

## GLOSSARY

**Acid** – A substance with pH between 0 and 7.

**Actinomycetes** – A type of bacteria, distinguished by their branching filaments called mycelia. Include both mesophilic and thermophilic species. In composting, actinomycetes play an important role in degrading cellulose and lignin.

**Adsorption** – The attachment of a particle, ion, or molecule to the surface of a solid such as soil or compost.

**Aeration** – The process through which air in compost pores is replaced by atmospheric air, which generally is higher in oxygen.

**Aeration, forced** – Addition of air to compost using blowers, fans, or vacuum pumps.

**Aeration, passive** – Relying on natural forces, such as convection, diffusion, wind, and the tendency of warm air to rise, for movement of air through compost.

**Aerobic** – (1) Characterized by presence of oxygen, (2) Living or becoming active in the presence of oxygen, (3) Occurring only in the presence of oxygen.

**Air-dry** – (adj) The state of dryness of a compost or soil at equilibrium with the surrounding atmosphere. (v) To allow to reach equilibrium in moisture content with the surrounding atmosphere.

**Amino acid** – An organic compound containing amino ( $\text{NH}_2$ ) and carboxyl ( $\text{COOH}$ ) groups. They combine to form proteins.

**Anaerobic** – (1) Characterized by absence of oxygen, (2) Living or functioning in the absence of oxygen, (3) Occurring only in the absence of oxygen.

**Annelid** – A member of the phylum Annelida, containing segmented worms.

**Bacteria** – Single-celled microscopic organisms lacking an enclosed nucleus. Members of the kingdom Monera. Commonly have a spherical, rod, or spiral shape.

**Base** – A substance with pH between 7 and 14.

**Batch composting** – Composting in which all of the ingredients are added at once rather than continuously over a period of time.

**Bedding** – A moisture-retaining medium for worm composting, such as shredded paper, leaves, or peat moss.

**Bioassay** – A laboratory procedure using living organisms to test the toxicity of a substance.

**Biodegradable** – Capable of being broken down through biochemical processes.

**Biofilter** – A filter that uses microbial action to reduce odors. Finished compost commonly is used as a biofilter to reduce potential odors from active compost systems. This can be as simple as layering finished compost over a pile containing fresh food scraps. In systems using forced aeration, the air commonly is blown through a biofilter of finished compost before being released to the environment.

**Biomass** – The mass of living organisms.

**Bioreactor** – An enclosed container used for making compost or conducting scientific experiments on the composting process.

**Buffer** – A substance that resists rapid change in pH.

**Buffering capacity** – The ability to resist change in pH.

**Bulking agent** – A material used in composting to maintain air spaces between particles.

**C:N** – See Carbon-to-nitrogen ratio.

**Carbon-to-nitrogen ratio** – The ratio of the weight of organic carbon to the weight of total nitrogen in soil, compost, or other organic material.

**Castings** – Worm feces, including undigested organic matter, bacteria, and soil that have passed through worm digestive systems.

**Cellulose** – The chief component of plant cell walls, cellulose is a series of organic compounds containing carbon, hydrogen, and oxygen formed into chains of 1000-10,000 glucose molecules. Cellulose forms the fibrous and woody parts of plants and makes up over 50% of the total organic carbon in the biosphere.

**Clay** – (1) A soil component consisting of the smallest mineral particles, those <0.002 mm in diameter, (2) Soil composed of >40% clay, <45% sand, and < 40% silt.

**Compost** – (v) To decompose organic materials under controlled conditions, (n) The humus-like material produced by decomposing organic materials under controlled conditions.

**Compost maturity** – See Maturity.

**Compost quality** – The suitability of a compost for use with plants. Compost that impairs seed germination or plant growth is of low quality, either because it is not yet fully decomposed or because the initial ingredients contained contaminants that are phytotoxic.

**Compost stability** – See Stability.

**Compost system** – The method used to convert organic wastes into a stable end product. Examples range from large outdoor windrows or piles to small indoor bioreactors.

**Compost tea** – An extract made by soaking finished compost in water.

**Compound microscope** – A microscope with two sets of lenses, one in the eyepiece and the other in the objective.

**Conduction** – The transfer of heat by physical contact between two or more objects or substances.

**Control** – In a scientific experiment, the test group used as a standard of comparison, to which no experimental factors or treatments have been imposed.

**Convection** – The transfer of heat through a gas or solution because of molecular movement.

**Culture** – (v) To grow organisms under controlled conditions, (n) The product of growing organisms under controlled conditions, such as a bacterial culture.

**Curing** – The final stage of composting, after the period of rapid decomposition has been completed, in which slow chemical changes occur that make the compost more suitable for use with plants.

**Cyst** – A sac surrounding an animal or microorganism in a dormant state.

**Debris** – Dead organic matter.

**Decomposer** – An organism that feeds on dead organic matter and aids in its degradation.

**Dependent variable** – In a scientific experiment, the variable that changes as a result of treatment variations. For example, in plant growth experiments, one dependent variable might be the height of the plants grown in potting mixes containing various amounts of compost.

**Detritus** – Dead organic matter.

**Endospore** – A structure inside some bacterial cells that is highly resistant to heat and chemical stress and can germinate to grow a new cell when environmental conditions become favorable.

**Enzyme** – An organic substance produced by living cells and capable of acting as a catalyst for a biochemical reaction.

**Feces** – Wastes discharged from the intestines of animals.

**Food chain** – A hierarchical sequence of organisms that feed on each other, starting with either green plants or organic detritus as the primary energy source.

**Food web** – The network of interconnected food chains found in an ecological community.

**Forced aeration** – See Aeration, forced.

**Fungi** – Plural of fungus. A kingdom that includes molds, mildews, yeasts, and mushrooms. Unlike bacteria, fungal cells do have nuclei. Fungi lack chlorophyll, and most feed on dead organic matter. In compost, fungi are important because they break down tough debris like cellulose, and they grow well during the curing stage, when moisture and nitrogen levels are low.

**Gram negative** – A characteristic of bacterial cells that are decolorized by 95% alcohol during the Gram staining procedure.

**Gram positive** – A characteristic of bacterial cells that retain Gram stain color after washing with 95% alcohol during the Gram staining procedure.

**Gram staining** – A differential staining procedure that provides for separation of bacteria into gram-positive and gram-negative types, depending on the structure of their cell walls.

**Heavy metals** – Metallic elements with high molecular weights. Includes cadmium, lead, copper, mercury, chromium, silver, and zinc. High concentrations in soil can be toxic to plants or to animals that eat the plants or soil particles.

**Hemicellulose** – A series of organic compounds made up of chains of 50–150 sugar units including glucose, xylose, and galactose. In wood, hemicellulose surrounds cellulose and helps to bind it to lignin.

**Holding unit** – A simple container that holds landscaping, garden, and food wastes while they break down.

**Humus** – The stable organic complex that remains after plant and animal residues have decomposed in soil or compost.

**Hydrolysis** – A chemical reaction in which water is one of the reactants.

**Hyphae** – Branched or unbranched chains of cells, as in fungi and actinomycetes.

**Hypothesis** – A prediction about the relationship between variables in a scientific experiment.

**Immature compost** – See Maturity.

**Independent variable** – A factor that is intentionally manipulated in a scientific experiment. For example, in plant growth experiments, one independent variable might be the ratio of compost to sand in the planting mixture.

**Inoculant** – Microorganisms that are introduced into compost or other culture media.

**Inoculate** – To introduce pure or mixed cultures of microorganisms into culture media.

**Inorganic** – Mineral, rock, metal, or other material containing no carbon-to-carbon bonds. Not subject to biological decomposition.

**Invertebrate** – An animal without a backbone, such as an insect or worm.

**Leachate** – The liquid extract that results when water comes into contact with a solid such as soil or compost. In composting, leachate containing dissolved and suspended substances drains from the system as organic matter decomposes.

**Lignin** – A series of complex organic polymers that are highly resistant to microbial decomposition. In wood, lignin cements cellulose fibers together and protects them from chemical and microbial decomposition.

**Lime** – Calcium compounds used to neutralize acidity in soils.

**Macrofauna** – Soil-dwelling invertebrates that are large enough to create their own burrows.

**Macroorganism** – An organism large enough to be observed with the naked eye.

**Mature compost** – See Maturity.

**Maturity** – A measure of whether compost has completed not only the phase of rapid decomposition, but also the longer curing phase during which slow chemical changes make the compost more suitable for use with plants.

**Mesofauna** – Soil-dwelling invertebrates that are intermediate in size. They live in the air-filled pores between soil or compost particles but generally do not create their own spaces by burrowing.

**Mesophilic** – (1) Organisms that grow best at moderate temperatures (10–40°C), (2) The phase of composting that takes place at temperatures in the range of 10–40°C, (3) The type of composting that does not reach temperatures exceeding 40°C.

**Microfauna** – Soil protozoa and other microscopic fauna that are small enough to live in the thin film of water surrounding soil or compost particles.

**Microbe** – A microorganism.

**Microorganism** – An organism that individually is too small to be observed without magnification through a microscope.

**Mulch** – Any material such as compost, bark, wood chips, or straw that is spread on the soil surface to conserve soil moisture, suppress weed growth, moderate temperature changes, or prevent soil erosion.

**Mycelia** – Branching networks of fungal hyphae.

**Nitrifying bacteria** – Bacteria that transform ammonium ( $\text{NH}_4^+$ ) to nitrite ( $\text{NO}_2^-$ ) and then to nitrate ( $\text{NO}_3^-$ ).

**Nitrogen-fixing bacteria** – Bacteria that transform atmospheric nitrogen ( $\text{N}_2$ ) to ammonium ( $\text{NH}_4^+$ ).

**Organic** – (1) Pertaining to or derived from living organisms, (2) Chemical compounds containing carbon-to-carbon bonds.

**Organic matter** – Material that has come from something that is or was once alive.

**Oxidation** – A chemical reaction in which an atom loses electrons or increases in oxidation number.

**Passive aeration** – See Aeration, passive.

**Pathogen** – Any organism capable of producing disease or infection in other organisms.

**Percolation** – Downward movement of water through pores in rock, soil, or compost.

**Permeability** – The ability of a soil to allow the movement of water through its pores.

**pH** – The degree of acidity or alkalinity of a substance, expressed as the negative logarithm of the hydrogen ion concentration. Expressed on a scale from 0 to 14. pH <7 is acidic, 7 is neutral, and >7 is alkaline or basic.

**Phytotoxicity** – A measure of the ability of a substance to suppress seed germination, injure plant roots, or stunt plant growth.

**Polymer** – A large, chain-like molecule composed of many identical repeating units.

**Pore** – An open area between particles of compost or soil, filled by air or water.

**Porosity** – The percentage of the total soil or compost volume that is occupied by open spaces rather than solid particles.

**Protozoa** – Single-celled, animal-like microorganisms belonging to the kingdom Protista. Many species live in water or aquatic films surrounding soil or compost particles.

**Radicle** – An embryo root that grows when a seed germinates.

**Replicate** – In a scientific experiment, the experimental units to which the same treatment has been imposed. For example, in a planting experiment, five plants would be replicates if they were set up under the same initial conditions and received the same treatment throughout the experiment.

**Sand** – (1) A soil component consisting of mineral particles between 0.05 mm and 2.0 mm in diameter, (2) Soil composed of >85% sand and < 10% clay.

**Screening** – The process of passing compost through a screen or sieve to remove large pieces and improve the consistency and quality of the end product.

**Silt** – (1) A soil component consisting of mineral particles between 0.002 mm and 0.05 mm in diameter, (2) Soil composed of >80% silt and < 12% clay.

**Soil amendment** – Any substance that is used to alter the chemical or physical properties of a soil, generally to make it more productive. Examples include compost, lime, sulfur, gypsum, and synthetic conditioners. Usually does not include chemical fertilizers.

**Specific heat** – The quantity of heat needed to raise the temperature of 1 g of a substance by 1°C.

**Stability** – A measure of whether compost has decomposed to the point at which it does not reheat, produce offensive odors, or support high rates of microbial growth when optimal moisture levels are supplied.

**Temperature profile** – A graph of temperature changes that occur during the process of thermophilic composting.

**Thermophilic** – (1) Organisms that grow best at temperatures above 40°C, (2) The phase of composting that takes place at temperatures exceeding 40°C, (3) The type of composting that includes a stage occurring above 40°C.

**Turning** – In a compost pile, mixing and agitating the organic material.

**Turning unit** – Three holding units built next to each other, so that compost can be turned from one into the next.

**Variable** – A factor that changes in a scientific experiment.

**Vermicompost** – (v) To decompose organic matter using worms, (n) The product obtained through decomposition of organic matter by microorganisms and worms.

**Vermiculite** – A mineral material that is used in potting soil to keep the mixture light and porous.

**Windrow** – An elongated pile of organic matter in the process of being composted.

**Yard and garden wastes** – Grass clippings, dead leaves, small branches, weeds, and plant residues.