

Understanding Fertilizers

A dictionary defines fertilizer simply as plant food but it is not that simple. Plant nutrients are chemical elements or compounds that are essential to plant growth. Nutrients come from various sources; those supplied by air and water, the things that we can't control, are Carbon, Hydrogen and Oxygen. The ones we CAN control are in the products that we buy, mix or make. These are referred to as major(macro), minor and micro nutrients and are represented by their elemental symbols. The **major** nutrients in fertilizers are Nitrogen(N), Phosphorus(P) and Potassium(K). The **minor** nutrients are Calcium(Ca), Magnesium(Mg) and Sulfur(SO). The **micro** nutrients are: Boron, Copper, Iron, Manganese, Zinc, Chlorine and Cobalt in tiny amounts. Fertilizers come in many different forms from naturally occurring in the soil, to commercial or 'organic' products, liquid and dry, and in many different formulations. It also can include some forms of compost. Each 'store bought' container tells you what the 'ingredients' are but you need to know what each one does to make an informed decision about what plants need.

The availability of nutrients already in your soil is largely dependent on the **pH**, a measurement of acidity or alkalinity. If it is too high or too low the nutrients may be 'locked up' and not available to plants. A simple soil pH test can tell you whether it is correct for what you want to grow. Between 6.2 and 6.8 is ideal for vegetables but is not right for rhododendrons or blueberries. Products are available to 'correct' or adjust the pH either up or down. Some nutrients are leached by winter rains which may cause a deficiency early in the spring. A complete baseline soil test is a good starting point to know what you may need to add.

The best way to feed your plants is by building good soil. Healthy soil is alive with billions of micro-organisms working in many ways to make nutrients available to plants. **Adding organic matter** is the best way to feed the micro-organisms and in turn feed your plants. Organic matter is anything that was once a living plant or animal; it includes compost that you can buy or make yourself, and such things as composted animal manures, green manures, seed, alfalfa, feather and bone meals, animal by-products, lawn clippings and leaves.

Once you have built healthy soil, worked in good compost and still find that your plants are not growing well, or if the color of the leaves doesn't look right, there may be a nutrient deficiency. You should be able to diagnose the particular plant problem from photos found on the internet. It is helpful to search by using the particular plant name such as citrus, tomato or rhododendron. Most plants, whether ornamental or edible have very specific nutrient needs and will not grow or produce properly if they suffer from a deficiency.

Whether you choose to use organic products or commercial products is entirely up to you. Plants don't care! They take up the nutrients they need without regard to the source. Organic products and amendments are better for building better soil and feeding the soil food web, the vast numbers of organisms that make up healthy soil.

Fertilizers are sold in many forms, you need to know what the differences are.

Commercial fertilizers: These are made from synthetically derived materials, or are mined, and come in many different formulas depending on the suggested use of each product. There are many N, P, K combinations such as 16-16-16, 5-10-10 or 4-6-6 as examples. They come in dry, liquid or slow release forms. Dry or liquid products are fast acting and easily leached by rains. The slow release products are not very good for the coast due to the fact that they usually are made to be released at about 70°; soil temps rarely get that warm here. Each package should tell you if the product has any minor nutrients. All commercial nutrients are available as single products. There are many combinations made for specific uses such as lawn, rhododendron or vegetable 'food'. Some commercial ingredients are derived from sources that are becoming scarce. The package should tell you how much to use by the square footage.

Organic fertilizers: The word 'organic' refers only to things that are derived or harvested from once living plants or animals. The other minerals such as phosphorus (which can come from bone meal), potassium and the minor nutrients are added and certified for use in organic growing. These frequently are produced in ways that do not damage the earth. They generally have lower N, P, K values than commercial products. Dry types are slow acting, however they will feed your plants over a longer period of time. All organic products are labeled as such. Organic approval comes from the oversight agency OMRI, the Organic Materials Review Institute, which certifies compliance with USDA Organic Standards and Practices. You will see the OMRI emblem on all store bought products that are organic.

Liquid fertilizers: These can be either commercial or organic, and may be high or low in nutrient values. These are very fast acting and will give plants a quick boost. They are especially useful when the soil is cold since dry organic products may not break down and become useful to plants until the soil warms. This is the time when liquids become especially valuable. Liquids are also best when you are starting seeds or growing seedlings. Liquids are very valuable in mid-season when plants need a boost and digging in more dry fertilizer doesn't work quickly.

Compost: For our purposes compost is organic matter that has been processed to create a useful product to add back to the soil. It is more difficult to quantify since nutrient values are unknown. You can make your own using kitchen waste or yard debris. Commercially it is made of forest products, peat, coir, woody municipal debris, and possibly poultry, animal manure, or added nutrients. Commercial compost may contain artifacts such as pieces of plastic or rocks. Animal products typically contain 'salts' that tend to build up and may be harmful in large amounts. If the product is not completely composted it will use available nitrogen(N) in the soil to continue breaking down. It is commonly available bagged or in bulk and makes a wonderful addition to as a 'soil conditioner' or side dressing. When it comes to choosing which compost to buy, this is where you get what you pay for; the better the compost, the higher the price is likely to be.

What fertilizer to use, when to use it and how to use it, are questions that you must answer for yourself. The answers depend on the individual plant, what stage of growth it is in, how big it is, the season of the year and whether you see that it needs one particular nutrient or a general purpose product. It will help to know what the major and minor nutrients do for plants. Following is a general description of each.

Nitrogen: This element promotes rapid green, leafy growth. Too much can cause a plant to grow too fast or not produce the part of the plant that you are growing it for. For example: too much on a tomato may cause the plant to grow lots of green leaves and few flowers, delay fruit set and attract insects such as aphids. The same is true of flowering and ornamental plants.

Phosphorous: It stimulates early root growth and hastens blooming. Too much may be lost in the soil and wash into water ways.

Potassium: Increases resistance to drought and disease, and quality of seeds.

Calcium: Improves root formation and vigor, and helps regulate the uptake of other nutrients. A deficiency combined with insufficient water will result in blossom end rot of tomatoes.

Magnesium: Aids in chlorophyll formation and phosphorus metabolism. Regulates the uptake of other nutrients.

Sulfur: Imparts dark green color, stimulates seed production and formation of amino acids and vitamins.

Micro Nutrients: These are all necessary in tiny amounts, they work with the other nutrients to provide a 'balanced diet' to all plants.

Refer to the following links to help you decide what your plants need. Remember that too much of a good thing may be too much! Always read the label of any product and follow the directions. Handle fertilizer products, including compost, carefully, use gloves and protect yourself from breathing the dust of dry products.

<https://extension.tennessee.edu/publications/Documents/PB1637.pdf>

<http://www.gardening.cornell.edu/factsheets/soil/fertilizing.pdf>

extension.arizona.edu/pubs/az1106.pdf <https://enst.umd.edu/people/faculty/ray-weil/deficiency>

Sally Reill, Lincoln County Master Gardener

Revised: 2/2018