Gardening Basics

Understanding Fertilizer Labels

To quote Texas A&M Professor Dr. Joseph Masabni, "If plants are not growing well, fertilizing them will help only if a lack of nutrients is the cause of the problem. Plants grown in poorly drained soils, in excessive shade, or in competition with tree roots will not respond to fertilizer." Make sure your plants are the right plants in the right place before you spend time and money on fertilizers. After that, having a soil analysis done is the best way to determine what nutrients may be missing in your soil and get recommendations as to how much of each nutrient should be applied in order to be efficient and effective. Here's how to understand fertilizer labels to help you choose the right one.

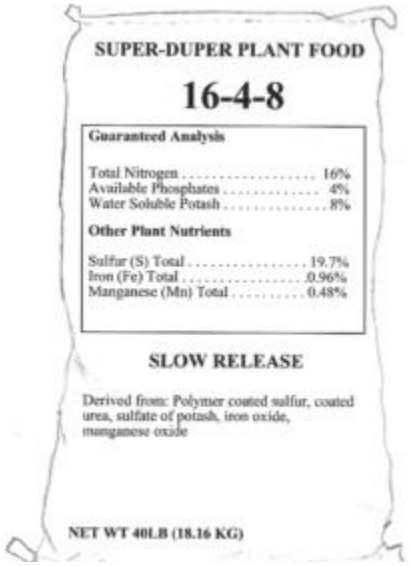
Essential Elements for Plant Growth

Plants require 16 elements for plant growth. Of those, **nitrogen (N), phosphorous (P), and potassium (K) are macronutrients** that are required for maximum growth.

Calcium, magnesium, and sulfur are secondary nutrients needed for plant growth. These elements are often available in sufficient quantities in the soil; however, they can be found in fertilizers in the form of other materials such as limestone.

There are 10 **micronutrients** plants need in very small amounts: Chlorine (Cl), iron (Fe), manganese (Mn), boron (B), zinc (Zn), copper (Cu), molybdenum (Mo), sodium (Na), cobalt (Co), silicon (Si), selenium (Se), and nickel (Ni).

It is important to note that there can be too much of a good thing, in other words, over or misapplication of nutrients through fertilizers can be injurious to your plants and the environment.



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There are several **key things** to look for on fertilizer labels:

- **Fertilizer analysis** – refers to the amount of nitrogen, phosphorus, and potassium **(NPK)** based on the percentage of the package's weight.
- **Characteristics** – refers to different types of fertilizers such as special-purpose fertilizers for certain types of plants (e.g., roses, lawns, vegetables), organic fertilizers, slow-release delivery fertilizers, etc.
- **Directions for Use** – the instructions for application methods, amounts, etc.
- **Cautions** – safety cautions, toxicity information, disposal, and cleanup, etc.
- **Manufacturer** – name and contact information.

Fertilizer Analysis

All fertilizers are labeled with the percentage by weight of nitrogen (N), phosphorous in the form of phosphate (P_2O_5), and potassium in the form of potash (K_2O) and are always in that order. These are represented on the label as three numbers, e.g., 16 – 4 – 8, which means 16% nitrogen, 4% phosphorous (in

the form of phosphate), and 8% potassium (in the form of potash). This is often referred to as the **N-P-K ratio** or fertilizer grade.

For example, a 40-pound bag of 16-4-8 fertilizer contains 6.4 lbs. of nitrogen (N), 1.6 lbs. of phosphorous (P) as phosphate (P_2O_5), and 3.2 lbs. of potassium (K) as potash (K_2O). The remaining 28.8 pounds is filler or carrier, so the fertilizer spreads evenly or coatings for slow release.

Texas and federal laws require manufacturers to guarantee what is claimed on the label. The guaranteed amounts will appear under **"Guaranteed Analysis"** on the label. There may also be secondary macronutrients and micronutrients that may or may not be in the Analysis section. (A link to the Texas Administrative Code regarding labeling is in the Resources section below.)

Fertilizers are also referred to as complete, incomplete, or balanced:

- **Complete** fertilizers contain all 3 major macronutrients in some percentage, e.g., an N-P-K of 16-8-4.
- **Incomplete** fertilizers are missing 1 or 2 major macronutrients, e.g., an N-P-K of 34-0-0 contains 34% nitrogen and no phosphorous or potassium.
- **Balanced** fertilizers have an equal ratio of all 3 major macronutrients, e.g., an N-P-K of 20-20-20.

Fertilizer Characteristics

- **Special-purpose** fertilizers are marketed by the manufacturer for use on certain types of plants listed on the label.
- The nutrients in **organic** fertilizers come from once-living organisms or their by-products. Look for organic materials on the label, such as meals (blood, bone, cottonseed, cocoa shell), manure and guano, oyster shell, peat, sewage sludge, and wood ashes. Note that organic materials release their nutrients slowly over a long period of time as they break down in moist, warm soil. Note that all manure must be thoroughly composted before use, or it can injure plants.
- **Slow-release** fertilizers are made of materials that release nutrients over a period of time. These may include materials that dissolve slowly, resin or sulfur-coated granules that dissolve at different rates, or micro-organisms that release nitrogen over time. These fertilizers are typically more expensive; however, they don't have to be applied as often, minimize the risk of fertilizer burn, and allow the plants to take in nutrients throughout their growth.

Fertilizer labels, by law, must include **directions for use,** such as:

- **Timing of application** – examples include application before or after rain or irrigation, number of applications over a period of time, and time of year to apply
- **Amount to apply** – for example, in terms of pounds per 1000 square feet, or ounces per plant, or ounces per tree trunk diameter at breast height or tree canopy diameter
- **Application methods -**
    - **Broadcasting:** Spreading fertilizer at the recommended rate over the growing area
    - **Banding**: Applying narrow bands of fertilizer in furrows next to vegetable seeds or plants
    - **Starter Solutions**: Liquid fertilizers applied to newly planted plants
    - **Drenching**: Liquid fertilizers applied in the plant's root zone
    - **Foliar Feeding:** Liquid fertilizers applied to the leaves of the plant

Cautions: Fertilizer labels must also include instructions for safety precautions, first aid, storage, use around bodies of water/runoff, children and pets, disposal, and clean-up.

Manufacturer Contact Information: Texas and federal laws require fertilizer labels to include the manufacturer's name and contact information for questions or information about the product.

Please carefully read and follow all label instructions, including directions for use and cautions, before using any chemical products, including inorganic and organic fertilizers, herbicides, and pesticides.

Resources

Masabni, Joseph and Patrick Lillard. "Easy Gardening: Fertilizing" EHT-069, Texas A&M AgriLife Extension, https://agrilifeextension.tamu.edu/library/gardening/fertilizing/

Griffin, Becky, and Clint Waltz. "Turf Grass Fertility: Understanding Fertilizer Labels, Macronutrients, and Micronutrients." Adapted from the original manuscript prepared by Gil Landry. Circular 1058-2. University of Georgia Extension, Nov. 2015. https://secure.caes.uga.edu/extension/publications/files/pdf/C%201058-2_1.PDF

Texas A&M AgriLife Extension Service Soil, Water, and Forage Testing Laboratory http://soiltesting.tamu.edu/

Texas Administrative Code, Title 4, Part 3, Chapter 65, Subchapter C: Labeling. https://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=5&ti=4&pt=3&ch=65&sch=C&rl=Y