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The Field.

Beet-Root Sugar.

If appearances are not deceptive, the production of beet sugar seems destined to be one of the important industries of the future both in America and in Britain. In the former country Professor Goessman, and in the latter Mr. Crookes have recently endeavoured to show that it is quite possible to grow sugar-beets with profit, and the evidence, though still scanty, seems amply to bear out this assertion. During the year 1867 beet-root sugar to the value of one million six hundred thousand pounds sterling was imported into Britain, and there seems to be no reason why this large demand should not have been supplied from home sources. It is by no means requisite for the successful prosecution of this branch of agriculture to grow monster roots. On the contrary, the weight of each root should not be more than two pounds, because the larger roots are watery and poor in sugar; nor should the roots fall short of one and a quarter pounds in weight, as the smaller examples are frequently woody. The juice should have a specific gravity of from 1.060 to 1.070; though sometimes, when very rich in sugar, it rises to as much as 1.078. The percentage of sugar in the roots varies considerably, the minimum quantity being 3.62, whilst the maximum is 13.47. The next number below this maximum is 13.19, and is of interest as representing the amount of sugar found in red beet manured with London sewage. Peligot obtained as much as 18 per cent. from some French beets, and some American specimens have produced nearly the same percentage—an amount, therefore, considerably ahead of the best English samples. In Ireland

from sixteen to forty tons of roots may be grown to the acre, so that very satisfactory results might be anticipated in that country. On the experimental farm of the Massachusetts Agricultural College, on the other hand, the amount of roots raised per acre fell short of twelve tons; but there were special disadvantages and difficulties to be allowed for in this case. Calculating from the average yield of a five-hundred acre farm, it is estimated that the producer should possess machinery capable of working up one hundred and fifty thousand pounds of beet-root every twenty-four hours for five months. Such a factory would require nearly two thousand cubic feet of water per hour, and the first outlay for its establishment is calculated at something over fifty thousand dollars. The profits are calculated at nearly twenty-five per cent on the outlay, when six and a-half per cent of sugar is obtained, each half per cent of sugar increasing the profit seven and a-half per cent—so that if eight per cent of sugar could be obtained the profit upon the original outlay would not be less than forty eight per cent. By the concreting process of Mr. Fryer, as applied to the raw juice, the refinery can now be carried on during the whole year, instead of only during crop-time; and the spent beet-root pulp, left after the extraction of the sugar, would appear to be a valuable food for stock. Indeed, so far as chemical analysis goes, this pulp, when mixed with other materials, should prove a more useful food for cattle than ordinary mangolds; but this point can only be properly established by a series of properly conducted comparative experiments on feeding. As regards the United States, it has been argued that the cultivation of beet sugar can never prosper, since the difference in the price of American and European la-

bour renders hopeless all competition with foreign producers. This argument is vigorously met by Prof. Goessman, who remarks as follows:—

“Although duly recognizing the great weight of this point, for with the farmer rests the success of the enterprise in the end, I believe that its influence as an obstacle is frequently overrated and based upon somewhat obsolete assumptions. The government tax of from \$40 to \$50 per acre of sugar beets in Germany and France, as well as our higher prices of sugar, will go far towards covering our most expensive labour. The interests of the Louisiana sugar planters and the sugar beet cultivators of more northern sections of the country are the same, as far as a proper protection of their industry is concerned; and the public opinion, in view of the requirements of the government, is apparently prepared to accord to them, for some time at least, this advantage. Great improvements in agricultural implements and in modes of securing the juice have reduced labour by hand to a considerable extent. A short enumeration of the most conspicuous instances may place this statement in its proper light. Various seeding machines, improvements more or less on Garrett's famous seed drill, are used in planting the seed, in four or more rows at once, and at any desired distances from twelve to twenty inches apart. According to the size of the machine, one or two men, with one or two horses or oxen, may seed from eight to sixteen acres per day; the same implement can also be modified by replacing the seed boxes with suitable knives to be used as cultivators, to clean the space between the rows of plants, and to cover the roots. Ploughs with two knives are used to break up the soil on both sides of the rows of beets, to loosen the latter in such a manner, without lacerating them, that children may do the harvesting of the roots. In fact, the whole work in the field, after the soil is once properly broken up, calls for no extraordinary labour. A good deal of the work can be done by boys. Machines do the washing, the grinding or cutting, and general handling