
GLOSSARY OF SOIL TERMS

Acidic soil: A soil that has a pH value less than 7.0.

Aerobic: A condition identified by the presence of oxygen.

Aggregate, soil: A mass of fine soil particles held together by clay, organic matter, or microbial gums. Aggregates are part of soil structure.

Agronomic nutrient rate: Amount of nutrients required by a crop for an expected yield after all the soil, water, plant, and air credits are considered. Agronomic rates consider nutrient credits from all soil tests, legumes, manure residuals, and other nutrient credits supplied from any other source.

Alkaline soil: A soil that has a pH value greater than 7.0.

Alluvium: A general term for all eroded material deposited by running water, including gravel, sand, silt, and clay.

Alum: A potassium aluminum sulfate or ammonium aluminum sulfate

Ammonia (NH₃): See anhydrous ammonia

Ammonium (NH₄⁺): A form of nitrogen that is available to plants from fertilizer and organic matter decomposition.

Ammonium nitrate solution: Non-pressure solution of ammonium nitrate in water; usually standardized to 20% nitrogen. Used for direct application or for making multi-nutrient liquid fertilizer. Analysis is 20-0-0.

Ammonium phosphate: A group of phosphorus fertilizer manufactured by the reaction of anhydrous ammonia with superphosphoric acid to produce either solid or liquid fertilizer.

Ammonium sulfate: Fertilizer material with an analysis of 21-0-0. It also contains 24% sulfur.

Anaerobic: A condition identified by the absence of oxygen.

Anhydrous ammonia (NH₃): Fertilizer in pressurized gas form, made by compressing air and natural gas under high temperature and pressure in the presence of a catalyst. Value is 82-0-0.

Animal unit: 1000 pounds of live animal weight; a term used to determine volumes of animal manure produced.

Anion: An ion with a negative charge.

Application rate: The weight or volume of a fertilizer, soil amendment, or pesticide applied per unit area.

Aqua ammonia: 20% anhydrous ammonia dissolved in water.

Aquifer: Layers of underground porous or fractured rock, gravel, or sand through which considerable quantities of groundwater can flow and which can supply water at a reasonable rate. May be classified as perched, confined, or unconfined.

Available nutrient: A nutrient in a form that a plant can absorb.

Available water: Portion of water in soil that can be readily absorbed by plant roots.

Banded nutrients: Fertilizer nutrients placed in a strip near the seed at planting, or surface or subsurface applications of solids or fluids in strips before or after planting.

Base saturation percentage: The proportion of the soil's cation exchange capacity occupied by basic cations.

Biological oxygen demand (BOD): The amount of oxygen required by aerobic microorganisms to decompose the organic matter in a sample of water; used as a measure of water pollution.

Biomass: Plant and plant-derived material, including manure. Includes forestry products; woodprocessing wastes; wastes associated with food processing operations; energy crops, such as switchgrass and poplar trees; and agricultural crop residues, such as corn stover and wheat straw.

Biosolid: Any organic material, such as livestock manure, compost, sewage sludge, or yard wastes, applied to the soil to add nutrients or for soil improvement.

Blocky: Soil structure classification in which aggregates are in the shape of blocks or polyhedrons.

Buffer pH: A soil test procedure whereby the pH of the soil is measured in buffer solution. This measurement is used in estimating the lime requirement of the soil.

Buffer strip: Areas or strips of land maintained in vegetation and strategically located on the landscape to help control runoff, erosion, and entrap contaminants.

Buffering: The ability of a solution, such as the soil solution or irrigation water, to resist changes in pH when acid or alkaline substances are added. Often used to describe a soil's resistance to pH changes when limed or acidified.

Buildup and maintenance: Nutrients applied to build up a target nutrient level and then maintained by annual addition of the quantity of nutrients expected to be removed in the harvested portion of the crop.

Bulk density: The mass of oven-dry soil per unit volume, usually expressed as grams per cubic centimeter.

Calcitic lime: Limestone consisting of CaCO₃-based material with very low magnesium content.

Calcium carbonate equivalent (CCE): The liming potential of a material as compared to CaCO_3 .

Capillary action: Movement of water in the soil through small soil pores.

Cation exchange capacity (CEC): The amount of exchangeable cations that a soil can adsorb at a specific pH, expressed as centimoles of charge per kilogram (cmolc/kg) of soil or milliequivalents per 100 g of soil (meq/100 g soil).

Cation exchange sites: Negative charged sites on the surfaces of clays and organic matter.

Cation: An ion that has a positive electrical charge. Common soil cations are calcium, magnesium, hydrogen, sodium, and potassium.

Chelated molecule: A large, water-soluble organic molecule that binds with a free metal ion to form a water-soluble compound. This process increases the amount of metal ion or atom dissolved in the water and the availability of that ion to plants.

Clay: 1) The class of smallest soil particles, smaller than 0.002 millimeter in diameter. 2) The textural class with more than 40% clay, less than 45% sand, and less than 40% silt.

Colloid: A very tiny particle capable of being suspended in water without settling out. Soil colloids have a charged surface that attracts ions.

Compaction (soil): Increasing the soil bulk density, thereby decreasing the soil porosity, by the application of mechanical forces to the soil.

Composite soil sample: A soil sample resulting from mixing together many individual samples.

Conservation tillage: A general term for tillage practices that leave crop residues on the soil surface to reduce erosion.

Contaminant: Any physical, chemical, biological, or radiological substance that is above background concentration but does not necessarily cause harm.

Contour tillage: Tillage that follows the contours of a slope, rather than running up and down a slope. Helps prevent erosion and runoff.

Contour: An imaginary line perpendicular to the slope that represents the same elevation.

Critical value: The point between sufficiency and deficiency levels for a nutrient.

Crop nutrient requirement: The amount of nutrients needed to grow a specified yield of a crop plant per unit area.

Crop removal rate: The amount of nutrients that are removed from the field in the plant harvest,

including harvested fruit, grain, forage, and crop residues that are removed from the field.

Crop rotation: A planned sequence of crops growing in a regularly recurring succession on the same field.

Crop sequence: The order of crops planted and harvested in a field over a period of time.

Crop utilization rate: The total amount of nutrients required by the crop to produce both vegetation and grain, including nutrients used to produce roots, stems, crowns, and other unharvested plant parts as well as the harvested portion that is removed from the field.

Crust: A thin layer of poorly aggregated surface soil formed by wetting and drying.

Deep tillage: Tillage deeper than that needed to produce loose soil for a seedbed, usually used to loosen compacted subsoil.

Denitrification: The transformation of nitrates or nitrites to nitrogen or nitrogen oxide gas, occurring under anaerobic conditions.

Diammonium phosphate (DAP): Fertilizer containing both nitrogen and phosphorus with an analysis of 18-46-0.

Diffusion: The movement of particles from an area of higher concentration to an area of lower concentration.

Discharge: Flow of surface water in a stream or the flow of ground water from a pipe, spring, ditch, or flowing artesian well.

Dolomitic lime: A naturally occurring liming material composed chiefly of carbonates of magnesium and calcium.

Drainage: Rate and amount of water removal from soil by surface or sub-surface flow.

Ecosystem: Community of animals and plants and the physical environment in which they live.

Effluent: Discharge or emission of a liquid or gas.

Elemental sulfur: Sulfur in the elemental form that must be oxidized by soil microbes to the sulfate form for plant uptake.

Environmentally sensitive area: Places on the landscape that are easily degraded by human or natural activity.

Erosion: The wearing away of the land surface by running water, wind, ice, geological agents or mechanical actions, such as tillage or land leveling.

Essential plant nutrients: Inorganic elements required for growth and development of plants.

Eutrophication: A natural process of enrichment of aquatic systems by nutrients, primarily nitrogen (N) and phosphorus (P). Accelerated, or cultural, eutrophication is caused by the addition of excess nutrients to a system. This results in excessive vegetative growth. Decomposition of this plant material can result in the depletion of oxygen in water, leading to the death of aquatic organisms.

Evapotranspiration (ET): Loss of water to the atmosphere from the earth's surface by evaporation and by transpiration through plants.

Fertilizer: Organic or inorganic material added to a soil to supply one or more nutrients essential to plant growth.

Fertilizer analysis: The composition of a fertilizer, expressed as a percentage of total nutrients; for example, total N, available phosphoric acid (P_2O_5), and water-soluble potash (K_2O).

Fertilizer suspension: A fluid fertilizer containing dissolved and undissolved plant nutrients. The undissolved nutrients are kept in suspension, usually by swelling-type clays.

Field capacity: The amount of water a soil holds after free water has drained because of gravity.

Flood plain: Land near a stream that is commonly flooded when the water levels are high. Soil is built from sediments deposited during flooding.

Foliar fertilization: Application of a dilute solution of fertilizer to plant foliage, usually made to supplement soil-applied nutrients.

Friable: The ease by which a moist soil can be crumbled.

Granular: Soil structure where the units are approximately spherical or polyhedral.

Gravitational water: Water that moves through the soil because of gravity.

Green manure: Plant material incorporated into the soil while green or at maturity, for soil improvement.

Groundwater: Water in the saturated zone below the soil surface.

Guaranteed analysis: Minimal percentages of available nutrients as stated on a fertilizer label.

Gully: A large channel in the soil, caused by erosion that is deep and wide enough that it cannot be crossed by tillage equipment.

Gypsum: Calcium sulfate ($CaSO_4 \cdot 2H_2O$) used to supply calcium and sulfur and to improve sodic soils.

Hardpan: A dense, hard, or compacted layer in soil that slows water percolation and movement of air

and obstructs root growth. Pans may be caused by compaction, clay, or chemical cementation.

Highly erodible land: A soil-mapping unit with an erodibility index of 8 or more.

Horizon (soil): A horizontal layer of soil, created by soil-forming processes, that differs in physical or chemical properties from adjacent layers.

Humus: Highly decomposed organic matter that is dark-colored and highly colloidal.

Hydrologic cycle: Movement of water in and on the earth and atmosphere through processes such as precipitation, evaporation, runoff, and infiltration.

Hygroscopic water: Water held tightly by adhesion to soil particles. Cannot be used by plants and remains in soil after air-drying. Can be driven off by heating.

Immobile nutrient: A plant nutrient that moves slowly in the soil or plant.

Immobilization: The conversion of an element from the inorganic to the organic form in microbial tissues, resulting in that element not being readily available to other organisms or plants.

Impermeable layer: Soil layers, either natural or man-made, that resist penetration by fluids or roots.

Infiltration: Entry of water from precipitation, irrigation, or runoff into the soil profile.

Injection: Placing something below the surface of soil by mechanical means.

Inorganic nitrogen: Mineral forms of nitrogen.

Inorganic phosphorus: A salt of phosphoric acid or any of its anions, usually orthophosphate or polyphosphate.

Irrigation: Application of water to supplement natural rainfall.

Landscape position: Using topography, slope characteristics, or both to separate a field into different zones that have similar soil characteristics and crop productivity.

Lateral flow: Movement of water horizontally below the soil surface, usually along an impervious layer.

Leaching: The movement of material in solution along with movement of water through the soil.

Lime fineness: The particle size of limestone determined by the fineness of grinding. The finer the grind, the better the material neutralizes acidity.

Lime material: A material capable of neutralizing soil acidity.

Lime purity: The measure of impurities in a given liming material; used to estimate its neutralizing value.

Liming requirement: The amount of liming material required to change the soil pH to a specific value.

Loading: Amount of a substance entering the environment (soil, water, or air).

Luxury consumption: The absorption by plants of an essential nutrient in excess of their need for growth. Luxury concentrations in early growth may be used in later growth.

Macronutrient: A nutrient that a plant needs in relatively large amounts. Essential macronutrients are nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S).

Mapping unit (soil): Basis for setting boundaries in a soil map. May include one or more soil series.

Mass flow: The movement of solutes associated with net movement of water.

Massive soil: A structureless soil.

Micronutrient: Nutrients that plants need in only small or trace amounts. Boron (B), chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), nickel (Ni), and zinc (Zn) are considered micronutrients.

Mineral soil: A soil whose traits are determined mainly by its mineral content; mineral soils contain less than 20% or 30% organic matter in the US and Canada, respectively.

Mineralization: The conversion of an element by soil organisms from an organic form to an inorganic form.

Minimum tillage: Tillage methods that involve fewer tillage operations than clean tillage does.

Mobile nutrient: A nutrient that moves readily in the soil or plant.

Monoammonium phosphate (MAP): A fertilizer composed of ammonium phosphates, resulting from the ammoniation of phosphoric acid; typically 11% N with an analysis of 11-52-0.

Mulch: Natural or artificial layer of plant residue or other material that conserves soil moisture, holds soil in place, aids in establishing plant cover, and minimizes temperature fluctuations.

Mulch till: A full-width tillage and planting combination that leaves some plant residues or other material on the soil surface.

N-based nutrient application: The rate of application of a nitrogen-containing material so the desired amount of nitrogen is applied, regardless of the amounts of other nutrients being applied in the material.

Nitrate (NO₃): An organic nitrogen form that is very soluble, easily leached from soils, and readily

available to plants.

Nitrification inhibitor: A chemical inhibitor that slows the conversion of ammonium to nitrate in the soil, reducing the risk of nitrogen loss from the field.

Nitrification: The microbial process of converting ammonium to nitrite to nitrate.

Nitrite (NO₂): form of nitrogen that is the result of the first step in nitrification in soil as microbes convert NH₄ to NO₂. It is subsequently oxidized to nitrate (NO₃) by microbes.

Nitrogen: An essential plant nutrient that is part of many compounds, including chlorophyll, enzymes, amino acids, and nucleic acids.

Non-point source (NPS) contamination or pollution: Water contamination derived from diffuse sources such as construction sites, agricultural fields, and urban runoff.

No-till/Direct seeding/Zero-till: Method of growing crops that involves no seedbed preparation prior to planting.

Nutrient buildup: An increase in soil analysis levels of a nutrient due to application of that nutrient at levels that exceed crop removal.

Nutrient drawdown: A decrease in soil analysis levels of a nutrient due to crop removal.

Nutrient management plan (NMP): A written plan that specifies the utilization of fertilizer, animal manures, and other biosolids.

Organic matter: The organic fraction of the soil exclusive of undecayed plant and animal residues.

Organic nitrogen: Nitrogen that is bound with organic carbon and forms organic molecules.

Organic phosphorus: Phosphorus that is bound with organic carbon and forms organic molecules.

Organic soil: Soil containing more than 20 or 30% organic matter in the US and Canada, respectively.

Orthophosphate: Inorganic form of plant available phosphorus.

P index: An environmental risk assessment tool for assessing the potential for phosphorus movement from agricultural lands. It is usually based on an estimation of potential soil erosion, the phosphorus soil test level, and phosphorus management practices, such as rate of application, source of phosphorus, and timing and method of application.

P₂O₅: Phosphorus pentoxide; designation on the fertilizer label that denotes the percentage of available phosphorus expressed as P₂O₅.

P-based nutrient application: The rate of application of a phosphorus-containing material so that the desired amount of phosphorus is applied, based on balancing the agronomic rate or crop removal rate of the crop with the amount of phosphorus contained in a material. This amount is regardless of the amounts of other nutrients being applied in the material.

Ped: A natural soil aggregate, such as a granule or prism.

Percolation: Downward movement of water through soil or rock.

Permanent wilting point: The soil water content at which most plants cannot obtain sufficient water to prevent permanent tissue damage.

Permeability: Capacity of soil, sediment, or porous rock to transmit water and gases.

pH: Numerical measure of hydrogen ion concentration, with a scale of 0 to 14. Neutral is pH 7, values below 7 are acidic, and values above 7 are alkaline.

Phosphorus: Essential nutrient for plants and animals. Component of cell walls, nucleic acids, and energy transfer molecules.

Plant available nitrogen (PAN): A calculated quantity of nitrogen made available during the growing season after application of fertilizer. PAN includes a percentage of the organic nitrogen, a percentage of the ammonium N, and all the nitrate nitrogen in the fertilizer.

Plant residues: Plant material that remains in the field after harvest.

Platy: A soil structure consisting of soil aggregates that are developed predominantly along the horizontal axis; laminated; flaky.

Point source contamination: Water contamination from specific sources, such as leaking underground storage tanks, landfills, industrial waste discharge points, or chemical mixing sites.

Potash (K₂O): Term used to refer to potassium or potassium fertilizers.

Potassium: An essential plant nutrient involved in energy metabolism, starch synthesis, and sugar degradation.

Preferential flow: The rapid movement of water and its constituents through the soil via large and continuous pores.

Prismatic (columnar): Soil structure where the individual units are bounded by flat or slightly rounded vertical faces. Units are distinctly longer vertically, and the faces are typically casts or molds of adjoining units. Vertices are angular or sub-rounded; the tops of the prisms are somewhat indistinct and normally flat.

Recharge area: Land area over which surface water infiltrates into soil and percolates downward to replenish an aquifer.

Recharge: Downward movement of water through soil to groundwater.

Recommended rate: Amount of nutrients recommended on a soil test report or plant tissue analysis for a specific crop that meets but does not exceed the crop nutrient requirements. Recommended rates can also include nutrients used for soil test buildup.

Remote sensing: The collection and analysis of data from a distance, using sensors that respond to different heat intensities or light wavelengths.

Restrictive layer: A nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restricts roots or otherwise provide an unfavorable root environment.

Rhizobia: Bacteria capable of living symbiotically with higher plants by receiving food and carbon and providing nitrogen to the plant.

Rill: A channel in the soil caused by runoff water erosion that is small enough to be erased by tillage.

Riparian zone: Land adjacent to a body of water that is at least periodically influenced by flooding.

Root interception: Method by which ions in the soil are intercepted by root growth.

Runoff: Portion of precipitation, snowmelt, or irrigation, which moves by surface flow from an area.

Saline soil: A non-sodic soil containing enough soluble salt to adversely affect the growth of most crops.

Salinity: An index of concentration of dissolved salts in the soil.

Secondary nutrients: Those macronutrients (calcium, magnesium, and sulfur) used less often as fertilizers than the primary elements.

Sediment: Eroded soil and rock material and plant debris transported and deposited by wind or water.

Sheet and rill erosion: A water erosion process caused by raindrop impact on the soil surface and a thin layer of water (sheet) moving over the soil surface.

Sidedress: To apply a fertilizer, pesticide, or soil amendment to one side of a growing plant, either by surface application or injection.

Single grain: A structureless soil in which each particle exists separately, as in sand.

Sodic soil: Soil high in sodium and low in soluble salts.

Soil analysis: A chemical, physical, or biological procedure that estimates the plant availability of nutrients and soil quality characteristics to support plant growth.

Soil drainage: The process where water is moved by gravity, either by surface channels or internal pores in the soil profile.

Soil organic matter: The organic fraction of the soil exclusive of undecayed plant and animal residues. Often used synonymously with “humus.”

Soil pH: The degree of acidity or alkalinity of a soil, expressed on a scale from 0 to 14, with 7.0 indicating neutrality. Increasing values indicate increasing alkalinity, while decreasing values indicate increasing acidity.

Soil productivity: A measure of the soil’s ability to produce a particular crop or sequence of crops under a specific management system.

Soil reaction: A quantitative term that describes how acidic or alkaline the soil is.

Soil sampling: Process of obtaining a representation of an area of the soil or field by collecting a portion of the soil.

Soil solution: The aqueous liquid phase of the soil and its solutes contained in soil pores.

Soil structure: The combination or arrangement of primary soil particles into secondary soil particle units, or peds.

Soil survey: The examination, description, and mapping of soils of an area according to the soil classification system.

Soil test interpretation: Using soil analysis data to manage soil fertility and monitor environmental conditions.

Soil test level: The nutrient status of the soil, as indicated by analysis of a soil sample.

Soil test recommendation: The suggested amount of nutrients or soil amendment to be added to the soil to achieve expected crop yields.

Soil texture: The relative proportions of sand, silt, and clay in the soil.

Solubility: Amount of a substance that will dissolve in a given amount of another substance, typically water.

Solute: A substance that is dissolved in another substance, thus forming a solution.

Starter fertilizer: A fertilizer applied in relatively small amounts with or near the seed at planting.

Subsurface band: To apply nutrients, pesticides, or soil amendments in narrow bands below the surface of the soil.

Sufficiency level: a) For interpretation of plant analysis: A nutrient concentration in the plant tissue above which the crop is amply supplied, and below which the crop is deficient. b) For interpretation of soil analysis: A soil test level above which economic responses to applied fertilizers are unlikely to occur.

Surface band: To apply nutrients, pesticides, or soil amendments in narrow bands over the surface of the soil.

Surface broadcast: To apply nutrients, pesticides, or soil amendments uniformly over the surface of the soil.

Surface creep: Movement of sand-sized particles/aggregates by wind, in which the particles roll along the soil surface. Surface creep may account for 7 to 25% of total transport by wind.

Symbiotic N fixation: Conversion of molecular nitrogen (N_2) to ammonia and subsequently to organic nitrogen forms by organisms.

Tillage erosion: The downslope displacement of soil through the action of tillage operations.

Tillage pan: Also known as a plow pan; a subsurface layer of soil that has a higher bulk density than the layer either above or below it. The compaction is caused by tillage operations.

Tilth: Physical condition of the soil in terms of how easily it can be tilled, how good a seedbed can be made, and how easily seedling shoots and roots can penetrate.

Topdress: To surface broadcast nutrients, pesticides, or soil amendments on the soil surface after crop emergence.

Total nitrogen: The sum of the organic and inorganic forms of nitrogen in a sample.

Toxicity level: A quantity of a material in plants, soil, or water that can harm or impair the physiological function of plants or soil.

Triple superphosphate: A product that has a guaranteed analysis between 40 and 50% available phosphoric acid. The most common analysis is 0-46-0.

Uptake antagonism: When the excess of one nutrient interferes with the uptake of another nutrient. Usually the nutrients in question have a similar uptake mechanism by the plant.

Urea ammonium nitrate solution (UAN): A non-pressure nitrogen fertilizer solution containing urea and ammonium nitrate in approximately equal proportions dissolved in water. The nitrogen content of the

fertilizer solution ranges from 28 to 32%.

Urea: A nitrogen fertilizer that is a white crystalline solid, is very soluble in water, and has an analysis of 46-0-0.

Volatilization: The loss of a compound in gaseous form from a solid or liquid phase.

Watershed: All land and water that drains runoff to a stream or other surface water body.

Above terms and definitions excerpted from "[Nutrient Management Guidelines for Agronomic Crops Grown in Mississippi](#)" by Larry Oldham, Extension Soils Specialist, Mississippi State University.