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UNITED STATES OF AMERICA.

SORGHO SUGAR GROWER

The Culture and Manufacture of Sugar
and Sirup from the

CHINESE AND AFRICAN CANES.

PUBLISHED BY

WEBSTER & CO.,

AGENTS FOR THE SALE OF THE

EUREKA SUGAR PRESS,

FOR MAKING SORGHO SUGAR.

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SORGHO SUGAR GROWER.

THE CULTURE AND MANUFACTURE OF

SUGAR AND SIRUP,

FROM THE

CHINESE AND AFRICAN CANES.

INTRODUCTION.

IN the year 1851, Count de Montigny, Consul of France, at Shanghae, China, forwarded to Paris, some of the CHINESE SUGAR CANE SEED, called Sorghum, being its first appearance in Europe. In the month of November, 1854, D. J. Brown, Esq., an agent of the United States Patent Office, obtained from M. Vilmorin, a Parisian agriculturist and seedsman, a limited quantity of the Chinese Sugar Cane Seed,—this being its first introduction in the United States, and was first planted in this country in the year 1855. In March, 1857, Mr. Leonard Wray, of England, arrived in New York, bringing with him, from France, a

quantity of the African Sugar Cane Seed, called Imphee. There are several different kinds of both the Sorghum and Imphee, comprised in botany under the name *Holcus Saccharatus*. In this treatise we use the term *Sorgho*, which includes all the varieties of both the Chinese and African. The cultivation of these canes, and the manufacture of sugar and sirup from them in this country, has been a matter of experiment for several years, which has, through the persevering disposition of the enterprising yeomanry of our land, been reduced to an absolute certainty, not only in the manufacture of syrup equal to the best Sugar house Sirup, but in the production of fine granulated sugar. Experience has already demonstrated that the choice varieties of Sorgho, when properly cultivated, will compare favorably, in point of richness, with the sugar cane *Saccharum Officinarum* of the tropics, from which is made the *brown or Muscovado* sugar of commerce; known as the Cuba, Havana, Louisiana and New Orleans sugars.

This brief treatise is not founded upon theory, but is based upon the plain and practical results of the ten years experience of the Sorgho growers in the United States.

Sorgho growers have recourse to a large number of cane mills for the expressing of cane juice from the Sorgho stalks, and numerous evaporating devices for reducing the juice to sirup, but they have been in need of one link, and that an

important one, to make the chain complete, for the manufacture of *Dry Sorgho sugar*.

In behalf of the inventive genius of America, we take pleasure in announcing to the Sorgho growers that the desired link is found, and named the EUREKA SUGAR PRESS, for separating pure sugar from *granulated* Sorgho sirup, in paying quantities, equal to prime New Orleans, and the best coffee sugars.

WHAT IS SUGAR?

CHEMICAL analysis shows that *Cane Sugar* is composed of twelve parts carbon, 11 of oxygen, and 11 of hydrogen. In the cane stalk are found; 1st. Cells containing sugar and water, and, 2d. Tubes, or vessels, for conveying the crude sap from the roots to the leaves. Crude sap consists of water, holding in solution amoniacal gases, carbonic acid, and saline matters. Arriving at the leaves a chemical change takes place, and by a natural process, cane sugar is deposited in the cells of the plant. A microscopic examination of a section of Sorgho cane stalk shows the pure white crystals of cane sugar as well developed as in the best double refined sugar. And the perfection of cane sugar manufacture would be the extraction of the pure white sugar,

Saccharum Purum, without change of color or the formation of molasses. Naturally there is no molasses in the cane. But cane sugar is of so sensitive a composition that it is easily changed in the manufacture from cane to *grape* or *uncrystallizable sugar*. This change is principally produced by *imperfect and long boiling*. A slow heat induces fermentation of certain parts; an excessive heat scorches the crystallizable portion, thereby decomposing the granules, and the result of either extreme is molasses. When we arrive at a perfect system of extraction of the sugar from the cane, the result will be pure white sugar, without refining.

BEST VARIETIES OF SORGHO CANE FOR SUGAR.

THE great object should be first to obtain those varieties of sugar cane that have proved to be the most successful in crystallizing. The *Oom-see-a-na*, known as black Imphee, and *Nee-a-za-na*, called white Imphee, mature early, and are considered by many experienced sugar growers to be superior to other varieties, as possessing more crystallizable sugar. And the common *Sorghum*, when properly evaporated, *will readily crystallize*, as many of the sugar growers have told us that they can furnish "*mush sugar from the common Sorghum, by the ton.*"

CULTIVATION OF THE SORGHO CANE SOIL.

THE soil best adapted for the cane is light, loamy, rolling land. Sandy soil is preferable. Do not plant on low, mucky ground. Sorgho, when grown on sandy soil, contains less vegetable albumen,—which is the substance that gives the sirup the green or rank taste,—than that grown on low and rich lands. Cane raised on manured land usually yields sirup very acid, of a dark color and a rank taste, containing a large amount of vegetable matter and grape sugar. The light, barren soils produce the best flavored sirups, and the lightest colored sugar.

CULTURE.

IN preparing the land, *plow deep*, as Sorgho roots are very penetrating. Fall plowing is considered preferable. Loosen the ground thoroughly in the spring, either with a heavy harrow or cultivator. Ridge the ground with a light plow, as for sweet potatoes, from North to South, four feet apart; by so doing the ground will be kept *warm and dry*. When the level soil is cold and wet, by ridging from ten to fifteen days time may be gained in ripening the stalk. Plant or drill

in the seed on the ridges, about every eighteen inches, or plant in hills the same as corn. About two quarts of seed per acre are required.

SPROUTING SEED.

PUT the seed into a cloth bag and soak in warm water twenty-four hours, then bury the bag in a warm soil, manure or steam pit, until sprouted, which will usually require from two to four days. Two weeks time may be saved in the ripening of the cane, by sprouting before planting. Plant *shallow, not over one inch deep*. Deep planting checks its growth, and frequently rots the seed, therefore plant shallow—half inch is sufficient.

PLANTING.

PLANT as early in the spring as the weather will admit. Many Sorgho growers put from ten to twenty seeds in a hill, with a view of having main stalks enough, so that they will not sucker, this being prevented by having a large quantity in the hill, although the stalks will not grow as large; but it is claimed that moderate sized stalks yield a juice of a less rank taste, hence, they will make a better quality of sirup and sugar. Plant *shallow, very shallow*.

CULTIVATION.

WHEN the plants are up, which in fair weather, will be in four or five days, use a small plow or cultivator, and work the same as corn.

WEEDS.

ALLOW no weeds to grow among the cane, as they materially check its growth and detract more or less of its saccharine richness.

STOP WORKING THE CANE.

AFTER the cane is two and a half or three feet high, it *should not be worked*, as it is kept growing longer, and thus prevents early ripening. Many work their cane too late in the season to insure a good crop, *especially for sugar*.

SAVING THE SEED.

THE Sorgho grower should pay careful attention to the selection of seed, by adopting a system of reproducing from the best samples.

The most important qualities in the cane are

saccharine richness, per centage of juice, large stalk, granulating properties, and in the Northern States, where the seasons are short, the seed should be selected with particular reference to *early maturity*; and these qualities should, so far as possible, be all combined.

In every field of cane some stalks *ripen earlier*, some grow to a greater size, some are more juicy, and some richer in sugar than others. It should be the aim of every planter to select from his growing cane the individual stalks which most fully combine these qualities, and gather the seed which they yield for the next season's planting. This process should be pursued from year to year, always producing from the richest, the largest and the earliest stalks, and thereby prevent the rich Sorgho from deteriorating. Collect the seed from the early stalks as soon as it is fairly into the dough, by cutting off the tufts—and only those that are perfectly matured on the stalks combining the above described qualities—and then strip off the lower footstalks of the tuft, tie them in small bundles, and hang them in a *dry shelter*, where they will be secure from the mice, rats and the rain.

WEIGHT OF SEED.

ORGHO SEED weighs forty-eight pounds to the bushel.

HOW TO PURCHASE GOOD SEED.

THE safest method in purchasing seed is upon the tuft, when, if sold by weight, a deduction of one-tenth for the weight of stalk, etc., would be about a fair rate of discount.

HYBRIDIZATION.

THE seed of Sorgho, if grown near either Indian or Broom Corn, is liable to be affected, even at a distance of sixty or eighty rods. In gathering seed for planting, secure that which grows the farthest from fields of Broom or Indian Corn.

HARVESTING.

THE time to commence gathering the cane will differ greatly in different localities and different seasons, but as a general rule in the Northern States it is from the middle of September to the first of October, or soon as the seed is ripe; which may be determined by the dough in the seed being stiff and hard.

The cutting should then be proceeded with expeditiously to secure the crop from danger of frost.

The stripping of the leaves from the stalk can be accomplished just before cutting or soon afterwards. It is believed by many that by gathering the cane with the leaves on it and retaining it thus *under shelter* for a few days, it will add somewhat to its saccharine properties.

SHELTER THE CANE.

BUT it is absolutely necessary that the cane should be protected from the storm, or the leaves would soon mold and *impart an unpleasant flavor* to the sirup and sugar. Do not let the butts of the cane touch the ground, as dirt will adhere to them, and have a tendency to make the sirup dark colored.

USE NO UNRIPE CANE.

IN gathering *reject* the *unripe* and *inferior* canes. Cut the cane stalk about six inches from the ground, and clip off about three feet from the top—using the balance. The top of the cane stalk contains a greater amount of acid and *Poetene*—a dark, bitter substance—than the main body of the stalk. Therefore, by removing the top a better quality of sirup and sugar is obtained.

CANE TOPS FOR FODDER.

THE top of the stalks when cut off should not be wasted. The seed heads, together with about three feet of the top of the stalk, should be cut off and tied into small bundles with the leaves; they are considered better food for every kind of stock than sheaf oats, thus making a valuable addition to the farmer's stock of fodder.

CANE MILLS.

USE the best mill for expressing the juice from the cane, that will accomplish its work effectually without loss of the juice.

SHOCKING THE CANE.

IF it is not convenient to press the juice out of the cane immediately, it should be shocked after the method adopted by farmers for corn stalk fodder. But it should not be allowed to remain in the field but a few days. It must be removed to a barn or shed, so as not to be exposed

to the *rain or frosts*, otherwise the saccharine richness will be more or less deteriorated.

FROZEN CANE.

FREEZING will almost, if not wholly, destroy the *granulating properties*. Cane fully ripe is much less liable to injury from frost than green cane. *Ripe cane*, when protected from the *rain and frost*, will keep unchanged for months.

SIRUP FROM GREEN CANE.

DO not in any instance use the juice from the suckers for making sugar, as it *will not* granulate with any certainty, and if mixed with the juice of the ripe cane, will prevent that from granulating to a great extent. The same rule applies to unripe cane, which will not make good sugar in paying quantities. It will make what is termed "Grape Sugar," a thick, gummy substance—similar in appearance to candied honey—containing but very little granulated sugar. Neither will the green cane, which contains more acid, make as good sirup for the table as the ripe cane. For, when fully matured, it has passed through a natural chemical change.

DELICIOUS COMPOUND.

SORGHO Molasses when prepared from green cane, and imperfectly boiled, and scorched—which is frequently the case—makes a crude article that is used quite extensively in the Northwest, and is *almost* as palatable as a compound of *vinegar, nut galls, tar and aloes*. This may be considered a *slight* cause for the prejudice which many persons have formed against the use of the extract of Sorgho.

PURIFYING AND NEUTRALIZING.

THERE are a variety of opinions in regard to the necessity of using something to neutralize the acid and purify the juice of the Sorgho cane when boiling. Various agents have been used, such as *Lime, Soda, Potassa, Saleratus, Alum, Cream of Tartar, Alcohol, Milk, Animal Charcoal, &c.* The majority, thus far, appears to be in favor of lime. In the manufacture of the *Brown Sugar* of commerce, in the West Indies and Louisiana, lime is almost wholly used for neutralizing the acid. (See manufacture of sugar, page 33.)

Soda or saleratus is also highly recommended by many sugar growers. And some of the leading

Sorgho growers claim that *ripe cane juice* does not require any neutralizing agent, especially where cane fully matures on warm sandy soil.

THE COMMON NEUTRALIZER.

LIME—(*Calx.*)

THE ordinary quick-lime is procured from common limestone by burning. By mixing an excess of lime with water, so as to form a thick liquid like cream, the mixture is called *milk of lime*, which is used in preparing cane juice for sugar.

Persons unacquainted with the chemical change that takes place when lime and acid are co-mingled, seriously object to its use; they supposing that the lime actually remains to be digested in their *stomachs*. While the fact is, that a perfect neutralization takes place, and nothing but a neutral sediment remains, which usually attaches to the pan or pipes, and is therefore perfectly harmless.

EVAPORATING.

AFTER the juice has been pressed out of the cane it should be evaporated *immediately*. By using an appropriate evaporating apparatus, scorch-

ing or coloring the sirup will be prevented, and the sirup produced will be clear, like new honey. Filter the juice carefully through sieves or straw, or coarse cloth, before running it into the evaporator. Boil down as rapidly as possible. Should the sirup show a disposition to froth a little, fresh butter or lard may be used. Never throw the white scum back into the pan, as it retards the crystallizing of sugar. Boil rapidly, and *skim thoroughly and frequently*. Evaporate the sirup to about 45° by the Saccharometer, or until the steam escapes in little puffs, it will then hair or stretch out to a long slim thread when it is rubbed between the thumb and finger. This is considered by some a better test than the saccharometer.

Sirup cannot safely be evaporated beyond this point over the naked fire, and if not removed immediately it may burn.

It is now ready to run off into coolers. SCORCHED OR BURNT SIRUP WILL NOT GRANULATE with any certainty.

SUGAR COOLERS.

SOON as the sirup is sufficiently evaporated, immediately run it off into shallow wooden vats, say two by five feet, and six inches deep,

is a very suitable size. The sirup should not remain in a body, while hot, to exceed one or two inches in depth. If it retains a great heat for some length of time, it has a tendency to give the sirup a dark color, and lessen its granulating properties.

CRYSTALLIZATION.

AFTER the sirup has cooled off in the coolers to about blood heat, then pour it slowly into the granulating vats. *Do not put the sirup in barrels if you wish to make sugar.* On the Louisiana sugar plantations, the ordinary sized vat, for granulating the Southern sugars, is six feet long, two feet wide, and one foot deep. This is a very convenient size for granulating Sorgho. To keep out the flies, cover the vats with thin muslin or musketo bars. Keep the rooms which contain the sirup in vats, about 90° Far.,—on no account should it be allowed to get below 75°. Stir four or five times per day, and granulation will usually be effected in from two to fifteen days. To hasten granulation, add two or three pounds of dry sugar to a vat of the sirup, and stir it thoroughly. As the sugar granulates it will settle to the bottom of the vat. It is then termed *Mush Sugar*. The farmers have

heretofore experienced great difficulty in separating the sugar and molasses, or, in other words, to *dry the mush*.

MUSH SUGAR.

WE are told by many Sorgho growers that they can furnish the *Mush Sugar by the ton*. Others say, "*I did not try to make Sugar, although my Sirup grained nicely.*" But they complain that they cannot successfully drain it. Sorgho molasses contains a large amount of a peculiar mucilage that prevents the sugar from draining on the Louisiana Sugar house plan, by which the Southern sugars are drained in from forty to fifty days after granulating in the open vats as above described.

This difficulty of draining has prevented most of the Sorgho growers from making any effort to granulate the sirup by evaporating it to the consistency required to crystallize; or, when properly boiled, they put it into close barrels, which, in most instances, prevent granulation.

THE DIFFICULTY REMOVED.

SCIENCE has come to the relief of the sugar grower, by the introduction of a peculiar constructed device.

THE EUREKA SUGAR PRESS.

BY the use of this valuable invention, a clear, light brown and lively sugar can be made from the *mush* in one hour's time, and at the same time prepare a delicious sirup, ready for the table.

FARMERS MAKE YOUR OWN SUGAR.

THE farmers need have no trouble in the future relative to making choice sugar from the *Chinese or African Sugar Canes*.

SIX POUNDS OF SUGAR FROM ONE GALLON OF MUSH.

FROM one gallon of mush weighing twelve pounds, the EUREKA SUGAR PRESS will make, on an average, six pounds of prime sugar, and two quarts of delicious sirup. *No heat or chemicals used.*

TEN CENTS PER POUND SAVED IN SUGAR.

TO buy the mush at the present price,—one dollar per gallon,—and manufacture Sugar equal in quality to that now sold in market for

eighteen cents per pound, it would not cost to exceed eight cents per pound, thus *saving ten cents* per pound by the use of this admirable invention.

GRAPES, CURRANTS, PIE PLANT, ETC.

THE EUREKA SUGAR PRESS is not only designed to manufacture sugar, but is also adapted to expressing the juice from grapes, currants, strawberries, gooseberries, pie plant, etc., etc., in a pure state, for the preparing of wines, etc. Also for making cider, and the separating of whey from cheese-curd, and lard and tallow from the scraps after they have been rendered, and in fact all kinds of juices and liquids that the farmer or manufacturer desires to separate from the solids, which can be done in a remarkably short space of time, *without heat*, or any loss of the materials. *Every farmer's wife throughout the land will have a machine* as soon as she can see one in operation. No puffing is required for this invention, as the Press speaks volumes for itself, and stands on its own merits.

VINEGAR FROM THE SCUM.

THE white scum makes excellent vinegar, made in the same manner as cider or molasses vinegar.

BAGASSE, FOR FUEL AND OTHER USES.

BAGASSE,—pressed cane stalks,—when dry, make good fuel. It is also valuable for the manufacture of paper.

VALUE OF SORGHO PER ACRE.

FROM an extensive investigation of the raising of Sorgho in the Northwestern States, the following is considered a fair estimate of the average cost and yield per acre.

EXPENSE—COST OF RAISING AND MANUFACTURING ONE ACRE OF SORGHUM,

Use of one acre of land.....	\$5.00
Preparation of soil for planting.....	2.00
Seed, 2 lbs., @ .50.....	1.00
Planting of seed.....	.75
Working through five times with cultivator and plow.....	5.00
Hoeing, weeding and thinning.....	2.00
Cutting of tips of stalks and tying in bundles.....	2.00
Stripping leaves.....	1.50
Three hands, with team, to cut and boil three days.....	15.00
Wood, one and one-half cords.....	3.00
Interest on machinery.....	6.00
Wear and tear of machinery.....	6.00
Two days work pressing sugar.....	4.00
Total expense.....	<u>\$49.25</u>

YIELD PER ACRE.

ON one acre of land there can be raised from 15,000 to 20,000 fully matured Sorgho cane stalks, which will produce from 1,500 to 2,000

gallons of rich cane juice, weighing 9 lbs. per gallon, yielding when properly evaporated, from 150 to 200 gallons of choice sirup, weighing 12 lbs. per gallon. As soon as thoroughly granulated, it is ready for the *Eureka Sugar Press*. One gallon of granulated sirup (or mush), will make 4 to 8 lbs. of *Prime Dry Sugar*, worth, at present prices of sugar, 18 cts. per lb. The balance is choice sirup, worth, at present prices, \$1.00 per gallon.

ESTIMATED AVERAGE YIELD PER ACRE.

Number of fully matured stalks.....	17,000
Gallons of rich cane juice	1,750
Gallons of choice sirup.....	175
Number of pounds of <i>Prime Dry Sugar</i> $\frac{1}{2}$ gall., 6, realizing @ 18c. $\frac{1}{2}$ lb., \$1.08, and 2 qts. choice sirup @ \$1.00 $\frac{1}{2}$ gall., 50c, making \$1.58 $\frac{1}{2}$ gall. of sirup, which, at 175 gallons $\frac{1}{2}$ acre, is.....	\$276.50
Ten bushels of seed $\frac{1}{2}$ acre, worth if gathered with top of stalk for feeding stock, at least,.....	10.00
Total receipts per acre.....	\$286.50

NET PROFITS.—RECAPITULATION.

175 gallons of sirup, yielding 6 lbs. of sugar $\frac{1}{2}$ gall., pro- duces one thousand and fifty pounds of prime dry sugar per acre, @ 18 cts. $\frac{1}{2}$ lb.....	\$189.00
The balance 87½ gallons choice sirup @ \$1.00 $\frac{1}{2}$ gall.	87.50
Ten bushels of seed, if gathered with top of stalks, for feed- ing stock are worth at least.....	10.00
Gross receipts per acre.....	\$286.50
Cost of raising and manufacture.....	49.25
Net profits per acre of Sorgho.....	\$237.25

SAVED BY USING THE EUREKA SUGAR PRESS.

175 gallons granulated sirup worth \$1.00 $\frac{7}{8}$ gall.,.....	\$175.00
175 gallons granulated sirup when made one half in prime dry Sugar, the remainder in choice sirup, both are equivalent when separated, as above shown, to \$1.58 $\frac{7}{8}$ gall., saving 58c. $\frac{7}{8}$ gall. on 175 galls., or, amount saved by the Press on the product of one acre.....	\$101.50

VARIETIES OF IMPHEE.

R. LEONARD WAY introduces fifteen varieties of Imphee as the product of Caffraria, Southeastern Africa, the country of the Zulu-Caffres, in latitude 30° South. The following are the Zulu-Caffre names of the fifteen varieties :

Oom-see-a-na,	Koom-ba-na,
Nee-a-za-na,	Shla-goo-va,
E-a-na-moo-dee,	Zim-ba-za-na,
Boom-vwa-na.	E-en-gha,
Shla-goon-dee,	See-en-gla,
Zim-moo-ma-na,	E-thlo-sa,
E-both-la,	Vim-bis-chu-a-pa.
Boo-ee-a-na,	

Of the above named varieties the *Vim-bis-chu-a-pa* is the largest and the richest. It grows to the height of twenty feet, and the stalk is from two to three inches in diameter. But it requires from four to five months to mature in a tropical climate, therefore it cannot be matured in the North with any

degree of certainty. The same may be said of many of the other varieties. Of the fifteen varieties of Imphee, only two, the *Oom-see-a-na* and *Nee-a-za-na*, are grown to any extent in the Northern States.

SORGHUM.

THE Chinese Sorghum is generally raised by most of the sugar growers in the North, and is already too well known to require any particular description.

EGYPTIAN.

OF Sorghums, there are in Egypt six different kinds, namely :

Dou-ra Hum-ra,	Dou-ra Kay-dee,
Dou-ra By-ood,	Dou-ra Suf-fra,
Dou-ra Say-fee,	Dou-ra O-way-geh.

The above varieties of Egypt are not grown to any extent in this country.

IS IT O-TA-HE-IT-AN ?

IN some parts of the Northern States the sugar growers are cultivating a variety of cane which they call O-ta-he-it-an. It yields a large per

cent of saccharine richness, and crystallizes more readily than any other variety of cane.

But, upon investigation, the Otaheitan cane is found to be one of the varieties of the India cane introduced into the West Indies from the Island of Tahiti (Otaheite), by Bougainville and Bligh. It is distinguished by its great height, and requires upwards of five months to mature in a tropical climate, being cultivated only from the cuttings, as all tropical canes are.

This brief description and history of the Otaheitan certainly disposes of the necessity of any discussion relative to maturing the West India Otaheitan, in the Northern States. The so-called *O-ta-he-it-an* by the Northern sugar growers is doubtless a cross between the Oom-see-a-na and the Chinese Sorghum, which has greatly improved the *new edition*. Therefore it makes no difference in the abstract as to the name we attach to the cane. It is the *best* cane that the sugar grower is desirous of cultivating, regardless the name.

SORGHO SUGAR IN 1862.

WE select the following statements from a few of the Sorgho growers in 1862:

"Made 500 lbs. Sorgho Sugar."—C. W. Hunter, Madison, Indiana.

"Made 5 tons last fall."—H. R. Smith, Quincy, Ill.

"Made about 500 lbs."—J. W. Steed, Woodsfield, O.

"Made 50 lbs. from a five gallon keg of sirup."—Avenger & Johnson, Pataskala, Ohio.

"One hundred tons were grained in the North this year."—E. F. Newberrg's Prize Essay on Sorghum and Imphee, published by the *Valley Farmer*, St. Louis, Mo.

"Made 300 lbs."—Hon. C. B. Lines, of Kansas.

"Made 225 lbs."—E. S. Ricker, Clermont, Ohio.

"Made 400 lbs."—Henry Cook, Clermont, Ohio.

"Made 950 gallons of mush."—David Barret, A. Lodhimter, M. Jury, Fayette, Ohio.

"Made 1650 gallons of mush."—E. F. Babb & Daniel Miller, Muncie, Ind.

"Made 600 gallons grained sirup."—John Fabrick, Kankakee, Ill.

"I find no trouble in making *mush*."—O. N. Brainard, Marion, Iowa.

"It is as easy to make Sorgho sugar as it is maple sugar."—Thomas Maxwell, Lexington, Ohio.

"One of my neighbors made a beautiful quality of white sugar from Sorgho."—J. Devons, Gallatin, Illinois.

"Made 3,000 gallons Sirup, and found no difficulty in graining it."—Isaac Crisman, Sycamore, Ill.

And numerous others could be named if it was deemed necessary to adduce further proof in regard to the making of Sorgho Sugar.

CHI-NA AF-RI-CA,

IS a variety produced by crossing the African *Nee-a-za-na*, or white Imphee, with the Chinese Sorghum, *Holcus Saccharatus*. This variety promises well. It yields a rich sirup that crystallizes freely, and produces a fine quality of sugar.

NEW VARIETIES.

DOUTBLESS, by crossing other African varieties with the Chinese Sorghum, new varieties may be produced, that will prove superior to any now raised in the Northern States.

CROSSING.

MIX together, before planting, equal proportions of the seed of the varieties desired to be crossed.

PRAIRIE FARMER.

WE are under many obligations to the enterprising Editors of the *Prairie Farmer*, for the valuable information contained in their

agricultural journal, during the past few years, relative to the culture of the Sorgho cane and the manufacture of sirup and sugar.

The interest manifested by the Editors in regard to the merits of Sorgho, makes it highly important that every sugar grower should attentively peruse the *Prairie Farmer*, and thus keep posted in the progress of Sorgho and other agricultural products. It costs only \$2.00 per year. Published by Messrs. Emery & Co., 204 Lake Street, Chicago, Illinois. It may save the farmer hundreds of dollars per annum.

THE EUREKA SUGAR PRESS.

IS substantially built of wrought and cast iron; not liable to get out of order, and consists of a *double perforated cylinder*, nine inches in diameter and twenty inches in height, with a capacity for holding five gallons (or sixty pounds) of mush sugar, at a pressing. The mush sugar is poured in at the top of this *peculiarly constructed cylinder*, in the centre of which is a vertical core cylinder, resting upon a convex follower with inclined grooves covered with double perforated metallic plate for the purpose of conveying the sirup from the centre to the sides of the cylinder upon application of a plunger (containing an air chamber) that slides over

the core cylinder, which, upon application of the lever, forces by atmospheric pressure, the sirup to a receiver below. The sugar being retained in the cylinder, can, by removing a bottom slide, be transferred, when desired, to the sugar receiver.

After the mush is put into the cylinder a weight is attached to the lever, and it requires no further attention until the expiration of about one hour, which is sufficient to separate the sirup from the sugar. The cylinder full of well granulated mush will yield from 25 to 30 lbs. of prime sugar.

Full directions for using accompany each press.

Price,\$65.00

Liberal discount to the trade.

Address all orders or enquiries relative to the
EUREKA SUGAR PRESS, to WEBSTER & Co., 186
South Water Street, Chicago, Illinois.

FAILURE OF THE SOUTHERN SUGAR CROP.

WILL SUGAR ADVANCE THIS FALL?

FEW nervous persons have expressed their belief that by the making of Sorgho sugar in the north, the price of sugar would decline to such an extent that Sorgho growers would be obliged to abandon the raising of Sorgho in the northern states.

For the benefit of such persons, we will state that the annual produce of sugar in Louisiana, before the

rebellion exceeded four hundred thousand (400,000) hogsheads, which has since diminished to about ten thousand hogsheads. From reliable sugar men in New Orleans, they now estimate that the probable amount this year (1865), may reach 30,000 hogsheads. They also say there is danger that the planters will lose the seed cane unless renewed attention is given to the crop. It will at least require three or four years to raise anything like the amount of sugar made per annum prior to the rebellion.

And we can raise Sorgho in the north as cheap as southern sugar can be produced hereafter.

Unless the human family abandon the use of sugar, there is no prospect of any great decline in the price for years to come.

By a careful estimate, the average consumption of sugar in the United States per annum is *nine hundred thousand hogsheads*, or about 40 lbs. for every man, woman and child.

THE EUREKA SUGAR PRESS AS A TINCTURE PRESS, FOR DRUGGISTS.

THIS Press is admirably adapted to druggists use. After the substances designed for tinctures are macerated or digested the usual time, introduce them into the cylinder of the press. The liquid portion can be expressed in from 15 to 30 minutes.

The tincture being expressed and strained—by the press—passes into the receiver below. The dregs being *pressed dry*, more liquid is obtained by the Eureka press than by the usual method.

And for preparing tinctures by *percolation* or *displacement* the Eureka press is preferable to any other apparatus now in use.

The Eureka presses are manufactured by the Eureka Sugar Press Company, and kept constantly on hand, by WEBSTER & Co., 186 South Water Street, Chicago, Illinois.

COST OF SORGHO SUGAR AND SIRUP.

Only 2 1-2 cts. per lb. to raise and make Sorgho Sugar, and 28 cts. per gall. to make Sirup.

As before shown, the average yield of *Prime Dry Sugar* per acre is 1,050 lbs., and $87\frac{1}{2}$ gallons of choice sirup, at a cost of \$49.25.

But to make it round numbers, and call the cost per acre \$50, and the yield only 1,000 lbs. of sugar per acre, and $87\frac{1}{2}$ gallons sirup. By dividing the cost of raising and making, equally between the sugar and sirup, it makes the sirup cost 28 cents per gallon and the sugar *only* $21\frac{1}{2}$ cents per pound.

Surely farmers will not in the future hesitate to make their own sugar when they can make it so *cheap, clean and pure*.

HISTORY

OF THE

SOUTHERN SUGAR CANE.

Saccharum Officinarum.

THE native country of sugar cane is China, in Asia. Sugar has been known from the earliest ages. The Chinese were acquainted with the manufacture of sugar from the sugar cane over two thousand years ago.

Chinese sugar, in small quantities, occasionally found its way into ancient Europe. The Greek physicians procured it from the Arabian merchants, and used it exclusively as a medicine. Early in the tenth century, it was cultivated in the vicinity of Ormus, on the Persian Gulf, and was carried from thence to Mesopotamia, a country celebrated for its sugar in the time of the Crusades. About that period the Venetians brought it to Europe. From 1466 to 1580, sugar was rare in England, being used only in the houses of the wealthy, or in medicine. Upon the discovery of the Cape of Good Hope and the maritime route to the East Indies, the commerce

in sugar passed into the hands of the Portuguese. Subsequently, the cultivation of the cane was extended to Arabia, Egypt, Sicily, Spain and the Canaries, and finally, upon the discovery of the new world, to America.

In 1643, the English began the manufacture of sugar in St. Christophers and Barbadoes, and in Jamaica in the year 1656.

Our term sugar is probably derived from the Bengalee *shukkur*, the name by which it is still known in India.

Sugar has become a common article of food throughout the civilized world. During the past few years, the greater part of the sugar of commerce has been manufactured in the West Indies, and some of the Southern United States. It is produced most abundantly in the West Indies, which supply the greater part of the consumption of Europe, little, comparatively, being taken thither from Brazil or the East Indies. The consumption of the United States, for a few years prior to the late rebellion, was more than half supplied by Louisiana and other Southern States. The crop of sugar of Louisiana from 1855 to 1860, was estimated at 400,000 hogsheads per annum. Within a few years, the Southern planters have introduced a variety of sugar cane called the *O-ta-hite cane*, which is harder and more productive than the common cane, and better suited to the climate of the Southern States.

THE RICHEST SUGAR CANES.

THOSE canes which have not flowered, or have no tendency to flower, are *richest in sugar*, and the lower part of the stalk contains the greatest proportion. The juice constitutes about 88 per cent. of the cane, and when expressed *ferments rapidly*, forming an acid, so that it requires to be immediately evaporated, and its acidity neutralized, before sugar can be made.

MANUFACTURE OF SUGAR.

THE ordinary method of purifying the juice of the sugar cane for making the *Mascovado*, or *brown sugar of commerce*, is, soon as the juice is pressed out of the cane, add eight ounces of the *milk of lime* to 400 pounds (or one bbl. of 40 galls.) of the cane juice, and immediately heat in a boiler or evaporating pan to 140°. (The exact proportion of the *milk of lime* cannot always be determined, as the juice varies in quality in different seasons; but the manufacturer should aim at making the liquor neutral, or very slightly alkaline.) Acids naturally exist in the saccharine juice, and have the effect of converting the cane juice into uncrystallizable sugar. The use of lime, by neutralizing the acid, prevents this result. An excess of lime, however, *must be*

carefully avoided, as it injures the product of cane sugar both in quantity and quality.

When the juice is heated from 175° to 190° a thick scum forms on top, consisting of albumen and gluten, and the liquid beneath is drawn off and strained into another boiler, and boiled to a thick sirup,—*Sacchari Sirupus Empyreumaticus*. The required density for sugar is from 40° to 45° Beaume. It is then transferred to shallow vessels, called coolers, and again conveyed, when about blood heat, into wooden vats having perforated bottoms, with the holes temporarily plugged. At the expiration of twenty-four hours the sirup is stirred from time to time, with wooden stirrers, in order to accelerate the granulation of the sugar, which is usually completed in one or two days. When granulation is effected the stoppers in the bottom of the vats are removed, and the sirup is allowed to drain off from the sugar, which is usually completed in from three to five weeks. In this condition it is granular, of a yellowish color, moist and constitutes the *Muscovado*, or *brown sugar*—*Saccharum commune* of commerce. The sirup which has drained off is sometimes evaporated a second time and a further supply of sugar obtained. The liquid which finally remains, incapable of yielding more sugar with advantage, is called *molasses*.

Nine pounds, or one gallon, of the sugar cane juice yields, on an average, *one pound* of brown sugar.

REFINING SUGARS.

THE refining of brown sugar forms a distinct branch of business, and the methods pursued have undergone many improvements in the past few years. In clarifying the sugar, bullock's blood, lime, animal charcoal, steam, etc., are used. The largest sugar and sirup refinery in the West is that of W. H. Belcher, Esq., of Chicago, Illinois.

THE EUREKA SUGAR PRESS FOR
SOUTHERN SUGARS.

THE Southern sugar not possessing the *peculiar mucilage* which is found in the Sorgho sugar, drains quite readily, although it requires from three to five weeks to drain. By using the EUREKA SUGAR PRESS, the draining can be accomplished in ONE HOUR'S TIME thus preparing the sugar for market considerably in advance of the usual method.

BE NOT DISCOURAGED.

SORGHO sugar growers who have been unsuccessful in making sugar, or even good sirup, from Sorgho, should bear in mind that it required a number of years, with hundreds of

thousands of dollars appropriated by Congress, to bring about the successful culture, machinery and experience to produce even a passable article of Muscovado sugar, or molasses, in the Southern States. The pure sugar is in the Sorgho cane stalk, and it only requires the application of science and experience to produce the best of sugar from Sorgho.

SORGHO FLOUR A SUBSTITUTE FOR BUCKWHEAT.

FLOUR made from the seed of Sorgho has been used to a limited extent, and thus far pronounced as an admirable substitute for buckwheat. The flour made into choice griddle cakes, and eaten with delicious Sorgho sirup, will constitute about as palatable a luxury as could be desired.

The average yield of Sorgho seed per acre is about *forty bushels*.

SORGHO, OR SORGO.

MUCH time has been consumed by writers and Sorgho growers, in discussing the propriety of spelling the word Sorgho either with or without the letter "h." After thoroughly consulting the best standard authorities, the weight of evidence

preponderates in favor of omitting the letter "h." In the second edition of this work, the word in controversy will be spelled "SORGO."

THE SORGO JOURNAL AND FARM MACHINIST,

Devoted to Northern Cane and Sugar Beet Cul-
ture, Improved Farm Machinery, and
Progressive Husbandry,

TANDS foremost among the agricultural jour-
nals of our land; and especially upon the
culture of Sorghum, and the manufacture of
sirup and sugar therefrom. Its able and talented
editor, WM. CLOUGH, Esq., who is a scientific and
practical researcher, and being thoroughly familiar
with the sugar culture, both in the tropics and the
Northern States, renders the *Sorgo Journal* of incal-
culable value to every farmer throughout the land.
The author of this work is indebted to MR. CLOUGH
and the *Sorgo Journal* for much valuable information
relative to Sorgo sirup and sugar.

The Sorgo Journal and Farm Machinist is worthy
a place in every household. Price, only \$1.00 per
annum. Published by the Clark Sorgo Machine
Company, No. 116 Main Street, Cincinnati, Ohio.

Every sugar grower will find it to his interest to
peruse *The Sorgo Journal and Farm Machinist*.

SUGAR, OR SACCHARINE JUICE,

A Constituent Part of Many Vegetables.

IN addition to the sorgho and southern sugar canes, a brief statement relative to the saccharine properties of other vegetables is herewith presented for the consideration of sugar growers.

MAPLE SUGAR

IS obtained from the sap of the Sugar Maple, *Acer Saccharinum*, which grows abundantly in the southern parts of Canada and the northern parts of the United States, and proves a considerable source of wealth and domestic luxury.

BEET ROOT SUGAR.

IN the year 1747, Marggraf, an eminent Prussian chemist, first called the attention of the public to manufacturing sugar from the Beet—*Beta Vulgaris*. Subsequently, Chaptal, a celebrated French chemist, established a manufactory of beet root sugar. There are at present upwards of five hundred establishments for the manufacturing of

beet root sugar in France. The process is similar to that employed in making cane sugar. The white beet is the best, as it gives no coloring matter.

The French make but very little molasses. They convert most of the saccharine properties into refined sugar, which is equal in whiteness and beauty to that from the sugar cane. Beet root sugar is said to constitute one-half of the sugar consumed in France.

PALM SUGAR.

LARGE quantity of sugar is obtained from the sap of the Date Palm—*Phoenix Dactylifera*; the *Phoenix Sylvestris*; and the Gommuti Palm *Saguerus Saccarifer*; as well as other species of Palm growing in India.

SUGAR FROM TURNIPS, PARSNIPS AND POTATOES.

PROF. VON THAER, of Germany, introduced the making of sugar from the Turnip—*Brassica Campestris*—which was equal in strength, color and hardness to that of the sugar cane. The Carrot—*Daucus Carota*; the Parsnip—*Pastinaca Sativa*; and the Potato—*Solanum Tuberosum*; all yield more or less sugar, but not enough to render the manufacture desirable.

GRAPE SUGAR. (*Glu-cosc.*)

Its Chemical Properties compared with Cane and Sorgho Sugar.

THE Grape—*Vitis Vinifera*—contains a large quantity of saccharine matter, mixed with mucilage; and during the process of drying them into raisins, part of the sugar is seen to exude and concrete spontaneously on the external part of the fruit, from which it might be supposed that to obtain this sugar in a purified state would be a work of no great difficulty. But the sugar of grapes is *not of the same kind nor composition* as cane sugar, and therefore it cannot be made to imitate it. Grape sugar is not so sweet as cane sugar, nor so readily soluble in water, but is much *more soluble in alcohol*. Obtained from a concentrated aqueous solution, it forms crystalline grains. Strong mineral acids hardly act on grape sugar, which destroy cane and sorgho sugar with facility. On the other hand, grape sugar is destroyed by alkalies, with which cane and sorgho sugar forms definite compounds. It undergoes very little change by long boiling with water, which is apt to decompose cane or sorgho sugar, causing a loss in the amount of sugar obtained. A solution of grape sugar *rotates the plane of polarization of polarized light to the right*, and is capable of undergoing the vinous fermentation immediately, without passing through any intermediate state. Its specific gravity is 1,386, and its formula, carbon 12, hydrogen 14 and oxygen 14 parts.

UNCRYSTALLIZABLE SUGAR (*Chulariose.*)

EXISTS in honey and in the juice of fruits, and is generated from cane sugar by solution in water or weak acids, and *long boiling*. Therefore it constitutes the principal part of molasses. A watery solution of this sugar *turns the plane of polarization to the left*, and, like grape sugar, is susceptible of the vinous fermentation without an intermediate change. Its formula, when dried at 212° is carbon 12, hydrogen 12, oxygen 12. Uncrystallizable sugar is transformed into grape sugar when it is made to assume a crystalline structure, but not by mere solidification. A solution of sorgho sugar, like that of grape, has a *rotating power to the right*. When a solution of sorgho ferments, it is not, as is generally supposed, first converted into grape sugar. It is found to be first changed into uncrystallizable sugar; and, as the change proceeds, the rotating power to the right of the sorgho sugar gradually lessens and disappears, and is replaced by the rotating power to the left of the uncrystallizable sugar formed.

PURE SUGAR.

PURE sugars, whether made from the southern sugar cane, the sorgho plant, or the beet root, are identical as regards saccharine richness.

THE GREAT SECRET IN CRYSTALLIZING

(OR PRODUCING MUSH)

SORGHO SUGAR.

IMMEDIATELY after the juice has been pressed out of the *ripe* Sorgho cane, boil rapidly as possible, *without heating the juice or sirup to exceed 225° or 230° Fahrenheit*, is very essential in making sugar. To produce a *greater heat may scorch the* crystallizable portion; and to evaporate with a *slow heat induces fermentation* of certain parts. The result of either extreme is sirup, *but no sugar*. The juice or sirup in the evaporating pan, when boiling, should *not exceed one inch in depth*. A greater depth will retard quick evaporation. *Skim thoroughly and frequently*. Evaporate the sirup to about 45° by the saccharometer, or until it will stretch out to a long thread when rubbed between the thumb and finger. The sirup must be immediately run off into *coolers*, (see page 15), and kept in open, shallow vessels, in a *warm room* (see page 16). It will crystallize in a few days, *if all conditions are right*.

NOTICE TO SORGHUM SUGAR GROWERS!

AMOUNT OF SORGHUM RAISED IN 1865.

We desire one or more sorghum sugar growers in every township in the United States, to inform us the number of acres of sorghum raised in their vicinity in 1865 (and in 1864, if convenient), giving the number of the township, and county and State; together with the general success in making sirup and sugar, stating the best varieties of sugar cane they have raised, for producing sugar, and all other information they have, relative to sorghum, will be thankfully received. We request every farmer to write us their experience in raising sugar cane, stating the number of acres raised, and amount of sirup and sugar made this year.

It is our design, with the assistance of Dr. W. C. Bruson, author of the *SORGHUM SUGAR GROWER* and inventor of the *EUREKA SUGAR PRESS*, to present an enlarged, revised and illustrated edition of the *Sorghum Sugar Grower* next winter, giving additional information, with the view of promoting the interests of the sorghum sugar growers. Whatever errors may have occurred in the present volume will be corrected in the next edition.

Address all communications to

WEBSTER & CO.,

P. O. Box 6188.

186 S. Water St., Chicago, Ill.

[We request the editors of agricultural and other journals, favorable to sorghum sugar culture, to send us their paper, and they will duly receive a notice in our next edition.]

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