Oregon Agricultural Experiment Station

Bulletin No. 23. February, 1893.

Experiments in the Culture of the SUGAR BEET IN OREGON.

By G. W. SHAW.

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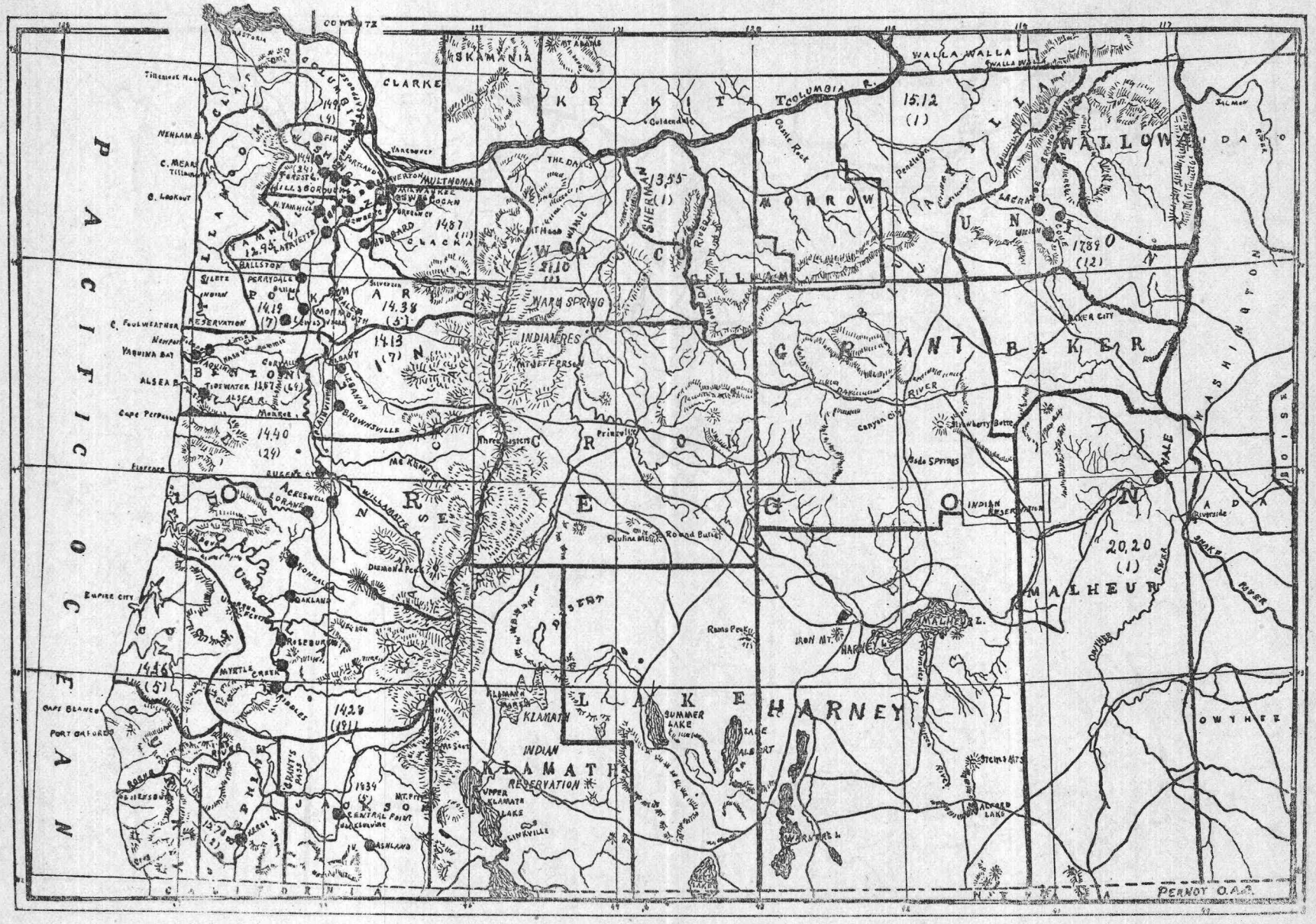
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THE SUGAR BEET IN OREGON.

By G. W. SHAW, A. M.

In accordance with the plan set forth in Bulletin No. 17, published by this Station in February, 1892, experiments as to the possibility of raising beets for the manufacture of sugar in Oregon have been continued during the past year, and the results, together with other points of interest and importance, are set forth in this bulletin.

The reasons for undertaking the investigations may be stated as follows: The United States consumes annually about 2,000,000 tons of sugar, and the demand is constantly increasing. At present the American people are consuming annually 59 lbs per capita of imported sugar and only 9 lbs per capita of American sugar. To pay for this imported sugar our country has sent to Europe during the last few years about $100,000,000 annually, and this has been done notwithstanding there are areas within the United States as well, if not better, adapted to sugar production than any in Europe. The Federal government, recognizing that we should be independent of Europe so far as possible and the more to encourage home production, on Oct. 1, 1890 abolished the duty on sugar and in lieu thereof offered a bounty of two cents per pound for all domestic sugar testing 90° or more (1½ cts for all testing between 80° and 90°) produced until July 1, 1905. If this country produced her own sugar under this law there would be a bounty of $50,000,000, paid to those engaged in the business in addition to saving to the nation the $100,000,000, now sent to foreign countries to satisfy the sweet tastes of the American people. This would certainly go some distance in satisfying the cry of many farmers for "more money".

The Experiment Stations of many States have been investigating this subject for the past few years and many thousand analyses of American raised beets have been made and there is no longer any doubt but that there are large areas in this country adapted to sugar beet culture. California, Utah, and Nebraska are already reaping the reward of the government bounty and the benefits of home production, and companies are being formed in other states where the conditions seem to be favorable. During the year ending June 3rd, 1892, the government paid for the production of beet sugar the following bounties, California, $163,511; Nebraska, $54,690; Utah, $21,898.

The question comes forcibly to us, can Oregon stand in the line of sugar

producing states? Can she not reap the rewards of this bounty? One of the heaviest sugar dealers in Portland estimates that that city alone consumes and distributes over 25,000,000 pounds of sugar per annum. In view of what has been said it certainly is well for us to ask why not keep a portion or all of the money paid for this sugar at home and also receive the benefit of the federal bounty, gaining also the other advantages to be derived from this culture, such as building up prosperous communities around the factory, giving better market for other home productions, and encouraging the farmer to adopt scientific methods of cultivation. This manner of work would of a necessity extend to other industries until its influence would be felt in all lines of agricultural pursuits.

If the soil and climate of Oregon are favorable to the production of good sugar beets then there is a new and profitable industry possible for our farmers and capitalists, and according to Mr. Paddock in his speech before the U. S. Senate, the beet sugar industry is more important than any twenty others in this country. It was to seek an answer to this question that the experiments were conducted.

The report of the investigations of 1891, which was published in February of last year, contained a full account of the relation of Oregon's climate to this culture, but since the edition of the bulletin above named was exhausted very soon after publication and as there is still a demand for the bulletin a review of the work of that year is incorporated in this report, which is therefore separated into three portions; Part I having to do with the results of 1891—1892; Part II with the results of 1892—1893; and Part III with conclusion and matters of general interest connected with the subject.

In the back of the bulletin is printed a complete table of the analysis of all beets which have been received at the Experiment Station in a suitable condition. Analyses numbered from 1 to 96 were made during the season of 1891—1892, and those from 96 to 161 during the season 1892—1893.

Following this table will also be found another showing the analyses of Oregon grown beets sent to Washington D. C. to the U. S. department of Agriculture. In the front of this bulletin will be found a map upon which the places where beets containing over 14 per cent sugar have been grown, and also the average of all the analyses for each county.

Part I.

The beet is a hardy biennial plant indigenous to Southern Europe and more recently introduced into Canada and the United States, and for its successful production depends mostly upon climate, soil and cultivation. To determine the best methods of cultivation as suited to our local conditions requires cultivation upon a larger scale than was feasible in these investigations besides being a line of work belonging to the Agricultural Department, hence no conclusions are attempted in this direction.

Each year arrangements were made with farmers in different portions of the State to cultivate a small plat of beets, the seed being furnished them

by the Station. Although there was a hearty and ready response to the Station's offer to furnish seed to those who would agree to forward samples for analysis, accompained by a report, —blanks for which were furnished— there were many who never responded to a single inquiry after they had received the seed, notwithstanding the fact that they had expressly agreed to report results. To those whose careful culture of the beets rendered it possible to conduct the experiment so successfully, as well as to the assistant Chemist, our heartiest thanks are hereby expressed.

In addition to those not reporting in any way there were some who seemed to think that no report was desired or expected if the crop was not successful and the results were not sufficiently large to "boom" the country. The Station was in pursuit of the facts in the case, and if the State or a county cannot produce good beets it is just as important for the public to know it, that failure may be avoided, as it is if the conditions, prove favorable. The Station does not exist to "boom" any portion of the State, but is in search of *bare facts*, be they favorable or unfavorable.

SEED AND CULTIVATION.—The seeds used in the investigation were imported varieties, and the following directions for cultivation, which were taken from the most competent authorities in this country and Europe, were sent out with each package of seeds.

Method of Growing Sugar Beets to be followed by those taking part in the Co-operative Experiments with Sugar Beets in Oregon.

SOIL.—This should, where possible, be a light loam, preferably containing some lime. The land should be well drained. The beet gets the greater part of its food from the ground at a depth of 8 to 12 inches. Hence freedom from excess of water is necessary.

PREPARATION OF LAND.—The land selected should have been plowed the fall before planting of seed. As soon as it can be properly worked in the spring the land should be plowed again, this time to the depth of 12 inches. Allow to lie until about one week before the time of seeding. Then plow once more to the depth of 4 to 5 inches, and work the soil up into a fine and *light* condition (i. e., do not pack it down with a drag). After allowing land to lie 5 to 7 days plant the seed. The object of allowing the land to lie is that sufficient moisture may be drawn from below for the germination of the plant, and that the land may be warmed by the sun, after pulverization. No manure should be applied unless in the shape of well rotted compost put on in the fall. The land on which the beets are to be grown should be measured approximately, and enough ground planted so that it will be possible to take the eightieth of an acre from the plot without including any *outside* rows. In ordinary soil the rows should be eighteen inches apart. In very rich less; and in poor soil more than that distance apart: The conditions should be such that the beets can not attain a greater weight than two pounds each. The seed should be planted one-half to three-quarters of an inch deep, and about 20 pounds of seed to the acre. Plant, where possible, in April.

CULTIVATION.—This should be thorough, and should begin as soon as the plants show in the row. When the beets have put out four leaves, thin them out so as to leave the plant standing about 4 to 6 inches (not farther) apart in the row. The weeds should be kept down and the ground well stir-

red. It should be remembered that a beet which grows up out of the ground is worthless for sugar, also that the beets must not attain to a weight greater than two pounds apiece, and must be smooth and tapering in shape.

CLIMATE.—In the matter of climate Oregon seems well suited to the sugar beet as is shown by the following tables and the chart on the opposite page. Temperature curves are given for the Willamette Valley and Eastern Oregon simply as a matter of convenience, the curves for Southern Oregon running very close to that of the Eastern portion of the State.

The season for the growth of beets may be divided into three periods—that of germinating; that of plant formation; and that of sugar storing. The following is a comparative table showing the temperature averages for Germany and certain parts of Oregon during these periods.

TEMPERATURE TABLE FOR PERIODS OF GROWTH,

Periods of Growth	Av. Temp. Foreign.	Av. Temp. East. Org'n	Av. Temp. Willam. Val	Av. Temp. South'rn Or
First.....	49.1	56.0	52,5	53.1
Second.....	63.3	65.0	64.4	64,5
Third.....	56.3	64.4	63.3	54.8

For charts showing the average monthly temperature for the season of 1891—1892, and its relation to the normal the reader is referred to page 10.

As to rainfall the average amount does not differ much from that of beet growing regions of other countries, yet it is not so evenly distributed. It will be true with this as with all crops in the northwest that the *seasonal* precipitation is that to which attention should be directed, for in Oregon, as in California, nearly all the precipitation takes place during the "rainy season." To show this the following table is used.

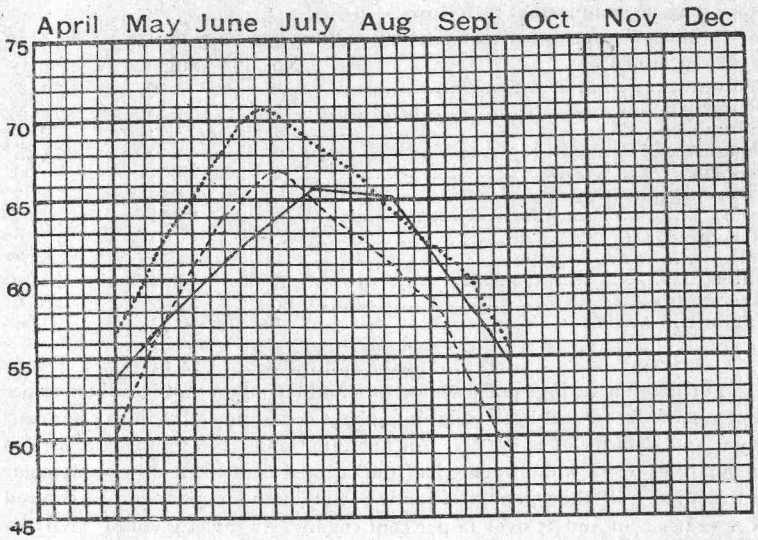
SEASONAL PRECIPITATION TABLE. †

LOCALITY.	SPRING. Mar-May	SUMMER. Jun–Aug	AUTUMN. Sep–Nov	WINTER Dec-Feb	Years Obs'v
LaGrande, Eastern Oregon	4.10	2.26	2.38	15.81	2
The Dalles, Central Oreg'n	2,93	.88	3.98	8.50	13
Albany, Willamette Valley	10.07	2.43	9.75	22.76	8
Roseburg, Southern Oregon	8.22	1.79*	8.00	17.60	10
Newport, Coast Region.....	11.60	8 16	10.72	34.50	2
Ashland, Southern Oregon.	4.79	1.61	4.90	11.63	4
Lakeview, Lake Region.....	4.32	3.09	3.18	6.79	3

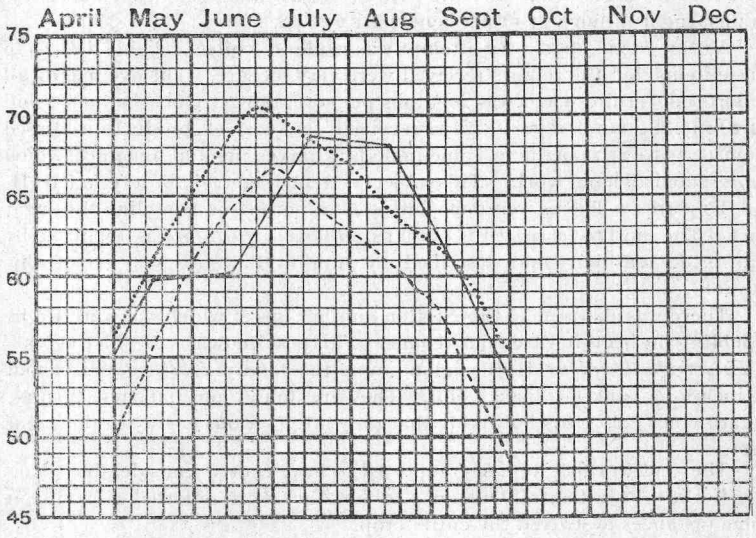
*For two months only. †Compiled from State Weather Bureau data.

SOIL.—"Vilmorin considers that any good soil that will grow wheat and has an arable stratum of 12 to 15 inches will be well suited to this culture." There is little more that need be said concerning this further than that new ground should never be used, and that a stiff clay soil is unfavorable. While soils carrying alkali do not materially affect the amount of sugar in the beet, its presence in the soil so affects the sugar stored in the beet as to render it difficult of crystallization, hence beets raised on such soil cannot be used for the manufacture of sugar.

Comparative Temperature Charts.



France .....
Germany - - - - - -
Willamette Valley———



France .....
Germany - - - - -
Eastern Oregon ———

RESULTS.—The analyses made at the Station during the season of 1891 -1892 may be summarized as follows:—

TABLE SHOWING COUNTY AVERAGES FOR 1891.

County	No.	Sugar.	Purity.
Benton	39	12.30	74.12
Clackamas	7	14.55	77.30
Columbia	1	13.74	79.42
Douglas	9	12.99	73.45
Jackson	3	18.93	80.99
Lane	16	14.32	79.95
Linn	5	13.54	79.91
Marion	1	15.99	78.38
Polk	1	14.72	78.08
Union	3	15.84	79.89
Washington	11	13.96	78.79
Yamhill	1	10.73	76.64
Average		14.13	78.08

For manufacturing purposes beets should contain not less than 12 per cent sugar; the typical beet weighing about 600 grams,* having 14 per cent sugar and a purity of about 80. An examination of the results reveals that the analyses had a wide range: viz: from 6.77 per cent to 22.44 per cent sugar in the juice. Of the 95 analyses made 8 fell below 10 per cent; 76 showed over 12 per cent and 37 over 14 per cent sugar. An average of 81 analyses for Willamette Valley shows 13.76 per cent sugar and a purity co-efficient of 77.89; the average beet weighing a little over 1¼ pounds, while an average of 10 analyses of beets from Southern Oregon showed 13.38 per cent sugar with a little larger beet. For the entire state the average weight was 608.5* grams; sugar in juice 14.13 per cent; purity 78.08.

YIELD AND COST.—An attempt was made to collect reliable data as to these items, but the reports received were very meagre. The average of all reports concerning yield was 20.5 tons per acre, the extremes being 5.1 and 44.2 tons. So far as reports were received the cost of production ranged from 11.25 to 24.18 per acre, some including harvesting and some not, which represented all hand work. This subject is treated more definitely in Part II.

ENEMIES.—There were but few pests reported as troubling the sugar beet. The most to be feared is perhaps, *Monoxia guttulata*, as reported by Prof. F. L. Washburn and described by him in Bulletin No. 14, of this Station.

There was also sent to this Station another insect which was said to be troubling the beets in Clackamas county. This pest known as the "flee beetle" —*Phylotreta decipiens* (Horn) belonging to the family *Halticidæ*—is about ⅛ inch long, and of a black color. They are found on radishes, turnips, potato vines etc. It is not likely that they are a serious enemy to the sugar beet.

The "cut worms" were also reported to have caused considerable damage to the beet in Central Oregon. In fact, they were reported as having in some instances destroyed the entire crop.

Gophers also caused some trouble in Benton county and are said to have shown a decided preference for the sugar beets.

*A gram corresponds approximately to .03528 ounces.

Part II. Experiments of 1892--1893.

PLAN.—As in the experiments of the previous year the beets were raised in different portions of the state, the seed being more generally distributed and more varieties used. From the experiments of the previous year it had become evident that beets containing a high percentage of sugar could be produced, hence in the experiments of 1892—1893 it was sought not only to confirm the results of the preceeding year but also to ascertain something more definite relative to the cost and the yield, and a few points of scientific interest.

For the investigations of 1892 the following varieties were used Desprez, Early Rose, Vilmorin Improved, Klein Wanzlebener and White Imperial all of which are favorite kinds, the first being much used in California. Unfortunately the seed was delayed in reaching us so it could not be distributed to the farmers as early as it should have been to secure the best results. Had the seed reached us in due time it could have been put into the ground in April for at that time there was a favorable time for seeding, but by the time the seed had been distributed cold weather set in and continued till May after which the weather became very dry rendering the conditions for a fair trial very unfavorable. The temperature conditions for the season are indicated on the charts given on the following page, which also give the normal temperature and that for the previous season. The rainfall for the season was below the normal and reports all read "very dry," "extraordinarily dry," "weather very unfavorable." In fact nearly all the beets in the Eastern portion of the state failed to mature, and in many instances the seed failed even to germinate. So far as the season's climate is concerned, then, the experiments were greatly handicapped and we were "in pursuit of knowledge under difficulties".

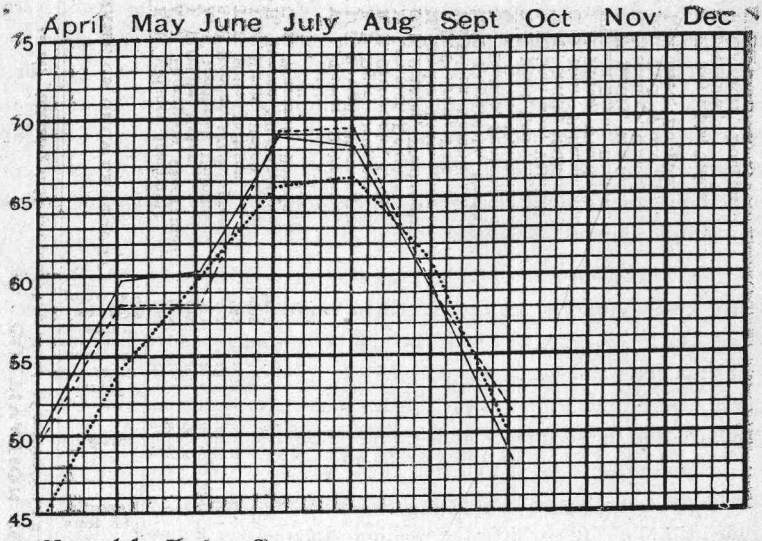
The cultivation for this season was the same as for the previous year except that the rows were placed 20 inches apart.

Owing to the disturbed condition of the experiment the results are doubtless poorer than would have been the case had the season been one of more nearly normal condition. Still the results confirm the conclusions of the previous year that Oregon possesses the conditions necessary for the production of excellent beets for the purpose of beet sugar manufacture.

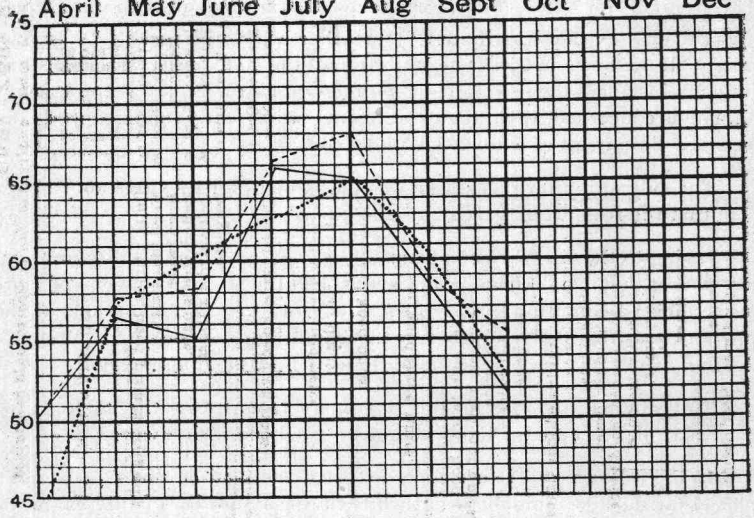
The complete analyses for this season are recorded in the table at the back part of this bulletin being numbered from 96 to 161 inclusive.

In the following table are recorded such cultivation notes as were reported for the above numbers and while they may not be of interest to the general reader, it is hoped they will be of value to those who desire to *study* the matter of sugar beet growing in Oregon.

Comparative Temperature Charts.



Normal for Eastern Oregon ———
Mean " " " 1891 - - - - -
" " " " 1892 . . . . . .



Normal for Willamette Valley———
Mean " " " 1891 - - - - - -
" " " " 1892 . . . . . .

CULTIVATION NOTES FOR 1892--1893.

In the following table is given the amount of cultivation which was given to each sample analyzed so far as reports could be obtained.

Lab. No.	NAME OF GROWER	COUNTY	Av wt of Beets in Grams.	Per cent Sugar in Juice.	Purity.	Report'd yld tons.	Soil.	Date of Planting.	Date of Harvesting	CULTIVATION.
96	E. F. Meisner, Josephine		392	16.0	74.41	15.2	Gravelly clay	Apr 19	Nov 14	Cult. 3 times, hoed 3 times, irrig'ed 3 times
97	A. J. Thompson, Clackamas		650	15.2	86.85	9 3	"Shotland."	May 11	Sept 26	Hoed four times.
98	J. J. Odale, Union		405	16.1	90.95	.....	Drk Sd. loam	May 7	.....	Hoed twice.
99	A. J. Goodbrod, Union		817	22.0	85.50	Enorms	Sandy.	June 12	Sept 27	Pulled weeds once.
104	S. P. Reeder, Washington		532	18.2	78.68	14.1	Black loam.	May 27	" 26	Cultivated six times.
109	T. E. Hills, Jackson		783	15.0	84.74	17.4	Granite, Sandy.	April 20	Oct 11	Irrigated.
110	J. M. Hirsh, Union		605	17.0	.....	.....	.....	.....	.....	.....
117	H. Buxton, Washington		1045	14.3	88.80	.....	Dark loam.	May 16	Oct 21	.....
119	G. R. Woodruff, Benton		620	9.4	81.70	29.4	Sandy loam.	May 5	Nov 1	Plowed twice, hoed five times.
120	" "		640	12.9	82.17	18.0	" "	" 5	" 1	" " " " "
121	" "		776	11.9	82,17	38.0	" "	" 15	" 1	" " " " "
123	W. L. Tower, Douglas		192	20.6	84,32	8,2	Red loam.	April 22	Oct 29	Plowed twice, hoed twice.
124	J. D. Rowell, Washington		341	19 0	67.80	21 0	Red hill.	May 6	" "	Cultivated four times.
128	B. D. Dyer, Douglas		291	11.3	79.02	6.7	Granite, Clay.	June 1	.....	Hoed twice
129	R. E. Cartwright, Lane		568	15.1	87.00	30 4		May 25	Oct 28	Plowed and hoed once.
130	M. Lemmer, Douglas		458	15.0	84.90	17.4	Sandy loam.	April 15	" 27	Garden.
131	O. P. Pointer, Washington		538	14.7	71.80	8,1	Clay	May 28	" 31	Hoed twice.
132	M. Snyder, Linn		617	17.1	73.40	11.7	Sandy loam	April 8	" 29	Plowed once, hoed three times.
133	J. D. Stewart, Polk		750	18.7	76.60	21.7	Black loam	May 15	" 31	.....
134	Jas Edson, Yamhill		1416	19.3	77.20	.....	" "	" 18	" 27	.....
137	M. O Lownsdale, Yamhill		1050	12.5	78.60	47.0	Red hill	" 20	" 20	Subsoiled to 19 in, cult. twice, hoed 4 times.
138	C. J. Bishop, Benton		860	14.2	85.00	23 9	Sandy loam	April 10	" 15	Cultivated four times, hoed four times.
139	M. J. Duffy, Union		676	21.5	88 10	5.0	Black loam	May 10	" 15	Hoed and irrigated twice.
140	R. S. Reed, Lane		660	15.3	88.10	22,8	" "	" 13	Nov 7	Hoed twice, weeded twice.
142	J. K. Sampson, Yamhill		352	14.8	87.00	6,8	" "	" 26	Nov —	Hoed and plowed once.
144	W. E. Smith, Malheur		570	20.2	84.90	12.0	Sandy loam	" 10	Oct 20	Hoed three times.
145	C. D. Nain, Polk		1623	14.0	74.20	44.4	Black loam	April 20	Nov 5	Hoed four times, cultivated four times
146	J. H. Rinck, Washington		165	17 7	76.60	10.5	Sandy loam	May 11	" 7	Hand cultivated once.
147	William Bogue, Benton		873	15.0	80.60	15,1	" "	" 20	" 1	Cultivated three times.
148	J. W Beatty, Marion		840	13.0	80.70	45.0	" "	" 5	" 14	Cultivated and hoed six times.
150	C. C. Stanley, Union		310	23 8	91.90	.....	" "	" 13	" 4	Plowed 15 inches, spaded, hoed twice.
151	John End, Wasco		330	21.1	90.50	7.5	Loam	April 16	Sept 22	Plowed twice, cultivated once.
153	J. H. Bard, Douglas		623	14.5	77.90	40.4	Clay loam	May 20	Nov 12	Cultivated four times.
154	" "		843	16.1	75.90	36.1	" "	" 20	" "	" " "
157	J. E. Reynolds, Union		633	20.9	85,42	22.0	Heavy "	" 1	Oct 1	Hoed three times.
158	Robert Deal, "		236	16.2	76.04	.....	Black loam	" 1	" —	.....
159	F. Clairhorn, Douglas		323	13.2	82.30	.....	Clay loam	April 1	Nov 30	Cultivated once.
160	W. H. Norcross, "		803	10.9	83,20	17.4	Sandy loam	May 1	" 24	Cultivated six times, hoed twice.

Summary of Results for 1892.

Seed was sent to 140 farmers 20 of whom reported absolute failure of crop on account of unfavorable weather, and two on account of insect pests and squirrels.

The average of all analyses for the State was 15.7 per cent sugar in the juice with a purity of 78.08 against 13.75 per cent and a purity of 77.57 for last season. Out of the 65 analyses made only 11 indicated less than 12 per cent sugar in the juice, and 41 samples indicated over 14 per cent, the extremes being 9.4 per cent and 23.8 per cent. The average for the different natural divisions of the state were as follows:

Willamette Valley, 44 samples..... .....14.7 per cent.
Eastern Oregon, 11 samples.. .....19.2 ,, ,,
Southern Oregon, 10 samples..... .....15.1 ,, ,,

Expressed by counties the averages are as follows:

COUNTY.	No. Analyses	Average for 1891.	No. Analyses	Average for 1892	No Analysis	Average for U. S. Dept. Agriculture	Mean of Analyses made at Station.	Mean of all Analyses.
Benton.....	39	12.30	20	12.80	5	14.34	12.30	12.57
Clackamas.....	7	14.55	1	15.10	3	15.36	14.62	14.87
Columbia.....	1	13.74	0	.....	3	15.30	13.74	14.91
Coos.....	0	.....	0	.....	5	14.56	.....	14.56
Douglas	9	12.99	9	15.20	1	17.74	14.28	14.48
Jackson.....	3	18.93	1	15.00	1	18.94	17.94	18.34
Lane.....	16	14.32	2	15.20	6	14.24	14.42	14.40
Linn.....	5	13.54	1	17.10	1	14.15	14.13	14.13
Marion.....	1	15.99	2	13.80	2	14.15	14.59	14.38
Polk.....	1	14.72	5	14.50	1	12.10	14.54	14.19
Union.....	3	15.84	7	19.80	2	14.32	18.61	17.89
Washington.....	1	13.96	10	15.50	3	12.49	14.69	14.41
Yamhill.....	1	10.73	5	13.70	0	.....	12.96	12.95
Josephine.....	0	.....	2	15.70	0	.....	15.70	15.70
Wasco.....	0	.....	1	21.10	0	.....	21.10	21.10
Malheur.....	0	.....	1	20.20	0	.....	20.20	20.20
Sherman.....	0	.....	0	.....	1	13.55	.....	13.55
Umatilla.....	0	.....	0	.....	1	15.12	.....	15.12

Gleaned from Reports.

96.—"The beets have gained 30 lbs. to the row (85 feet) since Oct. 1st."

97.—"Owing to the heavy rains in April, planting was very late, and drought later reduced the aggregate yield.

The land was new, had been in potatoes one year, no manure was used, a little plaster was sown at planting time. The result is not flattering but shows what may be done under very unfavorable conditions; upon land which had been longer in cultivation, and with a favorable season I should feel sure of 15 or 20 tons per acre. I base my "price per ton" upon, not less than 10 acres and a yield of 15 or 20 tons per acre, with cost of raising reduced to a minimum by using horse power."

104.—"I think sugar beets could be raised for $5.00 per ton in a favorable season."

109.—"The ground received water by sub-irrigation from sulphur springs."

117.—"Ground was two dry when seed was planted."

123.—"The season was very unfavorable and the cultivation was not perfect."

118.—"At $4.50 per ton the whole crop would have to be taken."

130.—"During the latter part of September and first of October about 10 per cent died and rotted from top downward."

137.—"I had bad luck with the seed sent me. Only 40 per cent of one lot came up and of another lot only about 50 per cent. So that without transplanting I could give only an approximate estimate of the yield per acre. I could not afford to grow them at any price around $4.00 per ton. I can use my land to better advantage with other crops. This was my first experience with any thing of the kind and could improve 50 per cent another year."

144.—"My plot of beets were a partial failure the seed sown in drills on the 10th of May. It was then raining and continued wet and cold for three weeks and only about one-third of the seed came up. These grew well, however, during the season, free from insects or disease."

151.—"This has been a very bad season for testing anything in the nature of beets. I do not think beet culture would be a success here without irrigation."

161.—"Beets should have been gathered before receiving so much rain —should be planted in April."

Concerning the failures most of the letters read about as the following:—

THE DALLES, Oregon, Oct. 29, 1892.

G. W. SHAW, Chemist Or., Exp. Station,

DEAR SIR:—I am very sorry to announce to you that I have none whatever. I planted the seed sent to me carefully and though late when planted, quite a good many seeds germinated. When the scorching weather came they *dried up* as did most all of my garden. The only root crop which amounted to anything with me was carrots which do finely here. I am sorry to report thus but do not see that I could in the least help matters. The soil was in fine tilth (summer fallowed the year previous) and free of weeds. I used a Planet, Jr. seed drill to plant the seed and cultivated them with a Planet, Jr. wheel hoe, besides doing a little hand weeding. With best wishes for success to your efforts, I am, Yours truly,

ALBERT S. ROBERTS, Box 107 The Dalles.

It will be evident from the data given above that in spite of the unfavorable conditions the results have surpassed those of a year ago.

Part. III.

As before stated, one of the things sought by this year's experiments was relative to the yield that might be expected from a sugar beet crop. The data given below will be drawn from the experiments of the entire two seasons. Altogether the reports for the present season are quite complete on this point. The results given are calculated from a measured plot according to the following instructions which were sent with each package of seed, this being the method used by the U. S. Department of Agriculture. This method was used in order that the results obtained might be comparable with those obtained elsewhere.

"When the beets seem to be mature select an average row and gather every plant along a distance which should vary as follows, according to width between rows:

From	rows	16	inches	apart	gather	75	feet.
"	"	18	"	"	"	66⅔	"
"	"	20	"	"	"	59.8	"
"	"	22	"	"	"	54¾	"
"	"	24	"	"	"	50	"

The number of beets growing in the row, of the length above mentioned, must be counted. The tops are then to be removed, the beets carefully washed free from dirt, wiped and weighed. When the row is not long enough to meet the conditions, take enough from the adjacent row to make up the required length. The number of beets harvested multiplied by 435.6 will give the total number per acre. The total weight of beets harvested multiplied by 435.6 will give the yield per acre."

Upon the above basis the following reports were made:

J. S. Powell	Benton		15.8
College Farm	"		5.8
G. R. Woodruff	"		18.0
"	"		38.0
C. J. Bishop	"		23.9
William Bogue	"		15.1
Average			19.1
A. J. Thompson	Clackamas		9.3
D. S. K. Buick	Douglas		25.0
W. L. Tower	"		8.2
B. D. Dyer	"		6.7
M. Lemmer	"		17.4
J. H. Bard	"		40.4
"	"		36.1
W. H. Norcross	"		17.4
Average			21.6
Edward Albright	Jackson		12.0
T. E. Hills	"		27,4
Average			14.7
H. C. Perkins	Lane		18.0
J. H. Crow	"		9.5
R. S. Reed	"		22.8
R.E. Cartwright	"		30.4
Average			20.2
M. Snyder	Linn		11.7
W. E. Smith	Malheur		20,2
J. Voorhees	Marion		21.5
J. W. Beatty	"		45.0
Average			33.2
A. W. Lucas	Polk		30.0
J. D. Stewart	"		21.7
C. D. Nain	"		44.4
Average			32.0
M. J. Duffy	Union		5.0
J, E. Rynolds	"		22.0
Average			13.5
J. H. Rinck	Washington		17.0
"	"		10.5
John Henry	"		5.0
S. P. Reeder	"		14.0
J. D. Rowell	"		21.0
O. P. Pointer	"		8.1
Average			12.6
M. O. Lownsdale	Yamhill		47.0
J. H. Sample	"		6.8
Average			26.9
E. F. Meissner	Josephine		15.2

An examination of this table reveals the fact that in spite of the unfavorableness of the season the average for the state was 23.18 tons per acre against 20.5 tons per acre for the year previous. In connection with this subject nothing more to the point could be said than the following:— "But results worked out on paper always vary from actual experience, and so it has happened with sugar beets. In California the yield has reached as high as 61 tons per acre (the highest reported for Oregon so far is 44.2 tons. G. W. S.) while in Nebraska the average during the past two years has been under 10 tons per acre."

The average yield at Watsonville, California, in 1886 was 21 tons per acre and the following averages have been obtained in other states:

Minnesota	15.0 tons per acre.
Wyoming	7.5 " " "
S. Dakota	8.1 " " "
Nevada	20.0 " " "
Colorado	26.0 " " "
Iowa	20.0 " " "
Indiana	30.0 " " "
New York	19.5 " " "

It is evident that, as with every other crop, the yield must necessarily depend upon many things, as variety, distance between rows, soil, cultivation, and season, hence this will always be a more or less varying factor. I think, however, that for the Willamette Valley, and Southern Oregon in general, an average of 15 tons per acre is a very conservative estimate.

In Eastern Oregon the uncertainty of the season renders the ability to irrigate almost an essential condition, and if this is met, there can be little doubt but that the yield would even exceed that for Willamette Valley.

CULTIVATION.—Too much cannot be said upon this subject, for in the cultivation lies the secret of success in sugar beet culture. It has been said "The sugar is hoed into the beet," and this is literally true.

Well drained land is necessary, for the beet demands a deep, loose soil so the long tapering tap root may penetrate and drink well of the soil moisture, the development of sugar not reaching a high per cent in irregular shaped beets. It is essential that the beets be *kept close together in our soils* or they grow to enormous size. Some having been sent to us weighing as much as 10 lbs. Such beets are worthless for sugar and a manufacturer would not take them as a gift. The sugar varies inversely as the size of the beet. Beets for the manufacture of sugar should not attain a weight of more than 2 pounds. Pagnoul has conducted experiments extending over 8 years intending to show this.

DISTANCES APART IN INCHES.	PER CENT SUGAR.	YIELD PER ACRE.
Wide distance, 20 x 20	10.2	28.40
Narrow " 17 x 8	12.2	36.05

The same may be shown by the following Oregon produced beets, selected at random from the tables:

SIZE.	VARIETY.	Wt. in grams.	Per cent Sugar in juice.	Purity.
Small beet.	White Imperial	192	20.60	84 32
"	Klein Wanzlebener	341	19.00	67.80
"	White Imperial	250	16.70	88.30
"	Early Rose	165	17.70	76.60
"	Klein Wanzlebener	236	16.20	76.04
"	Vilmorin	350	18.00	82.13
Average		256	18.00	79.19
Medium beet.	White Imperial	538	14.70	71.80
"	Klein Wanzlebener	865	14.15	81.79
"	White Imperial	803	10.90	83.20
"	Desprez Early Rose	980	14.00	82,90
"	Klein Wanzlebener	920	15,99	78.38
"	Vilmorin	1021	13.40	54.10
Average		856	13.86	75.36
Large beet.	White Imperial	1623	14,00	74.20
"	Klein Wanzlebener	1880	14.41	80.55
"	White Imperial	1416	19.30	77.20
"	Desprez Early Rose	1970	11.90	85.00
"	Klein Wanzlebener	1700	12.88	80.00
"	Vilmorin	1700	9.81	68,12
Average		1715	13.71	77.51

One of the most important of all things for the farmer to understand is that at all times must the root be kept below the ground. Bulletin No.

67, Guelph Agricultural College Ontario, calls attention to this and gives the following to illustrate.

		Amt. of sugar	Purity.
Well grown, average of	top	15,5	82.7
	bottom	16.6	83.0
Poorly grown " "	top	11.4	69.9
	bottom	13.6	77.2

COST of RAISING.—This is one of the most pertinent questions relating to the subject, and at the same time is the most difficult one to answer satisfactorily, since there are so many factors in the problem. The question "At what price per ton could you afford to raise beets in quantity," was asked on the report blank sent out this year, and of the 28 farmers who answered the question, 15 stated $4.00 or less, some stating as low as $2.00. One or two named the extreme price of $8.00, but this was based upon all hand labor. The agricultural department of the college failing to keep an accurate record of the experiment renders it impossible to give definite data from that source. The estimates for the previous season ranged from $11. 25 to $24. 18 per acre, some including harvesting and some not, and none including the cost of hauling to market. I insert the statement of a gentleman from California which covers the question as fully as possible, and the items given do not differ far from the same items in this state.

"A. F. Richardson, two miles from factory, eleven acres: Plowing and harrowing, $110; sowing $6; harrowing and sowing, $3; 4 days' cultivation first time at $2—$8; 23 days' thinning at $1.25—$28.75; 24½ days' thinning and hoeing at $1.25—$30.65; 5 days' hoeing at $1.25—$6.25; 9 days' hoeing at $1.75—$15.75; 7 days' hoeing at $1.75—$12.25; 9½ days' hoeing, second time, at $1.75—$7; fixing plow, $2.50; two knives, $1.50, 4 baskets, $3.50; topping and loading, 170. 05 tons at 80 cents—$136. 04; hauling at 50 cents, $85; plowing up at 20 cents, $34; total, $508. 59; yield, 170.05 tons value, $821.81; net profit, $413. 22 net profit *per acre*, $37. 56."

These results were obtained in 1889 when the farmers were practically unacquainted with the most economical methods of cultivation and it is safe to say that with a little more experience in the method of working, most of the items would be rendered somewhat lower. These figures are not theoretical, but are the actual accounts of a beet grower

THE MANUFACTURER AND THE FARMER.—It would certainly be a grand thing for Oregon to have a sugar factory located within her limits, officered by men of experience and ability, and while we would not say anything to discourage yet there is no royal road to riches even through the sweetness of the sugar beet, and success will only come through the efforts of the patient, careful, and persevering.

The question as to whether or not farmers should grow beets depends upon whether or not factories are established to use the beets, and *vice versa*, hence it is a question of double issue and can only be solved by co-operation. It is a lamentable fact—yet no less a fact—that the farmer looks upon the manufacturer as one who is at all times and under all circumstances trying to get the better of him, and this serves as a great barrier to success in the production of beet sugar.

In this industry, as in no other are the producer and the manufacturer linked hand in hand, and what is money in the pocket of one is also money in the pocket of the other, and neither can prosper without the other. From the standpoint of the manufacturer there are many

things to be considered before the establishment of a sugar factory, and after it has been shown that the natural conditions are favorable the main question is the supply of beets. The enterprise requires a large capital, and if Oregon enters the arena and is successful it will be with the most modern appliances, and true economy would demand an outlay of not less than $250,000. A plant of this capacity would require a large number of beets, the growing of which would require at least 5000 acres of land. Such a factory could well be located between two townships, and not be handicapped by the hauling distance.

The farmer's side of the question is one that can be practically settled by experiments, and in fact, outside of the actual cost of raising larger crops has been demonstrated in the experiments, but the cost of raising 10 acres of beets, when equipped for the work, is of course relatively less than for a small plat of land, hence the cost will be less than the average reported, and I am confident they can be raised at $4 per ton and leave *a fair* profit.

The manfacturer practically has all the risk to run unless he can actually be assured of a sufficient supply of beets. If he cannot be thus assured of course we have no factory, for no man or combination of men would invest $250,000 in an enterprise which would be entirely at the caprice of the farmers. There must be some written agreement binding both parties.

It is not within the scope of this publication to discuss the methods of organizing and conducting such an enterprise as the one in question, although the writer would be pleased to correspond with any parties interested in the snbject, and offer any suggestion that he may be able.

CONCLUSIONS.—1—Good sugar beets can be produced in Oregon.

2—They can be raised at a price a factory can afford to pay.

3—The yield compares favorably with that of states now raising beets for the manufacture of sugar.

4—The crop of beets cannot be depended upon in some parts of the State unless irrigation is practiced.

5—That the success of the farmer will depend more upon skill and industry than on the soils, for poorly cultivated beets contain a lower percentage of sugar and purity than well cultivated.

6—Large beets do not contain so large a percentage of sugar as small beets and the purity is less.

7— Upon no condition should farmers grow beets to the exclusion of other crops, but should make this a rotation crop, substituting for bare fallow, if a factory should be started near them.

8—The amount of cultivation necessary for beets in Oregon renders it important that no one farmer should attempt to care for more than 12 acres per season.

9—The plants should be left as far apart as possible and not allow the roots to attain a weight of more than 2 pounds in order that as much cultivation as possible may be done by machinery.

10—If any state can manufacture its own sugar, or any part of it, successfully, Oregon should be able to do so since she has all the natural requirements.

In view of the foregoing all possible encouragement should be given toward directing attention to Oregon as a State suitable for this industry and to securing the attention of any one interested in such an enterprise.

The farmers have it mainly in their own hands for their willingness to each contract to grow a small acreage of beets will be the main factor for the manufacturer to handle.

Table of Analyses of Sugar Beets, 1891--1893.

	GROWER.	LOCALITY. POST OFFICE & COUNTY	Weight in Grams.	SUGAR. Sugar in Juice	Sugar in Beet.	Solids not Sugar.	Brix.	Purity.	Pounds Sugar Per Ton.	VARIETY OF BEETS.
1	Edw. Albright	Ashland, Jackson	244	14.00	13.1	5.3	19.3	72.53	280.0	Klein Wanzlebener.
2	A. W. Lucas	Monmouth, Polk	624	14.72	13.3	4.2	18.8	78.08	294.4	" "
3	D. S. K. Buick	Roseburg, Douglas	1700	9.81	9.3	4.6	14.4	68.12	196.2	" "
4	do do	do do	1140	10.07	9.1	3.9	14.0	71.21	201.4	Vilmorin Improved.
5	J. Voorhees	Woodburn, Marion	920	15.99	14.6	4.4	20.4	78.38	319.8	Klein Wanzlebener,
6	H. C. Perkins	Llewellyn, Lane	739	17.06	16.0	4 3	21.3	80.09	341.2	" "
7	do do	do do	600	14.96	12.7	5.3	20.3	69.26	299.2	" "
8	L. F. Wilson	Corvallis, Benton	389	13.46	10.9	6.3	19.8	66.36	269.2	Unknown.
9	College Farm	do do	375	13.28	12.0	4.4	16.4	80.97	265.6	Vilmorin.
10	H. C. Perkins	Llewellyn, Lane	1200	17.70	16.1	4 3	22.0	80.45	354.0	Klein Wanzlebener.
11	College Farm	Corvallis, Benton	335	12.03	11.4	3 1	15.2	79.91	240.6	Lane's Imperial.
12	do do	do do	250	12.39	11.6	2.5	14.9	83.15	247.8	" "
13	do do	do do	330	14.63	12.7	2 7	17.3	84.57	292.6	Klein Wanzlebener.
14	do do	do do	216	14.02	12.6	2 8	16.8	83.45	280.4	" "
15	do do	do do	208	16.35	14.0	3.5	19.8	82.56	327.0	Dippe Klein Wanzlebener.
16	do do	do do	312	13.50	11.9	4.5	17.0	79.41	270.0	" " "
17	J. S. Powell	Philomath, do	384	13.08	12.4	3.8	16.9	76.80	261.6	Vilmorin Improved.
18	do do	do do	388	11.36	10.8	5.2	16.6	78.48	227.2	" "
19	do do	do do	465	11.97	10.8	5.0	17.0	70.45	239.4	" "
20	do do	do do	594	13.07	11.8	5 1	18.2	65.06	261.4	" "
21	C. J. Bishop	Tidewater, do	397	14.46	13.7	5.1	19.6	73.77	289.2	" "
22	College Farm	Corvallis, do	185	12.86	11.5	3.0	15.9	80.88	257.2	Dippe Klein Wanzlebener.
23	do do	do do	285	12.51	11.3	3.3	15.9	78.61	250.2	Klein Wanzlebener.
24	do do	do do	200	9 73	9.0	2.5	12.3	79.10	194.6	Lane's Imperial.
25	do do	do do	200	13.00	11.9	2.9	15.9	81.76	260.0	Vilmorin Improved.
26	do do	eo eo	780	12.88	11.5	3.7	16.6	77.59	257.6	Klein Wanzlebener.
27	do do	do do	642	12.05	11.0	4.7	16.8	71.78	241.0	" "
28	J. D. Wilson	Yoncalla, Douglas	348	14.75	14.0	3.8	18.5	79.72	295.5	" "
29	do	do do	496	14.32	13.3	6.0	20.4	70.16	286.4	Vilmorin Improved.
30	A. R. Shipley	Oswego, Clackamas	.....	12.00	10.9	3.1	15.1	79.47	240.0	Dippe Klein Wanzlebener.
31	do	do do	945	12.71	11.8	4.6	17.4	73.04	254.2	" " "
32	John Rickard	Corvallis, Benton	1100	9 81	8.4	5.1	15.0	65.40	197.	Klein Wanzlebener.

33	John Rickard	Corvallis, Benton	700	6.76	6.0	4.7	11.5	58.78	135.2	Vilmorin.
34	do	do do	650	8.16	7.0	3.4	12.6	64.92	163.2	"
35	I. N. Sanders	Union, Union	350	18.07	16.6	4.9	22.0	82.13	361.4	"
36	do	do do	475	15.52	14.4	3.7	19.3	80.04	210.4	"
37	C. L. Gowell	Toledo, Benton	205	17.29	16.1	4.0	21.3	80.37	345.8	Klein Wanzlebener.
38	P. Cooper	Roseburg, Douglas	1150	13.42	11.5	2.8	16.3	76.19	278.4	Vilmorin Improved.
39	B. F. Collins	Fir, Washington	375	9.95	9.4	2.6	12.6	78.96	199.0	" "
40	G. W. Mitchell	Newburg, Yamhill	975	10.73	9.8	3.2	14.0	76.64	214.6	Klein Wanzlebener. (?)
41	B. F. Collins	Fir, Washington	1145	12.17	11.38	3.2	15.4	78.90	243.4	" "
42	G. W. Mitchel	Newburg, Washington	1115	11.64	10.52	4.5	16.1	72.29	232.8	" "
43	J. C. Johnson	Scappose, Columbia	465	13.74	13.14	3.6	17.3	79.42	274.8	Vilmorin.
44	J. H. Rinck	Buxton, Washington	225	15.61	14.58	4.2	19.8	78.83	312.2	Klein Wanzlebener.
45	W. H. Smith	Roseburg, Douglas	665	10.34	9.12	2.0	12.3	84.64	406.8	Unknown.
46	H. Marks	do do	1230	10.80	10.26	4.2	15.0	72.09	261.0	"
47	John Withers	Lebanon, Linn	187	12.93	11.62	2.6	15.7	82.23	258.6	Vilmorin Improved.
48	John Henry	Beaverton, Washington	480	14.38	12.62	1.8	16.2	88.70	287.6	Redtop.
49	do do	do do	340	13.02	12.14	5.1	18.2	71.53	260.4	Klein Wanzlebener.
50	College Farm	Corvallis, Benton	475	13.36	12.06	3.4	16.8	71.78	267.2	Vilmorin.
51	do do	do do	509	12.51	11.91	3.1	15.7	79.61	250.2	Klein Wanzlebener.
52	do do	do do	283	12.05	11.52	4.8	16.9	71.30	241.0	Dippe Klein Wanzlebener.
53	do do	do do	170	12.12	11.10	3.9	16.0	75.75	242.4	" " "
54	do do	do do	155	12.82	11.68	3.8	16.7	76.75	256.4	Lane's Imperial.
55	do do	do do	225	12.42	11.18	3.4	15.9	78.11	248.4	Vilmorin.
56	Samuel Howard	Eugene, Lane	1300	13.00	11.97	3.9	17.0	76.47	260.0	Unknown.
57	do do	do do	1010	11.30	9.81	4.1	15.4	73.37	226.0	"
58	R. Scott	Milwaukie, Clackamas	1213	12.82	12.91	2.98	16.8	82.26	276.4	Klein Wanzlebener
59	do do		200	12.18	11.66	4.2	16.4	74.26	243.6	" "
60	T. Pavey	Yaquina, Benton	850	16.23	14.43	2.6	18.9	85.82	224.6	Unknown.
61	E. Terpenning	Eugene, Lane	865	14.15	13.76	3.1	17.3	81.79	183.0	Klein wanzlebener.
62	do	" "	1880	14.41	13.58	3.3	18.0	80.55	288.2	" "
63	do	" "	550	15.18	13.74	1.9	17.0	89.29	303.6	" "
64	M. H. Harlow	" "	1700	12.88	12.38	3.2	16.1	80.00	757.6	" "
65	do	" "	930	15.36	14.20	2.8	18.2	84.39	307.2	" "
66	do	" "	340	17.61	15.74	2.0	19.6	89.84	352.2	" "
67	do	" "	575	14.82	13.09	2.7	17.6	84.20	296.4	" "
68	W. W. Crow	Lorane, Lane	682	11.30	10.22	4.7	16.0	76.62	226.0	Dippe Klein Wanzlebener.
69	J. H. Crow	" "	215	15.69	14.23	2.7	18.4	90.70	313.8	" "
70	C. J. Bishop	Tidewater, Benton	875	13.42	12.24	3.3	16.8	79.88	268.4	Klein Wanzlebener.
71	W. R. Wise	New Bridge, Union	1150	13.95	12.67	4.1	18.0	77.50	279.0	" "
72	J. H. Rosebrook	Toledo, Benton	450	13.68	12.16	4.7	18.4	74.34	273.6	Dippe Klein Wanzlebener.
73	do	" "	460	13.42	11.92	3.8	17.3	77.57	268.0	" "
74	C. J. Bishop	Tidewater, Benton	927	14.68	13.95	3.9	18.6	78.82	293.6	Vilmorin.
75	John Gage	Stafford, Clackamas	720	16.05	15.07	5.3	22.4	71.65	321.0	Klein Wanzlebener.
76	do	" "	875	13.42	12.14	4.7	18.2	73.73	268.4	" "
77	C. J. Bishop	Tidewater, Benton	412	15.57	14.85	2.4	18.0	86.00	311.4	Bulteau Desprez.
78	do	" "	405	14.17	13.12	2.3	16.6	84.75	283.4	" "
79	James Wilkinson	Beaver Creek Benton	1075	12.55	11.59	4.6	17.3	72.54	251.0	Unknown.
80	Albert Brown	Philomath, "	825	12.03	11.23	4.3	16.4	73.35	240.6	"

Table of Analysis of Sugar Beets, 1891-1893.

	GROWER.	LOCALITY. POST OFFICE & COUNTY.	Weight in Grams.	SUGAR. Sugar in Juice.	SUGAR. Sugar in Beet.	Solids not Sugar.	Brix.	Purity.	Pounds Sugar per Ton.	VARIETY OF BEET.
81	J. H. Rinck	Buxton, Washington	305	15.71	14.38	6.2	22.0	71.40	314.2	Klein Wanzlebener.
82	do	do do	250	18.80	16.09	3.0	20.9	89.94	376.0	" "
83	Edw. Albright	Ashland, Jackson	325	20.56	19 30	3.1	24.7	87.21	411.2	" "
84	do	do do	255	22.24	20.99	3.2	25.5	79.88	287.6	" "
85	G. H. Baber	Forest Grove, Washington	830	14.38	13.08	3.6	18.0	76.94	292.4	
86	J. G. Stevenson	Eugene, Lane	495	14.62	13.25	4.3	19.0	58.68	151.4	Vilmorin Improved.
87	do	do do	475	7.57	5.88	5.3	12.9	70.87	226.8	" "
88	J. B. Riddle	Riddle, Douglas	865	11.34	10.48	4.6	16.0	68.04	241.0	Klein Wanzlebener.
89	do	do do	1010	12.05	11.93	4.6	17.7	83.01	380.0	" "
90	W. E. Smith	Vale, Malheur	350	19.00	17 69	2.8	22.9	81.98	272.2	" "
91	O. P. Coshow	Brownsville, Linn	450	13.61	11.58	3.6	16.6	72.16	226.6	Unknown.
92	do	do do	950	11.33	10.53	4.3	15.7	72.16	397.4	"
93	do	do do	750	9.87	8.48	1.7	11.6	85.08	200.0	"
94	do	do do	600	10.00	8.98	2.7	12.8	76.12	304.8	"
95	A. N. Ault	Forest Grove, Washington	375	15.24	15.00	6.0	21.3	71.54	266.0	Vilmorin Improved.
96	E. P. Meissner	Kebyville, Josephine	393	16.00	15.20	5.5	21.5	74.41	320.0	Early Rose.
97	A. J. Thompson	Oswego, Clackamas	325	15.20	14.40	2.3	17.5	86.85	314.0	" "
98	J. J. Odale	Union, Union	405	16.10	15.20	1.6	17.7	90.95	332.0	Klein Wanzlebener.
99	A. J. Goodbrod	do do	817	23.00	21.90	3.9	26.9	85.50	466.0	" "
100	College Farm	Corvallis, Benton	2468	12.60	11.90	1.8	14.4	90.95	252.0	" "
101	do do	eo do	2900	11.20	10.60	2.0	12.6	88.80	224.0	Vilmorin.
102	do do	do do	3326	15.50	14.70	2.2	17.7	87.50	301.0	White Imperial.
103	do do	do do	4526	13.90	13.20	1.8	15.0	92.60	278.0	Early Rose.
104	S. P. Reeder	Greenville, Washington	532	18.20	17.30	3.8	22.0	78.68	374.0	White Imperial.
105	College Farm	Corvallis, Benton	270	12.70	12.00	2.7	14.7	86.53	254.0	Klein Wanzlebener.
106	do do	do do	300	12.60	12.00	1.4	14.0	90.00	252.0	Vilmorin.
107	do do	do do	303	13.90	13.10	1.8	15.7	89.10	278.0	White Imperial.
108	do do	do do	305	10.00	9.50	1.7	11.7	85.88	200.0	Early Rose.
109	T. E. Hills	Ashland, Jackson	783	15.00	14.20	2.7	17.7	84.74	300.0	Desprez Early Rose.
110	J. M. Hirsh	Union, Union	605	17.00	16.20	1.5	18.5	93.40	340.0	Unknown.
111	College Farm	Corvallis, Benton	340	11.00	10.40	3.2	14.2	77.40	220.0	Klein Wanzlebener.
112	do do	do do	490	9.80	9.30	3.1	12.9	76.29	196.0	Vilmorin.
113	do do	do do	263	11.40	10.80	1.2	12.6	90.46	228.0	White Imperial.

114	College Farm	Corvallis, Benton	296	13.70	13.10	1.7	15.4	88.97	274.0	Early Rose.
115	H. Buxton	Forest Grove, Washington	1970	11.90	11.30	2.1	14.0	85.00	238.0	" "
116	do	do do	525	13.10	12.40	3.0	16.1	81.42	262.0	" "
117	do	do do	1045	14.30	13.60	1.8	16.1	88.80	286.0	" "
118	T. R. Cornelius	Cornelius, do	567	12.00	11.40	3.0	15.0	80.00	240.0	Desprez Early Rose.
119	Geo. R. Woodruff	Philomath, Benton	620	9.40	8.90	2.1	11.5	87.70	188.0	Early Rose.
120	do	do do	640	12.90	12.30	2.8	15.7	82.17	258.0	Vilmorin.
121	do	do do	776	11.90	11.20	2.6	14.5	82.17	238.0	Klein Wanzlebener.
122	M. P. Jones	Perrydale, Polk	1022	13.40	12.70	1.4	24.8	54.10	268.0	Vilmorin.
123	W. C. Tower	Oakland, Douglas	1938	20.60	19.60	3.7	24.3	84.32	412.0	White Imperial.
124	J. D. Rowell	Scholl's Ferry, Washington	341	19.00	18.00	9.0	28.0	67.80	380.0	Klein Wanzlebener.
125	College Farm	Corvallis, Benton	375	.....	.....	....	.....	.....	.....	Early Rose.
126	do do	do do	367	14.40	13.50	2.4	16.8	85.70	288.0	Klein Wanzlebener.
127	do do	do do	250	16.70	15.80	2.2	18.9	88.30	234.0	White Imperial.
128	B. D. Dyer	Myrtle Creek, Douglas	291	11.30	10.80	3.0	14.3	79.02	226.0	.....
129	B. E. Cartwright	Eugene, Lane	568	15.10	14.30	2.9	18.0	83.09	302.0	Desprez Early Rose.
130	Michael Lemmer	Roseburg, Douglas	458	15.00	14.20	1.6	16.6	73.40	300.0	Klein Wanzlebener.
131	O. P. Pointer	Hillsboro, Washington	538	14.70	14.00	6.0	20.7	71.80	294.0	White Imperial.
132	M. Snyder	Plainview, Linn	617	17.10	16.20	6.1	23.3	73.40	342.0	Early Rose
133	J. D. Leonard	Ballston, Polk	750	18.70	17.70	5.7	24.4	76.60	374.0	Klein Wanzlebener.
134	Jas. Edson	Carlton, Washington	1416	19.30	18.20	5.7	25.0	77.20	386.0	White Imperial.
135	S. W. Gaines	Hubbard, Marion	558	14.60	14.00	6.7	21.3	68.50	292.0	.....
136	M. O. Lownsdale	Lafayette, Yamhill	980	14.00	13.30	3.0	17.0	82.90	280.0	Early Rose.
137	do	do do	1050	12.50	12.00	3.4	15.9	78.60	250.0	Klein Wanzlebener.
138	C. J. Bishop	Tidewater, Benton	860	14.20	13.40	2.5	16.7	85.00	288.0	Early Rose.
139	M. J. Duffy	Cove, Union	676	21.50	20.40	2.9	24.4	88.10	430.0	.....
140	R. S. Reede	Creswell, Lane	660	15.30	14.40	2.7	18.0	85.00	306.0	Vilmorin.
141	B. C. Hawley	Logan, Clackamas	352	15.10	14.30	1.9	17.0	88.80	302.0	Klein Wanzlebener.
142	J. K. Simpson	North Yamhill, Yamhill	351	14.80	14.10	2.2	17.0	87.00	296.0	Desprez Early Rose.
143	B. F. Church	Monmouth, Polk	770	15.40	14.40	1.6	17.0	90.58	308.0	Vilmorin.
144	W. E. Smith	Vale, Malheur	570	20.20	19.10	3.6	23.8	84.90	404.0	Desprez Early Rose.
145	C. D. Nain	Ballston, Polk	1623	14.00	13.30	4.6	18.6	74.20	280.0	White Imperial.
146	J. H. Rinck	Buxton, Washington	165	17.70	16.80	4.1	21.8	76.60	354.0	Klein Wanzlebener.
147	Wm. Bogue	Toledo, Benton	873	15.00	14.20	3.6	18.6	80.60	300.0	Early Rose.
148	Z. W. Beatty	Chemawa. Marion	840	13.00	12.30	3.1	16.1	80.70	260.0	Vilmorin.
149	R. S. Barclay	Tidewater, Benton	210	19.40	18.40	3.5	22.9	83.40	388.0	White Imperial.
150	C. C. Stanley	Imbler, Union	310	23.80	22.60	2.1	25.9	91.90	476.0	Desprez Early Rose.
151	John End	Warmic, Wasco	330	21.10	20.00	2.2	23.3	90.50	422.0	Early Rose.
152	E. F. Meissner	Kebyville, Josephine	400	15.40	14.60	2.1	17.5	88.00	308.0	Desprez Early Rose.
153	J. H. Bard	Oakland, Douglas	623	14.50	13.70	4.1	18.6	77.90	290.0	White Imperial.
154	do	do do	843	16.10	15.30	5.1	21.2	75.90	322.0	Unknown.
155	P. J. Bond	Peel, Douglas	225	14.10	13.40	1.8	15.9	88.61	282.0	"
156	do	do do	246	21.50	20.40	2.4	23.9	85.77	430.0	Klein Wanzlebener.
157	J. E. Reynolds	La Grande, Union	633	20.90	19.80	2.4	23.3	85.42	418.0	Desprez Early Rose.
158	Robt. Deal	do do	236	16.20	15.30	6.1	22.3	76.04	324.0	Early Rose.
159	F. Clairhorn	Oakland, Douglas	323	13.50	12.80	3.1	16.4	82.30	270.0	Vilmorin.
160	W. H. Norcross	Central Point, Douglas	803	10.90	10.30	2.2	13.1	83.20	218.0	White Imperial.
161	A. H. Sampson	Lewisville, Polk	930	11.30	10.70	4.6	15.9	71.00	226.0	Vilmorin.

Analyses of Oregon grown Sugar Beets made by the Department of Agriculture at Washington, D. C. *

GROWER	COUNTY.	Weight in grams	SUGAR IN Juice.	SUGAR IN Beet.	Purity.	Solids.	Yield per acre tons.	VARIETY.
Herman Benke	Benton	370	13.88	13.18	79.3	17.49	.....	German.
J. J. Nye	"	355	13.30	12.65	78.4	16.97	7.5	"
C. J. Bishop	"	335	15.40	14.63	87.5	17.61	16.6	Bulteau Desprez.
G. H. Rosebrook	"	300	14.05	13.35	83.1	16.89	6.5	Klein Wanzlebener.
Henry Delinger Jr.	"	1589	15.05	14.30	85.4	17.64	25.9	.....
Average		628	14.34	13.71	82,8	17.32	14.12	
Thos. Daniels	Clackamas	500	19.88	18.88	87 6	22.68	16.7	.....
O. P. Yodler	"	105	14.55	13.82	86.5	16.83	.....	Klein Wanzlebener.
Richard Scott	"	1155	12.25	11.62	77.0	15.91	.....	" "
Average		586	15.56	14.78	84.2	18.47	16.7	" "
Clarence Reed	Columbia	275	16.50	15.67	83.9	19.67	17.0	" "
" "	"	830	15.60	14.82	79.8	19.67	20.0	" "
J. C. Johnson	"	535	13.90	13.21	86.0	16.17	11.5	.....
Average		546	15.30	14.56	81.7	18.50	16.2	
J. M. Perkins	Coos	1030	13 00	12.35	80 8	16 31	.....	Klein Wanzlebener,
Mat Kerrigan	"	600	14.50	13.77	83.8	17.31	.....	Vilmorin.
"	"	830	14 65	13.92	80.5	17.71	.....	Klein Wanzlebener.
John B. Fox	"	975	16 80	15.96	87.0	19.31	.....	.....
T. T. Smith	"	865	13.85	13.16	79.1	17.51	.....	Vilmorin Improved.
Average		860	14.56	13.83	82,6	17.63	.....	
W. L. Tower	Douglas	340	17.74	16.85	84.3	21.03	.....	German.
Edward Albright	Jackson	570	18.94	17.99	83,9	22.57	17.8	.....
J. G. Stevenson	Lane	115	12.15	11.54	77.5	15.67	6.5	Vimorin Improved.
W. N. Crow	"	595	14.05	13.36	77.7	18.09	.....	.....
H. L. Perkins	"	475	13.95	13.25	81.2	17.17	.....	.....
J. H. Crow	"	230	17.50	16.63	84.6	20.68	11.8	.....
C. J. Dodd	"	815	15.10	14.35	83.9	17.99	.....	French.
L. Martin	"	1100	12.67	12.05	82.5	15.35	.....	.....
Average		550	14.24	13.53	85.4	17.49	9.2	.....
John Wither	Linn	180	14.15	13.42	79.5	17.81	.....	.....
Jacob Raber	Marion	1365	12.35	11.73	76,2	16.17	.....	.....
J. Voorhees	"	560	14.45	13.73	85.7	16.87	20.3	.....
Average		962	13.40	12.73	81.1	16,52	20.3	.....
James Douglas	Polk	880	12.10	11.50	79,8	15,17	.....	German.
J. E. David	Sherman	435	13.55	12,86	72.2	18,77	.....	.....
J. H. Logan	Umatilla	395	15.12	14,36	80.9	18,69	.....	French.
W. R. Wise	Union	980	14,10	13.40	81.0	17.39	.....	.....
" "	"	1130	14.55	13.82	82,6	17.59	.....	.....
Average		1055	14,32	13.61	81,8	17.49	.....	.....
J. H. Rinck	Washington	250	12.67	12.04	85.8	14.77	12,8	Klein Wanzlebener.
A. N. Ault	"	430	15 00	14.25	82 0	18.29	15.2	Vilmorin.
"	"	1365	9.80	9.31	68.3	14.38	18.3	"
Average		681	12.49	11 86	80.7	15.48	15.4	.....
Average for State		644	14.57	13.84	82,2	17.72	15.6	

*Compiled from Bulletin No. 33, U. S. Department of Agriculture.