THE ORGANIC MATTER STATUS OF SOME MINERAL SOILS IN NEW ZEALAND

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Summary

Core samples of mineral soils representing a wide range of particle sizes were taken from 133 sites in nine soil types located in different parts of the country and analysed for organic matter content. Approximately 82% of the soils had organic matter levels between 7 and 17% but values ranged from 5.1 to 22.1% with an average of 12%.

INTRODUCTION

The existence of organic matter in soil has been demonstrated as being one of the main factors inhibiting the free phytotoxic action of many herbicides used in pastoral and arable situations. Its presence in water is also known to have a restrictive effect on the proper functioning of herbicides used for control of aquatic weeds (Stevenson 1972). As one of the major soil fractions involved in the persistence and dissipation of chemical residues, a knowledge of its distribution and degree would appear advantageous in the safe and efficient use of herbicides.

It has been assumed that New Zealand soils in general contain relatively high amounts of organic matter compared to soils of many other countries but little quantitative data are available on this subject. Preliminary studies were undertaken therefore, to obtain an idea of the organic matter levels of some mineral soils in New Zealand.

MATERIALS AND METHODS

A total of 133 sites was selected from nine soil types covering a broad spread of textures. The land sampled covered localities between Turua in the Hauraki Plains county of the North Island to Edendale in Southland. The soil types included the Hauraki clay near Thames, Waitoa silt loam near Te Aroha, Horotiu sandy loam, Ohaupo silt loam and Hamilton clay loam near Hamilton, Paengaroa sand in the Bay of Plenty region, Takapau silt loam from the Takapau Plains, Levin sandy loam near Levin and Waikiwi silt loam near Edendale. About 80% of the sites were under pasture at the time of sampling.

Sites under consideration were chosen for uniformity and divided into three sectors with one individual sample being taken from each area. All samples consisted of at least ten cores 1.7 cm in diameter taken at random from a depth of 0 to 10 cm within each sector. Organic carbon determinations of soil samples were made by the Ruakura Soil Testing Laboratory using a modified Walkley-Black method and the figures obtained were multiplied by 1.724 to secure organic matter percentages.

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RESULTS AND DISCUSSION

The average soil organic matter content of the samples studied was 12% with most of the samples assaying between 7 and 17% (Fig. 1). The maximum value was 22.1% and the minimum 5.1%. These limits would probably cover the range of organic matter levels in the surface of most mineral soils in New Zealand.

Fig. 1: Frequency distribution of organic matter levels in some mineral soils of New Zealand.

Although only a nominal number of soil samples have been examined, the data presented here suggest that relatively high organic matter levels occur in New Zealand soils compared to most overseas soils. McGrath (1973) measured organic matter in 500 Irish tillage soil samples and found an average level of 5.9%, while Brogan (1966) reported an average of 9.1% organic matter in Irish soils under pasture. In a review, Warren (1973) mentioned that many United States soils contain 2 to 4% organic matter. A study on the influence of soil characteristics on herbicide activity by Day *et al.* (1968) included 43 Californian soils, which had an average organic matter content of 2.5%, the highest level being 5.1% (with the exception of peat soils). An average organic matter level of 4.0% was found by Martel and Paul (1974) in some prairie soils of Canada.

In view of the generally high organic matter status of New Zealand soils, the need for herbicide container labels to carry some recommendations for herbicide rates in accordance with organic matter content becomes obvious.

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