

if the method adopted by our Chief Analyst in the examination of Thomas Phosphate is a fair one and a proper test of its agricultural value, the law should be used to prosecute the vendors of such a sample. I have before me an analysis, a high class Thomas Phosphate of which large quantities are being sold in Canada, showing 17.72 per cent, citrate soluble out of a total 20.16 per cent. phosphoric acid. I have also seen a further checking analysis of this material by Voelcker, of London, showing 20.17 per cent. total. This phosphate is only guaranteed 18 per cent. total and above government requirement, but, as we see, it analyses higher. None of the phosphoric acid in Thomas Phosphate is "water soluble," and neither is it necessary that it should be. In fact, if it was "water soluble," it would not have the lasting effects, particularly in light lands, it possesses.

Prof. Shutt, of Ottawa, says in his report, "It is readily soluble in dilute acids, and, for this reason, it is readily acted upon by the exudation of rootlets and absorbed."

As for mixed fertilizers, such as Freeman's, of which Mr. Topham speaks, it has long been pointed out that they are unscientific and uncertain. The same chief analyst to whom Mr. Topham recommends our farmers has for years dwelt on and pointed out these facts, yet it was not until Thomas Phosphate was introduced that any material progress was made by the farmer in buying fertilizers of any kind on intelligent principles.

On page 41 of the last fertilizer report Mr. Macfarlane makes this statement:

"In many of the fertilizers described in this and former reports their cost is very much increased by the admixture of nitrogenous constituents. This cost farmers might save by properly caring for the stock of nitrogen on their farms, and this stock might even be increased by cultivating those crops which have the power of appropriating the nitrogen of the atmosphere. Nevertheless, the fertilizer manufacturers still seem to be under the necessity of supplying this element in considerable quantity in their goods, and of charging for it. *In the case of the mixed fertilizers the extra charge varies from \$8 to \$14 per ton*, which the farmer must pay if he purchases, and which he can readily save in his own stables, or produce upon his own farm." Continuing, Mr. Macfarlane properly points out that "nearly the whole of the nitrogen in the fodder fed to farm stock is to be found in the excreta of the animals and one-half of it is contained in the urine." It is further well-known that 93 per cent. of the potash contained in the food of cattle and sheep may be recovered by carefully saving the liquid manure only.

If Mr. Macfarlane's calculations were applied to Freeman's "Sure Growth" fertilizer, then it ought to sell for \$10 per ton instead of \$30 per ton, since it only contains about one-third the amount of phosphate matter that Thomas Phosphate contains, and then in a form originating from the sulphuric acid on phosphate, and neutralized with lime, which forms gypsum.

It is all very well to talk of a balanced food for the soil, but it is another question when it comes to stuffing the farmer with the idea that he is getting something superior to his stock manure in a mixed fertilizer. Mixed fertilizers have a place to fill, and those who sell them should know what that place is, for, unfortunately, the majority of farmers do not know. Hence the reports of their results are more often classed as failures than successes. If Mr. Topham thinks these principles out thoroughly, he will understand then why Thomas Phosphate has won such a record, and why also it must continue to be one of the cheapest and purest sources of phosphoric acid so essential for the production of clover and all seeds. I would suggest further that Mr. Topham had better make an intelligent test with Thomas Phosphate, and then he will be able to group the principles which he seeks to know at present.

W. J. THOMPSON.

Bronte, Feb. 12th, 1900.

Clover and Phosphates

To the Editor of FARMING:

The letter of Mr. A. McNeill in FARMING of January 30th, in criticism of Mr. T. C. Wallace's address on clover as an exhauster of the phosphate of the soil opens up the way for a good discussion on soil fertility. Mr. Wallace's ideas, as published in the Ontario agricultural journals of the past four years, and in his lectures before Farmers' Institutes, have no doubt appeared very unorthodox to some farmers. Still, if they are wrong, it is a surprise (as Mr. McNeill points out) that the agricultural press has not drawn attention to the actual truth of things. Personally, in common with all the farmers of my acquaintance, I have been led in the past to suppose, like Mr. McNeill, that clover is a soil enricher rather than a soil impoverisher. My own personal investigation permits this idea as correct within certain limits, but beyond these I found there were facts to show that clover was an exhauster of soil fertility. So far as I have read Mr. Wallace's ideas, I find that he recognizes as most important the value of clover as a supplier of soil nitrogen, thus saving the necessity of buying it in the expensive form of nitrogenous fertilizers at \$30 to \$60 per ton. He has also emphasized the function of stock manure as supplying the potash requirements of most soils, where the manure is properly cared for. But his ideas on the question of keeping up the phosphate supply of the soil are worth looking into before passing any judgment or unfair criticism. I satisfied myself on this point, but did not feel it incumbent upon me to make known the result of my investigation, for the reason that I supposed every person was capable of working out their own conclusions in their study and working of soils under their own observation. Thanks to Mr. McNeill, however, I was led further to look into this question of clover as a soil enricher or impoverisher, and to find out the relationship of phosphate fertility to the grain and stock or dairy branches of farming.

No better authority, I think, could be consulted than Prof. Roberts' work on the "Fertility of the Land." This is not only the most recent, but also an exhaustive, detailed and clear summary of the questions underlying soils, crops and manures, and is, above all, very practical. Here it may be learned that a soil capable of producing 30 bushels of wheat per acre removes from the soil 14.4 lbs. phosphoric acid. The same soil in producing 3 tons of clover hay in a season removes no less than 33 lbs. of phosphoric acid per acre. At the same time, of course, it enriches the soil in nitrogen, but this power has been shown to be very dependent upon the phosphate and potash supply of the soil, hence one reason may be found for failure in growing clover. The results, as given above, are from an average of 788 tests of wheat and of 178 tests of clover.

In the dairy and stock business still more interesting are the results of analysis, showing that the exhaustive nature of soil fertility where these lines are followed is confined almost entirely to the phosphate supply, while at the same time the potash and nitrogen supply is increased in the soil. A cow giving an average of only 7,200 lbs. of milk per year removes as much phosphate (in the milk only) as 30 bushels of wheat. Every 1,000 pounds of live weight of cattle require 18.6 lbs. phosphoric acid; sheep, 12.3 lbs.; swine, 8.8 lbs. The potash needs amounts only to 1.7, 1.5 and 1.8 lbs. respectively.

If these evidences appeal to Mr. McNeill and farmers generally, there need be no necessity for accepting the possible conflicting statements of fertilizer agents. True, as Mr. McNeill says, that "agents of potash salts and nitrate of soda" are quite sure that their respective fertilizers supply exactly the material most needed by the soil. Nitrogen and potash are certainly needed, but the question is getting at the cheapest source of supply and buying only that which is imperative in keeping up a balanced fertility.

AGRICULTURIST.

Springfield-on-the-Credit, Feb. 18th, 1900.