

## **Course 1**

**Alkaline soil** – A soil with a pH above 7, containing more base than acid.

**Acid** – A solution containing free hydrogen ions ( $H^+$ ) or a chemical that will give off hydrogen ions in a solution.

**Anion** – A negatively charged acid-forming element or molecule, such as chloride ( $Cl^-$ ) or nitrate ( $NO_3^-$ ). The opposite of a cation.

**Available Nutrient** – The form of a nutrient that a plant is able to use, such as the nitrate ( $NO_3^-$ ) form of nitrogen.

**Base** – something that will neutralize an acid, such as hydroxide or limestone.

**Brix** – The unit representative of the sugar or solid content in a solution. A refractometer is used to measure the Brix of plant sap and fruit.

**Cation** – A positively charged ion such as calcium ( $Ca^{++}$ ) or ammonium ( $NH_4^+$ )

**Carbohydrate** – An organic compound containing hydrogen and carbon, usually in a ration of 2:1.

**Cation Exchange Capacity (CEC)** – The amount of negative charge that exists on humus and clays, allowing them to hold onto positively charged particles (cations), expressed in milliequivalents (ME).

**Chelate** – A molecule that uses more than one bond to attach firmly to certain elements, such as iron ( $Fe^{++}$ ) and zinc ( $Zn^{++}$ ). These elements may later be released from the chelate and be used by plants.

**Colloid** – A very small particle with a high surface area that can stay suspended in water for a very long time. In soils, colloid particles – clay and humus particles – are found in aggregates and are responsible for many of the chemical and physical properties of soils, including CEC, chelation of micronutrients, and development of aggregates.

**EC** – Electrical Conductivity, a measure of the quantity and mobility of ions in the soil, measured in Ergs/microsiemens.

**Erg** – A unit of energy. An erg is the amount of work done by a force of one [dyne](#) exerted for a distance of one [centimeter](#).

**Field Capacity** – Water content of a soil following drainage by gravity.

**Humate** – A salt form of humic acid.

**Humus** – The very well decomposed portion of soil organic matter (the “very dead”). It has very high CEC.

**Mycorrhizal relationship** – The mutually beneficial relationship that develops between plant roots of most crops and fungi. The fungi help plants obtain water and phosphorous by acting like an extension of the plant root system, and in return receive energy-rich molecules from the plant.

**ORAC** – Oxygen Radical Absorbance Capacity, antioxidant value of foods are expressed in ORAC units.

**pH** – Potential Hydrogen, a way of expressing the acid status or hydrogen ion ( $H^+$ ) concentration of a soil or a solution on a scale where 7 is neutral, less than 7 is acidic, and greater than 7 is alkaline or basic.

**Rhizobia bacteria** – Bacteria that live on the roots of legumes and have a mutually beneficial relationship with the plant. These bacteria fix nitrogen, providing the plant with an available form, and in return receive energy-rich molecules from the plant.

## Course 2

**Base Saturation** – The fraction of exchangeable cations that are base cations ([Ca](#), [Mg](#), [K](#) and [Na](#)). The higher the amount of exchangeable base cations, the more [acidity](#) can be [neutralized](#) in the short term.

**Biological Inoculant** – Inoculants often comprised of beneficial bacteria, fungi and trichoderma, which may form symbiotic relationships with plants. Can be coated onto seed, applied via drenches and foliar sprays, or added to potting soil and compost.

**Cover Crop** – A crop grown for the purpose of protecting the soil from erosion, building up soil, or maintaining soil organic matter, in a time of year when the soil would otherwise be bare. Also called a green manure.

**Crop Rotation** – The practice of rotating different types of crops over time to avoid the build-up of pathogens, increase soil organic matter, increase crop yields, spread out labor costs and reduce risk caused by climate or market conditions.

**Drench** – The application of nutrients and inoculant at the root level via drip irrigation, or hand-watering.

**Enzyme** – A specialized protein capable of catalyzing chemical changes, produced in living matter, each related to specific combinations of minerals.

**Exchangeable Cations** – The positively charged ions that are loosely attached to the edge of clay particles or organic matter in the soil. The cations include calcium (Ca), Magnesium (Mg), Potassium (K), Sodium (Na), Hydrogen (H), and Aluminium (Al).

**Foliar Spray** – The application of nutrients and inoculant directly to the above ground living parts of a plant with a back-pack sprayer, hand-help sprayer, or squirt bottle. Nutrients applied in this fashion are readily available to the plant, increase the rate of photosynthesis, and increase nutrient absorption by the roots.

**Macronutrient** – An essential plant nutrient, such as carbon (C), hydrogen (H), oxygen (O), nitrogen (N), phosphorous (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S), which is needed in large amounts by plants.

**Metabolite** – The intermediates and products of metabolism, usually restricted to small molecules. Primary metabolites are directly involved in growth, development and reproduction. Secondary metabolites are not directly involved in

these processes. In plants, an example of secondary metabolites are allelochemicals, which repel herbivores or block the germination of seeds of other plants.

**Micronutrient** – An element, such as zinc (Zn), boron (Bo), copper (Cu), iron (Fe), molybdenum (Mo), nickel (Ni), cobalt (Co), Chlorin (Cl), and manganese (Mn), needed by plants in small amounts.

**Mineral Balancing** – Addressing a field's mineral deficiencies and excesses in such a way that the available nutrients are in proper balance with each other. Excessive magnesium (Mg) will cause potassium (K), phosphorous (P) and nitrogen (N) deficiencies. Excessive potassium (K), sodium (Na), and magnesium (Mg) will cause calcium (Ca) deficiency. Excessive calcium will cause magnesium (Mg), phosphorous (P) and trace element deficiencies. Excessive boron (Bo) will cause potassium (K) and magnesium (Mg) deficiencies. Excessive chlorine (Cl) and/or sodium (Na) will cause potassium (K) deficiency.

**Mineralization** – The process by which soil organisms convert organic compounds into the mineral or inorganic form as they decompose organic matter, such as forms of nitrogen are converted to nitrate.

**Organic Matter** – consists of living organisms, fresh residues, and well-decomposed residues. Typical agricultural soil has 1-6 percent organic matter.

**Phytohormone** – A chemical (hormone) released in very low concentrations that regulate plant growth. They are released in one part of the plant and induce a response in another part of the plant. Classes of phytohormones include abscisic acid, auxins, cytokinins, ethylene, and gibberellins.

**Tillage** – The mechanical manipulation of soil for the purpose of loosening seed/root beds, controlling weeds, and incorporation of amendments.

**Total Exchange Capacity (TEC)** – The mineral/nutrient storage capacity of a soil. It is based on the assumption that very small soil particles (colloids) hold onto the bulk of the soil's nutrients. As opposed to CEC, TEC takes into account the effect of hydrogen, to supposedly give a better reflection of the potential cation storage capacity of soil.

**Vitamin** – An organic compound required as a nutrient in tiny amounts by an organism, but which cannot be synthesized in sufficient amounts by the organism and must be obtained through diet.