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AMBER CANE IN WISCONSIN.

A CIRCULAR

From the Agricultural Department of the State University,

BY PROF. W. A. HENRY.

INTRODUCTORY.

Lest the purpose of this circular be misunderstood it is well in the very beginning to explain its mission.

Last winter the Legislature generously appropriated to the State University Experimental Farm the sum of four thousand dollars for the purpose of conducting experiments in the production of syrup and sugar from Amber Cane, and for experiments in the ensilage of fodder.

With the means now at hand it remains to arrange for the greatest possible good to result from the undertaking. The act which grants the money provides that a "plain practical report" shall be made to the Governor at the close of the year, and I am anxious that this shall be one of real merit.

To obtain the best results the co-operation of all interested in cane growing is essential, and I consider that the quickest way to gain this is to make the public familiar with the proposed programme of operations. I have therefore taken this means to announce what will be undertaken in the way of experiments, and have given directions for one in which all cane growers can render efficient aid.

Since inquiries are quite frequent in regard to planting and cultivation, directions are given for this part of the work, which coming from a most reliable source cannot but be of value. The reasons for introducing other topics will ap-

pear evident, I think, to those who have the welfare of the subject at heart.

EXPERIMENTS TO BE CONDUCTED.

In compliance with the act granting the money, a chemist will be appointed early in the season, who will devote his whole time to the subject during the summer. It is expected that small works will be erected, and the operation of syrup and sugar making conducted experimentally. The attempt will be made to obtain a method for removing impurities from the juice which will admit of application by such workmen, as follow the vocation of syrup and sugar boiling. This is now the great problem and its solution is not easy. A study will also be made to determine the best means for reducing the juice to a sugar-syrup, without inverting the cane sugar. Since in the end the success in manufacturing sugar will depend upon the percentage of cane sugar in the juice, and the yield per acre, these subjects will receive due attention, and samples from various districts in the state will be analyzed to ascertain the per cent. of sucrose in the cane.

The improvement of the Amber Cane, if that be possible, by selecting seed from stalks rich in sugar, and by cross-fertilization is proper work for our farm, as well as testing new varieties and attempting to acclimatize varieties which now only ripen in latitudes south of Wisconsin.

The influence of soils on the quality of the syrup is one which, though much discussed, is far from settlement. The same is true in regard to fertilizers. Experiments to solve questions of this character can hardly be carried out on a single farm, and the attention of our farmers is earnestly directed to what is mentioned farther on in regard to this important topic.

AMBER CANE IN WISCONSIN.

Unfortunately the present law does not require statistics in regard to Amber Cane as with the other farm crops, and

consequently much valuable information is lacking relative to this new industry. It is certain however, that Wisconsin has grown a much larger quantity of cane than is generally supposed. Minnesota, where the Amber Cane excitement originated, has generally been considered as far in advance of the neighboring states, yet I believe our state nearly equaled it in the amount of syrup produced in 1880.

The area planted to cane in that state in 1880, was 7,317 acres, which if the average yield per acre was the same as in 1879, would amount to 546,383 gallons of syrup. The banner county was Le Sueur, where 580 acres were grown. Mr. George Pabodie, of Fairfield, Sauk county, Wisconsin, carefully ascertained the amount of syrup produced in his county by addressing letters to the various syrup manufacturers, and found by adding the sums reported that Sauk county produced 51,500 gallons of Amber Cane syrup in 1880. Allowing 100 gallons as the yield per acre, which is higher than the average in Minnesota, there were 515 acres of Amber Cane grown in that one county. There are several counties in the state which have produced nearly if not quite as much syrup as Sauk; among such may be named Fond du Lac, Jefferson, La Crosse, etc. Charles Eustis, of Jefferson county, grew forty acres of cane on his farm, manufacturing it with his own machinery. A. J. Russel & Co., of Janesville, grew and manufactured seventy acres, and other large planters could be named if necessary.

The wide spread interest is shown in the fact that there are now three cane-growers' conventions organized in the state. These are the Southern Wisconsin Cane-Growers' Association, which held its third annual meeting at Palmyra, February 18th and 19th; the Fox River Valley Association, which met at Appleton, March 2d, and the Wisconsin State Cane-Growers' Association, which met at Fond du Lac January 5th and 6th.

Although the rainy weather of last fall came on just at the time when the cane was ripening, and the season must be recorded as unfavorable for cane, those who manufactured for syrup are, on the whole, satisfied with the result.

THE OUTLOOK.

What are the prospects for the coming season is a question which elicits far more interest than any enumeration of past advancements. Many persons are about to invest considerable sums of money for machinery, buildings, and in planting a large acreage of cane. Will it pay the coming season as well as last is the question they would like to have answered. It is a curious coincident that just at the time when the creamery system is being adopted in the West, and the opportunity offers for the manufacture of a first-class quality of butter in unlimited quantities, that all sorts of imitation products as oleomargarine, suine, etc., should be put on the market and the trade demoralized. Now, almost in the same way, just as a means appears by which syrup of a good quality can be made, not only for home use, but for foreign trade, the manufacture of glucose assumes unthought of proportions, and it is affecting the trade in all classes of saccharine products.

Those forecasting the prices for Amber syrup should consider the peculiar condition of the market for such goods just at this time. Up to within two or three years, the demand for syrup was filled by the southern product. This, of course, will yet force itself upon the trade in some quarter if driven from our section and tend to weaken the market. Glucose is appearing everywhere and nearly always as an adulteration; with the large number of manufactories for the product which are now being put in operation, the price will be cheapened and the inclination to mix it with other syrups greatly increased. The effect of this can hardly be calculated, but in my opinion can not easily be

over estimated. Then the greatly increased acreage of Amber Cane will give us a greatly increased amount of syrup.

I am of the opinion that Amber syrup has created a market for itself to such an extent that this year twice the acreage of last could find a good home market, but when I hear that in some localities fifty times as much as last year will be grown, I become anxious lest next fall our syrup should go begging a market at twenty or twenty-five cents a gallon. If there was a possibility for turning the syrup into sugar the demand would be unlimited, but that fortunate era has not yet dawned. If the market is overstocked next fall this industry will receive a shock from which it will not recover in years.

SUGAR FROM AMBER CANE.

Chemistry shows that the amount of crystallizable sugar in Amber Cane is almost equal to that in the Ribbon Cane of the South, and enthusiasts have figured the number of pounds of sugar that an acre of ground will yield, and have given the large profits which would follow. These results look very well on paper, but unfortunately no one has yet made a fortune in producing sugar from Amber Cane. Our present methods are yet so imperfect that all effort thus far must be denominated experimental. Secret processes are offered to the credulous for sums varying from five dollars to five thousand, which will enable the person employing them to make sugar in unlimited quantities, and at rates which will pile up a fortune in a season.

Strangely, however, these venders prefer to peddle their methods about the country rather than use them to secure the fortune for themselves.

In 1879, a couple of car loads of good brown sugar was produced at Crystal Lake, Illinois. This seemed to indicate that the way was now open for the manufacture of sugar, but unfortunately we hear of none of those engaged in that undertaking having put sugar on the market this

year. I hear of amounts of a ton or two being produced in several places, but such results are experimental and not commercial. Yet we know that the sugar is in the cane, and can rest assured that the method of obtaining it will not much longer remain a mystery. Professor Scoville, of the Illinois Industrial University, conducted a series of experiments last season which are most interesting. I give here-with a short extract from his lecture before the Mississippi Valley Cane Growers' Association at its St. Louis meeting.

In a summary he gives the following general conclusions :

“First. From the results above given, it appears that crystallizable sugar can be obtained from the early Amber and Orange cane, of as good quality as that of the ordinary brown sugars found in the market. And from trials made, good white sugar can be made from the raw sugar by refining.

“Second. To insure the production of and best yield of cane sugar, the juice must be treated with lime. If, after skimming, the lime be neutralized with sulphurous acid, or sulphate of alumina, the syrups obtained will be of a light color, otherwise the excess of lime will cause the syrup to be dark.

“Third. From the proximate analysis of the canes, it appears that one acre of the Orange produces 2,559 pounds of cane sugar. Of this amount we obtained 710 pounds in the form of good brown sugar, and 265 pounds were left in the 727 pounds of molasses drained from the sugar. Hence 62 per cent. of the total amount of sugar was lost during the process of manufacture. This shows that the method of manufacture in general use is very imperfect.

“Fourth. The 710 pounds of sugar at 8c per pound, would be worth \$56. The molasses, at 25c per gallon, \$18.75, or the product of an acre would bring \$75.55, leaving out of the question of the value of the 30 bushels of seed, which some claim to be worth the cost of manufacture. The cost of manufacture would of course, vary with the amount manufactured and the distance of the cane from the mill, etc., so that no definite figures can be given. There is no question but with more perfect machinery, the above yield could be increased one-third.”

It is hoped that when proper means of defecation are discovered, the University will be in condition to give young men a course of training which will enable them to intelligently apply the directions and become experts in this work.

THE CENTRAL REFINERY SYSTEM.

It matters not how many discoveries may be made or what perfection may be reached, it will never be profitable, in my judgment, for the farmer to manufacture sugar in small quantities. Competition will force us to adopt the system now becoming common at the south. I can give nothing that is so clear on this point as Dr. Wilhelm's statements in his pamphlet on "Amber Cane and its Productions." In speaking of the attempt to make sugar in Minnesota, he says :

The planters of this State during the past year have raised about eight thousand acres of cane, all expecting to make sugar and refined syrup. Disappointment has met them all along the lines; nothing but crude syrup has been the result. Small crushing mills and open fire evaporators are very good as neighborhood fixtures for making crude syrup for domestic use, but for making sugar on a commercial scale we deem them a failure, and the sooner our planters find this out the better off they will be. The small amounts of sugar made by these operations was nothing more than what is generally denominated accidental. The only basis by which this business can be made successful is by the central system.

* * * * *

The central refinery system is the only successful one to operate. The planter figures his cost and probable yield; he is certain of a cash market for all the goods he can produce at the central refinery; hence the business, to a certain extent, is co-operative — one dependent upon the other, but each conducting their separate parts of the business. As convincing proof of our plan of operations, we have now parties figuring on machinery to work up from 100 to 500 acres. We want to be carefully understood on this question, for there are people in all communities who are willing to be influenced by those knowing but little how this business should be conducted; hence they plunge into heavy expense and find out too late their egregious mistake. To all those we refer to our present words of warning. Even in Louisiana this central system is being adopted. A great many planters cannot afford large field machinery; then a large set of field works can either buy their cane or

work it on shares. By so doing all find it profitable. The refiner prepares for his part of the work; the field operator and planter for theirs; so that all work in unison, thereby a grand result is the ultimatum and both parties handsomely rewarded. Another object attained by steam trains is the economy of fuel. Where fuel is scarce on the prairies the furnaces can be so constructed as to burn all the bagasse (or cane stalks), thereby working on quite an economical basis.

PROFITS OF CANE-GROWING.

To those in doubt as to whether it is pays to grow cane, I would refer the following letter sent me by one of our careful farmers. It is the most complete statement I have yet seen and deserves careful attention:

KENOSHA, WIS., Feb. 26, 1881.

PROFESSOR W. A. HENRY, Madison, Wis.

Dear Sir:—I herewith give you the result of growing one acre of amber sugar cane in 1880. The plot of ground is composed of black muck, verging into a sand loam, two-thirds of the plot being the former and one-third the latter. There were about four rods of very low ground on which the cane grew very rank and lodged. There was no waste ground. In 1879 it was heavily manured and a *very heavy* growth of drilled fodder corn raised, and plowed that fall. The ground was dragged and marked in rows one way, three feet and a half apart, extending north and south, on May 20th, and on May 21st it was planted by hand, dropping the seed in the marks made by the marker and covering with the foot. Two pounds of seed were used. One half of it was planted from twelve to eighteen inches apart and the other from twelve to twenty-five inches. I think it would average seven or eight seed to a hill. It was then rolled, and cultivated twice with a two-horse cultivator. One man spent one day on the piece with the hoe cutting out grass between the hills. This would not have been necessary had the seed come up evenly. One third of the piece was dry and the seed not being covered any deeper, did not come up for two weeks, hence could not cultivate it evenly. It was stripped by hand at intervals from September 14th to September 27th, cut and bound September 28th, drawn to mill on the 29th and 30th, carefully weighed and piled. Total weight $13\frac{1235}{2000}$ tons.

The first half, or that planted the thickest, weighed about eight tons and the other half $5\frac{1235}{2000}$ tons. The cane was made up October 7th, and yielded one hundred and seven-

ty gallons of syrup, weighing eleven and a half pounds to the gallon. The juice tested $7\frac{3}{4}$ by the saccharometer and was boiled down to forty. There was one load of leaves saved for fodder and three double boxes of seed which was fed to the pigs. I estimate the value of the crop as follows:

DR.	CR.		
To interest on land.....	\$2 00	By fodder.....	\$10 00
half days' work plowing..	1 50	170 gallons syrup at 50c...	85 00
dragging and marking...	50		
two pounds seed.....	70		\$95 00
planting.....	1 00		
hoeing.....	1 00		
cultivating.....	1 00		
stripping.....	6 00		
cutting and binding.....	3 00		
topping and hauling.....	10 30		
hauling fodder and feed..	1 00		
4 barrels at 75c.....	3 00		
making 170 gal'ons at 20c	34 00		
	\$65 00		
Balance	30 00		
	\$95 00		

M. O. MYRICK.

SEED.

Too much attention cannot be paid to the initial step in securing a good yield of syrup. Testimony upon this subject is very variable, and it seems that there have been no rigid tests made to discover whether seed from points to the north or south of us produce the best cane. At the Minnesota convention, held at Minneapolis, January 22d, 1880, the following resolution was passed:

Resolved, That early amber seed grown in the latitude of St. Louis, is the best for Minnesota for two years.

I find nothing in reports of conventions of 1881 which shows that opinion is at all settled upon this question.

It is urged upon persons having seed of any particular merit to forward a few hundred grains at once in a letter to this department, stating in what particular it is supposed to be valuable. A careful test will be made of such, the account published in our report and due credit given to the sender. I am desirous of obtaining seed of varieties which do best at points south of Wisconsin for experiments in cross-fertilization and acclimatization. Persons wishing

to obtain seed will be given the address of parties having it for sale upon application to this department. Those having seed for disposal are urged to send at once the name of the variety, the price they ask for it, and the quantity for sale. The department has no seed for distribution this year.

PLANTING AND CULTIVATION.

The following directions upon this subject are kindly furnished me by Mr. Charles Eustis, of Fort Atkinson, who, as mentioned on a preceding page, grew forty acres of cane last year.

"Have the ground well manured and plow deep; do not 'cut and cover.'" Pulverize the soil by harrowing until it is as mellow as a garden. Mark the ground as for corn, only having the rows but three feet apart each way. If you prefer drilling have the rows run north and south. Drop the seed in the check with ten or twelve seeds in each hill. Cover with moist earth one inch deep. If a horse planter is used the seed will come up evener and quicker. Just as soon as you can see the rows two rods ahead start in with the cultivator. A two horse sulky cultivator made narrow is the best, having the shield set so as to throw the earth away from the hills. Do not wait until the cane is three or four inches high before you commence cultivation, for by that time the weeds and grass will be higher than the cane. Keep the cultivators going until the cane is about six inches high, working as near the hills as is possible. Now go through and remove with the hoe all weeds that the cultivator left. Thin to six or eight stalks or if the ground is *very* rich allow ten or twelve to remain. Remember that you cannot cultivate too much. Keep the cultivator in the field as long as you can drive a horse through the cane. When you are forced to stop work the leaves will so shade the ground that it will keep moist and no weeds can grow. If you follow these directions carefully you will be almost certain to raise a large crop of cane."

MACHINERY.

Fortunately for the farmer, competition is so sharp among manufacturers that poor machinery is rapidly being driven from the market. This department has not the facilities nor have we the time to conduct a series of experiments with the different mills and evaporators to determine the relative merits, but it is urged upon those in charge of our annual fairs to put all machinery on exhibition to the test.

Have half a ton of cane put through each crusher on exhibition and report the number of gallons of juice expressed.

The Madison manufactory, which is the only firm in the state making mills, I believe, has generously given a crusher for use by the department, and we feel that we have as good a mill as is now in the market.

EXPERIMENTS IN GROWING AMBER CANE.

At the meeting of State Cane-Growers' Association held at Fond du Lac last January, I was impressed with the conflicting statements which were made as to the soil best adapted to cane-growing, and the influence of manure on the quantity and quality of the syrup. After trying in vain to tabulate the reports and attain something like uniformity, the attempt was given up as useless, and it was agreed that those interested should conduct a series of experiments to settle these doubtful points. The directions for these experiments were to emanate from the Agricultural Department of the State University, and as many persons as possible induced to help perform them. Although the attention of the farmers has not been called to this experiment as it should have been, nevertheless forty-three have informed me, either personally or by letter, that they would aid in this movement. It is urged that others join in this movement and help in settling questions which must wait for answer until just this kind of work is done.

I ask, then, that each farmer who expects to grow cane the coming season, study the directions for the experiments as here given, and if he is willing to follow them, to send me his name at once, so that I may know how many are working in this line, and can record their names for reference in case it is desirable to send additional instructions or modifications of those given below.

Here is an opportunity for our farmers joining with the University Experimental Farm in work for the advancement of Agriculture in Wisconsin, and I urge that our cause fail not through lack of adherents.

DIRECTIONS FOR THE EXPERIMENT.

Select in the field where cane is to be planted three plots of ground, each containing not less than ten square rods and lying side by side. The ground should be as uniform as possible in its composition and fertility. Do not select soil where one end of the plot is sand and the other loam or clay. No matter which it is, but have it all of one character. Have the plots if possible long and narrow, say one rod by ten, or two by twenty, etc. The plots should lie

side by side and should not be separated from one another or the rest of the field. One plot, No. 1, plow in well-rotted stable manure at the rate of sixteen large loads per acre — one load for every ten rods. Plot No. 2, which is to be the middle plot, has no manure of any kind upon it. When the cane on plot No. 3, is three or four inches high, apply plaster to the hills or rows to the amount of one hundred and sixty pounds per acre, or ten pounds for every ten rods. The cane is to be planted and cultivated in the same manner as the rest of the field. If possible, weigh the cane of each plot separately when ready for the mill. Boil the juice to a syrup weighing eleven and a half pounds per gallon, and determine accurately the yield of each plot. Save a sample of syrup from each plot for comparison.

Report to the department upon the following points:

1. Amount of ground in each plot.
2. Character of soil—clay, loam, sand, etc.
3. Is soil naturally rich or poor?
4. Number of years the field has been in cultivation.
5. Crops grown on field previous year.
6. Whether or not the field was manured the previous year.
7. Method of planting cane—in drills or hills.
8. Time of planting.
9. Time of ripening.
10. When manufactured.
11. Yield of syrup from each plot.
12. Character of syrup from each plot as to color, clearness, and flavor.

In addition to the above, give any facts of interest in connection with the experiment, making the report as full as possible.

All reports should be sent in by the first of December, and the samples of syrup from each plot should be preserved until some method is devised for collecting and comparing them.

CONCLUSION.

In concluding this most hastily written circular, I take occasion to urge upon those interested, to send in any facts they may possess that will help us along in the work. All letters of inquiry will receive attention. I shall send these circulars to every cane grower whose name I now have on my list, but this is *very* incomplete, and I ask those who may receive it to send in the names of neighbors who are interested and help to scatter it over the state. All facts worthy of public attention during the growing and manufacturing season will be announced in the *WISCONSIN FARMER*, published at Fond du Lac.

MADISON, WIS., April 12, 1881.