

the alteration of heat and cold, and of dryness and moisture, are all powerful agents to disintegrate the marl, reduce the shells to powder, and bring it into a condition most favorable to the crop, whose production it is intended to assist. Situated as the great mass of our farmers are, precise and exact rules cannot be followed. Many are obliged to yield to circumstances, but they should keep the above principles steadily in view, and conform to them as nearly as possible.

They are the result of much and careful observation; are substantiated by the highest authorities; and are derived from a knowledge of the qualities of the cause, by whose application the desired effect is sought to be produced; in other words: from a knowledge of the action of the agent, and the object upon which it acts.

From a knowledge of the properties of lime as carbonate, and of those agents to which it is subject, the reasons for the above rules will appear manifest. I need not here repeat what was said in relation to the *different* modes of applying lime, except in relation to its use as a top dressing for grass. Keeping in view the great principle of incorporating it thoroughly with the soil, we see how this is done by top dressing of grass land. Though lime be but sparingly soluble in pure water, yet we have seen that it is quite freely so in water charged with carbonic acid; when marl lies with the decayed leaves and stalks of grass on the surface of the meadow, this gas surcharges rain water, as soon as it falls, *dissolves* the lime, and carries it in a state of solution in the soil.

This is not the only way however in which it is mixed with the soil. A large quantity of lime, though not dissolved, is yet carried down the interstices of the soil mechanically, by the water which falls on it. In this way a large quantity of it will disappear from the surface, having become diffused through the soil.

The rationale of the application of marl to the surface is equally sustained, when we consider its physical condition in connection with its chemical qualities.

The lime which exists in marl is always in the state of carbonate, and hence subject to the same influences as common lime that has been burnt from shells or lime stone, and become slakened.

There is however this difference, that the lime in marls is either in masses of comminuted shells, or in large fragments that have never been disintegrated. By atmospheric exposure on the surface they are subject to the action of water charged with carbonic acid.

The shells by alternate freezing and thawing crumble into finer particles, become more easily acted on by water impregnated with carbonic acid as this change progresses, and become entirely blended with the soil, fulfilling, perfectly, all the indications which first directed their use.

MODES OF ACTION.—Sometimes it acts as direct food to the plant; sometimes by the decomposition of organic matter; and very frequently, by its power of setting free other valuable elements which may exist in soils, but not in a *form* capable of serving as food for plants.