

this should prove on further experiment to be the fact in other cases of ordinary grown beets, it gives us from September (the beginning of the grinding season) to the following April as the sugar season, during which the roots remain of full saccharine quality and in workable condition, thus securing the entire fall and winter, and two months into spring, during which the sugar factory can be advantageously worked.

This being the case (and the fact as here stated may be depended on), the great mass of the crop of beet root can be stored in the field. When dug, they should be piled in heaps two roots wide, with the leaves on, the leaves being of course on the outside, where they will form a kind of roof or thatch to assist in throwing off the water, which may percolate through the covering of earth, and they would also prove enough protection until the time came for covering up the heaps with earth, just before the frost. As soon as the season is sufficiently advanced towards winter, a trench should be dug along each side of the heaps, and the earth piled up on the roots until sufficiently covered; but in no case, I should say, of less than one foot thick. The heaps or rows should not be more than the length of two roots broad, and not too high, as they may heat; and care must be taken that the side ditches are well drained and freed from stagnant water. Arrangements should be made to cover a large bulk of the crop in such a way that the roots could be obtained all the winter for working, and as a matter of course those to be first worked will be housed; but in no case should the crowns be cut off or the roots bruised in knocking off the earth, nor should the roots be trimmed before washing; the washing in the rolling cage will be quite sufficient to remove the superfluous fibres and superfluous earth. The leaves should be removed, and possibly the crown cut off before washing, that, however, is a matter of judgment.

This may seem a little matter to write about, but it is an experiment that, unless observed in the way it was twice observed, would have taken one year to try, and but few people would be found to run the risk of any roots being spoiled, after all the warnings as to frost that have been showered on us through the books published on the subject.

I may here hazard a personal opinion—but it is only a personal one, and I do not wish any one to act on it—I doubt if frost destroys sugar at all, even when the roots are badly frozen, unless the roots thaw and have time to ferment; then, owing to the breaking up of the cells containing the sugar, and the mixture of that portion of the juice with the natural ferment of the root, destruction of sugar commences; but so long as the roots remain frozen without thawing, I do not believe the sugar is injured.

VECTIS.

## NO. XVI.

### MACERATION AND DIFFUSION.

The trouble and expense of pressing the beet root, even when ground, to extract the juice, has always been a great drawback to the manufacturer; and for the purpose of getting rid of all the machinery and hand labour necessary for that process, the attention of the more ingenious of the manufacturers has been turned into other channels, and it is now definitely settled that the expense and trouble of pressing, and even of fine grating of the root, is not only unnecessary but hurtful. The plan adopted in its place is called by some "maceration," and by others "diffusion;" and it is simply as follows: Instead of grating or rasping the roots, they are cut up into thin pieces, not exactly slices, but of this shape:



The knives in the cutter shave the entire root into pieces of this shape, and of the length of the diameter of the root. The purpose of so cutting them is to make as many spaces between the slices as possible. These slices are filled into vessels, and water is then added at such a heat as to bring the mixture to the heat of 122 degrees Fahrenheit. The vessel is covered to keep in the heat, and at the end of from two to three hours the liquor is drawn off, more clear water is added, and the soak is continued for a further length of time, but not so long as at first; it is then drawn off and a third water added, which is finally drawn off, and by that time all the sugar is out of the root within such a trifle that it is of no consequence. There are a series of these vessels in one way of working, and in order to keep the liquor as strong as possible, and thus save evaporation, the first liquor drawn off is put on fresh root slices, and that, when drawn off, is again put on fresh slices—the other liquor being always added to the partly extracted slices, until the liquor finally attains very nearly the strength of the pure juice. The root slices then go to the cattle. Not only by this means is the pressing of the roots saved, but the liquor obtained is far purer; and while it contains all the sugar of the root, is much freer from other matters which are inimical. The liquor, when it finally attains the strength required, goes into the defecating pans, and is heated with lime in the manner before described, and skimmed; and the clear liquor, after having been carbonated to get rid of the lime, is evaporated down either into "concrete" for the refinery, or it is made into sugar with the sucrate of lime process, or some other of the various processes of purification already mentioned.

One thing, however, cannot be dispensed with by the person who goes into the manufacture, and that is a thoroughly good and

reliable "Carbonator." This may be composed of anything—either water bellows, a good blacksmith's bellows, or such pistons and cylinders as are used by the fowlers to force the air into their furnaces; but in this case you do not force air into the liquor, but "carbonic acid gas." To obtain this, make a clear fire of charcoal or hard anthracite coal in a stove, put a sufficient length of tight stove-pipe to the stove—all which should fit well together so as to be tight; let the pipe be of common sheet iron, and of such a length that all the heat will be expended and lost before it comes to the bellows; from 40 to 50 feet may be necessary; then attach the end of the stove-pipe by a flexible joint to the air-hole of the bellows, into which the air is usually drawn; make all close; then, in working the bellows, instead of drawing air, they draw carbonic acid gas from the burning charcoal, and this gas is forced from the nozzle of the bellows into the liquor, in the defecating pans, which have been cleared from scum with lime. If the pans are not large enough to keep in the froth which ensues, a separate and larger vessel must be used, and the blowing the gas into the limed liquor is continued until all the causticity of the lime is gone. The lime is by this process turned into simple chalk, and the liquor is greatly purified. The vessel should have the means of forcing steam into it, as well as gas, so as to keep up the proper heat, which should be nearly boiling. After the strength of the lime is thoroughly exhausted by the gas, the liquor is filtered through bone charcoal, or fine bone-black may have been boiled with it, and the whole is then filtered through close felt or woollen filters, or any kind of filters that will run freely, and yet keep back the impurities which the gas and lime have set free. Some add more lime and boil again, and again blow the liquor up with gas from the bellows, and steam; at all events, it is done until the liquor is brought to as pure a state as possible; it is then filtered and evaporated very carefully, to prevent burning, until it is as thick as treacle, when it is set by in a warm place, and in five or six days the sugar crystallises. The whole mass of sugar and molasses is then strained, and the molasses may be again purified and made into sucrate of lime, and so purified. Beet root molasses has always a strong, disagreeable flavour, and cannot be consumed by men. Cattle do well on small quantities of it added to their ordinary food, or it is fermented and distilled into spirits; but as cattle always pay well when judiciously fed with very small quantities of it at a time, no farmer will of course think of distilling it. This plan of diffusion is now being extensively adopted all through France, Germany, and Austria. The large factories have a self-acting concern, which takes less trouble than the before mentioned vessels, and is done as follows:—

In these large factories the diffusing vessel