Knowledge grows

Yara Analytical Services
Technical Bulletin

Soil Organic Matter

Organic matter is the decomposed and partially decomposed remains of plants and animals in the soil. The agents of decay are the millions of bacteria and micro-organisms which are present in every gram of soil.

Soil without organic matter is nothing more than finely ground rock. Organic Matter is vital because it contains, and maintains, the vast population of microscopic organisms in the soil. These microbes are the key to fertility and have a beneficial effect both before and after death.

When active they transform complex organic materials into forms which will later be available to plant roots. In the process they produce heat; hence the heat that is produced from a compost heap. When dead, plant nutrients are released as well as colloidal gums.

It is these gums which cement the soil particles together producing a well aggregated, crumbly texture allowing good root penetration, improving water infiltration and reducing erosion.

Under normal conditions there is a rough balance which naturally maintains organic matter levels in the soil. However, under cultivation conditions decomposition is increased and more organic matter is lost than is replaced by natural means. This can be reversed overtime by reducing tillage thus reducing decomposition and increasing external organic inputs such as farm yard manures and greenwaste composts.

Typical OM levels:

Organic Matter Levels	
Mineral Soils	1 - 5 %
Guide Soils	3 %
Humose Soils	8 - 15%
Peaty Soils	> 16%

What Does Organic Matter Do?

Nutritional
- Increases the nutrient holding capacity of soil.
- Creates a pool of nutrients for plants.
- Is food for soil organisms, which hold onto nutrients and release them in plant available forms.

Water Dynamics
- Improves water infiltration.
- Decreases evaporation.
- Increases water holding capacity, esp. in sandy soils.

Soil Structure
- Encourages root development.
- Improves aggregation, preventing erosion.
- Prevents compaction.

Factors Affecting Soil Organic Matter Level

Organic matter is determined by two main processes. The addition (roots, surface residue, manures) and loss through decomposition. There are 4 main factors affecting additions and losses:-

Soil Texture - Fine textured, clay soils hold more than sandy soils because clay particles form bonds that hold organic compounds and decomposition occurs more quickly in well aerated sandy soils. A sandy loam will rarely hold more than 2% organic matter.

Climate - Higher temperatures speed up decomposition and in areas of high rainfall/irrigation there is more plant growth and therefore more roots and residues.

Landscape - Low, poorly drained areas have higher organic matter levels as the reduced oxygen levels slow down decomposition. Low spots also accumulate organic matter that runs off hills and slopes.

Management - Practices that increase plant growth (cover crops, irrigation) will increase the amount of roots and residues. Conversely, intensive tillage increases the loss of organic matter by speeding up decomposition. In addition to changing the amount, tillage practises can also affect the depth of soil organic matter.

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