

Appendix A

Glossary

Acid soil: A soil with a $\text{pH} < 6.5$.

Adsorption: A physical or chemical mechanism in which a compound is temporarily attached to a surface.

Aerobic: Conditions having a continuous supply of free oxygen.

Alkaline soil: A soil with $\text{pH} > 7.3$.

Agriculture: The production of crops or livestock on a farm.

Amendment: A material with beneficial properties that is added to a soil.

Ammonia (NH_3): A gaseous compound in the soil water that is in equilibrium with NH_4^+ . This is the form that will leave the soil and soil water as a gas.

Ammonium (NH_4^+): An inorganic (available) form of N, formed during the **mineralization** of **ON**. NH_4^+ is a **cation** that is soluble in water and available for **plant uptake**.

Anaerobic: Conditions that lack molecular oxygen. In soils, this condition is usually caused by excessive wetness.

Anion: An ion having a negative charge.

Arid: A climate in which potential **evapotranspiration** greatly exceeds precipitation for most of the year, and little water **percolates** through the soil.

Atmospheric nitrogen (N_2): A gaseous form of N not generally available to plants (except N fixers), that makes up about 79% of the atmosphere.

Available elements: The elements in soil solution that can readily be taken up by plant roots.

Available nutrients: See **available elements**.

Cation: An ion having a positive electrical charge.

Cation exchange: The transfer of **cations** in soil solution and **cations** held by soil particles on the exchange sites of inorganic and organic matter.

Cation exchange capacity (CEC): The total potential of soils for **adsorbing cations**. Determined values depend somewhat on the method used.

Chlorosis: The formation of pale green or yellow leaves in plants resulting in the failure of chlorophyll to develop. It is often caused by a deficiency in an **essential element**.

Compost: Organic residues (usually plant or animal) that are arranged into piles and allowed to decompose under controlled conditions of air, temperature, nutrients, and moisture.

Coniferous forest: A forest consisting of predominantly cone-bearing trees with needle shaped leaves (usually evergreen). These are the most common types of forests in the Pacific Northwest.

Continuously anaerobic (*very poorly drained*) soil: A **soil horizon** that is saturated with water throughout the year; it is blue, olive, or gray.

Deciduous forest: A forest composed of trees that shed their leaves at some season of the year.

Denitrification: The biological reduction of N to N gas or oxides of N, resulting in the loss of N into the atmosphere.

Dryland-farming: A moisture-conserving method of farming in arid and semi-arid areas without using irrigation. The technique consists of growing a crop in alternate years, allowing moisture to be stored in the **fallow** year.

Essential elements: Elements that are needed by plants. These include: C, O, H, N, P, K, S, Ca, Mg, Fe, Mn, B, Cl, Zn, Cu, Co, Mo, and Ni.

Evapotranspiration: The combined processes of evaporation and transpiration.

Excessively drained soil: A soil that loses water very rapidly because of rapid **percolation**.

Fallow: Land that has not been planted with crops for a period of time in order to accumulate moisture, control weeds, control pests, or induce **mineralization** of a nutrient.

Fertilizer: A material that is added to the soil to supply one or more plant nutrients in a readily available form.

Freely drained soil: A soil that allows water to **percolate** freely.

Humus: The well-decomposed, relatively stable part of the organic matter found in soils.

Immobilization: The process by which biological transformations convert inorganic N (NH_4^+ or NO_3^-) into **ON**.

Inorganic nitrogen: Forms of N that are available for plant uptake.

Leaching: The washing out of material (particularly ions) downward through the soil.

Legumes: A group of crops that have the ability to fix N_2 from the air (see **nitrogen fixation**).

Lime: Compounds of calcium used to neutralize soil acidity.

Lysimeter: Apparatus installed in the soil for measuring **percolation** and **leaching**.

Manure: Animal excreta with or without a mixture of bedding or litter.

Mineralization: The processes by which **ON** is biologically broken down and NH_4^+ is released (also called ammonification).

Neutral soil: A soil with pH 6.5-7.3.

Nitrate (NO_3^-): A mineral form of N formed by nitrification of NH_4^+ . It is an **anion** that is soluble in water, available to plants, and subject to **leaching**.

Nitrate leaching: Movement of NO_3^- with water from rainfall or irrigation downward through the soil or laterally along impermeable layers in the soil. Because NO_3^- is an **anion**, it is not held by the soil **CEC** and easily **leaches**.

Nitrification: The oxidation of ammonium to NO_2^- and of NO_2^- to NO_3^- by microorganisms. NH_4^+ is used as an energy source by the bacteria *Nitrosomonas* to produce NO_2^- ; the NO_2^- is then used as an energy source usually by the bacteria *Nitrobacter* to produce NO_3^- .

- Nitrite (NO_2^-):** A mineral form of N formed by nitrification of NH_4^+ , usually a short-lived intermediate between NH_4^+ and NO_3^- .
- Nitrogen (N):** An element (atomic number = 7, atomic weight = 14) that exists in every living organism and that makes up 78 percent of the atmosphere. N exists in one of three basic forms: gaseous, inorganic, or organic.
- Nitrogen fixation:** Conversion of N_2 to **ON** by the symbiotic association between specific plants and bacteria.
- Organic nitrogen (ON):** N that is incorporated into organic molecules such as amino acids, proteins, chlorophyll, and DNA.
- Percolation:** Passage of water through the soil by gravity.
- pH:** A scale that measures the acidity and alkalinity of a solution; the negative logarithm of the hydrogen ion concentration of a solution. pH near 7 is neutral, pH < 6.5 is **acid**, and pH > 7.3 is **alkaline**.
- Soil pH:** The pH measured in a soil-water mixture.
- Plant-available nitrogen (PAN):** The amount of inorganic N available to the plant from fertilization. This includes NH_4^+ and NO_3^- forms, plus the N that **mineralizes** from **ON** and minus the N lost by **volatilization, denitrification, and immobilization**.
- Plant uptake:** The amount of an element that is taken from the soil (soil water) by the plants. It is usually measured in the above-ground portion of the plant.
- Rangeland:** A type of agricultural land usually used for grazing cattle or other domestic animals that is not planted with a specific crop; often associated with arid soils. Applications of biosolids to these lands are normally to the surface, but sometimes can be incorporated.
- Residual soil nitrogen:** The **inorganic N** (usually in the form of NO_3^-) that exists in the soil at the time of application of an **amendment** such as biosolids. An application rate will be reduced if there is significant residual soil N.
- Soil:** A thin, weathered, and biologically active layer of inorganic and organic material occurring at the surface of the earth and supporting plant life.
- Soil horizon:** A layer in a soil **profile** consisting of relatively uniform materials that runs approximately parallel to the surface of the ground.
- Soil profile:** A vertical section (usually < 10 feet deep) through a soil exposing all the **soil horizons** from the surface to the relatively unaltered underlying material.
- Soil reclamation:** The practice of increasing the productivity (ability of the soil to grow plants well) of a disturbed or otherwise unproductive soil by the use of soil **amendments**, such as biosolids.
- Soil solution:** The water surrounding soil particles.
- Soil survey:** The systematic examination and mapping of soil.

Soil structure: The aggregation of individual soil particles into larger units with planes of weakness (usually pores) between them. Good structure improves the movement of water and air through the soil.

Soil texture: The coarseness or fineness of a soil; the relative proportions of sand, silt, and clay in a soil. Coarse-textured soils contain mostly sand, while fine textured soils contain mostly silt and clay.

Tilth: The physical state of the soil that determines its suitability for plant growth, taking into account texture, structure, consistence, and pore space. It is a subjective estimation and is judged by experience.

Unavailable nutrients: Plant nutrients that are present in the soil but cannot be taken up by the roots because they have not been released from the rock or minerals by weathering or from organic matter by decomposition.

Volatilization: Loss of gaseous NH_3 to the atmosphere.