

Video Guide: Organic Matter

Organic Matter

1. Describe details about lignins.

Lignins are a structural material in plants, and is used alongside cellulose to make wood tissue. Lignins can be 10-30% of plant tissue. Lignin can make plants resistant to decay.

2. Describe in detail the steps of decay.

Solution – free amino acids and sugars (water soluble) dissolve out of litter into nearby water.

Fragmentation – the litter is shredded by meso and macrofauna like mites and earthworms

Decay – increased surface area from fragmentation gives bacteria more room to grow, and speeds up decay during this step. Complex materials are broken down and oxidized, while nutrients are mineralized.

Humidification – The remaining lignins and other decay-resistant materials form humus, which is resistant to decay but rich in nitrogen.

3. Based on the factors of organic matter, describe which factors would promote higher organic matter.

Vegetation – plants with dense, fibrous root systems like grass increase underground organic material

Climate – higher temperatures cause organic matter to decay faster, so cooler temps lead to more organic matter. < 77F slows decay, <41F nearly stops it.

Soil Texture – fine texture soils tend to have less oxygen due to lower air exchange, so more organic matter is preserved

Drainage – soils that retain more moisture retain more organic matter since less is leached

Tillage – breaks aggregates that protect organic matter from decay

4. Identify the functions/benefits of organic matter.

Organic matter can store water and nutrients due to small particle size and high surface area. Humus can be consumed to fertilize a field by tilling it. Humus contains acids that make phosphorus more available in the soil, as well as holding onto metallic nutrients.

5. Identify the soil texture that can benefit the most in water-holding capacity by the addition of organic matter.

Sandy soil textures benefit greatly from organic matter addition, since humus will improve the soil's ability to retain water.

Managing Organic Matter

1. Describes the practices that help maintain organic matter.

Recycling grass clippings or crop residues will keep organic matter in the same soil it came from. Cover crops and grasses can add organic matter to the soil by growing roots. Conservation tillage or reducing the amount of tilling can

2. Describe how cover crops are used in a farm.

Cover crops or “green manure” can protect from erosion during the winter, and can be cut later to add organic matter back to the soil. Cover crops can also be planted as rows between the main crop to act as mulch. Crop rotation can improve organic matter by rotating in meadow or hay legumes. A good crop rotation for row crops is row crops > small grains > legume hay.

3. Identify the types of materials (i.e. what type of C:N ratio) that causes nitrogen tie-up of organic matter.

High C:N materials such as sawdust, pine needles, and newspaper lead to the most competition between soil organisms and plants for nitrogen. Composting can be an effective way of mixing these materials with materials higher in nitrogen in order to make them an effective soil addition.

4. Describe the weight of organic soils, such as peat.

Organic soils are typically heavy due to their ability to retain a lot of water. 20-30% of the bulk weight is organic matter.