



Role of Organic Matter

Decay detrivores —> soil —> plants —> herbivores —> primary predators —> secondary predators

- ♦ **Earthworms** : provide porosity to aerate soil, allow water to infiltrate soil
 - High porosity = air and water goes deeper = plant growth
 - Produce humus



<https://www.gardeningknowhow.com/composting/vermicomposting/benefits-of-garden-worms.htm>

Sources of organic matter

- ✦ Crop residue
- ✦ Green manure
- ✦ Livestock manure
- ✦ Organic waste

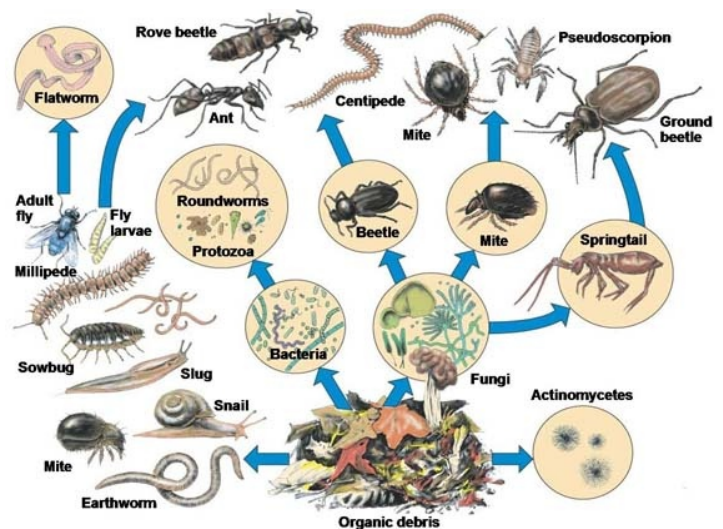


Green manure

<https://www.thegrassseedstore.co.uk/product/cut-compost-green-manure/>

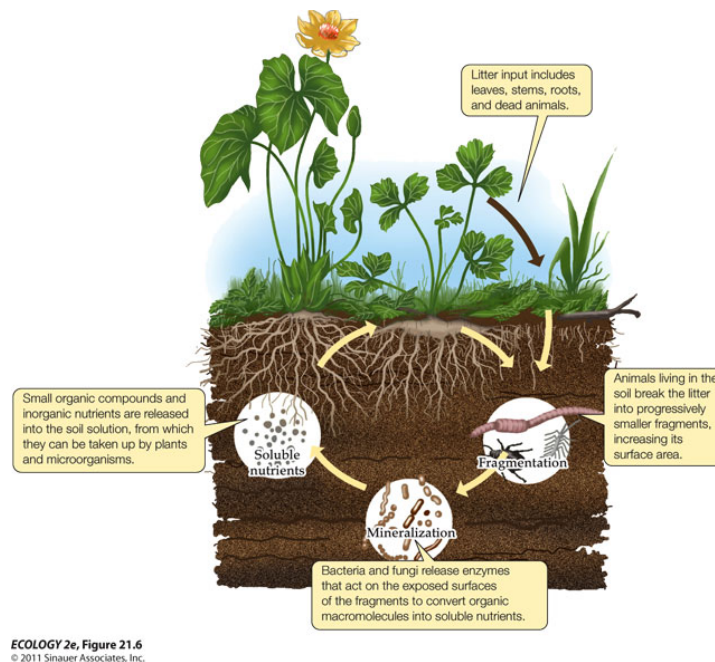
Categories of OM

1. Living soil organisms
2. Fresh organic residue
3. Active fraction
4. Stabilized OM(humus)



Living soil organisms

<http://i.bp.blogspot.com/-TNJWrSyU5mc/VhxRUqQX73I/AAAAAAAAA4s/UIVBsIaLzGo/s1600/SOIL.I.jpg>



<https://www.colorado.edu/eeb/courses/204obowman/>

Decomposition

- Breaking down of carbon and nutrients in dead organic matter
- Complex organic molecules to simple organic and inorganic molecules
- Releases nutrients available to microbes and plants
- Carbon, oxygen, hydrogen, nitrogen, etc.
- Release by-products and waste
 - ✦ Food for other soil organisms
 - ✦ **Complex polysaccharides** hold soil together
- **Humus** : chemically stabilized products of decompositions
 - ✦ Lignin → DECOMPOSITION → humus
 - ✦ C:N ratio = 10:1

Factors of decomposition :

1. Living organisms
2. Environmental conditions
 1. Moisture
 2. Temperature : low = good
 3. Oxygen : more = good
3. Quality of decomposing materials [C:N ratio]

Results of decomposition :

1. Breakdown of organic residues
2. Nutrient mineralization-produce available nutrients
 1. Water soluble compounds
 2. Inorganic and organic nutrients
3. Transfer of organic carbon, nutrients and energy into soil organisms, humus, and carbondioxide

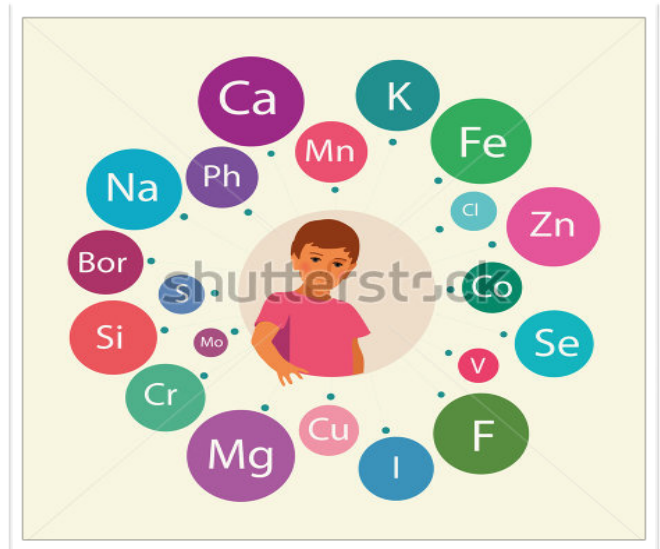
Plant Nutrition

Nutrients Reservoirs

- Soil : water and minerals
- Air : carbon dioxide
- Branching root system and shoot system of vascular plant ensure networking with both reservoir.

Macronutrients and Micronutrients

- Most organic mass comes from CO₂ in the air, but also depends on soil nutrients
- Chemical elements essential for plant to complete life cycle
- Macronutrients
 - o Plants require them in large amounts
 - o C O H N K Ca Mg P S
- Micronutrients
 - o Need in small amount
 - o Cl Fe Zn Mn B Cu Ni Mo
- Fertilizer
 - o Greatest effect on plant growth
 - Macronutrient
 - Provides proteins, nucleic acids, chlorophyll, host of other important organic molecules
 - Dead organic material
 - Bacteria and fungi break down organic N into nitrate ions so plants can use
- Nutrients mobility
 - o Mobile while in solution of water
 - o Move from roots to shoots



- Mineral deficiency
 - Symptoms depend on nutrient's function and mobility of nutrient
 - Deficiency of mobile nutrient
 - Affects older organs (young tissues can more efficiently draw minerals)
 - Deficiency of less mobile nutrients
 - Affects young organs (old tissue has store of minerals to fall back on)
 - Most common deficiencies:
 - Nitrogen, potassium, phosphorus



Requirement for optimum growth

- Growth media
- Light
- Water
- Temperature
- Fertilizer

Soilless mix - organic + inorganic substances that provide sufficient support for plant growth

- No topsoil
- Common components:
 - Peat moss: nutrient and moisture holding capacity
 - Perlite: aerate soil
 - Vermiculite: moisture holding capacity
 - Coir: hold water and air
 - Sand: reduce overall water holding cap
 - Rice husk: drainage of growth media
- Advantages:
 - Uniform: doesn't vary in components, texture, nutrients
 - Sterile:
 - Can be manipulated
 - Personalized
 - Lightweight—easy to ship or move

- Disadvantages:

- Added more frequently
 - Lack minor plant food elements that soil usually has
- Lightweight - wind can blow dry pots over
- Difficult to transplant plant from soil to soilless
- High cost

Field grown vs container

- Container disadvantages

- Need more water
 - Above ground, dry quicker
- Become pot-bound
- Higher start up cost

Watering

- Need more water in active growth and flowering stage
- Hydrogen in water key nutrient for photosynthesis
- Water is carrier of dissolved nutrients from soil into roots
- Water sustain plant cells
- No water = dead plants
- Factors affecting watering:
 - Weather, soil type, plant type
 - Media- more porous mix=more water
 - Size of container- small ones dry out faster
 - Type of container
 - Surface mulch- mulch reduce need of water
- When to water:
 - Observation: wilt/ loss of color/dullness



Lighting

- Light intensity requirements vary from plants
 - Direct sun
 - Partial sun/weak sun
 - Indirect/filtered light

Temperature

- Claytime temp 20-30C
- Night temp drop 5-10C below daytime temp

Air conditioning

- Can trouble plants
- Should be located away from direct air flow

Humidity

- Need additional moisture if atmosphere dry

Pruning

- Shapes the plants
- More compact
- Train growth/form of plants
- Remove dead/diseased parts

