Recent Research Work

Responses to Iron and Nitrogen on Peat

IN the early stages of the research work on the development of peat land at the Department of Agriculture Rukuhia Soil Research Station it was shown that the peat was deficient in minerals and available nitrogen and that outstanding pasture responses were obtained when the major plant nutrients were applied. Because of the way the peat is formed it was expected that it would also be lacking in other elements. Later experimental work showed that applications of copper sulphate produced big increases in the growth both of crops and pastures. More recently trials have shown that some pasture plants respond to applications of iron.

DEFICIENCY SYMPTOMS IN PASTURES

GROWTH on newly developed peat areas is usually very slow in early spring. Wet and cold conditions and the acute deficiency of available nitrogen in the peat are the main factors limiting growth at this time of the year. It is possible that other factors are also involved and therefore the pastures on an experimental peat area were observed carefully during the critical spring months. During spring 1957 a chlorosis of the leaves of cocksfoot and timothy plants was noticed. Part of the green colour from affected cocksfoot had disappeared and the plants were not growing as vigorously as was to be expected. The badly affected timothy seemed to be dying and nearly all the leaves had turned white.

The illustrations on the opposite page show the appearance of typically affected cocksfoot and timothy plants. The symptoms suggested iron deficiency, but various mineral applications were tried. Iron chelate applied as a foliar spray at the rate of 40 lb. per acre was the only treatment which had any effect on the chlorotic plants. About 10 days after the treatments the affected plants turned green and produced new growth which was vigorous and healthy.

IRON CHELATE

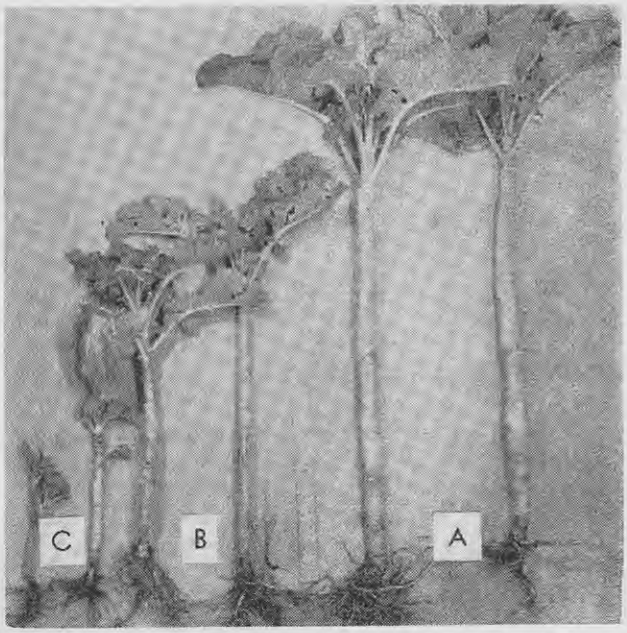
Chelates are organic compounds capable of combining with metals such as iron. Chela means claw. The metal is held and protected from firm fixation in the soil and the plant can absorb the chelate with the combined metal. Iron chelates are commonly used to cure iron deficiency in fruit trees.

On mineral soils which usually contain large quantities of iron in a relatively unavailable form, chelating agents not containing iron may be used to free some of the iron locked up in the soil and make it available to plants, but it is not certain whether there is sufficient total iron in the peat to enable a chelating agent to work in this way in the absence of added iron. In this trial the iron complex with ethylene diamine tetra-acetic acid containing 8 per cent of iron was used.

TRIALS WITH IRON CHELATE

A replicated mowing trial was begun on 10 December 1957 on the affected area. Half the plots were untreated, and the other half received an application of 40 lb. of iron chelate per acre. The immediate effect of the treatment was not only a change in colour of the pasture but an increase in the growth. On 8 January the plots were cut and weighed, and the treated plots yielded 27 per cent more pasture than the untreated plots. A further cut on 18 March showed an increase of 18 per cent. The final cut in May did not show any yield differences between treated and untreated plots.

The deficiency symptoms which showed up so clearly in the spring had disappeared by the beginning of January, and there were no longer any visual differences between treated and untreated plots. Presumably during spring the amount of iron in the peat available to these plants was insufficient, but under the conditions in summer sufficient became available.



Differences in a chou moellier crop, showing the after effect of ploughing down clover before sowing.

Further trials were begun in spring 1958 in which different forms of iron and iron chelate at varying rates were applied in order to investigate the duration of the effects and the efficiency of the different materials.

NITROGEN RESPONSE FROM CLOVER IN CROPS

Peat land is generally deficient in available nitrogen, the effect of this deficiency often being very conspicuous in crops.

The effect of nitrogen was spectacularly demonstrated on a farmer's crop of chou moellier which was sown following a crop of turnips the previous season. The paddock was sown in turnips in three sections: (A) with 3 lb. per acre of white clover seed, (B) with 1 lb. of clover, and (C) without clover. The turnip crop on all three sections was similar and there was not much evidence of the clover when the turnips were grazed by sheep in January and February. When the paddock was closed after grazing the turnips, the clovers formed a dense cover on section A, whereas on section B there was patchy clover growth and no clovers at all on section C. The clovers were grazed off in April and the paddock again closed until early August when it was set stocked with 10 ewes and lambs per acre until November.

The paddock was then ploughed and sown in chou moellier. At the time of ploughing there was a dense growth of clover 6 in. high on section A. The effect of the clovers as a source of nitrogen for the chou moellier crop is clearly shown in the photograph above. Section A had an excellent crop of chou moellier, whereas on section B there was only a medium crop. The crop on section C where no clovers were sown was practically a failure.

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