J&L Garden Center

The All Season Gift and Garden Center

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Plant Nutrient Information

This is a summary of plant nutrients, their functions, sources, and typical symptoms of deficiency.

Nutrient	Function In Plants	Sources	Typical Symptoms of Deficiency
Nitrogen (N)	Stimulates vegetative development. Necessary in production of leaves and stems.	Ammonium Sulphate Ammonia Nitrate Urea Bloodmeal Cottonseed Meal Fish Meal	Restricted growth. Leaves small, pale, yellowish-green. Growth upright and spindly. Flowering and fruiting delayed and reduced. Premature defoliation. Symptoms appear first on lower parts of plants, moving upward.
Phosphorus (P)	Especially important in germination of seeds, metabolism of seedlings, ripening of seeds, fruit, and general development of roots.	Super phosphate Triple superphosphate Bone Meal Ammonium phosphate	Greatly reduced and delayed growth. Leaves small and defoliation is premature, starting at older leaves. Lateral shoots reduced. Lateral buds die or remain dormant. Leaf color generally dull, bluish-green, tinting to purplish or bronzing later. Leaf margins often show brown scorching effect. Reduced seed & flower production.
Potassium (K)	Promotes general vigor. Contributes to disease resistance. Important to sturdy root formation and development.	Potassium Nitrate Muriate of Potash Potassium Chloride Potassium Sulphate Hardwood Ashes	Stunted squatty growth, internodes shortened, starting with older leaves. Browning of tips, marginal scorching, development of spots near the margins often “bronzed” appearance. Leaves may roll backward or forward along margins. Weak stems & roots. Reduced seed & fruit production.
Calcium (Ca)	Constituent of cell walls in tissue. Intimately concerned in development of root system and growing points (meristems).	Limestone -Calcium Carbonate Gypsum -Calcium Sulfate Calcium Chloride. Dolomite Limestone	Leaves distorted with tips hooked back and margins curled. Margins may exhibit brown scorching or spotting and often extreme collapse of mesophyll tissue. Growing points die. Roots poorly developed and weak (sometimes gelatinous). Tips of leaves may look scorched.
Magnesium (Mg)	Vital to chlorophyll production. Activator in most enzyme reactions.	Magnesium Sulphate (Epsom Salts) Dolomite Limestone	Symptoms vary widely for different crops but common symptoms include chlorosis often developing into brilliant tints. Defoliation can be severe and leaves may abscess without withering. Effects show first on older leaves and progress to younger.
Sulphur (S)	Constituent of proteins. Necessary for chlorophyll formation.	Garden Sulphur Ammonia Sulphate Gypsum Iron sulphate	Restricted shoot growth, leaves small, rolled toward upper surface, stiff and brittle with marked chlorosis, Defoliation first becomes severe and terminal buds die. Plants small & spindly.

Nutrient	Function In Plants	Sources	Typical Symptoms of Deficiency
Iron (Fe)	Necessary for chloro-phyll formation, but not a constituent of it. A major part of respiration and other oxidation systems.	Ironite Iron Sulphate Sequestrene 138 Sequestrene 330	Chlorosis of leaves, affects younger foliage first. Interveinal tissue yellow first, leaving veins green. Scorching of leaf margins and tips. Can be "lime-induced". The pH of the soil affects how much iron is available for plants to use and absorb.
Manganese (Mn)	Catalyst in many enzyme systems. Part of chlorophyll formation. Closely associated with iron and the two elements can be antagonistic.	Manganese sulfate	Symptoms vary in different crops, but chlorosis is common, Older foliage affected first. Growth retarded with flower formation greatly reduced.
Boron (B)	Necessary for translocation of sugars. Involved in reproduction. Regulates water intake by cells. Tends to keep calcium in a soluble form in the plant.	Sodium Borate (borax)	Growing points severely distorted and may die. Stems hollow and pith coarse or blackened. Leaves often scorched and curled. Possible mottle and discolored Fruits, may be severely deformed and useless. Flowers may drop off prematurely.
Zinc (Zn)	Necessary to protein synthesis. Influences rate of maturity and size of plant.	Zinc Sulphate	Interveinal chlorosis often with necrosis and bronzing or purpling. Reduced leaf size and malformation, sparsity of foliage, shortened internodes and reduced fruiting. Older leaves affected first.
Copper (Cu)	Necessary to protein synthesis. Important to plants' reproductive stage of growth.	Copper Sulphate	Leaves bluish-green color. Withering and marginal chlorosis of younger leaf tips leaves, may fail to open out or may wilt. Growing tips may show rosetting.
Molybdenum (Mo)	Essential constituent of nitrate reductase system. Necessary to nodule organisms of legumes.		Chlorotic mottling of leaves. Necrosis of leaf tissues. Distortion and death of growing tips in some crops. Irregular poor growth stunted appearance. Leaves thicken and curl.
Chlorine (Cl)	Uncertain but may affect carbohydrate metabolism and influence photosynthesis.		

A proper balance of plant nutrients is very important. Excesses of mineral nutrients may induce deficiencies of others: Excess nitrogen may produce a potassium deficiency; Excess potassium may induce a magnesium deficiency; Excess phosphorus may induce a magnesium deficiency; Excess magnesium potassium or sodium may induce a calcium deficiency; Excess boron may cause marginal and interveinal leaf scorch, which may be confused with potassium or magnesium deficiencies; Excess sodium or chlorine may cause margin leaf scorch similar to potassium deficiency; Excess chromium, cobalt, copper , manganese, nickel or zinc may induce an iron deficiency, in addition to producing direct, visible, toxic effects; Excess manganese may produce effects similar to a manganese deficiency; Excess aluminum may cause effects similar to a phosphorus deficiency.

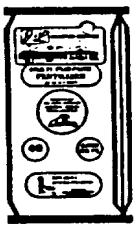
Too much fertilizer can be just as bad for the plants as not enough fertilizer. Plants need a regular source of Nitrogen for normal growth. Phosphorus and Potassium are also used in relatively large quantities. These two nutrients (phosphorous and potassium) are usually found naturally in the soil but are not always readily available for plants to use. The rest of the nutrients are used in very small amounts by the plants. It is best not to randomly apply fertilizers. Learn your plant's needs and fertilize accordingly.

N P K

What Do The Numbers Mean?

All labels on all boxes and all bags of fertilizer have three main numbers on them; such as 21-7-7. These numbers represent the percentage, by weight, of the three main plant nutrients contained in that particular fertilizer package. The first number is always ***Nitrogen*** **(N)**. The second number is always ***Phosphorus*** **(P)**. The third number is always ***Potassium*** **(K)**. The bag of fertilizer may also contain other ingredients, such as iron, sulphur, or calcium. These nutrients will also be listed on the bag of fertilizer if the manufacturer guarantees they are in the fertilizer mix, otherwise a fertilizer may contain some of these nutrients even though they may not be listed on the package. For example, a 100 lb bag of 21-7-7 would contain 21 lbs Nitrogen, 7 lbs Phosphorus, and 7lbs of Potassium. The rest of the bag would consist of ***'Filler Materials'.***

General Information



To better understand the fertilizer numbers and what they mean, it is best to start with the basics.

Plants need certain nutrients to maintain good health and vigor. Many nutrients are found as common elements in the soil. Other nutrients may be deficient and may need to be provided. Fertilizers provide many of these nutrients. A *fertilizer* is any material added to the soil, or applied to plant foliage, to supply an essential nutrient for good growth. The amount of a particular nutrient in a fertilizer is listed on each fertilizer package. It is listed in a numerical sequence consisting of three numbers, such as 16-16-8 or 21-7-7. These numbers represent the content of ***Nitrogen*** **(N),** ***Phosphorus*** **(P),** and ***Potassium*** **(K)** as a percentage. A zero in the formula (34-0-0 for example) indicates that particular nutrient is not included in the fertilizer product.

Nitrogen, which is always the first number, promotes greening and stimulates strong vegetative growth. It is often considered the most important nutrient in fertilizers, but it is also the most difficult to measure in soils. Too little nitrogen results in pale, slow-growing plants. Too much nitrogen can give your plants a boost that promotes too much leaf growth, resulting in few or no flowers or fruits. Nitrogen is very water soluble moves easily through the soil, atmosphere, and other living things. It leaches away quickly and is often in short supply.

Phosphorus, the second number, is especially important in germination of seeds, metabolism of seedlings, ripening of seeds and fruits, and general development of roots. A phosphorus deficiency shows up as stunted growth, sometimes with a purplish cast to the leaves. Phosphorus is not water soluble and doesn't move very far in the soil, so roots have to extend themselves looking for it. Phosphorus is usually found naturally in the soil. However, it is not always in a form that plants can readily absorb and use. Phosphorus becomes available to the plant when there is plenty of water, plenty of organic matter, and the soil pH is close to neutral. Otherwise, it is a good idea to apply phosphorus in small quantities on a regular, but not a constant, basis.

Potassium, the third number of the number formulation, is used heavily to regulate metabolic reactions within the plant, including photosynthesis. Potassium helps in the overall health of the plant, including helping the plant to resist diseases. It is also important for sturdy root growth and growing points in the stems. A plant deficient of potassium might be soft and weak, and leaf margins might appear scorched. Potassium is somewhat water soluble and moves in the soil more than phosphorus does but not as much as nitrogen. Again, just like phosphorus, there is usually a sufficient amount of potassium in our soils but the plants may have a hard time using it.

Types of Fertilizers

Fertilizer labels can be confusing. **"Balanced"** doesn't mean that nutrient levels are equal; it just means a fertilizer contains all three of the major nutrients; Nitrogen, Phosphorus, and Potassium. Seeing **"Organic"** on the label does not guarantee that all the ingredients are derived from natural animal, plant, or mineral sources.

Simple fertilizers contain one major nutrient (N, P, or K). These concentrate on that particular nutrient. For example Urea is 46-0-0; Ammonium sulphate is 21-0-0; and Bone Meal is 0-12-0.

Compound fertilizers provide two or more of the major elements.

"Complete" or **balanced fertilizers,** contain all three major nutrients N, P, & K (21-7-7; 16-16-8; or 15-30-15). They may or may not contain any of the other micro-nutrients. They can be either synthetic or organic fertilizers.

Special-purpose fertilizers are usually balanced fertilizers, but it is one that is formulated for particular types of plants rather than for general use. Bulb fertilizers, blooming fertilizers, and formulas for acid-loving plants are examples.

Slow-release fertilizers, also called time-released fertilizers, are pelletized forms of con-

centrated, fast-acting fertilizers treated to make them release nutrients gradually, over longer periods of time. Such formulas won't burn plants or soil organisms. They tend to be more expensive that ordinary types of fertilizers. Examples include Sulfur-coated Urea and Osmocote.

Liquid fertilizers, also called soluble fertilizers, can be either a powder or a concentrated liquid that can be diluted with water and then poured onto the soil to be absorbed by plant roots. Some liquid fertilizers are also designed to supply nutrients through the plant's leaves, when applied as a foliar application. Liquid fertilizers are fast-acting and may burn plants easily if applied incorrectly. They are sometimes more expensive that other types of regular fertilizers. They are good for quick, short-term treatments of deficiencies and to give plants a quick burst of growth. Miracle Gro Co., Fertilome Co., and the Shultz Co. make several formulations of liquid types of fertilizers, some for a very specific group of plants.

Organic or natural fertilizers usually indicate that the nutrients came from natural plant, animal, or mineral sources. The amount of actual fertilizer they contain is usually very minimal in content. Milorganite fertilizer, a processed sewage sludge, has a fertilizer content of 6-2-0. This is a very low amount of fertilizer but it is very valuable because it is in a very slow-release, long-lasting form; one that will not burn plants. Fish emulsion, bone meal, and blood meal are also organic fertilizers that are commonly available. Some organic fertilizers contain ingredient that may have been chemically enhanced. Triple super phosphate is sometimes used in organic fertilizers. Triple super phosphate is rock phosphate that has been treated with sulfuric acid to increase the concentration of phosphorus.

Synthetic fertilizers usually contained nutrients formed by manufacturing compounds, by-products of industrial processes, or by processing mined minerals with chemicals such as sulfuric acid. They are also called "chemical fertilizers," but that is misleading, because natural fertilizers are also made up of chemicals.

Application of Fertilizers

Whatever type of fertilizer you choose, don't exceed the label directions for how much and how often to apply. Too much fertilizer can be just as bad for your plants as not enough fertilizer. Too much fertilizer can create the following problems:

1. Too much fertilizer can make the plants grow too fast. The plants may be weak if they grow too fast.

2. Too much fertilizer can over-stimulate leaf growth at the expense of flower production. You may have pretty tomato and petunia plants with no flowers or fruit.

3. Too much fertilizer may upset the nutrient balance in the plant making the plant less flavorful. The fruit may not have much flavor or it may even be mushy.

A rule of thumb is that it is better to under-fertilize a plant than to over-fertilize it.

Fertilizer Definitions:

Broadcasting - Applying fertilizer by spreading it over the entire area, either by hand or with a spreader. This method is great for lawns but may not be the best choice for gardens. Weeds growing in isles and borders will benefit from your generous application of fertilizer.

Sidedressing - Applying fertilizer by spreading a band of fertilizer alongside growing plants. Side dressing is great for vegetable and flower gardens. It puts the fertilizer right where it needs to be, weeds get less fertilizer. A band can also be applied around the base of existing plants. It is best to keep concentrated fertilizers at least a few inches away from stems.

Foliar Feeding - Spraying fertilizers directly on plant stems and leaves. Plants absorb fertilizer both by their roots and by their leaves. By diluting fertilizer in water and then spraying it on the foliage you can stimulate the plant to respond in a very short time.

Major Nutrient (macronutrients) - Those nutrients that the plants use in relatively large quantities. The lack of these nutrients usually result with visual symptoms. The three most common macronutrients are Nitrogen, Phosphorus, Potassium. Calcium, Magnesium, and Sulfur are also considered major nutrients.

Minor Nutrient (Micro Nutrient, Trace Element) - Those nutrients that are essential to plant growth but are used in very minute quantities. Minor nutrients include: Iron, boron, manganese, copper, zinc, molybdenum, chlorine, nickel, and cobalt. ***How much is a Trace?***

An acre of corn can use 150 pounds of nitrogen in one growing season. In the same growing season that same acre of corn will probably use 1/2 ounce of boron. The corn used 4,500 times as much nitrogen as boron.

Filler Materials - Materials used to fill a bag of fertilizer after the N, P, K has been added. Example. A 100 lb bag of 21-7-7 fertilizer has 21 lbs of N; 7 lbs of P; 7 lbs of K; for a total of 35 lbs. The other 65 lbs is the filler.

Many inexpensive fertilizers use sand as a filler. Other fertilizers use gypsum, vermiculite, or perelite as a filler. The label does not usually indicate what the filler is.

Recommended Application Rate - The manufacturer suggests how large an area should be treated with that bag of fertilizer. For lawns, a rule of thumb is 1 lb of actual Nitrogen should cover 1,000 square feet of lawn. In a 15 lb bag of 33-6-18 lawn food there is 4.95 lbs of actual Nitrogen (33% x 15lb) so that bag should cover 4,950 square feet. In a 40 lb bag of 21-7-7 lawn food there is 8.4 lbs of actual nitrogen (21% x 40lb) so that bag should cover 8,400 square feet of lawn.