Sulphur Investigations in North Otago

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A DESCRIPTION of research work with sulphur as a fertiliser in North Otago appeared on page 559 in the June 1953 issue of the "Journal of Agriculture". Three trials then in progress on a certain soil type indicated that sulphur might be of some significance in promoting plant growth. One trial was on the property of Mr. W. S. Perry, Totara, and the other two were on the properties of Messrs. W. G. Spite, Alma, and B. R. Milmine, Teschemakers. These trials were laid down in July 1952 and there has been no retreatment. All have shown marked sulphur responses and these are still apparent. This initial success has been followed by further trials, and a summary of the position to date is given in this article.

IN most literature on the essential major and minor elements required by plants sulphur is referred to as a major element. In general it can be assumed that it is required in fairly large quantities by plants; in fact plants contain almost equal amounts of sulphur and phosphorus. It may be surprising, therefore, that sulphur has not received more attention as a fertiliser. The reasons for this may be that most soils may supply sufficient sulphur for plant growth, that sulphur is supplied in appreciable amounts from the atmosphere, especially near industrial areas, and that most fertiliser materials used have in any case provided sulphur, thus masking any possible sulphur deficiency.

HEADING PHOTOGRAPH: Despite their low rainfall, some of the steeply rolling hills and easy downlands in North Otago produce heavy crops of wheat, barley, potatoes, and vegetables. These soils are rightly considered fertile, but it is on them that sulphur responses are now being demonstrated.

The main emphasis to date has been on such nutrients as phosphorus, potassium, and nitrogen, and common fertilisers supplying these nutrients are superphosphate, sulphate of potash, and sulphate of ammonia, all of which contain sulphur. In trace element work many elements have also been used as sulphates; for example, copper, iron, magnesium, and manganese sulphate. Such factors have hindered the detection of soils naturally deficient in sulphur.

Sulphur and various sulphates have been widely used to make soil more acid. The use of sulphur and sulphate of iron to render soils suitable for the growing of such shrubs as rhododendrons, azaleas, and heaths is one example of this; the use of continuous applications of sulphate of ammonia on lawns and playing surfaces to induce acid soil conditions is another. However, the making of soils more acid by sulphur is unlikely to be the reason for plant responses to sulphur in North Otago.

Stimulation of Legume Growth

The effect of sulphur in the pasture trials in North Otago is almost wholly one of stimulating legume growth in much the same way as molybdenum has done on certain soils. As with molybdenum and nitrogen deficiencies, plants suffering from sulphur deficiency show symptoms of general yellowing, reduced growth, small leaves, and thin stems. In molybdenum deficiency it is considered that there is no reduction in the number of nodules on the roots of legumes, whereas in sulphur deficiency the number of nodules is reduced.

Total sulphur in a soil may not be a reliable guide to deficiency. In the soils of three of the trial areas the total percentage of sulphur was determined as 0.042, 0.065, and 0.057, all of which would be in the range normally found in soils. The rate of release of sulphur from organic combination may be the critical factor.

The soil tests on the areas where the best responses have been obtained are interesting and indicate high pH, calcium, phosphorus, and potash. The following table gives a comparison