

# Plant Nutrition and Fertilization

## 1. Plant Nutrition

Plant nutrition is a complex subject and a good fertilization program requires some investigation and frequent adjustment. Plants need to eat just like humans, and scientists have isolated a number of major and minor elements necessary for healthy plant development.

The label on all fertilizer bags is required to show the percentage by weight of nitrogen, available phosphate and soluble potash. This is called the guaranteed analysis of the fertilizer (e.g. 10-10-10).

- The first number is Nitrogen (N), which promotes overall shoot growth.
- The second number is available Phosphate which promotes strong root growth and flowering
- The third number is soluble Potash which helps plants withstand stress, drought or disease.

**Nitrogen (N)** is an essential component of chlorophyll, which gives plants their characteristic green color. It is also prominent in the amino acids (proteins) and nucleic acids (genes) which make up the plant tissue. Large supplies of nitrogen produce lush tender plants and may cause delay in flowering and weak stems. Nitrogen is available usually as  $\text{NH}_4^+$  (ammoniacal) or  $\text{NO}_3^-$  (Nitrate). Nitrate nitrogen creates stronger plant fiber and is more acidic. Nitrogen deficiency makes leaves turn a light yellow color (starting with the older leaves).

**Phosphorus(P)** Plants do not need as much phosphorus as nitrogen or potassium. It is necessary for energy transformation in plant growth. It promotes flowering and stiffer stems and balances large amounts of nitrogen. Phosphorus is very concentrated in seeds, and it helps promote early root growth and development of seedlings. Deficiencies produce stunted growth and eventually a purplish hue in the leaves.

**Potassium (K)** never actually becomes part of the plant cells, but is important in many metabolic processes, such as protein and carbohydrate synthesis. Potassium helps to strengthen root systems to resist fungal and bacterial diseases. Deficiencies manifest as necrotic (dead) spots on the edges of older leaves.

Calcium (Ca) is an important element in compounds forming cell walls. It also keeps internodes short and promotes leaf expansion.

Sulfur (S) is needed for forming enzymes and vitamins.

Magnesium (Mg) is at the center of the chlorophyll molecules and therefore indispensable.

### Trace Minerals

Iron (Fe), Manganese (Mn), Boron (B), Copper (Cu), Zinc (Zn), Molybdenum (Mo), and Chlorine (Cl) are the other known trace elements essential for normal growth. Iron (Fe) is used in the largest amounts. If deficient, young leaves will show chlorotic yellowing between the veins. Certain plants require more iron (e.g. Bougainvillea, Hibiscus, etc.) Supplement them with iron sulphate or chelate.

## 2. Fertilizers

Fertilizers can be put into 2 broad categories - organic and inorganic (synthetic). Plants absorb all elements in their ionic form (e.g.  $N^+$ ,  $P^+$ , etc.) which is the same whether it came from organic or inorganic forms. However, what differs in the fertilizers is how "available" these various elements are to the plants. Most organic fertilizers (e.g. bone meal, manures) have ions which are more tightly bound (complex molecules) and must be broken down before absorption. Synthetic fertilizers in liquid form produce ions, which are immediately available to the plant. This has some advantages (e.g. fast response) and sometimes disadvantages (e.g. more possibility of excessively concentrated solutions burning the root zone).

### Application Methods

Fertilizers can be applied in dry, liquid, or coated form.

**Dry** - some growers mix phosphorus in with the growing media before planting (in the form of superphosphate powder).

**Liquid** - fertilizers are usually added to the root zone or in some cases as a foliar spray. (This is particularly beneficial when you are supplementing iron to plants).

**Coated** - Concentrated fertilizer salts are coated with a kind of plastic (polymer resin membranes) which allow the nutrients to slowly diffuse into the growing media once they have become wet.

### Beware: Soluble-Salts

Slow release fertilizers can produce a build-up of soluble salts in the soil media of your houseplants especially early in the season before plants start to 'take off'. High soluble salts in the area of the root zone tend to draw water out of the roots (again due to osmotic pressure) and thus create a drought effect in the plant even if it seems to have enough water. The remedy is to leach the plants if you notice that they seem to be listless. Drench at least 3 times (waiting 1/2 hour between drenches) making sure that water runs freely through the bottom of the pot.

