

A COMPARISON OF THE WALKLEY-BLACK AND THE LOSS-ON-IGNITION METHODS FOR ORGANIC CARBON ESTIMATION IN CALCAREOUS SOIL PROFILES

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ABSTRACT

Two methods of organic carbon estimation were employed on three soil profiles (Caernarfon brick works, Lleiniog, & Penmon-buried profile; all belong to Salop series), formed on calcareous parent material, from North Wales, U.K. Lower recovery of %OC was observed by the dichromate combustion method than from the loss-on-ignition (L.O.I.). However, the soils having greater clay and carbonate contents gave more %OC, at high temperature, by L.O.I. method. Although both the methods gave consistent results, the dichromate combustion method was more reliable and therefore suggested for calcareous and/or high clay soils.

INTRODUCTION

Organic matter has a major influence on soil chemical and physical properties. The enhanced solubility of calcite in soil water reactions observed in several studies can be explained by the slow calcite precipitation following the production of HCO_3 via organic matter mineralisation (Amrhein and Suarez, 1987). Various methods have been developed for measuring its chief constituent,

provide a reliable method of measurement.

There is another approach that involves the determination of organic matter by loss-on-ignition (L.O.I.) and correlation of mass loss with soil organic carbon. In a study of soils with a range of organic matter and clay contents formed in different parent materials in North Wales, Ball (1964) found a good correlation between L.O.I. (L) and total organic carbon. He determined L at 850°C and 375°C and found a correlation coefficient of 0.99 between L850°C and total organic carbon estimated by the Walkley-Black method. Since organic matter has conventionally been assumed to contain, on average, 58% organic carbon, organic carbon ures are normally converted to organic matter by multiplying a factor of 1.724 (Nelson and Sommers, 1982).

MATERIALS AND METHODS

Selection of sites

All the three profiles belong to Salop series (Salop Association, SSEW, 1984). These profiles are characterised by being developed from glacial till