

COMPOSTING

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GROW BIOINTENSIVE CENTRE



GOAL

Maximize quality and quantity of cured compost produced per unit of compost built and maximizes micro biodiversity.

- In nature, living things die and their death allows life to be reborn. Both animals and plants die on forest floors to be composted by time, water, microorganisms such as air to produce a soil improved in structure and nutrients.

Composting in nature occurs in at least three ways

1. In the form of manures, which are plant and animal foods composted inside an animal's body including earth worms and the further aged outside the animal by the heat of fermentation /decomposition.

Earthworms are especially good composters. Their castings are five times richer in nitrogen, two times richer exchangeable calcium, seven times richer in available phosphorus and eleven times richer in available potassium than the soil they inhabit.

2. In the form of animal and plant bodies that decay on top of and within the soil in nature and in compost piles
3. In the form of roots and root hairs and microbial life-forms that remain and decay beneath the surface of the soil after harvesting

FUNCTION OF COMPOST IN THE SOIL

1. Improves structure --- compost - breaks up clay and clods and bind together sandy soil. Its helps make proper aeration in clay and sandy soil possible.
2. Moisture Retention -- Compost holds 6 times its own weight in water. A soil with good organic matter contents soaks up rain like a sponge and regulates the supply to the plants. A soil stripped of organic matter resist water penetration, thus leading a crusting, erosion flooding.

3. Aeration –Plants can obtain 96% of the nutrients they need from the air, sun and water. A loose healthy soil assist in diffusing air and moisture into the soil and in exchanging nutrients.

4. Carbon dioxide released by organic matter decomposition diffuses out of the soil and is absorbed by the canopy by leaves above in a Mini climate created by closely spaced plants.

5. Fertilization –Compost contains some nutrients, phosphorus, potassium, magnesium and sulphur but is especially important for trace element.

Soil Fertility

- There are 17 known elements that are essential for plant growth
- Plants require nutrients that are not created through photosynthesis
 - H, O, C – non mineral ----- Plants get from air and water
- **Macronutrients**
 - N, P, K ----- High amounts
 - **The main functions of N and P are that they are constituents of proteins and nucleic acids, which are important components of plant tissue**
 - **K is mainly of importance in the regulation of processes in the plant, such as osmosis and enzyme activities. K is generally playing an important role for the quality of harvested plant products.**
 - Ca, Mg, S ----- Lesser amounts
- **Micronutrients**
 - Fe, Mn, B, Mo, Cu, Zn, Ni, Cl ----- Small amounts

- Contains Organic matter, humus and some undecomposed organic matter. Humus also acts as site of nutrients absorption (accumulation of nutrients on its surface) and exchange for plants in soil .
- **The surface of humus particles carry a negative electric charge. Many of the plant nutrients such as calcium, sodium magnesium, potassium and more trace minerals carry a positive charge in the soil solution and are thereby attracted to and adhere to the surface of humus.**
- As plant roots grow through the soil in search of nutrients, they feed on humus. Each plant root is surrounded by halo of hydrogen ions that are a by-product of the roots respiration. These hydrogen ions also carry a positive electric charge.

What goes in your Compost

- **Carbon:** Mature materials
dried leaves, straws etc



- **Nitrogen:** Immature
Green plants



- Top soil

- kitchen wastes

- **Water:** moisture

- Oxygen



Carbon

BROWNS

Maize stalks

Dried leaves

Bean trash

Sorghum stems

Millet straws

Sawdust from indigenous trees

Peanut shells

Nitrogen

GREENS

- Immature plant materials
- Fresh garden weeds
- Manure from herbivorous animals (poultry, cattle, goat)
- Tea bags
- Coffee grounds & filter
- Kitchen scraps

Compost Crops

Farming Carbon, Growing Soil



- A Plant is 96% Carbon and only 4% water!



A Few Things to Avoid

- Meat, bones
- Dairy products
- Fats and oils
- Pet feces (*dog, cat, other carnivores*)
- Wood ashes?

These can attract critters you don't want, may create odd odors, or contain harmful bacteria/parasites.

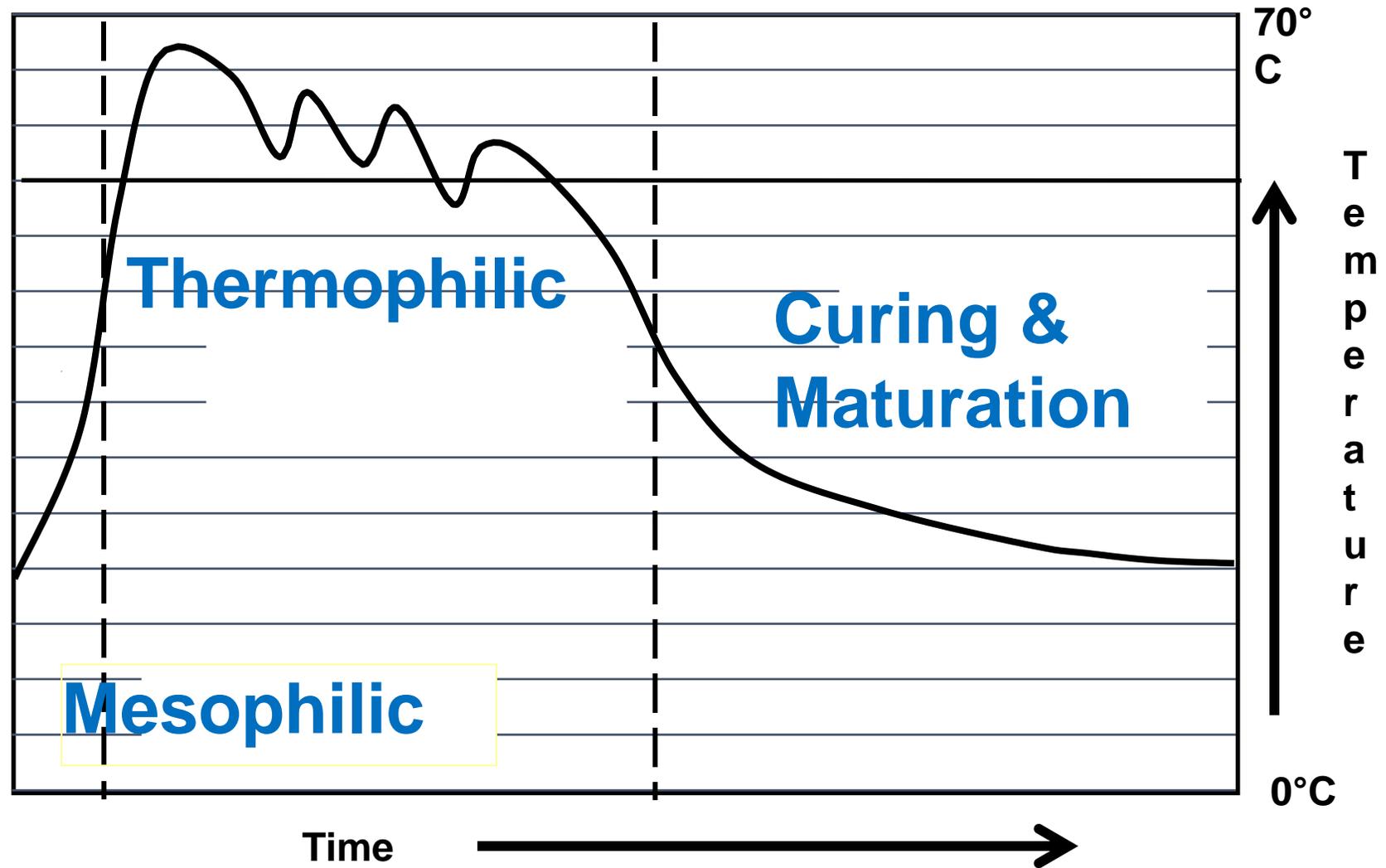
Three Stages of Composting

- **First stage:** Mesophilic – **FERMENTATION stage** (68° – 104°F; 20°- 40°C)
 - it is the breaking down of organic materials
 - break down soluble, readily degradable compounds (sugars and starches)

- **Second stage:** Thermophilic (105°-150°F; 40.6° – 65.6°C)
 - Break down proteins, fats; work with actinomycetes to begin breaking down cellulose and hemicellulose
 - **HUMUS BUILDING** is the synthesis /breaking down of organic matter into the simpler substances known as humus which increases the surface area for nutrient release

- **Third stage:** Mesophilic (<105°F; <40.6°C)
 - Actinomycetes and fungi are important during curing phase in attacking most resistant compounds
 - **MINERALIZATION** -organic matter continue to oxidize/burn up and the compost becomes mineralized which results to low organic matter (8% to 10%) thus lower in nutrient or fertilizer value and this stage should be avoided as this lowers the quality of compost.

Stages of Composting



Troubleshooting

Materials not decomposing:

Add water, turn pile to add oxygen, add more greens

Ammonia odor:

Add carbonaceous materials such as leaves, straw

Rotten odor:

Turn pile, add coarse dry materials.

