**Total Carbon**

For the purpose of TPM it may be important to distinguish between soil organic carbon (OC) and inorganic carbon (IC). Each has important but different roles in soil remediation and as a component of soil quality as a growing media. Total soil carbon (C) is the sum of soil OC and IC. Natural soil OC is present in soil organic matter, primarily as, stable humus, in cells of microorganisms, and in plant/animal residue (Nelson and Sommers, 1996). Soil organic matter contains approximately 50% OC. Soil IC exists primarily as carbonate (CO$_3$) minerals such as Calcite, dolomite, and bicarbonate salts. Carbonate minerals are only present in appreciable amounts in high pH (> 7.0) soils. In calcareous soils it is not unusual for the IC content to be greater than OC. High levels of soil carbonate inflate total C measures which can be misleading if it is not clearly understood which fraction of C is being reported.

**Dry Combustion**

Commercially, most total C analyses are done by dry combustion, with the liberation of CO$_2$, due to C oxidation, being quantified. To get an estimate of soil OC using dry combustion, without the interference of IC, samples can be pre-treated with acid to remove carbonates prior to dry combustion. Then IC is estimated as the difference between total C with and without acid pretreatment and OC is estimated as the difference between total C, prior to acid pre-treatment, and IC (Nelson and Sommers, 1996). Advantages of dry combustion include; it is fast, inexpensive and reliable and total nitrogen (N) and sometimes sulfur (S) can be measured simultaneously (Tabatabi and Bremner, 1991). Another measure of OC is by wet digestion using oxidation of OC with hot dichromate, followed by colorimetric analysis. Soil IC will not be quantified using this method.

**Cautions for Disturbed/Restored Sites**

On contaminated sites measures of C can be inflated by organic contaminants such as petroleum products, coal, or lignite. While these are certainly sources of C they cannot be expected to function the same as soil OC. Additionally, soil OC does not function the same as soil IC. It is important to distinguish among pools of C if they are considered an integral part of the site remediation or restoration.

**Total Nitrogen**

Though not directly related to plant N availability, a measure of soil total N will provide some insight into potentially plant available N pools and soil quality. There are two commonly used methods for determination of soil total nitrogen (N). The first is the Kjeldahl method, a wet oxidation procedure. The second is a dry combustion method. Either method will provide a measure of total N. Advantages of dry combustion are it is fast, inexpensive reliable, and total carbon (C) and sometimes sulfur (S) can be measured simultaneously (Tabatabi and Bremner, 1991).
Cautions for Disturbed/Restored Sites

On contaminated/remediated sites measures of N can be inflated by N containing contaminants (TNT, RDX) or additions of N such as those in organic polymers (polyamine, polyacrylimide).

References


