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The Field.

Familiar Talks on Agricultural Principles.

DRAINING.

THIS important method of ameliorating the soil takes effect by carrying off superabundant moisture. A very simple illustration may be used to explain the philosophy of it. Plants which are kept in flower-pots would soon rot at the root, if the water with which they are supplied were left to stagnate in the bottom of the pot, without any means of escape. To prevent this, there is a hole at the bottom of the pot, through which the superfluous water trickles out. Drainage performs the same part for the field, which the hole does for the flower-pot. In consequence of this provision for getting rid of an excess of moisture, several advantageous results are secured. There is not only a wholesome and suitable bed for the roots of plants to spread and grow in, but the earth being rendered less moist at the surfae, evaporation is greatly diminished. As evaporation cools the surface greatly, it follows that draining enables a soil to retain heat much better. Hence crops on well drained land grow more quickly and ripen much earlier than those on undrained land. For the same reason, such a soil can be worked earlier in spring and later in autumn than one not drained. The extremes of excessive heat and drought are borne much better by drained than by undrained land. In a very wet season, the excessive rains quickly settle through the ground and are carried off, while in a dry time, the porous character of the soil allows the moisture held in store below the point of evaporation to rise to the surface, under the action of a natural law, called *Capillary Attraction*. Draining also opens the soil to a free access of air, and thus promotes the absorption of the nutritive substances there are in it, and which are made soluble by rain. It also prevents what is known as the "souring" of the soil. It tends to lessen the effect of frost in heaving out the roots of clover and grasses, or freezing them out in consequence of water standing on the surface of the ground. In short, as Prof. Dawson observes, "draining renders land easier and more pleasant to work, makes crops more sure and heavy, prevents alike injuries from drought and excessive moisture, economizes manures, and is equivalent to the deepening of the soil and lengthening of the summer."

Notwithstanding the valuable results of draining, which have been briefly stated, it is to be regretted that it is not as yet very extensively practiced in this country. Here and there, a farmer of advanced views has resorted to it, but the cases are few and exceptional. Its universal adoption would work little short of a revolution in Canadian agriculture. For the information of such as are disposed to try this important amendment, we extract the following short summary of the methods of underdraining, from "Norton's Elements of Scientific Agriculture."

"First, as to depth; where a fall can be obtained, this should be *from 30 to 36 inches*. The plants can then send their roots down, and find to this depth a soil free from hurtful substances. The roots of ordinary crops often go down three feet, when there is nothing unwholesome to prevent their descent. The farmer who has a soil available for his crops to such a depth, cannot exhaust it so soon as one where they have to depend on a few inches, or even a foot of surface. Manures, also, cannot easily sink down beyond the reach of plants. On such a soil, too, deep ploughing could be practiced, without fear of disturbing the top of the drains. The farmer should not, by making his drains shallow, deprive himself of the power to use the subsoil plough, or other improved implements that may be invented, for the purpose of deepening the soil. There are districts in England, where drains have had to be taken up and relaid deeper for this very reason. It would have been an actual saving to have laid them deep enough at the first.

"Second, as to the way in which they should be made, and the material to be used."

"The ditch should, of course, be wedge-shaped, for convenience of digging, and should be smooth on the bottom."

"Where stones are used, the proper width is about six inches at the bottom. Small stones should be selected, or large ones broken to about the size of a hen's egg, and the ditch filled in with these to the depth of nine or ten inches. The earth is apt to fall into the cavities among larger stones, and mice or rats make their burrows there; in either case, water finds it way from above, and washes in dirt and mud, soon causing the drain to choke. With small stones, choking from either of these causes cannot take place, if a good turf be laid, grass side down, above the stones, and the earth then trampled in hard. Cypress or cedar shavings are sometimes used, but are not quite so safe as a good sound turf. The water should find its way into the drain from the sides, and not from the top."

"Stones broken to the size above mentioned are expensive in this country, and in many places they cannot be procured; in England, it it now found that tiles, made of clay, and burned, are cheapest. These have been made of various shapes.

"The first used was the horse-shoe tile. This was so named from its shape; it had a sole made as a separate piece to place under it, and form a smooth surface for the water to run over.

"Within a few years this tile has been almost entirely superseded by the pipe tiles (which are merely earthenware pipes, of one inch bore or larger, and made in short lengths.) These tiles have a great advantage over the horse-shoe shape, in that they are smaller, and are all in one piece; this makes them cheaper in the first cost, and also more economical in the transportation.

"*All* these varieties are laid in the bottom of the ditch, it having been previously made quite smooth and straight. They are simply placed end to end, then wedged a little with small stones, if necessary, and the earth packed hard over them. Water will always find its way through the joints. Such pipes, laid at a depth of from 2½ to 3 feet, and at proper distances between the drains, will in time, dry the stiffest clays. Many farmers have thought that water would not find its way in, but experience will soon show them, that they *cannot keep it out*. The portion of earth next the drain first dries; as it shrinks on drying, little cracks begin to radiate in every direction, and to spread until at last they have penetrated through the whole mass of soil that is within the influence of the drain, making it all, after a season or two, light, mellow, and wholesome for plants."

"They form a connected tube, through which water runs with great freedom, even if the fall is very slight. When carefully laid, they will discharge water, where the fall is not more than two or three inches per mile. If buried at a good depth, they can scarcely be broken; and if well baked, are not liable to moulder away. There seems no reason why well made drains of this kind should not last for a century. The pipe tiles are used of from 1 to 1½ inches diameter of bore for the smaller drains, and for the larger up as high as 4 or 5 inches. They are all made in pieces of from 12 to 14 inches in length. An inch pipe will discharge an immense quantity of water, and is quite sufficient for most situations. These small drains should not ordinarily be carried more than 400 to 500 feet before they pass into a large one, running across their ends. Where a very great quantity of water is to be discharged, two large-sized horse-shoe tiles are often employed, one inverted against the other.

"Third, as to the direction in which the drain should run. The old fashion was to carry them around the slopes, so as to *cut off* the springs; but it is now found most efficacious to run them *straight down*, at regular distances apart, according to the abundance of water and the nature of the soil. From 20 to 30 feet between them, would probably be the limits for most cases. It is sometimes necessary to make a little cross-drain, to carry away the water from some strong spring. In all ordinary cases, the drains running straight down, and discharging into a main cross-drain at the foot, are amply sufficient."

"Tile machines are now introduced into this country, and tiles will soon come into extensive use. Their easy portability, their permanency when laid down, and the perfection of their work, will recom