AGRICULTURAL.

The following very useful "HINTS," were published a short time ago, in the *Wexford Herald*, and although more particularly applicable to the "Irish Small Farmer," for whose use they were originally intended, they contain nevertheless, many useful hints for the Nova Scotia Farmers.

HINTS TO FARMERS.—No 1.

CONDITION AND QUALITY OF LAND.

Hence let wise Farmers understand,
The need of draining swampy land;
The soil that too much wet has got,
Is worthless as the guzzling sot.

THE first thing which you have to consider is the nature and condition of your land. If your land be wet, the wetness proceeds from one, or all, of the following causes :—

1. A close undersoil, or bottom, which prevents the surface water from soaking through it.

2. Land springs, bursting from the bowels of the earth, wanting a free passage.

3. Water from higher lands oozing downwards.

The first case is, I think, the worst, especially if the ground be flat. One remedy is to *score* the land with drains—the closer the better. These draines need not be more than from 2 to 3 feet in depth, and 12 or 16 inches in breadth at top, and 9 inches at bottom. They should be shored with flat stones, or filled with round stones or coarse gravel, (covered with bushes, straw, rushes or sods, the latter the best, with the grassy side downwards,) and care should be taken not to throw the stiff yellow or bluish clay, you dig out, *over* the stones, else you will defeat your object, by hindering the water from trickling downwards. Ground of this kind, from the nature of the bottom, will never become perfectly sound, nor fit for working in winter, during which time (it in a broken state) it should be carefully ribbed up with spade and shovel, and when in lea, cattle should not be allowed to tread on it.

Another mode of cure (which I recommend in preference), is the following :—

Take your spade and shovel, throw off all the loose earth, or upper soil, into rows 30 feet asunder, then shape the hard clay underneath, in the intermediate spaces, into ridges 4 feet high in the centre ; work as if you were forming a road 30 feet in breadth, (only making your ridge much higher than if for that purpose,) and then spread the earth which you had removed equally over this new surface. By this treatment you will render your land *perfectly* dry at all times, which, with such an undersoil as I am supposing, cannot be the case in very wet seasons, even if with much draining ; all the upper soil will be of uniform depth ; and when these ridges are thrown into this shape, they preserve it for ever—running the ridges, as much as can be done, north and south, by which *one* side will *receive* the morning sun, the other the mid-day and evening sun.

When wetness is caused by *springs* on flat ground, bursting upwards and requiring vent, cut drains (of depth according to the depth of the springs.) in the best line for a fall, and if you happen to cut off the real or principal spring, which supplies all the others, they will speedily dry up. Skill and practice are much required in this branch of draining, but so long as a spring makes its appearance, you must cut it off. Since the object here is to carry off *under*, not surface water, you may throw in as much clay over the stones in draining, as you please.

When the wetness arises from the oozing of water from *higher* land, you should cut a good head-drain between the wet and dry ground, of such depth, if practicable, as will cut off the communication ; if the vein (or porous stratum) should not lie too deep, and if you can cut completely through it and reach a hard bottom, which will conduct the water along its channel, without suffering any of it to soak downwards, your work is done at once ; but in general it is not easy to stop all communication in this way ; you must therefore often proceed in a different manner, and if the springs appear in your field, *at different levels*, on a slanting surface, and (according to the season's wetness) continue to run at the bottom, while the higher ones are dry, it is plain that they are connected, and flow from the same point ; in which case you are to draw your line of draining along the level of the lowermost springs, which will keep all the others dry.—But if you make your drains along the line of the highest of the spots where the water breaks forth, without being sufficiently deep to reach the level of those below, (which in a *steep* field cannot well be done,) you would only carry away the overflowings of the spring while the main spring still continuing to run, would wet all the land below the level of the bottom of the drain, by discharging itself lower down over the surface of the ground. When finishing your drains, give a very gradual fall, otherwise they will be choked from the earthy particles brought down by a rapid flow. I have only to add a caution, that you should keep the outlets of all your drains clear, and scour the main drain whenever it requires it. Where stones are scarce, and tough sods plenty, sod draining in many cases will answer well ; this operation proceeds quickly, and only requires a spade of a particular make. Wet land, when perfectly drained, becomes loose and productive ; otherwise it is of very inferior value ; if under grass, its herbage will be stunted and sour, and it will produce a particular weed, which gives the rot to sheep. Immense portions of land are half waste, from want of draining. The man who has idle hands at home, and possesses an undrained field, deserves to be poor and miserable.

The opposite description of land is that which has a shingly or gravelly bottom ; here the moisture escapes too fast ; but, alas ! you cannot remedy this deficiency ; however, when I come to treat of cropping, I shall give you a few hints as to the best mode of farming on it, merely observing that *slacked* lime is the manure best calculated to remedy every defect of nature in soil, rendering a loose soil more adhesive, and a heavy soil more friable.

SCIENTIFIC GARDENING.

GARDEN CHEMISTRY—CONTINUED.

Carbon and Carbonic Acid Gas.—Carbon is pure charcoal, which is well known and easily proved to form a large proportion of most vegetable substances,—the oak, for example contains sixty ounces in a cubic foot ; consequently the living plant must hvae the power of deriving it from carbonic acid gas, for it has been proved by the experiments of Sir H. Davy, that the most finely powdered carbon is not taken up by plants in the acid form. Nothing, indeed, is more hurtful to plants than smoke, which is carbon mixed with watery vapour ; though soot, which is condensed and collected smoke, is useful when spread upon the soil, so that water may derive from it a portion of its gases.

All animal and vegetable substances, in a state of fermentation, give out a considerable portion of carbonic acid gas, and if it is not dissipated by heat, but confined on or beneath the surface of the soil, it will become mixed with the moisture there, and be taken up by the spongelets or the roots of plants. A great quantity of carbonic acid is also produced by the breathing of animals and by burning wood, peat, or coal ; and being heavier than the air of the atmosphere, it must all descend, in the first instance, to near the surface of the soil, into which much of it must be carried by rains and dews. When it becomes diffused in the air however, its weight has little influence in causing it to descend.

The carbonic acid gas thus mixed with water, and taken up along with it into the system of plants, is there decomposed, as we shall afterwards see, into its constituent parts of oxygen and carbon, part of the oxygen being given off into the air, and the rest with the carbon remaining in the plant, where it goes to form most of the solid parts as well as the nutrient pulp.

The carbonic acid also exists in soils combined with lime, magnesia, iron, and some other substances in the form of carbonates, which are soluble with great difficulty in very small quantities in water, but readily in humic acid, as we shall immediately see.

Nitrogen or Azote.—This gas, as we have already seen, constitutes by much the largest portion of the atmospheric air, and consequently must enter largely into the system of a plant, though it is not found in general to contribute so much to vegetable as it does to animal substances, in all which azote is in considerable proportion.

Azote is found in larger quantities in cabbages, savoys, cauliflower, brocoli, sea-kale, turnips, radishes, mustard, and cresses, than in any other garden plants, and it is this which produces in these the peculiar acrid taste which most of them possess. It is also a chief ingredient in starch and in the gluten of wheat. It is the nitrogen also, which, escaping from these when boiled, or in a state of fermentation or decay, is diffused around and produces an odour in general very strong and disagreeable.

It will follow, that as these plants when healthy, contain much nitrogen it ought in rearing them to be abundantly supplied from its two chief sources—the air and decaying animal substances,—in other words, by free air and animal manure. Though when it is an object, as in rearing of sea-kale, to render the flavour mild, the supply of nitrogen must for this reason be diminished.

Humic Acid or Humin.—This important substance was first discovered by Klaproth in a sort of gum from an elm, but it has since been found by Berzelius in all barks ; by M. Braconnot in saw-dust, soot, starch, and sugar ; and what is still more interesting for present purpose, it has been found by Sprengel and M. Polydore Boullay to constitute a leading principle in soils and manures. Humin appears to be formed of carbon and hydrogen and the humic acid of humin and oxygen, but the difference between the two requires farther investigation. Pure humic acid is a deep blackish brown, without taste or smell, and water dissolves it with great difficulty and in small quantities ; consequently it cannot when pure, be available as food for plants.

Humic acid, however, which, I may remark, is not sour to the taste, readily combines with many of the substances found in soils and manures, and renders them, and itself, easy to be dissolved in water, which in their seperate state could not take place. In this way humic acid will combine with lime, potass, and ammonia, in the form of humates, and the smallest portion of these will render it soluble in water, and fit to be taken up by the spongelets of the root fibres.

It appears to have been from ignorance of the important action of the humic acid in thus helping to dissolve earthy matters, that the