

## “Understanding Fertilizer Labels”

Fertilizers are to plants what food is to animals. Except plants can't forage widely for food like most animals. Plants are stuck in one place and can only absorb the nutrients present in their root zone. By fertilizing plants we can help supply the nutrients that may be lacking in the soil and provide for enhanced growth and production. Plant scientists have long known that plants require 15 elements to grow and develop normally, in addition to air and water.

The primary nutrients, Nitrogen (N), Phosphorus (P) and Potassium (K), are those used in the greatest quantities by plants. Lesser amounts of secondary minerals, Sulfur (S), Magnesium (Mg) and Calcium (Ca), and minute amounts of nine other micronutrients including Iron (Fe), Copper (Cu) and Boron (B) are all necessary for healthy plant growth. Micronutrients are usually present in adequate amounts in good soils, but the primary nutrients need to be replenished regularly to replace what crops remove from the soil. Liming, which makes soils less acidic, makes fertilizer nutrients more available to plants. Lime also supplies calcium and magnesium if dolomitic, or 'hi-mag' lime is used.

It's always best to fertilize based on the recommendations of a soil test. Too much of some plant food elements may cause plant damage. Excess fertilization can also lead to non-point source pollution that harms water bodies and leads to the growth of excessive algae. Fertilizer applications should be avoided around surface water or near wells. Always follow label directions and adjust spreader settings as indicated.

Commercial fertilizers are required by state fertilizer labeling laws to state the percentage of the nutrients present in the form of a "Guaranteed Analysis," found on every fertilizer bag. For example, a '5-10-5,' referred to as "the grade," specifies the percentage by weight of Nitrogen (N), Phosphate ( $P_2O_5$ ), and Potassium ( $K_2O$ ) present in the container. A fertilizer package of 5-10-5 weighing 50 pounds would have an actual plant food content of 2.5 pounds of N (50 lbs. x 5%), 5 lbs. of P and 2.5 lbs. of K. Thus, a 50 lb. bag contains only 10 lbs. of actual plant food, the other 40 lbs. is inert ingredient or filler.

Sometimes, fertilization guidelines refer to a certain plant food ratio. The 5-10-5 example above has a 1-2-1 ratio of N to P to K. A 10-20-10 provides the same ratio of N-P-K, but has twice the nutrient concentration. An application of one-half as much 10-20-10, say 10 lbs. per 1,000 square feet will provide the same feeding level to plants as 20 lbs. per 1,000 square feet of the 5-10-5, plus less handling and fewer bags to dispose of. If a 5-10-5 costs \$10 for a 50 lb. bag, the cost for the actual nutrients (10 lbs.) is \$1 per pound. If the 10-20-10 sells for \$15 per bag the cost per pound of actual plant food (20 lbs.) is only \$.75 per pound, clearly a better buy.

Fertilizers can be chemically based or natural based. Most chemical fertilizers are simple compounds. Nitrogen is synthesized from the atmosphere, which contains 78% N in a gaseous form, to create ammonia and urea. Phosphate and Potash fertilizers are obtained from naturally occurring mined deposits that are minimally processed to make the nutrients more available to plants. The fertilizer ingredients that carry the nutrients are then mixed together to

create any number of different grades to suit the needs of different crop types and soil fertility levels. Natural based fertilizers are derived from organic materials such as bone meal, fish waste, or food processing by-products. Generally, natural based fertilizers are lower in plant nutrient content than chemical based fertilizers, they also tend to be slower to release their nutrients in a plant-available form. On a cost per pound of nutrient basis, chemical fertilizers are usually far less expensive.

Some fertilizer packages make claims to be “slow release,” “slowly available,” or “controlled release.” These slow release claims generally refer to the nitrogen content, since nitrogen is relatively soluble and may not last long in the soil, especially during rainy periods. Chemical fertilizers can be manufactured so they mimic natural based fertilizers inherently slow release characteristics. By coating the nitrogen particles with sulfur or other materials, the particles dissolve slowly, feeding plants over a longer period of time. Expect slow release fertilizer products to cost more. Gardeners may wish to apply smaller amounts of fertilizer more frequently, adjusting for plant growth response and rainfall to accomplish the same objective, which is to feed plants just what they need when they need it, to maximize crop production while minimizing impacts to the environment.

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