

drawn is further removed from the root; a circumstance arising from the dextrine being in greater amount in the lower vessels of the tree, and becoming converted into sugar, as its transition upwards is effected through a greater number of cells. Sugar can obviously be transformed into starch, as the accumulation of starch in the seeds of the grasses, particularly in the grain of the cerealia, clearly proves. In their yearly growth, these and many other plants are rich in saccharine matter, which, as in the cases of the Indian-corn stalk, disappears when the grain attains its perfection, and is converted, as it would seem, into the great quantity of starch which those grains are found to contain. Whether the formation of sugar always precedes that of starch, is not generally to be ascertained; that it is often, however, the case is certain. Starch, like woody fibre, may, it appears probable, be formed immediately from dextrine, in the same manner as dextrine, on the other hand, may be easily produced from starch. Sugar also, under certain circumstances, undergoes a clear reconversion into woody fibre and cellular matter, as may be observed in the case of sweet fruits, which sometimes lose their sweetness in consequence of their sugar being in a great degree converted into cellular substance. It is impossible to point out the causes of all these progressive and retrograde formations; we must content ourselves with knowing that they do actually take place, and that they possess in themselves some instruction for our guidance, since all these substances display so great a similarity in their chemical composition, while at the same time, by the simple assumption or rejection of water, they are often, beyond the range of vegetable organization, transformed into each other, and always contain oxygen and hydrogen in the same quantitative proportions as they exist in the composition of water.

PAYEN AND RICHARD (1851).—There are very few agriculturists of the present day, who are not perfectly acquainted with the advantages attending the cultivation of the beet or mangel-wurzel; it is, in fact, one of the most important plants in good husbandry. Its roots give, in nearly every soil, a large amount of crop, and serve both as a food for cattle, and for the extraction of a sugar, which, when well refined, is equal in every respect to that which, in hot climates, is produced by the sugar-cane. These roots also, when properly cooked, furnish a tolerably agreeable vegetable, which serves to vary the food of man during the winter season, when there are so seldom fresh vegetables for the table. The breadth, however, of its cultivation in France, is only 142,500 English acres, being much less than that of the potato. The departments in which beet culture is carried on to the greatest extent are those of the north, of the Pas-de-Calais, of the Somme, of the Aisne, &c., which furnish the greater part of the roots required for the sugar manufactories.

The beet is an indigenous plant; it came originally from the southern countries of Europe, but can be cultivated with equal facility in the north or the south. The following are its principal varieties:—1. Field-beet: long, rose color, growing above the earth; fleshy part veined with rose color. It offers two sub-varieties: the one flat-bulbed, short, and half sunk into the earth; the other long, and growing more above the ground. This variety of beet contains in general less nutritive principles than the other varieties, and especially less saccharine matter. In deep, wet land the crop is very abundant; it can, therefore, be only grown as food for cattle. A sub-variety has, however, been found, by M. Payen, and M. Vilmorin, to yield greater proportions of sugar and other proximate principles than even white varieties grown on the same soil. 2. The sugar beet; white, short, growing in the earth; flesh white. Two sub-varieties have been distinguished; the one with the neck green, is the Silesian beet; the other, with the neck of a rose color, is in general richer in sugar. 3. The yellow German beet; long, yellow, grows above ground; flesh white, or lightly veined with yellow. 4. The yellow globe beet: round shape, growing almost completely out of the earth; flesh white, or lightly veined with yellow, contains only a small proportion of sugar. 5. White-yellow beet: middle length grows in the earth, flesh white, skin of a pale yellow color. 6. The long or great yellow beet of Castlenaudary: long, grows much out of the ground; flesh and leaf-stalks deep yellow. This is the variety especially cultivated in the neighbourhood of Paris. 7. The great red beet, long; grows much out of the soil; flesh and leaf-stalks red. In general, even for the food of animals, we should less consider the bulb of the roots, or even the quantity of their produce, than the amount of nutritive matter that they contain. There is obviously every advantage in cultivating a variety, which in the same bulb will contain more nutritive principles. On this account the generality of farmers agree in giving the preference to the Silesian beet, which contains more sugar and less foreign matter than the field beet; and has also the great advantage of being one of those varieties that best resist the action of frost. If all rearers of stock are agreed as to the nutritive qualities of the beet, they are not equally so to the influence it exercises on the production of milk in dairy cows. According to some authors, beet favors the secretion of milk; while others, on the contrary, think it is very unfavorable for that purpose. Schweiz considered that feeding for two days only on this root was sufficient to diminish the amount of milk in a very striking degree. It maintained animals in flesh, and good condition, a circumstance highly favorable in severe seasons. Potatoes and turnips forced the milk, and beet the flesh; the latter being more favorable for fattening stock than potatoes and war turnips are.