

more or less of carbonic acids, their phosphates are readily dissolved, and are thus brought into a fit state for assimilation by the plant. Whilst these changes are proceeding, the organic portion of bones are being acted on by the air, and its decay accelerated, carbonic acid and ammonia are the results, which, with the phosphates, now reduced to a fluid state, become available as food to the growing crop.

The action of bones as manure greatly depends on the state of fineness to which they are reduced. What are usually called "half-inch bones" consist of a number of smaller fragments with a considerable amount in a state of mere powder; and in this condition they are best adapted to agricultural purposes; readily yielding a portion of their organic and mineral constituents to the wants of the first crop, provided the soil be sufficiently moist and porous. Coarse bones being extremely slow in decomposing, their use is not economical, and whenever any decided effect is desired to be produced on the first crop, they should be reduced to as minute a state of division as possible. In turnip culture this is absolutely essential, as the very existence of the crop will frequently depend on the immediate action of the manure pushing forward the growth of the plant during its early stages, beyond the reach and destructive ravages of the fly.

Several methods of accelerating the decomposition of bones, with a view to insure their full and immediate action, have been, within these few years, proposed and tried. Steaming them, has in some instances been found advantageous; but the surest and by far the most economical mode is that of dissolving them by the application of sulphuric acid (oil of vitriol), a practice which has now become general in the United Kingdom. Several methods have been practised, but the simplest at present known, and therefore the best adapted to this country, may be briefly stated as follows:

Form a circular wall of ashes about two feet high, of sufficient diameter to contain the bones to be dissolved, which should be crushed as small as practicable, and the finer portions, obtained by passing the whole through a sieve, should then be placed around the inside of the wall; forming a thick lining to the barrier of ashes. The coarser bones are placed in the centre, and the surface may be left slightly convex. Pour evenly over the lump sufficient water to originate decomposition, and turn the whole over thoroughly several times during the day, and when the bones are sufficiently and evenly saturated, apply the necessary quantity of sulphuric acid, taking care to continue the stirring of the mass till all the materials are thoroughly incorporated. In a day or two the ashes of the wall should be mixed with the bones, and the whole thrown into a heap for a week or ten days, when the mass should again be thoroughly stirred, and, if necessary, more ashes added, and the mixture in a few days will be sufficiently dry for use. It may be applied either broadcast or by the drill. The amount of sulphuric acid, at the strength at which it is ordinarily obtained in commerce, required for this operation, is from one-fourth to one-sixth of the weight of bones. It has been proved by most satisfactory trials, that eight or ten bushels of bones per acre,

treated in this way, produce as much, if not greater effect, than twice that amount applied in a dry state.

Bone manure is peculiarly adapted to exhausted arable land, and upon poor unproductive pastures, its application has been attended with the most striking results. The soil in such cases having been exhausted of its phosphates by repeated cropping, or, as in the case of pasture, by the gradual deprivation of these materials by the milk, cheese, and bones of animals, that have been sold off through a long series of years without any adequate return in the form of manure; a liberal dressing of bone-dust speedily restores the equilibrium, by returning to the weakened soil, the very ingredients of which it had been deprived.

Bones have been used with great economy and success in connection with farm-yard manure, rape cake, guano, &c.; and mixtures of such kinds, when judiciously combined, have generally, advantages over single fertilizers. Bones have been applied with marked success to sickly or decayed fruit and forest trees; in such cases it is not necessary to reduce them to powder, as in a coarser state they continue to act for a greater number of years. For root crops, especially turnips, this manure is of all others the best adapted; and turnips dressed with bones, have uniformly a greater specific gravity than when manured with other substances, and consequently contain a larger amount of nutritive matter, and keep longer in sound condition. In England 15 to 20 bushels of bones per acre, are considered a liberal dressing for turnips, and when they are dissolved in acid, half the quantity will suffice. The seed and manure are deposited in rows by a single operation of the drill, an implement which has lately been so far improved, as to prevent the seed from coming into immediate contact with the manure, by causing the intervention of a little soil, thereby preventing guano, and such like substances, from endangering the germination of the seed. Large quantities of bones in the cotton districts of England, are boiled for making size, a glue substance, which is extensively employed in calico-printing. Such bones, however, being deprived of a portion of their organic substance only, the phosphates remaining undisturbed, are found to produce the most marked improvements on the deteriorating pastures of Cheshire; they operate more quickly even than bones unboiled, their duration must be brief, and consequently their value diminished, when a series of years or an entire rotation is taken into calculation.

As the highly fertilizing properties of bones have now been fully tested, both by scientific research and practical demonstration, every effort to collect and reduce them to a proper state for the purposes of manure is deserving of encouragement; and in a country like Canada, where thousands of acres formerly highly productive, have become almost sterile by the practice of repeated cropping and non-manuring, bones unquestionably rank among the most powerful and economical means of a restoration.

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