

## **BENEFITS OF SOIL ORGANIC MATTER**

The List of benefits from having organic matter in soil is so varied and extensive that it makes one think of the claims printed on old-time patent medicine labels: fortunately, these for organic matter are all true:

1. Organic matter is the source of 90-95 percent of the nitrogen in unfertilized soils.
2. Organic matter can be the major source of both available phosphorus and available sulfur when soil humus is present in appreciable mounts (about 2 percent or more).
3. Organic matter supplies, directly or indirectly through microbial action, the major soil aggregate-forming cements, particularly the long sugar chains called polysaccharides.
4. Organic matter contributes to the cation exchange capacity, often furnishing 30-70 percent of the total amount. The large available surfaces of humus have many cation exchange sites that adsorb nutrients for eventual plant use and temporarily adsorb heavy metal pollutants ( lead, cadmium, and the like), which are usually derived from applied waste waters. Adsorption of these probably helps clean contaminated water.
5. Organic matter commonly increases water content at field capacity, increases available water content in sandy soils, and increases both air and water flow rates through fine textured soil. This latter effect is probably due mainly to soil aggregation, which produces larger soil pores.

6. Organic matter acts as a chelate. A ligand is any organic compound that can bond to a metal (usually iron, zinc, copper, or manganese) by more than one bond and form a ring or cyclic structure by that bonding, called a **chelate** (key-late). The *soluble chelates* probably help mobilize these micronutrient metal ions increasing their availability to plants and general mobility in soils. The chelate mechanisms are not fully known at present.
7. Organic matter is a carbon supply for many microbes that perform other beneficial functions in soil (e.g.: free nitrogen fixers, denitrifiers).
8. When left on top of soil as a mulch, organic matter reduces erosion, shades the soil (which prevents rapid moisture loss), and keeps the soil cooler in very hot weather and warmer in winter.
9. Most soils above the Arctic Circle below the Antarctic Circle depend on a thick layer of organic matter to stabilize them. When this layer is destroyed by fire or construction activities, soils may become warmer by  $9^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ). In summer this causes melting of permafrost and results in very severe surface and pothole (vertical) soil erosion.
10. Humus buffers the soil against a rapid change in acidity, alkalinity, and salinity; and damage by pesticides and toxic heavy metals.