

Farm Drainage.

The benefits which high lands, as we ordinarily call them in distinction from swamp or flowed lands, derive from drainage may be arranged in two classes, mechanical and chemical; though it is not easy, nor indeed is it important to maintain this distinction in all points. Among those that partake of the nature of mechanical changes are the following.

Drainage deepens the soil. Every one who has attempted to raise deep rooted vegetables upon half drained swamp land has observed the utter impossibility to induce them to extend downward their usual length. Parsnips and carrots on such land frequently grow large at the top, but divide into numerous small fibres just below the surface and spread in all directions. No roots except those of aquatic plants will grow in stagnant water. If therefore it is of any advantage to have a deep, rather than a shallow soil, it is manifestly necessary from this consideration alone to lower the line of standing water at least to the extent to which the roots of our cultivated crops extend. A deep soil is better than a shallow one, because it furnishes a more extensive feeding ground for the roots. The elements of nutrition which the plants find in the soil are not all upon the surface. Many of them are washed down by the rain into the subsoil, and some are found in the decomposing rocks themselves. These—the plants—by a sort of instinct search out and find as well in the depths of the earth as at its surface, if no obstacle opposes. By striking deep roots again, the plants stand more firmly in the earth, so that they are not so readily drawn out or shaken by the winds. Indeed, every one knows that a soil two feet deep is better than one foot deep, and market gardeners and nursery men show by their practice that they know, if others do not, that a trenched soil three feet deep is better than one of any less depth. We know that indian corn, in a dry soil sends down its roots two feet or more, as well as most of the grasses. It is manifest that a wet soil can never be pulverized. Plowing clayey or even loamy soil tends rather to press together and render it less pervious to air and water. The first effects of under draining is to dry the surface soil, to draw out all the water that will run out of it, so that in early spring and autumn it may be worked with the plow as advantageously as undrained lands in mid-summer. All land which is not level, and is not in grass, is liable to great loss by heavy rains in spring and autumn. If the land is already filled with water, or has not sufficient drainage, the rain cannot pass directly downward, but runs away upon the surface, carrying with it much of the soil, and washing out of what remains of valuable elements of fertility, which have been applied with much expense. If the land be properly drained, the water falling from the clouds is at once

absorbed, and passes downward saturating the soil in its descent, and carrying the soluble substances with it into the roots, and the surplus water runs away in the artificial channels provided by the draining process. So great is the absorbent power of drained lands, that after a protracted drought all the water of a heavy rainstorm will be drunk up and held by the soil, so that for a day or two none will find its way to the drains, nor will it run upon the surface.

Drainage lengthens the season for labor and vegetation. In the colder latitudes of our country, where a long winter is succeeded by a torrid summer, with very little ceremony by way of an intervening spring, farmers have need of all their energies to get their seed seasonably into the ground. Snow often covers the ground in April, which is so saturated with water, that the land designed for corn and potatoes frequently cannot be plowed until late in May. The manure is to be hauled from the cellar or yard, over land lifted and softened by frost, and all the processes of preparing and planting are necessarily hurried and imperfect.

On drained land the ground becomes almost as dry in two or three days after a frost comes out in spring, or after a heavy rain, as it would do in as many weeks before draining. But the gain of time for labor is not all. We gain time also for vegetation by thorough drainage. Ten days may frequently be the security of our corn crop against frost. In less than that time, a whole field passes from the milky stage, when a slight frost would ruin it, to the glazed stage when it is safe from cold, and twice ten days of warm season are added by this removal of surplus water.

The growing of winter wheat has been entirely abandoned in some localities, on account of freezing out or winter killing, and one of the worst obstacles in the way of getting our lands into grass and keeping them so, is this very difficulty of freezing out. The operation seems to be simply this; the soil is pulverized only to the depth of the plow, some six or eight inches. Below this is a stratum of clay, nearly impervious to water. The autumn rains saturate the surface soil which absorbs water like a sponge. The ground is suddenly frozen. The water contained in it crystallizes into ice, and the soil is thrown up into honey combs, and the clover roots or wheat plants are drawn from their beds, and by a few repetitions of this process left dead on the field in the spring. Draining followed by sub-soiling lets down the falling water at once through the soil, leaving the root bed of the plants so free from moisture, that the earth is not heaved, as the term is, and the plants retain their natural position, and awaken refreshed in spring by their winter's repose.

It is often difficult to find a day in the year, when a wet piece of land is in suit-

able condition to plow. Usually such tracts are unequal, some parts being much wetter than others, because the water settles into the low places. In such fields, teams are driven knee deep in mud, and a stream of water follows in the furrow, and now we rise upon a knoll, baked hard and sun-cracked; and one half of the surface, when finished, is shining with the plastered mud ready to dry into the consistency of bricks, while the other is already in hard dry lumps like paving stone and about as easy pulverized.

This is hard work for the team and men, hard in the plowing, and hard through the whole rotation. The same field well drained is friable and porous, and uniform in texture. It may be well plowed and readily pulverized, if taken in hand at any reasonable season.

Land which has been puddled by the tread of cattle or by wheels, acquires a peculiar consistency, and a singular capacity to hold water. Certain clays are wet, and beaten up into this consistency, to form the bottom of ponds, and to tighten dams and reservoirs. A soil thus puddled requires careful treatment to again render its permeable to water, and fit for cultivation. This puddling process is constantly going on under the feet of cattle, under the plow and the cart wheels, wherever land containing clay is worked upon in a wet state. Thus, by performing a day's work on wet land, we often render necessary as much additional labor as we perform to cure the evil we have done.

The Importance of good Foundations.

It is a curious fact that the Swiss roadways of to-day are really a revival of Roman engineering, both in method of construction and in selection of routes, a return being made to it after years of mistaken experiments. It is stated that the most important lesson for us from European experience is that the worst surface with a good foundation, affords a better road than the costliest surface without a foundation. No matter how much money is laid out on the surface, the result will be swift ruin unless it is properly supported from beneath. But with a good foundation the surface may be of gravel, or even of common soil if nothing better is available.

Allison McKay, Leamington, Ont., has the contract for drainage work at Point Pelee. The price is \$16,000.

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The contract for paving Dovercourt road from College to Bloor street, Toronto was awarded to Shannon & Wellings for \$10,887.

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Sudbury, Ont., is voting on a by-law to introduce systems of waterworks, sewage and electric lighting.