Chapter 35

Organic Matter Characterization

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INTRODUCTION

It is generally accepted that the term soil organic matter refers only to the non-living organic material in the soil, which makes up by far the major portion of the total organic components. The living organic components, which are part of the soil biota, comprise a minor portion of the total organic material, and they will not be considered in this chapter. The soil organic matter can be of plant, animal or microbial origin and may be relatively fresh or highly decomposed and transformed. It is to the characterization of this material to which this chapter will be devoted. For in-depth reviews on this topic, the reader should consult Hayes and Swift (1978), Stevenson (1994), Aiken et al. (1985), and Hayes et al. (1989).

In chemical terms, it is possible to identify in soil organic matter, components belonging to the main classes of naturally occurring organic compounds found in plants and animals. Each of these compounds can be found in a wide variety of physical environments and physicochemical associations. In addition to these identifiable compounds, there are much larger amounts of organic matter which are not amenable to current methods of chemical characterization. To bring some semblance of order to this diverse and complex system, it is necessary to establish and superimpose a set of classifications and definitions in order to establish a common framework for discussion and investigation.

Given the complexity of the soil system, any attempt to rigorously categorize soil organic components is likely to be, at best, imperfect. Quite clearly the most likely basis for classification lies in readily observable physical, chemical and/or biochemical differences between the various components. A useful delineation based on physical characteristics is that drawn between recognizable remains of plants (or animal) debris and the highly degraded and transformed materials which contain no recognizable plant, animal or microbial structures. Although this classification is essentially based on visual observation of physical differences, in essence, it purposes to differentiate between the results of biochemical transformations. As such it is unlikely to be wholly successful. For example, the same classes of organic compounds (e.g., carbohydrates, peptides and amino acids) can be found in both fractions.