

in Britain with this substance (apatite) carry with them this one lesson, and I cannot understand how any one can have remained unconvinced. It is tiresome, doubtless, both to my readers and to myself, to keep on repeating the same thing, but so obstinate are some folk that, even now, experiments are being tried in this country with ground apatite; as if people were unwilling to believe that practical agricultural chemists, like Lawes, Voelcker, Jamieson, and Aitken, were capable of conducting the trials to which they have devoted the last twenty-five years. I warn the young farmers of the province that experiments in manures are about the most difficult things to conduct they will ever meet with. Thousands of dollars are wasted every year in such rubbish as Coprogène, or Boomer's system of making manures out of rotten water, and the main thing, comparison, seems to be utterly neglected. "I sowed so many pounds of such a manure on such a field, and I got a good crop." That is what the unthinking man says; *post hoc, ergo propter hoc*, i.e. the crop came *after* the manure, and therefore was caused *by* the manure; as if a man should say: the thunder is heard after the lightning, and therefore the lightning is the cause of the thunder. By the bye I am happy to say that Mr Chas. Gibb, of Abbotsford, has empowered me to say that, after taking great pains to manufacture manure by the Boomer process, he has given it up. As far as he could judge, he tells me, the crops were utterly unaffected by it.

You will please to understand that, when I speak of the utter uselessness of undissolved apatite, I by no means intend to insult the softer forms of mineral phosphate. On the contrary, if I were to use phosphatic manures for turnips, or any other root-crops, I should mix finely ground phosphate with superphosphate. For it is clear, that perfectly manufactured superphosphate is soon exhausted, and that at the most important time of all, namely, when the bulb is beginning to swell, and then a good end would be served by the plant having the undissolved phosphate to fall back upon. If I were to make sulphated bones, I should only employ about 30 lbs. of brown sulphuric acid to the 100 lbs. of bones, to the same end, viz: that after the dissolved part of the bones was worked up in the soil, the undissolved part would go on supporting the plant for the rest of the season. You understand, of course, that mineral phosphates are only valuable in proportion to the phosphoric acid they contain. When, as in the ordinary course of commerce, nitrogen, in some form, is added to superphosphates, they should have specific name given them—ammoniated superphosphates, for instance. It can hardly be necessary to say that superphosphate should never be sown in autumn; it would all be carried off into the nearest river when the snow melts.

Upon the whole, I am inclined to think that, where mineral phosphates are available, I would not dissolve bones in sulphuric acid. I should grind them into the finest meal, and mix them with mineral superphosphate. I saw some very fine bone-meal in Montreal last month; price \$32 a ton. You must not forget that bones contain  $4\frac{1}{2}$  0/10 of ammonia, which is the dearest of all manurial elements, costing as it does, at the Montreal gas-works, no less than 16 cts. a pound. However, as many of us may have bones for next to nothing from a neighbouring butcher, I may as well give the recipe for dissolving them here:

Into a large tub pour twice the quantity of water (in bulk not weight) as you intend to use acid; to this add the bones, broken up as fine as you please, and then pour in the acid and stir the whole up with an iron fork, taking care not to splash yourself. Of brown sulphuric acid, equal in weight to 1.70 of its bulk of water, 50 lbs will be wanted for 100 lbs of bones, but, as I said before, I should try 30 lbs if the bones are ground so that no piece is larger than a small pea.

You will thus have a most valuable manure, consisting of superphosphate, undissolved phosphate, and ammonia. (1) An average sample of genuine dissolved bones contains about 30 0/10 of phosphates, 20 0/10 of which are soluble in water, and  $2\frac{1}{2}$  0/10 of ammonia; a first class mineral superphosphate contains more than 30 0/10 of soluble phosphates, but no ammonia at all, and as all crops demand nitrogen in some form, either as nitrates or otherwise, it seems to me that, for those who are desirous of knowing what they are about, it would be wise to buy each constituent separately; for example: 1800 lbs of mineral superphosphate and 200 lbs of sulphate of ammonia would actually contain more soluble phosphate and ammonia than a ton of dissolved bones. This with a few bushels of ashes, and, for clover, lucerne and other leguminous plants, a barrel or so of plaster (sulphate of lime) would be the ideal manure for this province (2)—as for your special manures, they are all absurdities, and if you try them, you will suffer for it.

As we are upon the subject of nitrate of soda, for the moment (v. note 2), I take the opportunity of saying that you will probably hear this manure talked of as a stimulant. This, again, is nonsense. "Nitric acid," says Mr Lawes, in his evidence before the Royal Commission on agricultural depression, "Nitric acid is the essential manure. It is the great food of all plants in all soils. It is not a stimulant at all, really; it is one of the most essential elements of food there is. With our own food we may overfeed a person, for instance, if you give a person butter without any bread, you may call that a stimulant if you like, but you would kill him. Nitrate of soda is no more a stimulant than butter without bread is a stimulant; it is an essential article of food." And all forms of nitrogen, as ammonia &c., come under the same category, they are all honest, genuine plant-food. I am not, upon the whole, an advocate for the use of salt as a manure; but it will not be unbeneficial when using heavy doses of nitrogenous manures on grain crops to mix a moderate quantity of salt with them: the effect will be to check the extra growth of straw, without diminishing the extra yield of grain.

There is a great want in this province—a cheap sulphuric acid—and there is no reason why the want should not be supplied. With the copper pyrites from the mines in the Eastern Townships, there should be no difficulty in making, and selling at a fair profit, brown acid for a cent and a half per pound; with this and our own apatite, so rich in phosphoric acid, a good superphosphate might be put on the market at \$15 a ton, which with, as we saw above, a couple of hundred pounds of sulphate of ammonia, a few bushels of ashes, and a barrel of plaster, would furnish a manure for any crop we may wish to grow at a very moderate price, say, \$20 a ton:

One ton of superphosphate.....	\$15.00
Two hundred pounds of sulph. am.....	8.00
Plaster.....	3.00
20 bushels of ashes.....	4.00
	30.00

The mixture would weigh about 3500 lbs., and one third of it, or from 1000 lbs. to 1200 lbs., would be as good a dressing for an acre of land as one could desire, and the cost of it only \$6.66 per acre! ARTHUR R. JENNER FURST.

(1) The damp mixture must be dried by mixing with ashes, road dust, or black earth.

(2) The superphosphate, plaster, and ashes may be mixed; but I should sow the sulphate of ammonia by itself, at twice, after the crop is up, if on grass, as soon as the land will bear treading. It, as well as nitrate of soda, is very soluble, and in wet seasons, in Britain, soon vanishes; it is more likely to stand here.