Elements Essential For Plant Nutrition

Plants have ability to build up organic tissues directly form in-organic material. They live, grow and reproduce by taking up water and minerals substances from soil, CO_2 from and energy form sun to from plant tissues.

Nutrition:

The supply and adsorption of chemical compounds needed for growth and metabolism may be defined as nutrition.

Nutrient:

The chemical compounds required by organisms are known as nutrient.

Metabolic Process:

The mechanism by which nutrients are converted to cellular material used for energetic process occurred in living cell in order to maintain life and growth of plant.

Essential Element:

An element is said to be essential if plant cannot complete its life cycle without it. If the elements are special in its physiological function and if it's deficiency develop in plant and remedied by that element.

Criteria for an element to be essential:

An element to be considered as essential plant nutrient the criteria must be met.

(I) Deficiency of the element makes it impossible for the plant to complete the vegetative or reproductive stage of its life.

(II) The deficiency symptoms of an element in the plant can be prevented or corrected only by the supply of that element.

(III) The element is directly involved in the nutrition of the plant quite apart from its possible effect in correcting some micro biological or chemical condition in the soil.

21 nutrients are essential for plants to complete their life cycle.

(9) Nine are macro nutrients

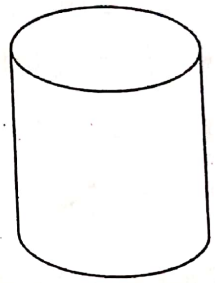
(C, H, O, N, P, K, S, Ca, Mg)

Major

(12) Micro-nutrients

(Fe, Zn, B, Mn, Cu, Mo, Na, Si, Co, Ni, Ci, Se)

Liebig's Law of Minimum:



"The Nutrients in shorter Supply, limit the yield"

Criteria for Nutrient Essential :

Classic:

Arou and Stout (1939)

(1) Plant cannot complete its lifecycle without that element.

(2) It must be the part of plant bio-molecule and element must be directly involved in nutrition.

(3) Deficiency symptoms must be specific and cannot be corrected with any other element.

Modren:

Bloom and Aspetine (2003)

(1) It may or may not be the part of plant bio-molecule

(2) It shows the -ve tendency in growth of plants.

Pool of the Nutrients Soil:

(I) Water Soluble (II) Exchangeable

(III) Slowly available (IV) Reserved

(1)-Water Soluble Nutrients:

They are present in soil solution. These nutrients are in ionic from and possess (to share) a great mobility, then the unavailability or exchangeable nutrients so they are must available for plant uptake. Soluble salts such as chlorides, sulphate and bi carbonates of sodium, potassium, calcium and magnesium are often present in appreciable quality.

(2)-Ex-changeable Nutrients:

The exchangeable nutrients exist as absorbed ion on the surface of mineral and organic compound. The exchangeable cations are available to plant and are the most important from involved in plant nutrition.

(3)-Slowly Available Nutrients:

These are least available to plant. They are available upon decomposition of organic matter or weathering of clay minerals.

(4)-Reserved Nutrients:

This fraction (part) is un-available and found as a combine part of organic or in-organic compound which are not accessible to plant absorption unless the compound are decomposed.

Role of Macro-Nutrients (N-P-K):

Nitrogen (N):

(1)-Function:

An important constituent of chlorophyll, protoplast, protein, and nucleic acid.

(2) Increase growth and development of all living tissues.

(3) Improve the quality of leafy vegetable and fodders and the protein content of food grains.

Deficiency Symptoms:

i) Stunted growth

II) Appearance of light green or pale yellow colour on the older leaf, starting from the tip. This is followed by death or dropping of older leaf depending on the degree of deficiency.

III) In acute deficiency, flowering is greatly reduced.

IV) Lower portion content.

Phosphorus (P):

Function:

I) It is constituent of nucleic acid, phospholipids NADA and ATP

ii) It is necessary for cell division, constituent of chromosomes.

III) It stimulates cell division.

IV) It is necessary for seed and fruit development and stimulate flowering.

Deficiency Symptoms:

I) Over all stunted growth appear on leaves characteristics of dark to.

II) In acute deficiency, pu of leaves and stem will appear.

III) Delayed maturity and lack of seed development.

Potassium (K):

Function:

I) Potassium is an activator of enzymes involved in photosynthesis and protein and carbohydrates metabolism.

II) Potassium assists carbohydrates synthesis of protein by stomatal regulation.

III) It enhances plant ability to resist cold condition.

IV) Potassium enhances the plant ability to resist diseases.

V) Increases the size of grains or seed and improve the quality of fruit or vegetable.

Deficiency Symptoms:

I) Chlorosis a along the leaf margin fallowed by scorching and browning of the tips of older leaf, these symptoms then gradually progress.

II) Slow and stunned growth of plant.

III) Stalks weak and plant lodge easily.

IV) Shriveled seeds and fruits.