

(5) Being a reverted phosphate, it is of a type which is becoming increasingly popular, and this is in line with modern developments in the fertiliser industry. An article in the "Journal" for February, 1941, by the Supervisor of Fertiliser Supplies (I. L. Elliott) discusses such developments. The two major advantages of reverted phosphates are:—

(a) They can be sown in contact with small seeds, such as turnips and swedes, without causing injury to germination.

(b) On some soils plants may recover a greater proportion of the phosphates of reverted manures than is the case when water-soluble phosphates are applied. Such soils are often termed "high-fixing," for they lock-up easily soluble phosphates in such a way that they are not available to plants. When a water-soluble fertiliser is applied to such a soil, most of it is rendered unavailable, but the reverted phosphate dissolves much more slowly in the soil water, and although it is liable to be "fixed" when in solution, actively-growing plants will absorb a large proportion of the phosphate before this can take place. However, we still have much to learn before

the mechanism of "fixation" is fully understood.

(6) If it is equivalent weight for weight to superphosphate (that is, if 3 cwt. of serpentine superphosphate gives as good results as 3 cwt. of superphosphate) a considerable saving in imported phosphate rock and sulphur is possible, for serpentine is a common mineral in several parts of New Zealand. It can be seen, therefore, that, should our investigation show the new mixture to be of **equal** merit to superphosphate on a weight basis, we have every reason to be satisfied with its performance.

(7) Serpentine superphosphate should be at least as cheap or cheaper than superphosphate when the manufacture of the material is on a sufficiently large scale and is running smoothly. Some saving in the fertiliser subsidy should result, as there is every reason to believe that ground serpentine can be produced at the works at a lower cost than superphosphate. The utilisation of a New Zealand product should also make possible a saving in sterling funds overseas.

(8) Serpentine is a magnesium silicate, and magnesium is an element to which increasing attention is being paid. From work carried out by the Soil Survey Division and the Cawthron Institute, Nelson, it would seem that quite a considerable number of soils in New Zealand are dangerously low in magnesium. Certain diseases in apples and tobacco have been shown at Cawthron to be due to a shortage of this element in the soil, and have been cured by the application of magnesium compounds. The value of the magnesium in serpentine superphosphate is being investigated, for this element appears to be present in a form readily available to plants.

Serpentine also contains measurable amounts of cobalt, which is the element used in the control of "bush sickness" of sheep and cattle. However, the amount of cobalt in serpentine superphosphate, although apparently available to plants, is very small, and is probably insufficient for the control of the stock diseases caused by a deficiency of the element. The value of the cobalt content of serpentine superphosphate is being investigated by the Animal Research Division, Department of Agriculture.

Disadvantages

(1) As it is a slow-acting fertiliser, it may not be as suitable for low rainfall districts as superphosphate. In

such districts more soluble fertilisers tend to give greater responses.

(2) Where the soil has a low "fixing" capacity, superphosphate is usually held in the soil in a form available to plants. To a considerable extent adequate liming overcomes the disadvantages of superphosphate on soils of medium "fixing" capacity, for the superphosphate reacts with the lime to form another type of reverted and available phosphate.

(3) Serpentine must not be regarded as a substitute for lime. For one thing, it is considerably less pure than reasonably good limestone, and contains fairly large amounts of useless materials. The amount of basic substances applied in serpentine superphosphate is small. Consequently, similar amounts of ground limestone should be applied where the mixture is used to those that would have been applied when using superphosphate.

(4) Unless the mixture is as good as superphosphate on a weight basis, or unless there is some special merit in it apart from the production angle, serpentine superphosphate is merely a "diluted superphosphate" of lower

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