

WHAT IS PLANT NUTRITION?

Plants use inorganic minerals for nutrition. Complex interactions involving weathering of rock minerals, decaying organic matter, animals, and microbes take place to form inorganic minerals in soil. Roots absorb mineral nutrients as ions in soil water. Many factors influence nutrient uptake for plants. Ions can be readily available to roots, or may be "tied up" by other elements, or the soil itself. Soil too high in pH (alkaline), or too low (acid) makes minerals unavailable to plants.

FERTILITY OR NUTRITION

"Fertility" refers to the inherent capacity of a soil to supply nutrients to plants in adequate amounts and in suitable proportions. "Nutrition" refers to the interrelated steps by which a living organism assimilates food and uses it for growth and replacement of tissue. Previously, plant growth was thought of in terms of soil fertility, or how much fertiliser should be added to increase soil levels of mineral elements. Plant nutrition is a term that takes into account the interrelationships of mineral elements in the soil as well as their role in plant growth. This interrelationship involves a complex balance of mineral elements essential, or beneficial for optimum plant growth.

ESSENTIAL versus BENEFICIAL

Three criteria must be met for an element to be considered essential. These criteria are: 1. A plant must be unable to complete its life cycle in the absence of the mineral element. 2. The function of the element must not be replaceable by another mineral element. 3. The element must be directly involved in plant metabolism. These criteria are important guidelines for plant nutrition, but exclude beneficial mineral elements that can compensate for toxic effects of other elements, or may replace mineral nutrients in some other less specific function such as the maintenance of osmotic pressure. The omission of beneficial nutrients in commercial production could mean that plants are not being grown to their optimum genetic potential but are merely produced at a subsistence level.

CATION EXCHANGE CAPACITY

The Cation Exchange Capacity refers to the ability of the growing medium to hold exchangeable mineral elements within its structure. These cations include ammonium nitrogen, potassium, calcium, magnesium, iron, manganese, zinc and copper.

pH: WHAT DOES IT MEAN?

pH refers to the alkalinity or acidity of a growing media water solution, which consists of mineral elements dissolved in ionic form. The reaction of this solution will have a marked effect on the availability of mineral elements to plant roots. When there is a greater amount of hydrogen H^+ ions, the solution will be acid (<7.0). If there are more hydroxyl OH^- ions, the solution will be alkaline (>7.0). A balance of hydrogen to hydroxyl ions yields a pH neutral soil ($=7.0$). The range for most crops is 5.5 to 6.2 or slightly acidic. This creates the greatest average level for availability for all essential plant nutrients. Extreme fluctuations of pH can cause deficiency or toxicity of nutrients.