

pleasure, but a laboratory which will only do its work well when the needed supply of material is forthcoming. Exhaustion of this nature can only be remedied by reintroducing artificially the material that has been abstracted. If a thorough knowledge of the need of phosphate for the soil prevailed, and practical application of such knowledge were more general, it would materially help to develop the phosphate industry of this country, and would lead to the manufacture of fertilizers on a large scale, while an extensive home market tending to a lower price for the manufactured article, instead of exportation of the raw material, would be the result. I am informed that the cereals and the grass crop of Canada extract from the soil annually an average of 235 million pounds of phosphoric acid, equal to 117,972 tons of 2,000 pounds each. Supposing one half only of this to be returned to the soil in the stable manure, there is still left a deficit of 59,000 tons of phosphoric acid. The percentage of phosphoric acid in Canadian apatite is, according to evidence obtained from the leading experts in the trade in England, and given in a report made by Mr. Dyke, of Liverpool, in his appendix to the departmental report for 1885, about 33 per cent. Taking this as a fair average, the requirement for the production of the needed quantity of phosphoric acid to be restored to the soil would be about 177,000 tons (of 2,000 pounds) of apatite. During the past six years the apatite raised averaged 25,500 tons, of which 24,000 tons have been exported; so that we have been supplying ourselves with 500 tons of phosphoric acid against 59,000 needed to keep the constituent elements of plant food to the proper standard. What I mainly desire to impress upon the agricultural community is the necessity of bringing up their farms to the normal condition of fertility, and to give at the same time thereby a much needed impetus to the manufacture of fertilizers and the mining of phosphate. To sum up, the whole art of farming consists in supplying the nutritious elements of plants in the form most favourable for absorption and assimilation. As ordinary manure does not always contain the two most important inorganic elements of plant food, phosphoric acid and potash, in sufficient quantity for plant use, the needs of mankind demand the employment of artificial fertilizers along with or as a substitute for farmyard manure. A demand for the materials from which these could be manufactured would at once materially aid the now almost abandoned phosphate mining of this country.

"Inquiries were made of my department, early in the year, regarding the question of rendering natural phosphate soluble in an economical manner through calcination. It was stated that in France and Belgium apatite had been treated in the same way as limestone for the manufacture of lime, the crude material being baked in an oven, then powdered and mixed with soil with which it at once become incorporated.

"I had the subject at once referred to the chemist at the Experimental Farm, and his report forms an appendix herewith.

"The experiments appear to show that the solubility of this valuable natural fertilizer is not materially increased through calcination. The finely ground phosphate is soluble only to a slight degree in water, and in the soil the process is extremely slow, but further experiments are now in progress with the hope of obtaining results which will be of practical benefit to the agricultural community."