. Tie up the sack, attach the enclosed shipping tag and forward to us by express. We will pay the express charges.

N. B.—Do not send the largest beets you have raised as they are not fit for sugar making. Do not send the smallest as they are not ripe. Send *average* sized and perfect beets. The best beets for sugar making weigh from three quarters of a pound to a pound and a half. If any beets grew seed stalks do not send them for analysis."

About the usual per cent. of experimenters reported and returned samples. But one thing is noteworthy, and that is, very few who reported and did not return samples gave as a reason therefore a failure of the crop. Stock destroyed some plats, the

heavy rains washed out a very few, some were neglected and some growers were too busy to attend to sampling the beets and others forgot all about them.

The samples on an average were taken with greater care than in previous years, but some clinging to the delusive belief that the largest beets were the best, and in spite of the explicit instructions given, sent the largest beets raised, beets that evidently came from the ends of rows or from thin places in the row.

On the whole the results obtained are satisfactory. The season could not be called better than the average and after due deliberation the Station council voted to discontinue further work in the state and this action was approved by the Board of Trustees.

EXPERIMENTS THROUGHOUT THE STATE.

For the same reasons assigned in the last Sugar Beet Bulletin the state is divided into four regions:

THE BIG SIOUX VALLEY AND EASTERN REGION embraces all that portion of the state east of the eastern watershed of the James river.

THE JAMES RIVER VALLEY REGION is a well marked district most of which is situated over the artesian basin in South Dakota. This region has many advantages for sugar beet culture.

THE MISSOURI RIVER REGION extends from the western watershed of the James river to the Missouri river. The tier of countries west of the river are but sparsely inhabited toward the northern portion of the state.

THE BLACK HILLS REGION, as is well known, embraces the rich mining regions of western South Dakota. There are many fertile valleys and level plateaus throughout this region where farming is carried on; and it is from these places that the samples of this year have come.

THE BIG SIOUX VALLEY AND EASTERN REGION.

Ninety four samples of seed were distributed to this region.

The following notes have been gleaned from the reports sent in by experimenters.

MARSHALL COUNTY:—Six packages of seed were sent to this county and two samples of beets were returned. Mr. Linse reports that the soil was heavy and was manured a year before the beets were sown. Mr. Blackman used light sandy soil with no fertilizer. May and June were wet and cold. July was rainy, August was hot and dry, some local rains in September and October was dry until the 12 when it rained two days

ROBERTS COUNTY:—Three samples were sent to this county and none of them have been heard from.

DAY COUNTY:—Nineteen samples of seed were sent to this county and seven returned beets. May was wet and cold; June warmer with heavy showers; July plenty of rain; August warm and dry; September warm and dry; October dry and cool, hard frost the 20th. Mrs. Resseguie sowed the seed in black loam and the beets grew very large. Mr. Atkins sowed on clayey land with no fertilizer; a fine stand reported. Mr. Sanders sowed on prairie loam that had been fertilized in 1891 with stable manure; many beets grew large, one of the largest weighing 10 pounds. Mr. Heydlauff used black loam ten inches deep with yellow clay subsoil; manured the previous year. Mr. Johnson used black sandy loam. He divided his seed and sowed part on old ground and part on new. (456) Mr. Lewis sowed on black loam never fertilized and reports plenty of rain all the season. Mr. Reed used sandy black loam never fertilized. Beets came up thin and poor owing to cold weather.

GRANT COUNTY:—Twenty one samples of seed were sent out to this county and nine experimenters returned beets. May was cold and rainy, rainfall 8.8 in. beets washed out, June much rain, temperature ranging from 41 to 58 min. and 59 to 83 max. rainfall 3.3 inches. July total rain 3.80 tem. 48 to 68 min., 70 to 94 max. August total rain 6.66 in. tem. 40 to 64 min. 56 to 92 max. September first part rainy, lastly dry and warm. October dry and warm.

Mr. Ferry selected a black loam with little sand. The land became hard and lumpy owing to the rain. Mr. Diggs selected

a black loam on a sloping piece of ground. He had kindly consented to raise one acre for the purpose of determining the cost. But the beets washed out. He had some transplanted, but the cost of raising far exceeded the income of the beets.

Mr. Armstrong used new land only cropped once previously. Mr. Kelley planted on black loam with clay subsoil. Mr. Johnson used a piece of old garden land, sandy loam. Mr. Priest planted on black loam and had a good stand in spite of the fact that the ground became hard. Mr. Lloyd planted on new ground which had one crop of potatoes previously. Mr. Holloway used slightly rolling ground. Mr. Hicks planted on sandy loam and beets germinated well.

CODINGTON COUNTY:—Four samples of seed were sent to this county and only one man reported. Mr. Skogstad planted on high prairie and his beets did not germinate well owing to a heavy rain right after planting. He reports the weather substantially as from the preceding county except frost in the latter part of October.

DEUEL COUNTY:—Mr. Comport was the only applicant for seed from this county he planted on black loam with clay subsoil. The plat was part of a garden that had been manured with stable manure for the past eleven years. Although the garden was on rising ground it was submerged three times with heavy rain. Weather similar to preceding county. Sharp frosts Oct. 19, 20 and 21. He states that at least five per cent of beets grew prongy which he attributes to deteriorated seed.

The real cause was that his ground was not plowed deep enough and properly pulverized.

HAMLIN COUNTY:—Five samples of seed were distributed in this county and three samples of beets were returned. Mr. Jardine sowed the seed on upland with surface soil two feet deep. Beets came up uneven on account of cold wet weather. The weather report for this county was similar to that of last county. Mr. Walker planted on black loam manured the previous year. Mr. Payne used rolling upland which had been in oats the previous year.

BROOKINGS COUNTY: Ten samples of seed were sent to this county and eight experimenters returned beets for analysis. The Station Farm plat covered one acre. It was plowed eight inches deep and subsoiled four or five inches. The ground was well prepared and was on a slightly sloping piece of land facing the north. Owing to the cold wet weather the seed was not sown until the 16th, of May, on the 17 a heavy rain exceeding two inches fell within the space of about one hour, The water rushed down the slope and carried the seed of some rows away and cut the piece into deep gullies. The intention was to raise this acre of beets just as would obtain in actual practice. The heavy rain spoiled the experiment.

The weather for this county was similar to that of the last mentioned. Mr. Devan used sandy loam without fertilizers. Cattle ate the tops of the beets in September and damaged the plat otherwise. Mr. Hendrikson used summer fallow of the previous year, plowing again in the spring and the piece was never fertilized. Mr. Pike planted on sandy loam sloping to the south. The directions were carefully followed. Mr. Quinlan sowed on a rich loam but his beets stood so far apart that the results were poor. Mr. Sundt planted on sandy soil manured the year before and plowed in the fall. The directions were followed and the results were good. Mr. Honan used a sandy, gravelly loam manured the previous year with stable manure. Mr. Pool used black loam plowed very deep and not manured for two years.

LAKE COUNTY:—Eleven samples of seed were sent to this county and four experimenters returned beets for analysis. The weather reported is for May first half dry, second half frequent showers. June frequent showers. July quite dry, a few showers. August hot and dry and September the same. October dry.

Mr. Rankin used black loamy land between two rows of trees that had been mulched five years ago. The beets were not shaded. Mr. Huyzer used black loam very sandy, heavily manured in 88 and 90. The beets were damaged about ten per cent by cut worms. Dr. Jones used black loam with a little

sand in it. Used stable manure the year before and planted to potatoes. The beets were rough being affected with a species of scab. Mr. Whitmore used horse manure on the land the previous year.

MOODY COUNTY:—Two samples of seed were sent to this county and one sample of beets was returned. Mr. Haskins sowed on upland fertilized the previous year with fresh barn yard manure and planted to corn. He reports the weather about the same as in the preceding county except more rain in May.

MINNEHAHA COUNTY:—Six samples of seed were sent to this county and two samples of beets were returned. Weather reported similar to last excepting many frosts in October. Mr. Grant planted on common prairie soil and the first sowing was partly washed out. A second sowing was made on the 22. Mr. Oleson planted on sandy loam and his stand was irregular in the rows, the single beets often standing thirty inches apart.

MCCOOK COUNTY:—Mr. Patheol was the only applicant for seed from this county whose application came in time. He planted on upland and thinks the crop is easily raised in his county.

LINCOLN COUNTY:—Four packages of seed were sent to this county and two samples of beets were returned. The weather reports are the same as in last county no mention being made of frosts in October. Mr. Myhre sowed on sandy loam and reports that most of his beets weigh three pounds each. Mr. Olin also sowed on sandy loam and reports that his beets grew very large many weighing six pounds.

The following tables complete the reports for this whole region. Under the heading, "variety" the letters K and V are used to denote respectively the Kleinwanzlebener and Vilmorin types as previously explained. Under the heading "pounds sugar per acre" is given the total pounds sucrose raised. It does not follow that that many pounds would be extracted at the factory. Much depends upon the processes used and upon how skillfully the operations are conducted:

Station No.	Variety.	Grower.	Planted.	Harvested.	Rows— inches.	Beets in Row — inches.	Tons per Acre.	Number Beets Analyzed.	Av. Weight— grams.	Per c't. Sugar in Beets.	Per c't. Sugar in Juice.	Degrees Brix.	Purity Coefficient.	Per cent. Ash in Juice.	Per cent. Marc in Beets.	Pounds Sugar per Acre.
MARSHALL COUNTY—																
539	K	L. E. Blackman.....	May 1	Nov 1	22	7	10	5	320	17.57	18.50	22.60	81.42	....	5.00	3514
535	K	H. R. Linse.....	Apr 28	O't 28	20	4	10	5	470	14.60	15.40	21.00	70.00	....	5.00	2920
DAY COUNTY—																
437	K	Mrs. S. Resseguie.....	May 27	O't 21	36	8	....	5	453	10.70	11.17	16.50	67.70	1.22	4.22	....
445	V	H. A. Atkins.....	May 16	O't 28	22	5	27	5	510	13.25	13.84	18.00	76.89	1.07	4.31	7155
449	K	N. Sanders.....	"	O't 25	22	6	45	4	830	13.20	13.71	18.10	75.75	1.38	3.74	11880
452	K	H. J. Heydlauff.....	May 12	O't 28	22	5	20	5	582	13.90	14.57	19.10	76.28	1.14	4.60	5560
455	K	T. E. Johnson.....	May 10	O't 29	20	5	14.3	3	544	15.00	15.72	18.60	84.52	1.12	4.55	4292
456	K	".....	"	"	20	5	14.3	3	390	14.65	15.38	18.40	83.59	1.30	4.79	....
494	V	L. W. Lewis.....	.....	O't 26	22	....	....	4	479	13.10	13.73	17.20	79.83	1.01	4.62	....
528	K	S. J. Reed.....	May 9	O't 28	24	....	17	5	629	11.50	12.00	15.80	76.00	.85	4.20	3910
GRANT COUNTY—																
399	K	W. H. Ferry.....	May 24	O't 21	20	6	18	5	404	16.50	17.35	20.50	84.64	.98	4.92	5940
401	K	D. W. Diggs.....	May 2	O't 22	22	4	28	4	751	15.20	15.89	18.50	85.89	1.11	4.37	8512
434	K	W. F. Armstrong.....	May 12	O't 20	22	....	....	4	735	15.20	15.87	17.80	89.16	1.01	4.24	....
459	V	Edgar Kelly.....	.....	.....	22	....	....	4	713	10.80	11.23	15.60	71.99	1.52	3.87	....
465	V	Nels Johnson.....	May 6	O't 28	22	18	12.5	4	914	15.60	16.29	17.40	93.62	1.20	4.23	3900
478	K	J. V. Priest.....	June 3	O't 24	22	7	40	4	713	10.30	10.68	14.90	71.68	1.59	3.55	8240
517	V	F. P. Lloyd.....	May 15	Nov 3	44	12	....	4	1125	14.30	14.90	17.00	87.60	.72	3.97	....
526	K	Wm. Halloway.....	May 16	Nov 5	22	6	32	4	610	14.00	14.60	18.20	80.20	.98	4.28	8960
540	V	Jno. Hicks.....	May 4	N'v 10	22	6	30	5	520	17.20	18.10	19.20	94.80	....	5.00	10320
CODINGTON COUNTY—																
443	K	N. A. Skogstad.....	May 12	O't 25	22	6	15	5	574	11.90	12.42	16.20	76.66	1.23	4.19	3578
DEUEL COUNTY—																
397	K	Thos. Comport.....	May 25	O't 21	22	10	10.5	4	724	14.60	15.35	19.00	80.79	1.19	4.89	3066

HAMLIN COUNTY—																
496	K	John Jardine	May 10	O't 26	22	6	32	4	703	12.25	12.74	16.00	79.65	.98	3.85	7840
512	V	B. W. Walker	Apr 30	" 24	22	8	12	5	456	16.50	17.40	20.00	87.00	.82	5.40	4000
527	K	R. T. Payne	June 8	Nov 2	48	8	17	5	386	11.80	12.30	15.80	78.00	1.01	4.23	4010
BROOKINGS COUNTY—																
384	V	Station Farm	May 16	O't 19	22	5	19	5	374	13.00	13.58	16.53	82.15	.86	4.30	4940
384	V	" "	" 16	" 25	22	5	19	6	175	14.50	15.41	22.00	70.05	.60	5.80	4940
384	V	" "	" 16	" 27	22	5	19	6	309	14.70	15.51	17.40	89.14	1.05	5.22	4940
391	K	R. P. Devan	Apr 28	" 20	22	6	38	5	443	14.50	15.13	16.00	94.56	1.03	4.18	11020
398	V	H. Hendrickson	" 26	" 24	22	6	20	3	490	14.90	15.61	18.60	83.92	.90	4.54	5960
406	V	J. S. Pike	" 30	" 24	22	5	32	5	628	12.30	12.85	17.00	75.50	1.25	4.29	7872
408	K	M. Quinlan	May 18	" 22	44	12	15	3	933	10.20	10.63	14.50	73.31	1.38	4.04	3060
448	K	O. J. Sundt	" 7	" 28	22	6	32	4	630	13.20	13.76	18.80	73.19	1.52	4.10	8448
484	V	M. Honan	" 16	" 29	22	4	40	4	638	14.50	15.15	19.00	79.74	.95	4.31	11600
485	V	Z. Pool	June 1	" 20	18	8	.....	3	1080	9.40	9.74	14.40	67.64	1.34	3.49	.....
LAKE COUNTY—																
415	K	J. R. Jones	May 15	" 24	18	4	46	5	536	13.20	13.80	17.30	80.00	1.13	4.33	12092
463	K	A. L. Rankin	" 2	" 28	22	5	20	5	542	13.70	14.28	18.00	79.33	1.53	4.06	5549
492	V	J. S. Hyzer	" 18	" 26	46	8	15	8	662	14.55	15.19	19.30	78.70	1.20	4.19	4365
533	V	Wm. Whitmore	" 20	" 22	30	4	22	5	631	14.65	15.50	18.90	82.00	1.08	5.36	6446
MOODY COUNTY—																
440	V	E. S. Haskins	Apr 28	" 18	28	.....	.....	4	891	13.35	14.00	18.20	76.92	1.13	4.64	.....
MINNEHAHA COUNTY—																
431	K	G. A. Grant	May 17	" 22	24	6	25	4	631	15.50	16.27	19.00	85.63	1.22	4.77	7750
504	V	Olaf Olson	" 15	" 19	22	.....	19	3	1099	9.50	9.90	13.00	76.00	1.59	3.62	3800
MCCOOK COUNTY—																
461	K	A. C. Patheal	" 1	" 29	22	5	20	5	575	13.00	13.54	16.80	81.19	1.09	4.00	5200
LINCOLN COUNTY—																
470	K	Anthony Myhre .....	.....	Nov 4	.....	10	.....	5	646	16.50	17.32	19.50	88.82	.93	4.72	.....
479	V	Jas. Olin	May 20	O't 22	18	5	54	3	827	15.50	16.13	18.20	88.90	.98	4.24	16740

THE JAMES RIVER VALLEY REGION.

BROWN COUNTY:—Thirty nine samples of seed were distributed in this county and twelve samples of beets were returned. The weather is reported, May cold and wet; June, first part cold with heavy rains, balance favorable; July, very dry and hot; August, warm with plenty of showers; September, fairly warm and dry; October, first part very warm with frosts in latter part.

Mr. Fulker planted on black loam with some clay in soil. Mr. Narregang planted on black loam and he sends in the best sample from this country. Mr. Hansen planted on high sandy loam. The beets were not properly thinned out. A heavy wind storm in June drifted sand over many of the young plants which received no farther attention. Mr. Webber planted on black loam that was too low for the wet weather. Mr. Matteson planted on black loam with clay subsoil plowed ten inches deep. Mr. Vetter planted on black loam and the wet weather interfered with the cultivation of the beets. Mr. Miller planted on creek bottom. Mr. Coburn planted on light sandy soil fertilized with stable manure and plowed under May 10. Mr. Edson planted on black prairie loam a little sandy in character. The cold wet weather interfered with germination. Mr. Crockard used sandy loam with no fertilizers. Mr. Moody planted in black loam which had been used for a garden four or five years.

In August the long legged potato bug destroyed the tops of the beets. New tops were immediately thrown out but this so delayed the ripening of the beets that the per cent of sugar was low at the time of harvesting. Mr. Svarstad used no fertilizers.

MCPHERSON COUNTY:—Only two applications for seed were received from this county and one sample of beets was returned. Mr. Reid planted on sandy loam and although his beets were not large they were exceptionally fine for sugar making.

EDMUNDS COUNTY:—Eighteen packages of seed were sent to this county and five samples of beets were returned.

The weather reports are the same as from Brown County, frosts occurring after the 18 of October. Col. Brown planted on black sandy loam so level that at times the beets were covered

with water. Mr. Dickinson planted on sandy loam and used no fertilizer. Mr. Bergman planted on black loam. Mr. Bakkegard planted in good deep soil and does not understand why the beets did not grow longer and larger. He had a very fine lot of beets for sugar making and the beets grew just as they should have grown. Mr. Hilton planted on black loam between gravel knolls and had a fine even stand all over the plat.

FAULK COUNTY:—Eight packages of seeds were sent to this county and three samples of beets were returned. The weather reports are similar to the foregoing with the exception that hail is reported for July 20.

Dr. Wentworth planted both varieties of beets sent to him on dark sandy loam and used no fertilizer. Mr. Thompson planted on black sandy loam that was manured four years ago. On the 20 of July hail cut off all the tops of the beets but new ones immediately grew and from the final results it will be seen that the sugar beet is a hardy plant.

SPINK COUNTY:—Eighteen samples of seeds were sent to this county and nine samples of beets were returned. The weather reports are the same as in Brown county.

Mr. Else planted on creek bottom sandy land and used no fertilizer. Mr. Sander planted on black loam and the beets grew rather small. Mr. Perkins planted on sandy loam which had the wash of the barn yard. On the tenth of June a heavy rain fell accompanied with hail which destroyed many of the little plants.

Mr. Thomas planted on sandy loam and used no fertilizer. Mr. Brunn planted on black loam beside mangels and his beets grew too large owing to the great width of the rows. Many beets weighed from 8 to 9 $\frac{3}{4}$ pounds each. Those sent were under medium size. Mr. Bingham used black prairie soil with no fertilizer. He planted too far apart and in the rows the beets stood from six to thirty inches apart.

Mr. Carrier planted on a plot of ground that was just on the brow of a run and the soil was considered to be of a poor quality as it washed into the run. The beets came up finely but as now storm three weeks after planting killed about three fourths of the young plants. These were replaced by transplanting when the crop was thinned thus securing almost a perfect stand. The subsoil was gravelly and the beets grew long and perfect, some being two feet in length. Mr. Wilson sowed both varieties on light prairie soil and the stand was rather uneven. He

thinks the Vilmorin strain would yield six times as much per acre as the other variety.

CLARK COUNTY:—Sixteen samples of seed were sent to this county and six packages of beets were returned. The weather report is about the same as for the other counties of this region.

Mr. Westover planted on black loam that was not plowed deep enough nor was it sufficiently pulverized. The ground became packed very hard. Mr. Waterman planted on black prairie loam. He asks why the seed is sown so thickly and then more than three fourths of the plants afterwards pulled up. The reason for this is, it is absolutely necessary to have a full stand of beets in order to produce the best beets for sugar making. If the beets are too far apart they grow too gross and they take up so much mineral matter that a large proportion of the sugar in them will not crystalize out in the process of manufacture and the non sugars also accumulate and tend toward the same result. Sowing the seed thickly provides against accident and insures enough plants to make a full stand. Mr. Peterson used rich black soil sloping toward the south. Mrs. Schulz used high sandy soil and the poor results given in the analysis are unaccountable unless the beets grew new leaves late. Mr. Howey planted on gravelly loam which was plowed too shallow. Mr. Weston planted on heavy clay loam which was sloping. The heavy rains washed the seed down into the bordering ditch and the stand was too thin in many places. In these places the beets grew to an enormous size.

HAND COUNTY:—Six packages of seed and two samples of beets make the report for this county. The weather is reported as before noticed. Mr. Pash planted on sandy loam and used no fertilizer. Mr. Jones used upland that was loose and mellow.

BEADLE COUNTY:—Nine packages of seed were sent to this county and four samples of beets were received. The weather report is like that of the preceding county.

Mr. Fuller planted on sandy loam that was fertilized last year. Beets made second growth in September. Mr. Keator planted on black loam and his beets grew large and scabby. Beets made new tops in October which accounts for low per cent of sugar. Mr. Campbell planted on black loam not fertilized and had a fine stand of beets. Mr. Spragne planted on dark sandy loam. Beets made but little growth in July. Mr. Howell sent his beets to the express office but the agent neglected to send them and let them freeze.

KINGSBURY COUNTY:—Twenty one samples of seed were distributed in this county and only two of the experimenters re-

ported. Weather report same as in preceding county. Mr. Gleason planted on black loam manured in 1889 with stable manure. Mr. Masters reports dry weather in his section and thinks there would have been better results if more rain had fallen.

JERAULD COUNTY:—But three samples of seed were asked for from Jerauld and one sample of beets was sent in for analysis. Mrs. Atwood planted on black sandy loam and reports that the beets were still growing when harvested.

SANBORN COUNTY:—One sample of beets from two packages of seeds is the report for this county. Mr. Trinen planted on black sandy loam. His beets were too far apart.

MINER COUNTY:—Seven packages of seed and three samples of beets for this county is this year's record. The weather reports differ but little from the average for this section. Hard frosts in October are noticed. Mr. Bohlman planted on old land, black loam, and transplanted to fill out vacancies where seed did not germinate. Mr. Holmes used sandy loam with much sand. Mr. Ogden planted on sandy loam and although water stood on the plat until in June a fine stand was secured.

AURORA COUNTY:—Five samples of beets were returned from this county. The weather report is about the same as for the other counties. A heavy rain is reported on the 12 of October.

Mr. Swatman planted on black loam. Mr. Townsend planted two varieties on black loam. Owing to the wet spring the beets were sown late. A good opportunity is here seen to judge of the comparative merits of the two strains of beets. The two analyses nearly duplicate each other with a slight advantage for the Kleinwanzlebener type. Mr. Oppel planted on sandy loam but his ground got hard and the beets did not thrive. Mr. Burnham used black loam but it was so wet that the planting was late. Cut worms destroyed many of the young plants at first and on the 22 of June hail ruined many more. About half a stand was secured.

HANSON COUNTY:—Four packages of seed were sent to this county but none of them have been heard from.

DAVISON COUNTY:—Of the four applicants who received seed in this county Mr. Angell is the only one who returned beets for analysis. He planted on black sandy loam, but the seed was slow germinating, taking in some cases till after the third hoeing before they all came through. He firmed the ground on the seed after drilling it in, by laying a board on the row and then stamping on the board.

The following table completes the reports from this section:

Station No.	Variety.	Grower.	Planted.	Harvested.	Rows— inches.	Beets in Row —inches.	Tons per Acre.	Number Beets Analyzed.	Av. Weight— grams.	Per c't. Sugar in Beets.	Per c't. Sugar in Juice.	Degrees Brix.	Purity Coefficient.	Per cent. Ash in Juice.	Per cent. Marc in Beets.	Pounds Sugar per Acre.
BROWN COUNTY—																
395	V	N. Fulker.....	June 5	O't 14	18	.....	6	325	15.20	16.05	21.40	75.00	1.52	5.28	.....	.....
403	V	S. W. Narregang.....	May 1	O't 15	12	3 39	8	250	18.30	19.28	21.00	91.81	.91	5.08	.....	14274
410	K	O. P. Hansen.....	May 13	O't 21	.....	.....	4	829	12.50	13.03	16.10	90.00	1.17	4.17	.....	.....
412	K	Chas. V. Webber.....	May 9	Sep 22	22	8 24	3	812	11.80	12.35	16.50	74.85	1.50	4.43	.....	5782
417	V	O. C. Matteson.....	May 22	O't 25	20	6 16 $\frac{1}{2}$	5	789	13.00	13.57	16.50	82.24	1.19	4.30	.....	4290
424	V	Geo. Vetter.....	May 11	O't 27	22	5 28	5	474	13.20	13.87	18.00	77.06	1.19	4.86	.....	7392
433	V	H. J. Miller.....	May 25	O't 25	22	5 25	5	477	12.50	13.08	16.60	78.79	1.19	4.41	.....	6250
447	K	H. C. Coburn.....	"	"	22	9 16	5	452	12.50	13.18	17.70	74.46	1.19	5.16	.....	4000
462	V	C. J. Edson.....	May 12	O't 31	22	5 19	5	454	14.20	14.83	19.00	78.05	1.58	4.24	.....	5396
480	V	Wm. Crockard.....	May 6	Nov 2	27	.....	5	478	13.00	13.58	16.10	84.35	1.13	4.29	.....	.....
489	K	Robt. Moody.....	Apr 23	O't 26	22	5 20 $\frac{1}{2}$	5	552	9.90	10.29	15.50	66.39	2.21	3.75	.....	4009
522	V	J. W. Svarstad.....	May 6	O't 22	22	6 23	5	446	16.35	17.20	20.40	84.30	.99	4.90	.....	7521
MCPHERSON COUNTY—																
488	V	Geo. B. Reid.....	May 20	Nov 1	22	9 11	5	326	16.70	17.65	19.60	90.05	1.05	5.40	.....	1837
EDMUNDS COUNTY—																
396	K	J. W. Brown.....	May 6	O't 20	22	6 $\frac{1}{2}$ 46 $\frac{1}{2}$	5	589	14.30	14.98	18.40	81.41	1.22	4.55	.....	13251
400	V	W. H. H. Dickinson.....	May 28	"	22	6 10	5	514	14.20	14.84	17.80	83.37	.91	4.34	.....	2840
402	K	John Bergman.....	May 18	O't 22	24	8 20 $\frac{1}{2}$	5	680	14.80	15.52	19.20	80.83	1.22	4.66	.....	6142
474	V	S. L. Bakkegard.....	May 15	O't 24	20	..... 15 $\frac{1}{2}$	5	486	18.70	19.65	22.10	88.91	1.39	4.83	.....	5797
477	K	H. Hilton.....	May 5	Nov 1	22	5 33	5	536	15.50	16.28	18.80	86.69	.94	4.79	.....	10230
FAULK COUNTY—																
441	V	S. S. Wentworth.....	May 16	O't 27	48	7 31.3	2	683	15.10	15.80	20.40	77.45	1.24	4.40	.....	9452
442	K	do.....	"	O't 27	48	7 32.2	2	749	13.15	13.71	18.20	75.33	1.41	4.13	.....	8468
486	V	A. M. Thompson.....	May 14	O't 24	22	5 26	6	412	17.10	17.96	20.10	89.35	1.01	4.80	.....	8892

SPINK COUNTY—																
393	K	G. W. Else.....	May 5	O't 20	18	6	23.7	5	575	15.50	16.20	16.40	98.78	1.00	4.30	7365
405	V	W. F. Sander.....	Apr 28	" 24	22	5	15	5	474	15.30	16.05	19.20	83.59	1.16	4.69	4590
418	K	E. C. Perkins.....	May 30	" 25	22	11	14	5	596	12.00	12.40	15.70	79.55	1.31	3.94	3360
446	K	W. L. Thomas.....	Apr 28	" 26	22	6	15	5	327	11.65	12.11	15.80	76.65	1.10	3.79	3495
454	K	R. Brunn.....	May 4	" 26	36	8	19.8	2	1048	11.25	11.69	18.00	64.94	.91	3.77	4455
464	V	R. Bingham.....	" 20	" 28	45	.....	.....	.....	710	10.80	11.27	14.50	77.72	1.22	3.80	.....
466	V	F. J. Carrier.....	" 3	" 25	22	4	20	5	446	15.80	16.54	20.00	82.70	1.23	4.49	6320
499	K	H. Wilson.....	Jun 15	" 20	24	5	10.5	5	316	15.10	16.09	18.80	85.58	1.30	5.15	3171
500	V	".....	" 24	" 21	24	.....	.....	3	310	17.00	17.79	21.20	84.86	.98	5.49	.....
CLARK COUNTY—																
392	V	S. Westover.....	May 8	O't 22	22	12	39½	3	953	12.30	12.85	16.00	80.31	.90	4.36	9717
425	V	N. T. Waterman.....	" 26	" 25	30	6	.....	5	538	13.00	13.62	17.10	79.65	1.09	4.56	.....
429	V	P. B. Peterson.....	" 6	" 21	22	4	27	5	560	14.00	14.69	17.70	83.00	.86	4.71	7560
460	V	Mrs. E. C. Schulz.....	" 11	" 28	22	4	22½	5	411	10.20	10.72	19.00	56.42	.94	4.82	4590
483	V	E. A. Howey.....	" 6	" 25	22	10	31½	4	868	14.80	15.42	18.40	83.80	1.19	4.04	9324
503	K	R. M. Weston.....	" 6	" 29	30	6	29	3	529	11.30	11.80	16.00	74.00	1.68	4.33	6554
HAND COUNTY—																
421	K	Oliver Pash.....	May 15	O'e 25	18	5	28.8	4	518	15.90	16.68	20.20	82.57	1.10	4.69	9158
538	K	James Jones.....	" 12	" 22	22	6	40	2	1040	13.87	14.60	18.80	77.66	.....	.....	11096
BEADLE COUNTY—																
423	V	Chas. R. Fuller.....	May 6	O't 26	22	10	16½	4	454	14.60	15.35	19.80	77.53	1.19	4.90	4818
493	V	Simon Keator.....	" 20	" 22	22	5	15	5	496	8.90	9.21	14.50	63.52	1.93	3.39	2670
523	K	C. A. Campbell.....	" 6	" 25	22	4	11½	5	372	15.10	15.90	22.00	72.30	1.40	5.18	3473
524	V	C. S. Sprague.....	" 11	" 24	22	11	11¼	5	352	17.25	18.25	21.40	85.30	.82	5.47	3381
KINGSBURY COUNTY—																
439	V	W. L. Gleason.....	May 10	O't 24	22	6	22	3	1092	11.10	11.57	15.70	73.70	1.27	4.06	4884
505	K	J. F. B. Masters.....	June 5	" 28	22	6	14	5	283	12.80	13.30	15.80	84.00	1.13	4.80	3584
JERAULD COUNTY—																
451	K	Mrs. S. E. Atwood.....	May 6	O't 21	22	5	21	4	499	11.15	11.60	17.70	65.54	1.55	3.88	4683
SANBORN COUNTY—																
506	K	Peter Trinen.....	May 15	O't 22	46	8	27	3	752	12.40	13.00	16.00	81.00	1.31	4.27	6696
MINER COUNTY—																
427	K	M. Bohlman.....	May 12	O't 27	22	6	24	5	428	14.20	14.85	19.00	78.16	1.30	4.40	6916
444	K	H. T. Holmes.....	" 1	" 25	22	6	20	5	497	11.65	12.19	16.00	76.19	1.25	4.44	4660
487	K	A. B. Ogden.....	" 2	" 31	22	5	34½	5	586	12.70	13.20	17.50	75.43	1.36	3.94	8763

Station No.	Variety.	Grower.	Planted.	Harvested.	Rows— inches.	Beets in Row — inches.	Tons per Acre.	Number Beets Analyzed.	Av. Weight— grams.	Per c't Sugar in Beets.	Per c't. Sugar in Juice.	Degrees Brix.	Purity Coefficient	Per cent. Ash in Juice.	Per cent. Marc in Beets.	Pounds Sugar per Acre.
AURORA COUNTY—																
422	V	M. G. Swatman.....	May 1	Oct 26	22	6 14	5	441	15.70	16.49	20.00	82.45	1.80	4.81	4396	
472	V	D. G. Townsend.....	June 8	" 24	30	... 20	4	834	13.60	14.23	18.20	78.19	1.56	4.45	5440	
473	K	"	" 8	" 24	30	... 21	4	762	13.60	14.26	18.20	78.35	1.78	4.65	5712	
491	K	J. P. Oppel	May 10	" 25	36	10 12½	5	464	11.80	12.33	17.80	69.27	1.48	4.27	2950	
507	K	V. E. Burnham.....	" 23	Nov 5	22	8 15	5	557	14.20	14.90	17.20	86.00	1.02	4.53	4260	
DAVISON COUNTY—																
518	K	F. B. Angell	May 7	Nov 1	22	6 20	5	558	14.60	15.30	17.80	86.00	1.52	4.31	8468	

THE MISSOURI RIVER REGION.

CAMPELL COUNTY:—Two packages of seed were sent to this county and two packages of beets were returned. The weather report is as follows: May, rainy; June, rainy and hot; July, first part rainy and cool; second warmer; August and September dry and hot; October dry and cold.

Mr. Larson used black sandy loam and secured good results. He asks if there is any way that molasses may be made out of the beets. In a small way some parties in South Dakota have already made molasses from the juice of the Sugar Beet. The beets are grated and the juice expressed in a manner similar to the process used in making cider from apples. The juice is simply boiled and skimmed. No doubt an improvement might be made by using lime water to clarify the juice. This might also remove some of the taste peculiar to sugar beets. Mr. Gjeffe did not complete his report.

WALWORTH COUNTY:—Two packages of seed and two samples of beets is the report for this county. The weather report is similar to that of the preceding county. Mr. Payne employed a reddish black bunch grass soil. Land was fertilized two years ago. Mr. Welch planted on sandy loam mixed with clay and used no fertilizer this year.

POTTER COUNTY:—Fourteen packages of seed were sent to this county and seven samples of beets were returned. The weather report is similar to the preceding. Frosts are reported in October. It might be well to observe here that sugar beets will stand a rather severe frost without suffering any material damage after they are mature and while they are still in the ground.

Mr. Huyck used a deep black loam that has been in garden since 1885. Hen manure has been used sparingly. Some of the beets washed out but the places were filled in by transplanting. Mr. Walter used a dark sandy loam manured last season with well rotted stable manure. Hail injured the leaves severely. Mr. Gorman used a gravelly and sandy loam never fertilized. Mr. Scanlon used bunch grass soil and no fertilizer. Mr. Naylor sowed on black prairie loam and used no fertilizer.

Had raised beets on same ground for two years. His beets gave the highest percentage of sugar of any samples coming to this laboratory this year. Mr. Catron used dark loam, no fertilizer and secured a good stand. Mr. Mancher used a variable soil but it was poorly prepared and plowed very shallow.

SULLY COUNTY:—Five packages of seed and five samples of beets is the report from this county. None of the observers report frosts in October.

Mr. Schreiber planted on black loam and secured about half a stand owing to the formation of a crust on the ground soon after the beets were sown. Mr. Schultz planted on black loam and his plants were injured during the dry weather by a long grayish beetle. Mr. Spitz gives a similar report. Mr. Fagner reports an extra fine stand and finds the beets good both for stock and for table use. Mr. Porter planted on black loam and found the beets easier to cultivate than he expected.

HYDE COUNTY:—Three samples of seed were sent to this county and one sack of beets was returned. Mr. Lawson planted on a clay loam and gives a report of the weather not varying much from the preceding.

HUGHES COUNTY:—Seventeen samples of seed and five sacks of beets returned. The reports for the weather are as usual but October is spoken of as a warm month.

Mr. Chandler sowed on light sandy soil and reported a number of beets in outside rows that weighed over eight pounds. Mr. Fuller planted on black loam near a draw and a heavy rain washed out many of the beets. Mr. Chandler used a deep sandy loam and thinks the late spring a great disadvantage. Mr. Millett sowed on sandy loam but his beets were not properly tended. The ground caked and the beets were injured when the weeds were pulled out. Mr. Purinton planted on sandy timber land but his beets were too far apart. He suggests that the Experiment Station should furnish the seed to farmers at cost as they are fine for stock. Farmers can buy as cheaply and of the same parties as the Experiment Station can.

BUFFALO COUNTY:—Mrs. Johnson sowed on sandy loam. The ground was sloping so that much of the seed washed out.

The weather report is substantially as the preceding. Three samples of seed were sent to this county.

BRULE COUNTY:—Four packages of beets were returned for the seven samples of seed distributed to this county. The weather resembled the preceding.

Mr. Wollbert used black loam and secured fine results. Mr. Crisford planted on black loam and simply sent five beets about right size. Mr. Rigney sowed on a dark sandy loam. His beets were injured by grass hoppers. Mr. Vanloan used gravelly clay. During July and August a long, slim bug ate the tops all off the beets.

CHARLES MIX COUNTY:—One sample of beets came from this county while five samples of beet seed were sent out. Weather report as preceding.

Mr. Miner planted on black clay loam. His beets were large and he reports the enormous yield of 95 tons per acre. This is a most extraordinary yield and the analysis shows surprising results.

BON HOMME COUNTY:—Six samples of beets were received from seventeen packages of seed. Frost is reported in October.

Mr. Mullinger used bottom land rich with mold. His beets grew large and were poor in sugar. Mr. Kirk planted on sandy loam fertilized last year with barn yard manure. Mr. Bullis used a light black soil. His beets were too far apart and were poor in sugar. Mr. Hook planted on sandy soil and obtained a large yield although the per cent. of sugar was rather low. Mr. Heitgen planted on sandy soil and fertilized with barn yard manure. Mr. Schmidt planted on loamy soil but the ground became very hard.

YANKTON COUNTY:—Mr. Nelson sent in beets raised from seed sent by Secretary Rusk, Dippes Kleinswanzleben. He used a black loamy soil and his results are good. He reports the weather about the same as before.

The following table completes the report for this region:

Station No.	Variety.	Grower.	Planted.	Harvested.	Rows— inches.	Beets in Row — inches.	Tons per Acre.	Number Beets Analyzed.	A. V. Weight — grams.	Per c't. Sugar in Beets.	Per c't. Sugar in Juice.	Degrees Brix.	Purity Coefficient.	Per cent. Ash in Juice.	Per cent. Marc in Beets.	Pounds Sugar per Acre.
CAMPBELL COUNTY—																
519	V	Jno. Larson.....	May 5	Nov 2	22	7 16	5	448	17.00	17.80	20.00	88.00	1.23	4.69	5540	
530	V	S. O. Gjeffe.....	May 23	O't 28	22	8	5	450	14.25	14.98	18.10	83.00	.86	4.85	.....
WALWORTH COUNTY—																
411	K	W. H. Payne.....	May 3	O't 22	22	5 19½	5	445	16.50	17.22	19.20	89.68	1.28	4.20	6517	
542	K	F. W. F. Welch.....	May 15	Nov 4	20	5 30	5	520	14.73	15.50	18.80	82.40	.....	.....	8838
POTTER COUNTY—																
404	K	M. Huyck.....	May 2	O't 24	22	3 24½	5	560	13.60	14.24	17.40	81.84	1.13	4.50	6664	
414	K	John Walter.....	May 16	" 22	22	7 13½	5	544	16.40	17.17	21.20	81.00	1.50	4.55	4428	
453	V	R. T. Gorman.....	May 11	" 28	22	6 17	5	374	16.10	17.00	21.20	80.19	1.33	5.32	5474	
490	V	W. E. Scanlon.....	May 11	" 22	22	6 70½	4	950	13.20	13.81	16.80	82.20	1.47	4.41	18612	
515	V	Jas. Naylor, Jr.....	May 19	" 31	22	6 20	5	377	20.40	21.60	23.60	91.53	.85	5.63	8160	
529	K	C. F. Catron.....	May 21	Nov 6	22	6 17½	5	584	15.40	16.10	18.60	86.50	1.17	4.40	5467	
541	K	Edward Mancher.....	May 27	O't 22	48	.....	6	383	14.63	15.40	20.50	75-10	.....	.....	.....
SULLY COUNTY—																
531	K	Thos. Schriber.....	May 14	Nov 7	22	9 15	5	452	14.60	15.26	17.60	86.70	.72	4.32	4380	
439	K	E. Schulz.....	May 7	O't 24	22	8 10	4	561	12.50	13.11	17.30	75.78	1.13	4.65	2500	
482	K	E. Spits.....	Apr 4	" 31	22	7 10	5	377	15.20	15.94	20.80	76.63	1.91	4.64	3040	
509	K	F. E. Fragner.....	May 11	" 22	22	6 15	5	634	18.10	19.00	21.30	89.20	1.05	4.53	5430	
521	V	C. B. Porter.....	May 14	" 24	22	7 19½	5	556	14.90	15.70	17.80	88.00	1.16	5.00	5885	
HYDE COUNTY—																
501	V	W. O. Lawson.....	May 11	O't 31	22	6 4	6	214	15.40	16.29	20.90	77.94	1.19	5.45	1232	
HUGHES COUNTY—																
419	K	A. M. Chandler.....	Apr 30	O't 24	22	6 33	5	443	16.10	16.80	18.60	90.32	1.17	4.19	10626	
428	V	E. B. Fuller.....	May 16	" 25	22	4 33½	4	605	16.10	16.92	19.20	88.13	.84	4.85	10867	
438	V	L. A. Chandler.....	May 7	" 24	22	4 20	5	425	13.90	14.69	18.00	81.61	.95	5.40	5560	

450	K	G. J. Millett.....	"	16	"	27	22	13	35½	4	623	10.20	10.64	16.60	64.10	1.84	4.22	7242	
458	K	R. E. Purinton	Apr	30	"	27	44	12	18	3	1084	11.15	11.64	16.40	70.98	1.65	4.23	2007	
BUFFALO COUNTY—																			
536	K	Mrs. M. C. Johnstone....	May	26	O't	29	22	6	7½	5	400	13.68	14.40	20.20	71.30	.....	.....	2052
537	V	do	"	"	"	"	22	6	6½	5	340	16.91	17.80	23.00	73.00	.....	.....	2198
BRULE COUNTY—																			
426	V	Adam Wolbert.....	May	23	O't	20	22	8	24	5	516	17.50	18.43	20.70	89.03	1.13	5.05	8400	
468	K	Jno. Cresford.....	"	5	"	24	22	5	16	5	438	14.30	15.07	18.90	79.73	1.13	5.12	4576	
471	K	P. Rigney.....	"	7	"	20	.....	.....	.....	3	800	14.60	15.27	19.20	79.53	1.64	4.40	.....
476	V	J. A. Van Loan.....	"	2	"	28	22	5	32½	5	422	14.60	15.35	19.20	79.95	1.59	4.92	9490	
CHARLES MIX COUNTY—																			
432	V	H. W. Miner.....	May	25	O't	24	22	6	95	3	923	13.40	14.00	16.90	82.83	1.35	4.28	25460	
BON HOMME COUNTY—																			
457	V	R. Mullinger.....	.....	.....	O't	24	22	6	40	3	905	9.55	10.01	15.00	66.73	1.69	4.69	3820
467	K	Jas. Kirk.....	Apr	30	"	28	22	9	34	5	594	17.30	18.12	21.00	86.29	1.09	4.51	11764	
495	K	N. A. Bullis	"	23	"	31	44	5	.....	5	468	10.70	11.20	14.80	75.67	.98	4.48	.....
497	V	Jno. Hook.....	"	30	"	17	22	4	56	4	525	11.70	12.27	15.80	77.65	1.13	4.63	11700	
498	K	M. Heitgen	May	28	"	21	22	8	19	3	840	10.10	10.51	15.60	67.37	1.26	3.89	3838	
514	V	J. B. Schmidt.....	Apr	30	Nov	3	22	8	16	5	510	16.40	17.20	19.40	88.60	.93	4.62	5248	
YANKTON COUNTY—																			
435	V	T. Nelson.....	May	28	O't	26	24	8	18	4	500	15.40	16.16	20.00	80.80	1.23	4.73	5544	
436	K	"	"	"	"	"	24	6	24	4	565	14.20	14.79	20.30	72.85	1.61	3.97	6816	

THE BLACK HILLS REGION.

Forty six applications for seed were received from this region and fifteen samples of beets have been returned. The analyses of the samples sent make a very creditable showing. Not one has fallen below the standard required for sugar making and a good percentage shows a high standard. The weather report is, May wet and cold; June wet and cool; July and August hot and dry; September wet and moderately warm; October first part dry and warm, last part wet and cold.

CUSTER COUNTY:—Mr. Sanborn planted on sandy land and used no fertilizer. Mr. Stoltz planted on gumbo and let the beets take care of themselves. Mr. McVey sent no report with his beets. Mr. Boland planted on a red gypsum soil and some of the seed failed to germinate. He filled in the breaks with sweet corn and cultivated the beets with the corn.

BUTTE COUNTY:—Mr. Vallery planted on gumbo alkali soil which became so hard it deformed the beets.

FALL RIVER COUNTY:—Mr. Wight planted on sandy loam with no fertilizer and simply hoed twice. Mr. McDowell planted on made land composed of sand and clay. Mr. Ball planted on low sandy soil and kept clean from weeds.

LAWRENCE COUNTY:—Mr. Breslin planted on strong clayey soil mixed with sand. His crop was injured some by a heavy rain and hail storm in June. Mr. McLaughlin used gypsum soil.

MEAD COUNTY:—Mr. Heinrichs used a high sandy soil mixed with lime stone and he used no manure.

PENNINGTON COUNTY:—Mr. Nelson planted on light black loam but the deep plowing threw up too much raw subsoil. The plowing should have been done in the fall. He has saved beets to plant for seed. Mr. Stucker used sandy loam. Mr. Thompson planted on sandy loam situated in the foot hills, on Mr. Little's ranch. Had a good stand. Mr. Jornston planted on black loam with very little sand. The following table completes the report for this region:

Station No.	Variety.	Grower.	Planted.	Harvested.	Rows—Inches.	Beets in Row—Inches.	Tons per Acre.	Number Beets Analyzed.	A. V. Weight—grams.	Per c't Sugar in Beets.	Per c't. Sugar in Juice.	Degrees Brix.	Purity Coefficient	Per cent. Ash in Juice.	Per cent. Marc in Beets.	Pounds Sugar per Acre.
CUSTER COUNTY—																
407	V	G. C. Boland.....	May 12	O't 20	22	.....	.....	4	650	14.80	15.50	17.50	88.57	.96	4.49	.....
409	K	G. O. Sanderson.....	" 5	" 21	22	5	28½	5	516	13.30	13.91	16.20	85.86	.98	4.44	7581
508	V	F. Stoltz.....	June 1	Nov 3	36	12	.....	4	668	12.80	13.40	16.00	84.00	1.16	4.50	.....
534	V	E. D. McVey.....	.....	.....	.....	.....	.....	4	792	13.77	14.50	19.00	76.32	.....	.....	.....
BUTTE COUNTY—																
416	K	P. P. Vallery.....	May 21	O't 22	16	8	42.7	4	769	12.10	12.64	16.80	75.24	1.37	4.28	10334
FALL RIVER COUNTY—																
469	K	Stephen Wight.....	Apr 31	O't 28	22	10	16	5	511	15.30	16.14	18.40	87.72	1.04	5.23	4896
481	K	F. C. McDowell.....	" 28	Nov 1	.....	.....	18.2	5	376	16.50	17.22	21.90	78.63	1.49	4.22	6013
532	K	J. A. Ball.....	" 30	" 2	22	4	22	5	498	13.20	13.90	17.30	80.40	1.31	4.79	2904
LAWRENCE COUNTY—																
475	V	Jno. Breslin.....	May 6	O't 28	24	.....	18	5	722	15.20	16.03	19.20	83.49	1.40	5.19	5572
510	K	Jno. McLaughlin.....	" 10	" 29	36	6	9½	5	415	15.50	16.30	20.60	81.50	1.29	4.95	2892
MEAD COUNTY—																
511	V	R. Heinrichs.....	May 16	Nov 2	22	6	12	5	*402	17.10	18.04	20.60	87.60	1.43	5.23	4104
PENNINGTON COUNTY—																
502	V	J. A. Nelson.....	May 7	O't 29	22	10	10	5	425	17.00	17.99	21.60	83.30	.99	5.48	3400
513	V	F. Stucker.....	" 18	" 28	22	4	35	3	847	15.70	16.50	18.80	87.80	1.05	5.11	11990
516	K	T. Thompson.....	" 13	" 21	22	8	.....	5	486	14.30	14.99	18.00	83.30	.86	4.61	.....
525	V	W. H. Johnson.....	" 30	" 31	22	8	10½	5	298	14.10	14.99	20.00	74.95	1.04	5.91	2961

SUMMARY OF RESULTS FROM THE WHOLE STATE.

160 analyses all told were made this season. One sample came from outside of the state and the report is not included. One sample was spoiled when it reached the Station Laboratory and the analysis is thrown out as worthless.

Arranged according to percentages the work makes the following exhibit:

Under 12.00 per cent sugar in the beet,	27	samples.
Between 12 and 13 per cent sugar in the beet,	13	"
" 13 and 14 " " " "	26	"
" 14 and 15 " " " "	34	"
" 15 and 16 " " " "	28	"
" 16 and 17 " " " "	13	"
" 17 and 18 " " " "	10	"
" 18 and 19 " " " "	6	"
Over 20 per cent sugar in the beets,	1	"

Considering the number of experimenters, and considering the confessedly bad care some of these experimenters gave the trial plats, and considering the bad season it is evident that nearly every portion of the state is capable of raising beets well adapted to sugar manufacture. An inspection of the yield in tons of beets per acre will show a profitable yield. It is true that the experiments were made with excellent seed, but such seed is easily obtainable by importation or it can be grown at home.

In consideration of the trial now extending over four years and of the results obtained it is safe to say that further experimentation in this line is unnecessary. The fact may be accepted that most portions of the state can raise sugar beets of a high grade for sugar manufacture.