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FORMS AND TRANSFORMATIONS OF SOIL MANGANESE AS AFFECTED BY LIME ADDITIONS TO A CENTRAL YELLOW-BROWN EARTH IN THE WAIRARAPA DISTRICT, NEW ZEALAND.

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I. INTRODUCTION

The application of liming materials to New Zealand agricultural soils for the purpose of increasing the productivity of pastures is an important soil ameliorative treatment. Specific benefits accruing from lime additions are thought to include the improvement of soil structure and moisture retention characteristics, increased supply of essential plant nutrients, and increased activity of desirable soil microorganisms. Much attention in New Zealand has focussed on the relationship between lime addition and the resultant increased plant availability of soil Mo. The lime and/or Mo requirement of New Zealand Soils have been reviewed by During (1972).

Recently, however, it has been suggested (N.D. Grace, pers. comm.) that pastures on certain Wairarapa hill country soils can contain a sufficiently high cohtent of the trace element Mn to impair the health and performance of grazing animals, particularly sheep. Such observations have been reinforced as a result of preliminary field trials indicating improved ewe fertility and growth rates of lambs following the application of lime to these soils. Further, the controlled feeding of supplemental dietary Mn to young sheep has been shown to depress their growth rate.

It is well known that the addition of lime to acid soil generally results in decreased availability of soil Mn for plant uptake. However, there is very little information for New Zealand soils on the amounts and forms of native soil Mn and the types of transformations resulting from lime application. The present field experiment was initiated to investigate the chemical forms of soil Mn in a typical unlimed Wairarapa hill country soil (Purimu silt loam) and to follow any changes

in these forms, for a period of one year, following broadcast application of several rates of lime addition. When possible, bulk herbage samples were collected and analysed in order to assess changes in Mn content resulting from lime application.