

There is much difference in opinion, as to the mode in which it should be applied, some advocating its application to the surface as a top dressing, others ploughing it under. Where the soil is porous, the former, I believe, is preferable; in stiff soils the latter is the better mode. In either case gypsum should be applied with it, in the proportion of about one-eighth by weight. The best quantity per acre, depends on the quantity of phosphates and ammonia in the specimen to be applied. A quantity of guano, capable of yielding phosphates, equal to about seventy-five pounds of bone dust, is the best, as far as my knowledge enables me to say; the facts in my possession in relation to this are very few, though I believe, more numerous than have been obtained by any one else. Indeed, though there has been so much written and published, as to the action of guano, no information has been elicited of general utility, because neither the composition of the guano, nor of the soil, has been given, and yet yet they are the two chief items which can afford us data, whereby to establish rules for the quantity to be used, or, indeed, for its use at all. I know of cases where it has acted well, that is, has more than paid for its cost, where, however, a much less sum expended in other manures, has paid more than twice as well.

Phosphates exist in night soil, in poudrette, in ashes, in stable and in barn yard manure, in some marls in oyster shell lime, and also in stone lime, but in the last, not in sufficient quantity to merit especial attention in reference to agriculture.

The next substances claiming attention, are those which furnish

SULPHUR OR SULPHURIC ACID

to the soil. They are called sulphates, because formed of sulphuric acid, (oil of vitriol,) in combination with some base. The sulphate, almost universally used, is gypsum, or plaister of paris, this is a sulphate of lime with two equivalents of water.

This substance has been most extravagantly lauded and condemned by different persons, as it chanced to act well or badly, when used by them.

The indication for its use, is its absence or deficiency in a soil. When all of the other necessary constituents of a soil are present, this being absent, its use in very small quantities, produces an almost magical effect, making all the difference between a soil almost absolutely barren, and one very fertile. Even though it be absent or deficient, by itself it will not do any good, unless *all* of the other necessary constituents of a soil be also present, so that when gypsum does not act well on land, it may be for two reasons; the first, because of its presence already in the soil,—or secondly, because of the *absence* or deficiency of some *other necessary constituent*—the analysis of the soil, or a *series* of experiments, being alone capable of deciding, to which of these causes its non-action should be attributed.

The very great difference in the gypsum which is sold in market, I shall advert to particularly when recommending some action in