

Glossary

Acid: A solution with an excess of hydrogen ions (H^+). This solution will have a pH reading below 7.

Acre furrow-slice: The amount of topsoil contained in an area of 1 acre to a depth of 6 in. The weight of this volume of soil is about 2,000,000 lb.

Adsorb: To stick to the surface of something, as opposed to being absorbed into something. Nutrient ions are generally adsorbed on the surface of clay particles.

Aerobic: In the presence of oxygen (air).

Alkaline: A solution with an excess of hydroxyl ions (OH^-). This solution will have a pH reading above 7.

Allelopathic: The negative effect of some plant residues on the growth or vigour of the following crop.

Anaerobic: In the absence of oxygen. In soils, generally occurs when the soil is waterlogged.

Anion (AN-eye-on): A negatively charged ion, produced by the dissociation of an acid or a salt when dissolved in water (e.g., $KCl \rightarrow K^+$, a cation, + Cl^- , an anion). Common anions in the soil of importance for crop production include nitrate (NO_3^-), phosphate (PO_4^{3-}), sulphate (SO_4^{2-}), and chloride (Cl^-).

Apparent specific gravity: See bulk density.

Arbuscular mycorrhizal fungi (AMF): Symbiotic fungi that colonize roots of many crop species, effectively extending the root system and increasing the absorption of nutrients, especially phosphorus. The word mycorrhizae comes from Latin *mycos* for fungus and *rhizae* for root.

Atomic Absorption Spectrometry: An analytical technique where an extract is broken down to individual elements in a flame, and then a light beam passing through the flame measures the concentration of each element by determining the absorption of specific wavelengths.

Auto Analyzer: A machine that automates the repetitive tasks of chemical analysis. In most soil and plant tissue analysis, the concentration of an element is determined from the intensity of a colour formed when mixed with specific compounds.

Available phosphate: In a fertilizer, the sum of the water soluble and the citrate soluble phosphate, expressed as phosphorous pentoxide. (P_2O_5).

Biosolids: Organic materials from industrial or municipal sources that are suitable for application to agricultural land. This includes a wide range of materials, from sewage sludge to paper waste.

Buffer pH: A measure of how much lime is required to neutralize the acidity in a particular soil.

Bulk density: Sometimes referred to as apparent specific gravity. A measure of the weight of a material in a given volume. In soil, bulk density is an indication of how compact the soil is. In fertilizer application, bulk density is important for setting application rates, since spreaders meter the fertilizer by volume rather than weight.

Calcareous: A soil containing calcium carbonate in the mineral form. Calcareous soils have a high pH and are very well buffered against changes in soil pH.

Calibration: The process of determining the most economic fertilizer application rates for a particular soil test value with a specific soil extraction.

Cation (CAT-eye-on): A positively charged ion, produced by the dissociation of an acid or a salt when dissolved in water (e.g., $KCl \rightarrow K^+$, a cation, + Cl^- , an anion). Cations are commonly held in the soil by electrostatic attraction to negative charges on soil particles and organic matter. Common cations in the soil of importance for crop production are calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^+), hydrogen (H^+) iron (Fe^{2+} or 3^+) and ammonium (NH_4^+).

Cation exchange: The continuous movement of positively charged ions (cations) between the soil solution and the surfaces of clay minerals and organic matter. This process results in an equilibrium between ions in solution and adsorbed ions. Adding to or taking ions away from the solution upsets this equilibrium, causing an exchange of ions until a new equilibrium is established.

Chelate (KEY-late): A complex organic molecule that can surround a metal ion and bind to it in several places, keeping the ion in solution and protecting it from reactions that could precipitate it as an insoluble compound. Chelates are used as carriers for some micronutrient fertilizers and as extractants for determining the amount of available micronutrient in the soil.

Chelating: The process of combining a metal ion with a chelate.

Chlorosis: Discolouration of plant tissue caused by a loss of chlorophyll. It typically shows as a yellow colour, but may range from pale green to almost white.

Coefficient: A number describing the relation between two other numbers or objects.

Colloids: Very small particles (less than 0.002 mm diameter) of clay or organic matter. Colloids carry a negative charge and are responsible for most of the nutrient-holding capacity of the soil.

Complex: To combine with a single metal ion at several different places, as with a chelate.

Correlated: Related to one another. For example, an increase in crop yield could be correlated to the amount of fertilizer added.

Denitrification: The conversion of nitrate (NO_3^-) to nitrogen gas (N_2) or nitrogen oxides (NO_x) by bacteria. This occurs under conditions of low oxygen and can result in considerable loss of available nitrogen to the atmosphere.

Desorb: To remove an ion from the surface it was adsorbed to. Usually accomplished by adding an excess of ions, which desorb the others from the clay surfaces.

DTPA (diethylenetriaminepentaacetic acid): A chelate used as a soil test extractant for zinc and other micronutrients and as a carrier for micronutrient fertilizers.

EDTA (ethylenediaminetetraacetic acid): A chelate used as a soil test extractant for zinc and other micronutrients and as a carrier for micronutrient fertilizers.

Equilibrium: Many chemical reactions can operate in both directions, so that in the end there is a mixture of the initial reactants and the final products in balance. The most common example of this type of reaction in soil is the adsorption of cations onto negatively charged soil particles. Some cations always remain in solution, and these are in balance, or equilibrium, with the cations held on the soil particles. There is a constant movement of cations between the solution and the soil particles, but the average concentrations do not change.

Extractant: A solution used in soil fertility testing to extract nutrients from the soil in proportion to the amount available to plants growing in that soil. No single extractant is appropriate for all nutrients or for all soil types.

Fixation: 1. The reduction of atmospheric nitrogen, which is not available to plants, to ammonium by microbial action. 2. The tie-up of potassium between the layers of some clay minerals (vermiculite and smectite), rendering it unavailable or slowly available to plants.

Grade: The percentage content of total nitrogen (N), available phosphate (P_2O_5) and soluble potash (K_2O) stated in that sequence as hyphenated numbers arranged horizontally and including zero if applicable. The grade of urea 46% nitrogen is 46-0-0. The grade represents minimum guarantees in whole numbers for materials and mixes. The grade of a custom blend (customer formula fertilizers), however, can be stated in percentage to the second decimal e.g., 19.25-19.21-19.27.

Guaranteed analysis: Also referred to as guarantees, should be described as guaranteed minimum analysis, except for chlorine (in tobacco fertilizers) where the maximum percentage must be guaranteed. Guarantees are expressed in terms of the chemical element, except for available phosphate (P_2O_5) and soluble potash (K_2O).

Hygroscopic: Attracting and absorbing water out of the atmosphere. Many fertilizer ingredients are hygroscopic and will cake because of the moisture they absorb when exposed to the atmosphere.

ICP: Inductively Coupled Plasma Emission Spectrometry.

Immobilization: The temporary or permanent unavailability of nutrients due to their incorporation into microbial tissue and organic matter. Temporary immobilization of nitrogen can occur if organic materials with a high carbon content are added to the soil.

Ion: An atom or molecule carrying an electrical charge, either positive (cation) or negative (anion). Most are formed by the dissociation of acids or salts when dissolved in water (e.g., $KCl \rightarrow K^+$, a cation, + Cl^- , an anion).

Labile: Held loosely by soil particles and able to move easily into soil solution.

Leaching: The movement of ions down through the soil and eventually into groundwater, with the movement of water through the soil. Leaching occurs only when there is a net downward movement of water (usually late fall to spring) and ions present in the soil solution. Nitrates, sulphates and chlorides are the ions most susceptible to leaching.

Lodging: Crops that lean over or lie flat on the ground because of stalk breakage or inadequate roots. Cereals may lodge because of excess nitrogen.

M: Abbreviation for mole. One mole is the number of molecules with a weight in grams equivalent to their atomic weights. In other words, one mole of hydrogen (atomic weight = 1) weighs one gram. A one molar solution (1M) contains one mole of a compound dissolved in one litre of water.

Macropore flow: the rapid movement of water through preferential pathways in the soil, e.g., cracks and earthworm channels

Midrib: A prominent, strengthened vein along the midline of a leaf.

Mineralization: The release of nutrients from organic matter as it is broken down by microbial activity.

Mitscherlich equation: One form of equation that is used to describe the response of crop yield to added fertilizer or to soil test. It never reaches a maximum value.

N-P-K: Denotes the grade guarantees. In formulation calculations it is common usage to use the phosphorus symbol (P) to mean available phosphate (P_2O_5) and the potassium symbol (K) to mean soluble potash (K_2O).

Petiole: The stalk that attaches the leaf blade to the stem.

pH: A measurement of the acidity or alkalinity of a solution. The pH scale is from 0 to 14. A pH of 7 is neutral. Values below 7 are acid and values above 7 are alkaline. Most soils fall in a range from pH 5 to 8.

Phosphorus Index: An indicator of the risk of surface water enrichment with P from runoff from agricultural land. It takes into account proximity to water, land management and erosion potential as well as P soil test and fertilization to assess risk.

Phloem: Interconnected hollow cells (vascular tissue) extending from the leaves through the stems to the roots and fruits. Water and dissolved nutrients can move in both directions in the phloem. This is the pathway for redistributing sugars and proteins within the plant, as well as mobile nutrients.

Potash: In the fertilizer industry, the word potash is used to mean either K_2O (potassium oxide), to measure the potassium content, to refer to KCl (muriate of potash), or to identify the fertilizer material.

Prill: A small granule of urea or ammonium nitrate. The name is derived from the method of producing the granule.

Quadratic equation: A form of equation used to describe the response of crop yield to added fertilizer. It reaches a maximum value and then begins to drop off as the fertilizer rate is increased.

Quadratic plateau equation: A form of equation used to describe the response of crop yield to added fertilizer. It is similar to the quadratic equation, but remains level upon reaching its maximum value.

Salt index: An index of the relative solubilities of different fertilizer ingredients, by total weight. There is no critical level, but the higher the salt index, the more risk of injury to seeds or roots when the fertilizer is in contact with these plant parts. The index is expressed in relation to sodium nitrate, which is given a value of 100.

Sodic: A soil with the majority of the cation exchange complex occupied by sodium. These soils are characterized by large shrinking and swelling and very poor structural stability when wet.

Soluble potash: That portion of the potash, expressed as potassium oxide (K_2O), that is soluble in aqueous ammonium oxalate, aqueous ammonium citrate, or water, according to an applicable AOAC international method.

Suspension: A mixture of finely ground solid material and water or a solution, which is agitated to keep the solid material suspended in the liquid. Higher concentrations of fertilizer materials can be carried in a suspension than in a true solution.

Tilth: The structure and friability of the soil; the ease of producing a desirable seedbed from the soil.

Volatilization: The loss of a vapour, usually ammonia, to the air from a solid material that has been applied to the soil surface.

Xylem: Hollow tubes extending from the roots to the leaves and fruiting bodies of a plant. Water and dissolved nutrients flow only up the xylem. Most nutrients entering plants travel through the xylem.