

should be ploughed at least 10 inches deep before winter, as the frost renders the soil as fine as ashes, it enables the farmer to work the land readily in the spring, and the rapid growth of the plant is greatly facilitated. 2. From experience it is proved that roots planted in ground freshly manured, either with farm yard dung or compost, suffer from unequal growth and various kinds of insects. The quality also, in most cases, is inferior. It is better, therefore, to highly manure the previous crops and avoid the direct application of manure to the beet field. 3. As soon as in the month of April as the land has become sufficiently warm (say 15 to 50 deg. Fahrenheit) the sowing of the seed should commence, for according to all experience, the earliest planted beet are always the best. Drilling in all cases is to be preferred to sowing by hand. The cultivator should always bear in mind that the soil should be as fine as meal, yet not too loose, so that the seed is not deposited too deep. 4. If sown by hand, the roots should be in 14 inch squares; within the radius of the Cologne fortification, a rich district; the rows should be 12 inches wide and the roots 8 inches apart, so that they do not become too big. If drilled with a machine, the distance should not exceed 15 inches, and thinned out at 10 inches. 5. As soon as the plants are visible, hoeing between the rows should commence. The growth of the weeds is thereby checked, and also, the ever-forming crust which shuts out the air, is broken, and insects and vermin are destroyed. When the plants have six leaves the thinning or singling out should be begun. Frequent hoeing subsequently is also necessary to keep the land from becoming bound. When, in the month of July, the heads of the roots show above ground, which heads are totally useless for the sugar manufacturer, their development must be checked by mounding-up, which operation also facilitates the getting up of the roots when ripe. 6. Leaves are to a plant what lungs are to an animal; therefore, nothing damages the beetroot more than taking off the leaves before harvest. Such a senseless course reduces the value of the crop one half. 7. Roots, which are to be kept for several weeks or perhaps months, before being taken to the factory, should be quite ripe when gathered, should not have been exposed to frost, and should have been harvested in a fresh or moist condition. The roots are seldom ripe before the middle of October, yet frequent frosts occur at the beginning of November; the beetroot cultivator must, therefore, make haste to harvest his crop before the frost commences, and postpone all other work until the crop is secured. If a long drought has occurred, the growers should wait until a good rain has fallen, for roots that are harvested in dry weather, and after a long drought, will not keep. 8. The raising of the roots is best performed by means of spades or shovels, forks are not suitable for this operation, for, from experiment, too many roots get pricked, and pricks are a certain

cause of decay, whereas a smooth cut with a shovel is not so injurious. In any case, however, wounding of the roots must be most carefully guarded against. 9. The leaves of the gathered roots should be cut off with a sharp knife close to the crown, also the under leaves, which in most cases are decayed, must be removed by the hand or the knife, because they induce rotteness, and if left on are troublesome during the washing process. 10. Roots which are to be conveyed to the factory within three or four days of gathering should be plentifully covered with leaves, because the sun's rays beget decay of the roots, and rotten roots produce dark coloured juices, which are valueless. If the roots have to be taken to the factory later, they must be thoroughly well covered with earth, either in pits or heaps, so as to protect them as well from the heat of the sun as from the frost, and thus prevent their losing quality or quantity. The beetroot cultivator should remember the well-known proverb, 'Out of the earth, into the earth,' i. e., the earth not only produces but preserves. 11. The pit or heaps should be 3 feet wide, and 1 spit deep, and of any convenient length. The roots should be laid with the heads outwards. The work of covering up as well as the removal to the factory should be carefully performed, so as to avoid the bruising or wounding of the roots as their soundness is of the utmost consequence. Heaps which are 3 feet wide should not be more than 3 feet high, so as to keep the roots cool and prevent their sprouting. The roots should be covered up immediately, with at least two feet of earth, in order to avoid thoroughly the admission of air, for every change of temperature is injurious to the roots. Ventilation by straw chimneys or other methods must be most strictly avoided. If the heaps cannot be completed before night, a thick layer of leaves should be used as a temporary covering to prevent damage by night frosts. 12. In carting the roots to the factory, great care must be taken against bruising or breaking off the tap-root (the tap root is the richest in sugar), for roots handled roughly soon show black spots and quickly rot. 13. That the foregoing rules are attended to properly, the inspector appointed by the sugar factory will satisfy himself from time to time by actual observation."

Mr. Howard says: "If I do not mistake, these rules contain matter for reflection, and may suggest to the thoughtful English farmer some useful lessons in the cultivating and harvesting of the ordinary mangold crop. The processes pursued in the sugar factories of the Continent are very simple. The roots, being first washed in a machine, are dried and pulped, the juice pressed out by hydraulic machines, followed by the usual refining process. At the great manufactory I have referred to at Cologne, at which 100 tons of beetroot are converted into sugar daily, the process of extracting the sugar is unique, and far more perfect than any other factory I had the opportunity of inspecting. In-

deed, the whole arrangements are complete. Every department was thrown open to me, and every process explained, without the least reserve. When the inspection of the factory was finished, a carriage and pair, belonging to one of the partners, was politely placed at my disposal for a drive round their extensive farm. To return, however, to the sugar-making: Instead of extracting the juice from the pulp by pressure, as is the general practice, the pulp is put into a kind of colander, placed inside of a cylindrical vessel; when filled, the colanders are put in action by the steam-engine, and a rapid rotary motion is imparted to them. The juice is thereby thrown off by centrifugal force. The result of this plan was said to be that two or three per cent. more sugar was obtained than could be extracted by the process of pressing. In Prussia the manufacturer has to pay the Government duty of 14s. 6d. per ton on the roots, instead of 17s. 8d. per cwt. on the sugar, as in France. The Prussian maker has, therefore, a greater inducement to extract every particle of sugar. This arrangement, again, has led the German cultivator to be much more particular in the choice of his seed. The best description I met with is the "Improved Vilmorin," propagated by M. Louis Vilmorin, of Paris, who claims to have had recourse to the process of selection and the establishment of pedigree in plants long before Mr. Hallet was heard of. M. Vilmorin informs me that the Vilmorin beet is more highly prized in Germany than in France, and accounts for it by the fact of the duties being levied in the different manner I have described. The refuse of the beetroot after the sugar has been extracted forms an article of cattle food, and is held in high estimation. About eighteen to twenty per cent. is the proportion of pulp left; the worse the quality of roots, the smaller the quantity of pulp. It is preserved in deep pits, generally bricked like a grave—very often the expense of bricking is avoided—a covering of earth is laid upon the top. The pulp is generally consumed within the year; but if well covered up it can be kept sweet and good for two years, or, as I was assured, even for three years.

"Much controversy has taken place both as to the relative value of pulp as feeding stuff and as to its real money worth. Many practical men maintain that a ton of pulp is equal in value to a ton of roots. I think the money worth is best settled by the price it fetches. The average price at the factories I visited will amount to about 13s. per ton. Although horses do not like it, bullocks, which cannot be fattened on the root alone, can and are sometimes fattened for the English and foreign markets, without any other food than the pulp. Pigs do well upon it when cooked. Sheep will eat about twelve pounds a day of raw pulp. It is unquestionably more easily digested than the root itself, but cows kept upon it are said not to produce much milk. I was fortunate enough to obtain a debtor