

Introduction

A plethora of methods for the chemical analysis of soils exists for at least six main reasons: (a) there are many types of soils with widely differing physical and chemical characteristics and problems; (b) the total elemental composition of soils mostly has little consistent association with the ability of soils to provide necessary levels of nutrients for good plant growth; (c) tests that are quick and cheap to perform are often sought for operational and commercial reasons, even when superior procedures exist; (d) technological advances in instrumentation and computing open new analytical opportunities; (e) an ongoing quest by soil scientists and chemists to develop tests superior to those of times past, and (f) broadening demands to deal with emerging natural resource management, soil health and environmental issues. In practice, soil test methodology used by soil testing services varies within and across regions, across states and from one nation to another, making it difficult to exchange meaningful soil chemical information.

Calls from 19th century agricultural chemists failed to 'settle on a uniform method of soil analysis, so that results obtained by different analysts might be comparable'. A two-part response in harmony with this book provides a way forward. The first, the main focus of this book, is to explain and define the (mostly) empirical methods (see Note 1) of analysis now in use or suitable for use in at least parts of Australasia. The second, also supported by this book, is to periodically assess whether the selected method/s can produce consistent results when used by individual and multiple laboratories. The now superseded Australian Laboratory Handbook of Soil and Water Chemical Methods (Rayment and Higginson 1992) made an important contribution to both components. This book extends that two-part framework for soil chemical methods, with a focus on the Australasian region. For this book, the Australasian region is that accepted by ASPAC, i.e. it comprises Oceania (Australia, New Zealand, Papua New Guinea, other islands in the south Pacific Ocean) plus areas of south-east Asia.

Organisation

This book contains over 200 ready-to-use methods, each accompanied by contemporary background information. There is sufficient detail for the book to be used as an operational laboratory methods manual and as a comprehensive reference to guide educators, researchers and end-users on choice and performance of the various methodological options contained therein. Key references are included to facilitate follow-up by those who seek additional knowledge.

Each method has a unique, three-character or four-character alpha-numeric code number. These codes harmonise with those for soils in Rayment and Higginson (1992). That is, code numbers used for particular methods and analytical finishes in the Rayment and Higginson Handbook are reproduced and extended when necessary. Specifically, the code incorporates two numerals separated by an upper-case alpha-character. The left-hand-side numeral represents methods with related features or applications, such as carbon (C), nitrogen (N), ion-exchange properties and the like. The first alpha-character identifies a variant of the main test,