

INTERNATIONAL CERTIFIED CROP ADVISER

Glossary

The American Society of Agronomy Certified Crop Adviser Program



**American Society
of Agronomy**



Copyright ©2026 by the American Society of Agronomy

This glossary contains key terms that a person may encounter while studying for the four sections of the International Certified Crop Adviser exam: nutrient management, soil and water management, pest management, and crop management. Note that this list is not meant to be exhaustive.

4R management. A system of nutrient management based on the principles of the right source, right rate, right time, and right place.

A horizon. Mineral soil horizon formed at or near the soil surface. It is usually higher in organic matter and biological activity than the deeper horizons. Often called topsoil.

abiotic. Non-living, physical or chemical; includes solar radiation, temperature, humidity, and pH. Used in context of an effect, such as abiotic injury.

accuracy. The ability of a measurement to match the actual value of the quantity being measured.

acidic soil. A soil that has a pH less than 7.0.

action threshold. The pest density at which a pest management tactic should be implemented in order to avoid economic loss. It is equivalent to the economic threshold and precedes the economic injury level.

active ingredient. The chemical in a formulated pesticide product that acts to control the pest, as indicated on the product label.

acute exposure. Contact with a pesticide or toxin over a short period of time.

adjuvant. Substance that enhances the effectiveness of a pesticide.

aeration, soil. The process of replacing air in the soil with air from the atmosphere. In a well-aerated soil, the soil air is similar in composition to the atmosphere above the soil. Poorly aerated soils usually contain a much higher content of CO₂ and a lower content of O₂ than the atmosphere above the soil.

aerobic. A condition identified by the presence of oxygen.

aggregate, soil. A group of soil particles that bind to each other more strongly than to adjacent particles, held together by clay, organic matter, or microbial secretions. Aggregates are part of soil structure.

agronomic nutrient rate. Amount of supplemental nutrient required by a crop for a realistic yield goal, after all the soil, water, plant, and air credits are considered. Agronomic rates consider nutrient credits from all soil tests, legumes, manure residuals, and any other nutrient source.

alkaline soil. A soil that has a pH greater than 7.0.

allelopathy. Chemical methods used by plants to benefit or harm other plants growing in proximity through the release of chemical compounds into the environment.

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.**

ammonification. The biological process whereby microbes decompose soil organic matter, residues, manures, and other organic inputs to produce ammonium (NH₄⁺). Part of the nitrogen cycle.

ammonium (NH₄⁺). A form of plant-available nitrogen derived from fertilizer addition and/or soil organic matter mineralization.

ammonium nitrate solution. Non-pressure solution of ammonium nitrate in water used for direct application or for making multinutrient liquid fertilizer. Analysis is commonly 20-0-0.

ammonium polyphosphate (APP). Liquid fertilizer that contains phosphorus in “polyphosphate” chains complexed with ammonium. Typical analysis is 10-34-0.

ammonium sulfate (AMS). A granular fertilizer material with an analysis of 21-0-0. Also contains 24% sulfur.

anaerobic. A condition identified by the absence of oxygen.

anhydrous ammonia (NH₃). Fertilizer in pressurized gas form, made by reacting nitrogen with hydrogen gas (H₂) under high temperature and pressure in the presence of a catalyst. Analysis is 82-0-0.

animal unit (AU). A standardized measure representing the forage or feed requirements of a mature 1,000-pound cow, used to compare different livestock species and manage grazing or environmental impacts.

anion exchange capacity (AEC). The sum total of exchangeable anions that a soil can adsorb at a specific pH. Expressed as centimoles of charge per kilogram (cmol_c/kg) of soil or milliequivalents per 100 g of soil (meq/100 g soil).

anion. An ion with a negative charge.

annual, summer. Plants whose seeds germinate in the spring, the plants produce seed and die the same fall.

annual, winter. Plants whose seeds germinate in the fall, the plants produce seed in the spring and die in the summer.

anoxia. The absence of dissolved oxygen. Compare **hypoxia**.

anther (male). The pollen-bearing portion of a stamen.

anthesis. The time of flowering in a plant.

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

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

auricle. Leaf lobes that occur in pairs and project around the base of a grass or monocot leaf blade. Not all grasses have auricles.

autotoxicity. A specific type of allelopathy in which a plant species releases chemicals that are toxic to itself, particularly to its own seedlings or new plants of the same species.

available nutrient. A nutrient in a form that a plant can absorb.

B horizon. The zone of accumulation (illuviation) of materials such as clay, iron, aluminum, and organic matter moving down from the above horizons. Often called subsoil.

bacteria. Microscopic single-celled organisms that include free living, saprophytic, and parasitic forms.

banding, nutrients. Placing solid granular or liquid fertilizer in a band on the soil surface or injected below the soil surface before, at, or after planting.

banding, pesticides. Pesticide application in a narrow strip over, alongside, or between the crop rows to reduce total amount of pesticide applied per acre.

base saturation. The percentage of a soil's cation exchange capacity occupied by basic cations (sodium, potassium, magnesium, and calcium).

basis. The difference between the cash price and the futures price, for the time, place, and quality where delivery actually occurs.

bedrock. Solid, or consolidated, rock lying under the soil.

beneficial elements. Elements not considered essential by all plants but that can promote growth or be otherwise advantageous in certain species or under specific conditions. Examples include silicon (Si), sodium (Na), cobalt (Co), and selenium (Se).

beneficial organisms. Organisms that reduce pest numbers or improve soil or plant quality.

best management practices (BMPs). Practices recognized as effective and practical means for producing a crop in an economically and environmentally sound way.

biennial plant. A flowering plant that typically takes two years to complete its life cycle. It grows vegetatively the first year and reproduces the second year.

biological control agents. Beneficial organisms that naturally suppress pest populations.

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.

biological pest control. The process of conserving, augmenting, or introducing beneficial living organisms to reduce a pest population or its effects. Such practices include the use of insects, nematodes, mites, fungi, bacteria, viruses, plants, vertebrates, and other living organisms.

biological pesticides. Or biopesticides. Pesticides derived from living organisms or their by-products, such as Bt (*Bacillus thuringiensis*).

biomass. Organic material derived from living or recently living organisms, such as plants, animals, and microorganisms. Plant biomass is the total mass of a specific plant or plant part in a given area, usually expressed as weight or volume per unit area.

bioreactor, woodchip. An edge-of-field treatment for tile drainage water; a buried trench filled with woodchips through which the tile water is routed.

bioremediation. The use of biological agents to remove substances hazardous to human health or the environment from contaminated soil or water.

biosolids. Sewage sludge from the wastewater treatment process that has been treated to meet specific standards or requirements and intended to be applied to land as a soil conditioner or fertilizer.

biotic. Pertaining to living organisms.

blocky. Soil structure classification in which aggregates are in the shape of blocks or polyhedrons. Commonly found in subsoils.

boot stage. A grass growth stage when an inflorescence is enclosed by the sheath of the uppermost leaf, just prior to inflorescence emergence.

broad-spectrum pesticides. Pesticides that are toxic to a wide range of organisms.

buffer pH. A soil test whereby the pH of the soil is measured in buffer solution. This measurement is used to determine soil active and reserve acidity and is used to estimate the lime requirement of the soil.

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

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

buildup and maintenance. Nutrient recommendation approach where nutrients are applied in order to build up a soil test level and then maintained by annual addition of the quantity of nutrients expected to be exported in the harvested crop.

bulk density. The mass of oven-dry soil per unit volume, usually expressed as grams per cubic centimeter. Essentially a reflection of how compacted a soil is.

C horizon. Zone of parent material. The lowermost soil layer in the profile; contains the material from which A and B horizons formed originally.

C3 plant. A plant using the pentose phosphate pathway of carbon dioxide assimilation during photosynthesis; cool-season plant. Examples include rice and soybean.

C4 plant. A plant using the dicarboxylic acid pathway of carbon dioxide assimilation during photosynthesis; warm-season plant. Examples include corn and sorghum.

calcareous soil. A soil containing significant amounts of naturally occurring calcium carbonate (CaCO_3), which releases carbon dioxide gas when dilute acid is applied.

calclitic lime. Limestone containing mostly calcium carbonate (CaCO_3).

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

carbon sequestration. The process by which atmospheric carbon dioxide is captured and stored in perennial biomass and soils.

carbon-to-nitrogen (C:N) ratio. The ratio of the mass of carbon to the mass of nitrogen in soil, organic material, or plants.

cation exchange capacity (CEC). The sum total of exchangeable cations that a soil can adsorb at a specific pH. Expressed as centimoles of charge per kilogram of soil (cmol_c/kg) or milliequivalents per 100 g of soil ($\text{meq}/100 \text{ g}$ of soil).

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

cation. An ion with a positive charge.

certified seed. Seed that has passed through an official certification program to ensure genetic purity, varietal identity, and seed quality. Certified seed generally comes in four classes: breeder, foundation, registered, certified.

chelated formulations. Fertilizer products utilizing water-soluble organic molecules or “chelating agents” (e.g., citric acid, EDTA) that bind with free metal ions, surrounding them to form a water-soluble ring complex. Chelated fertilizer improves the bioavailability of micronutrients such as iron (Fe), copper (Cu), manganese (Mn), and zinc (Zn).

chemical pest control. The use of pesticides to reduce a pest population or its effects.

chlorophyll meter. Handheld device that clamps onto a leaf and estimates chlorophyll content based on measured light passing through at specific wavelengths. The readings often correlate with nitrogen status.

chronic exposure. Contact with a pesticide or toxin over a long period of time, usually at low levels.

clay. (1) The class of smallest soil particles, 0.002 mm or less in diameter. (2) The textural class with 40% or more clay, 45% or less sand, and less than 40% silt.

claypan. A dense, compact, slowly permeable layer found in the subsoil having a higher clay content than the overlying material that limits or slows the downward movement of water through the soil.

clean till. Tillage where all plant residues are covered to prevent growth of all vegetation except that of the crop being produced. Also referred to as conventional or inversion tillage.

coliform bacteria. Bacteria that are present in the intestines and feces of warm-blooded animals. Their presence in drinking water could indicate the presence of other pathogenic bacteria.

colloid. Minute particle capable of being suspended in water without settling out. Soil colloids have a charged surface that attracts ions and are the most chemically active portion of the soil.

commodity crops. Staple grains, oilseeds, fiber, and similar products that are produced in large volumes and traded on global markets.

common pesticide name. Name given to a specific pesticide active ingredient. Many pesticides are known by a number of trade or brand names but have only one recognized common name.

compaction (soil). Increase in the soil bulk density, with a corresponding decrease in porosity, by the application of mechanical forces to the soil. Occurs when soil particles are pressed together and the pore space between them is reduced. Often caused by wheel traffic.

companion crop. A crop grown to protect and/or enhance the growth of another crop seeded in the same field. Also called **nurse crop**.

competition. The simultaneous demand by two or more organisms for limited environmental resources.

composite soil sample. A soil sample resulting from mixing together many individual samples within a field unit of interest.

composting. A controlled aerobic and thermophilic decomposition of organic matter (typically agricultural, municipal, or food wastes) by microorganisms into a stable soil amendment.

conservation tillage. Any tillage and planting system that maintains at least 30% of the soil surface covered by crop residue after planting to reduce soil erosion by water or wind.

contact pesticides. Pesticides that kill or injure organisms primarily through direct contact rather than through translocation or ingestion. Compare **systemic pesticides**.

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

continuous cropping. Growing the same crop in a field year after year.

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

contour tillage. Tillage following the contours of a slope, rather than up and down a slope. Helps prevent erosion and runoff.

cotyledon. The first set of leaves that emerges from a germinating seed.

cover crop. A crop grown (1) to protect the soil from erosion during periods when it would otherwise be bare; (2) to scavenge excess nutrients from a previous crop to prevent nutrient loss; or both.

critical value. The tissue or soil nutrient concentration falling just between deficiency and sufficiency for a given crop.

crop management zone. A sub-region of a field that has a relatively uniform combination of yield-limiting factors where a single level of crop management is appropriate.

crop removal rate. The amount of nutrients, per unit area, that are removed from the field with plant harvest. This would include harvested fruit, grain, forage, and any crop residues that are physically removed from the field.

crop residue. Plant material remaining in the field after harvest.

crop rotation. The practice of growing different crops across a planned regular sequence of growing seasons on the same land.

cropping pattern. The yearly sequence and spatial arrangement of crops, or crops and fallow, in a given area.

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

crust. A thin layer of poorly aggregated surface soil, typically high in silt or fine sand and low in organic matter, formed by wetting and drying that can impede plant emergence.

cultivar. A variety, strain, or race that has originated and persisted under cultivation or was specifically developed for crop production. See also **variety**.

cultural pest control. The use of practices other than physical (mechanical), chemical, and biological controls to reduce a pest population or its effects. Examples include row spacing, mulch, and the use of cover crops.

day neutral crop. A crop whose flowering is not influenced by day or night length.

deep tillage. Tillage typically deeper than 8 inches (20 cm) to produce loose soil for a seedbed, usually used to loosen a compacted subsoil.

denitrification. The microbial transformation of nitrates or nitrites to dinitrogen gas (N_2), nitric oxide gas (NO), or nitrous oxide gas (N_2O), usually under anaerobic conditions. Part of the nitrogen cycle.

desiccation. The removal of moisture from material.

determinate plants. Plants that change from vegetative to reproductive growth and produce their fruit over a relatively short time period.

diammonium phosphate (DAP). Solid fertilizer containing nitrogen and phosphorus. Analysis is 18-46-0.

dichotomous key. A system used for identification in which a decision is reached in stepwise fashion; the user proceeds at each step by choosing among distinguishing characteristics that eventually leads to the final decision.

diffusion. The movement of ions/nutrients from an area of higher concentration to an area of lower concentration. An important nutrient uptake process for phosphorus and potassium.

discharge. Flow of surface water in a stream or the flow of groundwater toward the soil surface, or from a pipe, spring, ditch, or flowing artesian well.

disease triangle. The interaction of three factors, a susceptible host plant, pathogen, and environmental conditions, that is necessary for disease development.

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

double cropping. The practice of consecutively producing two crops of either like or unlike commodities on the same land within the same year.

dough stage. Stage of seed development at which the endosperm is pliable, like dough, defined as the time when 50% of the seeds on an inflorescence have dough-like endosperm.

drainage. Movement of water out of the soil profile.

duripan. A subsurface soil horizon cemented by illuvial silica into a hardpan.

E horizon. A mineral layer in the upper part of the soil characterized by leaching of clay, minerals, and organic matter, leaving a concentration of sand and silt particles of quartz or other resistant materials. Also known as the eluviation layer.

economic injury level. The pest damage level at which the cost of controlling the pest population equals the value of the crop lost.

ecosystem. Community of animals, plants, and other living organisms 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. Commonly used to reduce soil pH or to reclaim sodic soils.

endangered species. (United States) Any plant or animal that is in danger of extinction throughout all or a significant portion of its range.

environmentally sensitive area. Places on the landscape that can be readily affected by human or natural activity so as to degrade the condition of the site.

erodibility index. A numerical expression of the potential of a soil to erode; the higher the index, the greater the need to maintain the sustainability of the soil resource base if intensively cropped. The erodibility index (EI) value represents the potential of a soil map unit to erode by sheet and rill erosion as determined by the formula $EI = RKLS/T$, using values from the Universal Soil Loss Equation, where R = rainfall and runoff factor, K = susceptibility to water erosion, L and S = combined effects of slope length and steepness, and T = soil loss tolerance value.

erosion. The process of detachment and movement of soil particles or rock fragments by moving water, wind, ice, or gravity.

essential plant nutrients. Elements that are required for growth and development of plants. C, H, O, N, P, K, Ca, Mg, S, B, Cl, Cu, Fe, Mn, Mo, Ni, Zn.

eutrophication. A natural process of enrichment of nutrients into aquatic systems, primarily nitrogen and phosphorus. Accelerated, or cultural, eutrophication is caused by the addition of excess nutrients to a system, which 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. See also **hypoxia**.

evaporation. The process in which a material/compound changes from a liquid state to a gaseous state, such as from free water bodies or soil and plant surfaces.

evapotranspiration (ET). Loss of water to the atmosphere by evaporation from plant and soil surfaces and by transpiration through plants.

fallow. Fields left idle on which vegetative growth is controlled by tillage or herbicides to accumulate water and/or mineral nutrients.

fertigation. Applying fertilizer through an irrigation system.

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, typically total N, available phosphoric acid (expressed as P_2O_5), and water-soluble potash (K_2O).

fibrous root system. A plant root system having a large number of small, finely divided, spreading roots, but no large individual roots; common with grass species.

field capacity. The amount of water a soil holds after it has been saturated and allowed to drain freely, usually for one to two days.

field composite approach. The whole field is managed the same, where all parts of the field receive the same inputs and at the same rate.

flag leaf. The uppermost leaf on a fruiting grass stem. The leaf immediately below the inflorescence.

flood plain. Land near a creek, stream, or river that is commonly flooded when the water levels are high. Soil can form in sediments deposited during flooding.

flowering stage. The physiological growth stage when anthesis occurs in a plant.

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

fragipan. A dense and brittle subsurface layer of soil that restricts root penetration and water movement due to extreme density or compactness.

friable. The ease by which a soil can be crumbled.

fumigant. A pesticide that acts in the gaseous phase to destroy insects, pathogens, weed seeds, or other pests in soil or enclosed spaces.

fungi. Organisms that lack chlorophyll and vascular tissue and range in form from a single cell to a body mass of branched filamentous hyphae that often produce specialized fruiting bodies. Fungi cannot produce their own food.

genetic resistance. Genetically based mechanisms within host plants that hinder pest development.

genetically engineered. A living entity with genetic material added, deleted, or altered using genetic engineering techniques. See also **transgenic crop**.

genetically modified organism (GMO). See **genetically engineered**.

geographic coordinates. The system of latitude and longitude that defines the location of any point on Earth's surface.

Geographic Information System (GIS). A computer system for measuring and relating environmental and crop data to positions on Earth's surface.

germination. Growth of a seed embryo after a period of dormancy. Requires a favorable environment of adequate water, oxygen, and suitable temperature.

germination test. A method to measure seed viability. Warm germination test measures seed viability under optimum environmental conditions. Cold germination test measures seed viability under stressed (cold, wet) conditions.

Global Positioning System (GPS). A system that uses a number of orbiting satellites to identify a location on Earth, based on longitude, latitude, and altitude.

granular. Soil structure typically found near the surface where the loosely packed units are approximately spherical or polyhedral.

gravitational water. Water that drains freely downward through the soil under the influence of gravity.

green manure. Living plant material incorporated into the soil, or killed and left on the surface, to improve soil fertility. Legumes are often used to increase soil nitrogen levels.

greenhouse gases. Gases that trap heat in the atmosphere. Major greenhouse gases include carbon dioxide, methane, nitrous oxide, and fluorinated gases.

grid management. A precision farming technique where crop inputs are applied on a subfield basis, the subfield areas delineated by subdividing the field using geographic coordinates.

grid sampling. Sampling soil or plants within a grid (often 2.5 acres) of equal-sized cells within or across fields to assess variability in soil and plant properties.

groundwater. Water in the saturated zone below the soil surface.

growing degree unit (GDU). Heat accumulation, calculated by subtracting a base temperature from an average of the maximum and minimum daily temperatures for an area to predict plant and insect development. Also called growing degree day.

growth regulator. A substance that when applied to plants in small amounts either inhibits, stimulates, or otherwise modifies the growth process.

guaranteed analysis. Minimum quantities of available nutrients contained in a fertilizer material, stated as percentages on the fertilizer material's label.

gully, classic. A large channel in the soil, caused by erosion that is deep and wide enough that it cannot be crossed by tillage equipment. May begin as an ephemeral gully that was left in the field.

gully, ephemeral. A shallow gully that can be filled in by normal tillage operations, but it recurs in the same location in the field following surface water flow after heavy rain events.

gypsum. Calcium sulfate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), 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.

harvest index. The quantity of harvestable biomass produced per unit of total biomass.

harvest population. The number of harvestable plants per unit area remaining at the end of a growing season.

hazardous waste. Solid, liquid, or gaseous substance that, because of its source or measurable characteristics, is classified under state or federal law as potentially dangerous and is subject to special handling, shipping, and disposal requirements.

heading. The developmental stage of a grass plant from initial emergence of the inflorescence from the boot until the inflorescence is fully emerged.

heavy metals. A term that describes a group of naturally occurring elements that have high molecular weight and density and that may become toxic at higher concentrations. Includes lead, copper, zinc, mercury, arsenic, cadmium, and nickel.

herbicide carryover. Occurs when an herbicide does not break down during the season of application and persists in sufficient quantities to affect the growth succeeding crops.

highly erodible land (HEL). Land that can erode at an excessive rate due to soil properties. Per the USDA, a field with an Erodibility Index (EI) of 8 or more is considered HEL.

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

host plant. A plant that serves as a food source or refuge as part of the life cycle of another organism, including insects, pathogens, nematodes, or parasitic plants.

humus. Stable, highly decomposed portion of soil organic matter that decomposes very slowly and is highly colloidal.

hybrid. First-generation progeny resulting from the controlled cross-fertilization between individuals that differ in one or more genes.

hydraulic conductivity. A measure of the capacity of a porous material such as soil to transmit water.

hypoxia. Low levels of dissolved oxygen in the environment (such as water), at levels insufficient for survival of most aerobic life. Compare **anoxia**.

identity-preserved (IP) crop. A crop with known specific traits or characteristics that are tracked through production, processing, and marketing channels.

immobile nutrient. A plant nutrient that moves only 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.

impaired waters. A water body (e.g., stream reaches, lakes, water-body segments) with chronic or recurring pollutants above the applicable numeric and/or narrative water quality thresholds.

impermeable layer. Soil or rock layer that resists penetration by water or roots.

in furrow fertilizer. Starter fertilizer placed in the furrow with the seed at planting.

indeterminate plants. Plants that continue vegetative growth after reproductive growth has begun.

infiltration. Entry of water into the soil from precipitation, irrigation, or runoff.

inflorescence. The flowering part of a plant or arrangement of flowers on a stalk.

inhibitor herbicides. Herbicides that disrupt a specific plant growth process by blocking key enzymes or metabolic pathways; they are classified by their mode of action.

injection. Placement, by mechanical means, below the surface of the soil.

inoculant. A seed or soil additive, typically some type of bacteria or fungi, that enhances plant growth and development.

inorganic nitrogen. Mineral forms of nitrogen.

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

integrated pest management (IPM). A sustainable approach to pest management that combines the use of prevention, avoidance, monitoring, and suppression strategies in a way that minimizes economic, health, and environmental risks.

intercropping. Growing two or more crops together in the same field at the same time.

irrigation. Application of water to supplement natural rainfall. Common methods include drip, flood, furrow, sprinkler, and subsurface irrigation.

irrigation efficiency. The ratio of the amount of water actually consumed by a crop or stored in the root zone on an irrigated area to the amount of water applied to the area.

juvenile hormone analog. A type of insecticide that disrupts the normal growth and development of insects.

karst. Terrain formed by eroded bedrock characterized by closed depressions, sinkholes, caves, and underground drainage.

landscape position. A topographical location relative to surrounding topography, commonly using slope characteristics as defining characteristics.

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

LD₅₀ or LC₅₀. The lethal dose (LD₅₀) of a substance that causes death in 50% of the test organisms, expressed as milligrams (mg) per kilogram of body weight. Similarly, the lethal concentration (LC₅₀) of a substance that causes death in 50% of the test organisms exposed, often expressed as parts per million (ppm) or parts per billion (ppb) in the environment (usually water).

leaching. The movement of dissolved materials with water downward through the soil profile.

least significant difference (LSD). A statistical range test used to determine true differences among treatment means.

ligule. Specialized structure found at the junction of the leaf blade and sheath in many grasses. Varies in size, shape, and texture.

lime fineness. The particle size of limestone or other liming material determined by the fineness of grinding. The finer the grind, the more reactive the material and the more quickly the material neutralizes soil acidity.

lime material. A material capable of neutralizing soil acidity. Different lime materials have different abilities to neutralize acidity as determined by the calcium carbonate equivalent (CCE).

lime purity. The measure of impurities in a given liming material, used to estimate the material's neutralizing value and its calcium carbonate equivalent (CCE).

lime requirement. The amount of liming material needed to change the soil pH to a specific desired value.

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

lodging, root. Condition in which stalks or stems fall at the crown area because of a weak root system, root damage, or soil condition.

lodging, stem. Condition in which stalks or stems break or fall above the soil surface because of weak stalk, damage, or weather events.

long-day crop. Crop that requires daylight in excess of a critical length to initiate flowering.

luxury consumption. The absorption by plants of an essential nutrient in excess of the need for growth. Some nutrients taken up by luxury consumption in early growth may be used in later growth.

macronutrients. Nutrients that a plant needs in relatively large amounts. Essential macronutrients are nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S), as well as the structural macronutrients carbon (C), hydrogen (H), and oxygen (O).

macropores. Large soil pores, usually between soil aggregates, generally >0.08 mm in diameter and responsible for preferential flow.

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

mass flow. The movement of solutes in soil water into plant roots in response to loss of plant water through leaves (transpiration). An important nutrient uptake process for nitrate, sulfate, calcium, and magnesium.

massive soil. A structureless soil, often restrictive to plant root growth and penetration.

maturity. The developmental stage when a plant reaches maximum dry matter production, yield, or desirable quality.

mechanical (physical) pest control. The use of physical or mechanical methods to reduce or suppress a pest population or its effects. Examples include cultivation, hoeing, hand weeding, mowing, pruning, or vacuuming.

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

micropores. Small soil pores (typically <0.08 mm in diameter) found within soil aggregates. Water within these pores is considered immobile, but much is available for plant extraction.

milk stage. In grain, the stage of development following pollination in which the endosperm appears as a whitish liquid like milk.

mineral soil. A soil with traits determined mainly by its mineral content; mineral soils are defined as soils that contain less than 20% or 30% organic matter in the United States and Canada, respectively.

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

mobile nutrient. A nutrient that moves readily in the soil or plant.

mode of action. The overall biological process or physiological mechanism through which pesticides affect target organisms.

monitoring. Systematically observing or sampling a crop to assess its condition, stage of growth, infection by disease, infestation of pests, etc.

monoammonium phosphate (MAP). A solid fertilizer created via the reaction of ammonia and phosphoric acid. Typical analysis is 11-52-0.

monoculture. Growing one crop in a field at a time. Often used to refer to the same crop grown in a field continuously year after year.

mottles. See **redoximorphic features**.

mulch. Natural or artificial layer of plant residue or other material covering the land surface to conserve soil moisture, hold soil in place, aid in establishing plant cover, and minimize temperature fluctuations.

mulch tillage. A full-width tillage and planting combination that leaves >30% of the surface covered with crop residue.

narrow-spectrum pesticides. Pesticides that act on a limited range of species.

natric soil. Soil characterized by a high concentration of sodium in the subsoil's argillic (clay-enriched) horizon.

nematode. An unsegmented worm with an elongated rounded body pointed at both ends and piercing mouth parts; most are free-living but some are parasitic.

nitrate (NO_3^-). An inorganic nitrogen form that is soluble, easily leached from soils, readily available to plants, and readily denitrified.

nitrate-nitrogen. The amount of nitrogen that is in the nitrate form.

nitrification. The conversion of ammonia or ammonium to nitrite and then to nitrate by soil microbes. Part of the nitrogen cycle.

nitrification inhibitor. A substance that slows the conversion of ammonium to nitrate in the soil, with the goal of reducing the risk of nitrate-N losses from the field.

nitrite (NO_2^-). A form of nitrogen resulting from the first step in nitrification by soil microbes. Nitrite is subsequently oxidized to nitrate (NO_3^-) by other soil microbes so it generally does not accumulate in soils.

nitrogen (N). Essential nutrient for plants and animals. Nitrogen is a component of chlorophyll, enzymes, amino acids, and nucleic acids.

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

non-point source pollution. Water contamination derived from diffuse sources such as construction sites, agricultural fields, eroding streambanks, and urban runoff. Compare **point source pollution**.

no-till. Method of growing crops that involves planting directly into plant residue, creating a channel that is just spacious enough for seeds to be planted, minimizing soil disturbance. Also referred to as zero-till.

nurse crop. A crop planted with another crop to foster the growth of the second crop, usually by protecting the second crop.

nutrient buildup. An increase in soil levels of a nutrient due to application of that nutrient at rates that are greater than crop removal.

nutrient drawdown. A decrease in soil levels of a nutrient due to application of that nutrient at rates that are less than crop removal.

nutrient management plan. A written plan for a farming operation or a part of farming operation that specifies the most efficient allocation and use of fertilizer, animal manures, biosolids, and other nutrient sources to provide for crop nutrient needs while protecting water, soil, and air quality. The plan may be voluntary or regulatory, depending on regional requirements.

nutrient stratification. An uneven distribution of nutrients within the soil profile due to fertilizer applications and residues near the soil surface.

O horizon. A surface soil horizon primarily composed of organic matter.

open pollinated. Plants pollinated naturally by wind, insects, birds, or animals. Open-pollinated plants have traits that reliably carry through to the next generation.

organic farming. Crop production systems that do not use synthetic pesticides or fertilizers. Standards for growing and labeling organic food may differ between certifying agencies.

organic matter. See **soil organic matter**.

organic nitrogen. Nitrogen that is bound within carbon-containing chemical structures.

organic phosphorus. Phosphorus that is bound within carbon-containing chemical structures.

organic soil. Soil containing more than 20% or 30% organic matter in the United States and Canada, respectively.

orthophosphate. An inorganic form of plant available phosphorus. The primary form of phosphate utilized by plants.

ovicidal insecticide. Insecticide that works by killing the egg stage.

P₂O₅. Diphosphorus pentoxide, phosphate; used in a fertilizer analysis to denote the percentage of available phosphorus expressed as P₂O₅.

PAMS. An acronym that classifies integrated pest management practices into four groups: prevention, avoidance, monitoring, and suppression of pest populations.

panicle. A grass inflorescence, the main axis of which is branched, and whose branches bear loose flower clusters.

parasite. An organism that lives on or in another living organism and obtains part or all of its nutrients from that other organism.

parasitoid. An insect that feeds on and develops in another insect and causes death in the host insect.

parent material. The underlying mineral geologic or organic material from which soil develops.

parts per billion (ppb). A means of expressing concentration, parts of analyte per billion parts of sample.

parts per million (ppm). A means of expressing concentration, parts of analyte per million parts of sample.

pathogen. Living agent that causes diseases in plants and animals, including fungi, oomycetes, bacteria, phytoplasmas, nematodes, viruses, and viroids.

ped. A natural soil aggregate, such as a granule or prism. See also **aggregate, soil.**

percolation. Downward movement of water through soil or rock.

perennial. Plant that has a vegetative structure that allows it to live more than 2 years.

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

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

persistence. Ability of a pesticide to remain in active form either at the site of application or in the environment. Dependent on environmental conditions and chemical properties.

personal protective equipment (PPE). Clothing and protective devices worn by handlers of pesticides to minimize exposure to hazards. The pesticide label mandates the personal protective equipment required when handling and applying the pesticide.

pest density. The number of pests per unit area or plant structure.

pest. In agriculture, an organism that directly or indirectly causes damage to crops.

pest resistance. See **resistance, pest.**

pesticide resistance. See **resistance, pesticide.**

pH. The negative logarithm of the hydrogen ion concentration, a measure of acidity or alkalinity on a scale of 0 to 14. Neutral is pH 7, values below 7 are acidic, and values above 7 are alkaline. See also **soil pH.**

phloem. Complex vascular tissue in plants that transports soluble organic nutrients from leaves and other photosynthetic tissues throughout the plant.

phosphorus (P). Essential nutrient for plants and animals. Component of cell walls, nucleic acids, and energy transfer molecules.

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

phosphorus-based nutrient application. Applying crop nutrients with a focus on the most efficient allocation and use of phosphorus to supply crop needs, balance nutrient levels, maximize returns, and protect water quality, regardless of the amounts of other nutrients being applied in the material.

photoperiodism. The growth and flowering response of plants in relation to changes in hours of daylight.

physiological maturity. Plant growth stage representing the end of reproductive development, where the maximum dry weight has occurred.

phytotoxic. Chemicals that are injurious or toxic to plants.

plant available nitrogen. A calculated quantity of nitrogen made available during the growing season after application of fertilizer. Of particular importance in organic fertilizer, plant available N includes a percentage of the organic N, a percentage of the ammonium-N, and all the nitrate-N in the fertilizer. Percent of organic N available is typically based on researched mineralization rates given the nutrient source, application rate, and timing to incorporation.

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

plant nutrient uptake. The total amount of nutrients, per unit area, 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.

plant residue. See **crop residue**.

plant variety protection (PVP). Laws that grant intellectual property rights to plant breeders over new varieties they develop.

platy. A soil structure consisting of flat and plate-like soil aggregates that are generally oriented horizontally.

point source pollution. Water contamination from specific identifiable sources such as leaking underground storage tanks, landfills, industrial waste discharge points, chemical mixing sites, or municipal sewage treatment. Compare **non-point source pollution**.

pollination. The transfer of pollen from the anther to the stigma of a flower.

polymer coated fertilizer. Controlled-release fertilizer coated with a water-permeable polymer coating that slows the release of nutrients into the soil.

postemergence. Applied after emergence of the specified weed or planted crop.

potash (K_2O). Potassium oxide; used in a fertilizer analysis to denote the percentage of water-soluble potassium, expressed as K_2O .

potassium (K). Essential nutrient for plants and animals. Involved in plant moisture regulation, energy metabolism, starch synthesis, and sugar degradation.

potassium chloride. Widely used solid potassium fertilizer. Frequently referred to as muriate of potash. Most common analysis is 0-0-60.

potassium magnesium sulfate. A naturally occurring mineral fertilizer granulated for application. Typical analysis is 0-0-22. Also contains 22% sulfur and 10% to 11% magnesium.

potassium nitrate. Fertilizer composed of potassium (K^+) and nitrate (NO_3^-), marketed as a crystalline form for applying with water or prilled for soil application. Typical analysis is 13-0-46.

potassium sulfate. Potassium fertilizer available in granular or powder form. Frequently referred to as sulfate of potash. Common analysis is 0-0-50. Also contains 17% to 18% sulfur.

precision. The ability of a measurement to be consistently reproduced.

precision agriculture. The use of technologies to identify and manage site-specific in-field soil and crop variability to improve production and economic return.

preemergence herbicide. Herbicide applied prior to emergence of the specified weed or crop.

preferential flow. The relatively rapid movement of water and its constituents through the soil via large and continuous pores, as compared to the slower movement of water through the soil matrix.

preplant incorporated (PPI). Herbicide applied and incorporated into the soil before planting.

primary macronutrients. The three macronutrients used by plants in the largest quantities: nitrogen, phosphorus, and potassium.

prismatic/columnar. Soil structures where the individual units are prislmlike and bounded by flat to rounded vertical faces. Units are distinctly longer vertically than horizontally. Vertices are angular or sub-rounded. Prismatic: the tops of the units are somewhat indistinct and normally flat. Columnar: the tops of units are distinct and normally rounded.

proximal sensing. In agriculture, the use of sensors positioned near the crop canopy, designed to estimate canopy greenness and biomass in order to indirectly assess nitrogen status.

pure live seed. Amount of seed that is the actual crop variety and germinates readily; it excludes inert material, weed seeds and other crop seeds, and seeds that do not germinate in the container. Percentage pure live seed is calculated as (pure seed percentage × germination percentage)/100.

radicle. The first root of a plant that elongates during germination of a seed and forms the primary root.

randomization. An arrangement of plots where treatments are assigned without a specific order; the random arrangement of treatments helps obtain representative data for an experiment.

real-time kinematic (RTK). A position location correction process that uses a reference station to improve the accuracy of a mobile GPS receiver.

recharge. Movement of water into the aquifer or a recharge area.

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

redoximorphic features. The resulting appearance or morphology of the soil horizon due to reduction and oxidation chemical reactions. (Old term: mottles.)

reduced tillage. Tillage methods that involve fewer tillage operations than clean tillage does.

re-entry interval. A mandatory time period set by governments that restricts individuals from entering a pesticide-treated area. Complying with the re-entry interval is a legal requirement and is specified on the product label.

refuge. An area intentionally left untreated with pesticides to maintain populations of susceptible pests, thereby slowing the evolution of pesticide resistance.

remote sensing. The collection and analysis of data from a distance, using sensors carried by UAVs, aircraft, or satellites that measure reflected and emitted radiation from an area on Earth.

replication. Repeating treatments on different plots, generally within the same field, to perform an experiment. Without replication, it is not possible to determine whether differences in plots are due to the treatment or inherent field variability.

resistance, pest. Genetic ability of a plant (host-plant resistance) to avoid, tolerate, repel, or limit damage caused by a pest.

resistance, pesticide. The inherited ability of an individual organism or a population to survive and reproduce following exposure to a dose of pesticide normally lethal to the wild type.

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. Symbiotic bacteria that fix atmospheric nitrogen in nodules on the roots of legume plants.

rill. A channel in the soil caused by runoff water erosion that is small enough to be erased by tillage. Compared to an ephemeral gully, it is not expected to recur in the same location after being erased.

rill erosion. A type of erosion that occurs when rivulets of water are concentrated in small channels to create a pattern of small channels on the soil surface. Rills can often be removed by tillage. See also **rill**.

riparian zone. The transitional semi-terrestrial area that is regularly influenced by fresh water and that extends from the edges of water bodies to the edges of upland communities.

root interception. Nutrient uptake due to direct contact between the root and soil particle surfaces during root exploration of the soil. Can be an important nutrient uptake process for calcium and magnesium.

runoff. Portion of precipitation, snowmelt, or irrigation that flows across the soil surface and toward surface water.

RUSLE II. USDA-developed soil loss prediction model. Revised Universal Soil Loss Equation: $A = RKLSCP$. An equation for predicting soil losses, where A is the average annual soil loss, R is the rainfall factor, K is the soil erodibility factor, L is the length of slope, S is the percentage slope, C is the cover and management factor, and P is the conservation practice factor.

saline soil. A soil containing sufficient soluble salt (non-sodic) to adversely affect the growth of most crops.

salinity, soil. The amount of soluble salts in a soil. The conventional measure of soil salinity is the electrical conductivity of a saturation extract.

salt index. A measure of the soluble salts a fertilizer contains.

saltation. Movement of individual soil particles/small aggregates by wind, in which the particles are lifted as much as 12 inches above the soil surface, then travel a short distance before dropping back to the soil surface. From 50% to 80% of total soil transport by wind is by saltation.

sampling. Any valid method to determine a representative value for a field parameter.

sand. (1) The class of largest soil particles, 0.05–2.0 mm in diameter. (2) The textural class with more than 85% sand and less than 10% clay.

saturation. The soil water content at which all soil pores are filled with water.

scouting. Sampling or observing crops to determine levels of pest populations and disease; also used to assess crop health and yield potential, as well as levels of beneficial insects.

secondary macronutrients. The macronutrients of calcium, magnesium, and sulfur. Required in relatively large amounts for good crop growth.

sediment. Particles or aggregates derived from soil, rock, or biological material transported and deposited by wind or water.

seed lot. A specific quantity of seed that has uniform characteristics within recognized limits or tolerances.

selection pressure. An action, event, or chemical, biological, or management practice that preferentially allows survival of one group over another.

selectivity. Refers to whether a pesticide targets a narrow or broad range of pests. Selective pesticides are toxic primarily to the target pest, leaving most other organisms, including natural enemies, unharmed.

self-pollinated. A plant containing flowers with both male (anther) and female (stigma) parts that can produce seed by fertilizing its stigma with its own pollen. Self-pollinating plants do not require pollinators for fertilization.

setback. The distance from sensitive areas, such as surface water, wetlands, or tile drain inlets, where no pesticides are to be applied.

sheet erosion. The removal of a thin layer of soil from the surface, caused by shallow overland flow (sheet flow) and raindrop splash.

short-day crop. A crop in which flowering is initiated when the crop's critical night length is exceeded.

sidedress. To apply a fertilizer, pesticide, or soil amendment to one side of a growing plant or row of plants, either by surface application or injection into the soil.

silt. (1) The class of soil particles 0.002–0.05 mm in diameter. (2) The textural class with 80% or more silt and less than 12% clay.

single grain. A structureless soil in which each particle exists separately, as in loose sand.

site of action. The specific biochemical target within an organism affected by a pesticide, such as an enzyme, receptor, or metabolic pathway. In herbicides, the site of action is often a specific enzyme.

sodic soil. Soil containing sufficient sodium to adversely affect the growth of most crops and that is low in neutral soluble salts.

soil analysis. A standardized chemical, physical, or biological measurement procedure that estimates soil characteristics.

soil health. The continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Basic soil health management principles include minimizing soil disturbance, maximizing biodiversity, maintaining living roots, and maximizing soil cover.

soil loss tolerance (T value). (1) The maximum average annual soil loss that will allow continuous cropping and maintain soil productivity without requiring additional management inputs. (2) The maximum soil erosion loss that is offset by the theoretical maximum rate of soil development that will maintain an equilibrium between soil losses and gains.

soil map unit. An area delineated on a soil map that is dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils.

soil organic matter. The organic fraction of the soil that includes plant and animal residues at various stages of decomposition, biomass of soil microorganisms, and substances produced by plant roots and other soil organisms. See also **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 pH affects the soil's physical, chemical, and biological properties and processes, as well as plant nutrition and growth. See also **pH**.

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

soil sampling. Process of obtaining a portion of soil to represent a field or any designated part of that field.

soil solution. The aqueous liquid phase of the soil and its solutes.

soil structure. The combination or arrangement of primary soil particles into secondary soil particle aggregates, or peds.

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

soil test interpretation. Finding and understanding the meaning and significance of soil test analytical values.

soil test level. The quantitative or qualitative chemical, physical, or biological status of the soil, as indicated by analysis of a soil sample.

soil test recommendation. The suggested amount of nutrient/amendment to be added to the soil to achieve the expected crop yield based on the nutrient supplying power of the soil.

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

soil water storage. Water retained in the soil pore space.

solubility. Amount of a substance that will dissolve in a given amount of a liquid solvent, typically water.

solute. A substance that is dissolved in a liquid solvent, thus forming a solution.

specialty crops. Fruits, vegetables, tree nuts, dried fruits, and horticulture and nursery crops, including floriculture crops.

species at risk. (Canada) Any plant or animal with a small population, limited range and/or are associated with habitats that have been lost or drastically reduced.

split application. A nutrient application method where a portion of nutrients, especially N, is applied multiple times within a growing season, such as some at planting and the remainder during crop growth.

spray adjuvant. See **adjuvant**.

spray drift. Movement of airborne spray droplets of a pesticide outside the intended area of application.

starter fertilizer. A fertilizer applied in relatively small amounts with or near the seed or transplant at planting.

stigma. The female part of a flower where pollen is deposited.

stomate. Opening in the surface of a leaf through which water vapor, carbon dioxide, and oxygen pass.

strip cropping. A system of growing crops in alternating strips along the contour of the land, usually alternating a row crop with another crop (e.g., forage).

strip-till. An in-row tillage and planting system that disturbs a relatively narrow area of the soil (normally 8 to 10 inches wide), into which the crop is planted and some or all of the crop fertilizer is applied. The area between the tilled strips is left undisturbed. Also known as zone tillage.

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

sufficiency level. (1) For interpretation of plant analysis: A nutrient concentration in the plant tissue at/above which the crop is amply supplied, and below which the crop is deficient. (2) For interpretation of soil analysis: A soil test level at/above which significant yield and/or quality responses to applied fertilizer are unlikely to occur.

supply and demand. For agricultural commodities, supply is the total production of the crop available to the market; demand is how much of the crop buyers want at various price levels.

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.

surfactant. A material that favors or improves the emulsifying, dispersing, spreading, wetting, or other surface-modifying properties of pesticides in solution.

suspension. Movement of fine (<0.1 mm) soil particles by wind. The particles are dislodged from the soil surface and are small enough to remain in the air mass for an extended period. From 20% to more than 60% of an eroding soil may be carried in suspension.

symbiotic nitrogen fixation. Biological process in which legume crops form a mutually beneficial association with bacteria such as *Rhizobium* or *Bradyrhizobium* that convert atmospheric dinitrogen (N₂) into a form that plants can use. See also **rhizobia**.

systemic pesticides. Pesticides that are absorbed by the target organism (or host plant) and move internally to distribute the active ingredient. Compare **contact pesticides**.

tank mix. A mixture of two or more compatible pesticides, adjuvants, fertilizers, or other products intended for simultaneous application.

taproot. The primary root of a plant formed in direct continuation with the root tip or radicle of the embryo. Forms a thick, tapering main root from which arise smaller, lateral branches.

tile drainage. Subsurface drainage systems of concrete, ceramic, plastic, or other rigid pipe, or similar buried structure, installed in fields to remove excess water from the soil profile.

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

tillage pan. A subsurface layer of soil right below the normal tillage depth having a bulk density that is higher than the layer either above or below it. The compaction is caused by continual tillage operations at the same depth. Also known as a plow pan.

tilth. The physical condition of the soil in terms of how easily it can be tilled, its fitness as a seedbed, and how easily seedling shoots and roots can penetrate.

tolerance. The inherited or engineered ability of a species to survive and reproduce after pesticide treatment. In crops, also refers to the ability of a crop to yield satisfactorily in presence of pest injury or environmental stress. Compare **resistance, pest** and **resistance, pesticide**.

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

total availability. The total amount of a given nutrient in a fertilizer that is expected to eventually become available for plant uptake.

Total Maximum Daily Load (TMDL). (1) A regulatory term in the U.S. Clean Water Act, describing the maximum amount of a pollutant a body of water can receive while still meeting water quality standards; (2) An allocation of that water pollutant deemed acceptable to the subject receiving waters.

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

toxicity. Degree to which a pesticide is poisonous; the ability of a substance to interfere adversely with the vital processes of an organism.

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

trade name. Name given to a product sold by a company to distinguish it from similar products made by other companies.

transgenic crop. Plant that contains DNA derived from a foreign plant or animal. Transgenic crops are a type of genetically modified organism (GMO).

transgenic resistance. Resistance conferred through genetic engineering in which one or more genes are introduced (often from other species) or modified to enhance protection against pests or pathogens.

translocation. Actively moved within and between plant tissues and organs.

transpiration. The release of water vapor from plant leaves.

trap crop. A crop that attracts and concentrates insect pests.

triple superphosphate (TSP). A solid fertilizer that has a guaranteed analysis between 40 and 50% available phosphate. Most common analysis is 0-46-0.

uptake antagonism. When one nutrient interferes with the uptake of another nutrient. Often the nutrients in question have a similar plant uptake mechanism/pathway.

urea ammonium nitrate (UAN) solution. A non-pressurized solution containing dissolved urea and ammonium nitrate in approximately equal proportions. The nitrogen content of the fertilizer solution ranges from 28% to 32%.

urea. A nitrogen fertilizer that is a white crystalline solid, highly soluble in water. Analysis is 46-0-0.

urease inhibitors. Compounds added to urea-based fertilizers (e.g., urea, UAN solutions) to slow the conversion of urea to ammonia by reducing the activity of the enzyme urease in soils and help minimize nitrogen losses.

vapor drift. The movement of chemical vapors from the area of application.

variable rate technology (VRT). A precision agriculture tool that uses site-specific information to control the amount of farm inputs that is applied across a field. Variable rate technology may be map-based, sensor-based, or manual.

variety. In the formal botanical sense, refers to a naturally occurring subset of a species that is true to type from seed. See also **cultivar**.

vegetative. (1) The non-reproductive parts of plants. (2) The non-reproductive stage of plant development.

vernalization. A process by which exposure of seeds or plants to prolonged low temperatures accelerates germination or promotes flowering.

viability. A measure of the potential for seeds to germinate, grow, and develop normally under favorable conditions.

viruses. Non-cellular organisms composed of genetic material (RNA or DNA) encased in a protein coat. Most plant viruses contain RNA.

volatile organic compounds (VOC). Some carbon-containing chemicals that readily evaporate and may undergo a photochemical reaction with potentially harmful health effects.

volatilization. Conversion of a solid or a liquid to a gas. Ammonia volatilization is part of the nitrogen cycle.

water cycle. Movement of water in and on the Earth and atmosphere through processes such as precipitation, evapotranspiration, runoff, and infiltration. Also called the hydrologic cycle.

Water Erosion Prediction Project (WEPP). USDA-developed soil loss prediction model.

water holding capacity. A measurement of how much moisture a soil can retain under the influence of gravity. Influenced by soil texture, soil organic matter, and soil structure. See also **field capacity**.

water table. Upper surface of the groundwater or layer of soil saturated with water.

water use efficiency (WUE). The crop output (yield or biomass) obtained per unit of water used. It is a measure of a cropping system's ability to convert water into plant biomass or yield.

watershed. A topographically delineated area of land where all of the water draining from the area drains to the same stream or river system.

weathering. The breakdown and changes in rocks and sediments at or near the Earth's surface produced by biological, chemical, and/or physical means.

wetland. A land area that is inundated or saturated with surface or groundwater at a frequency or duration sufficient to support a prevalence of vegetation adapted to saturated soil conditions. Wetlands are delineated on the basis and presence of three factors: wetland hydrology, hydric soil, and hydrophytic vegetation.

whole field management. See **field composite approach**.

whole field sampling. Traditional sampling approach where one composite sample represents an entire field (or large area assumed to be uniform).

Worker Protection Standard. EPA regulation in the United States requiring protective clothing and practices designed to protect pesticide handlers by reducing pesticide exposure.

xylem. Complex vascular tissue in plants that transports water and minerals from the roots to other parts of the plant.

yield map. The pattern of crop yield in a field based on data collected using a yield sensor on a harvester, and geographic positioning of these yield values using a Global Positioning System.

yield monitors. Tools installed on a harvester for site-specific management. They provide geo-referenced data on crop yield and moisture content during harvest that are used to produce yield maps.

zone management. A precision farming technique in which crop inputs are applied on a subfield basis, where the subfield areas are delineated by spatial variability such as soil mapping units, soil test results, and crop yields.

zone sampling. Sampling soils or plants within management zones expected to be internally similar (soil, landscape, yield stability, or management history) and different from other zones.