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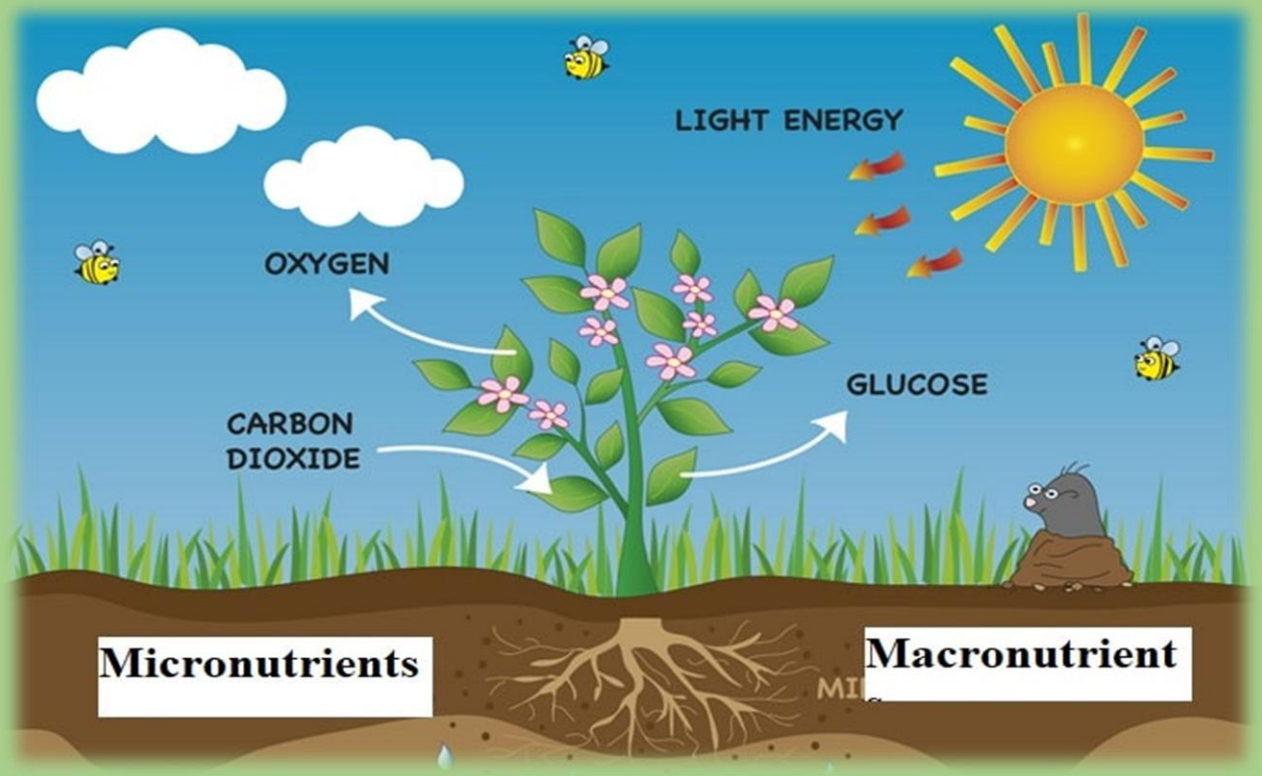

ESSENTIAL PLANT NUTRIENTS AND THEIR DEFICIENCY SYMPTOMS

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INTRODUCTION

Plants acquire essential nutrients from the soil or air where they grow. The physiological process of a plant requires these nutrients to be available for its growth. Too little quantities can cause death in plants whereas slight or moderate insufficiencies can delay their development or decrease productivity rates. In this article we are going to look at the roles played by these elements in a plant's life cycle and how one can identify their inadequacy signs. Essential Plant Nutrients: A full range of **17** essential nutrients must be provided for complete plant growth. The elements carbon (C), hydrogen (H) and oxygen (O) are most abundant in plants. The remaining **14** are grouped into two categories based on their needs: **macronutrients and micronutrients** that exist as fourteen different types in total. **Macronutrients** being needed in larger quantities and **Micronutrients** required in smaller quantities.

MACRONUTRIENTS

1) **Nitrogen (N)** - The highest amount of N, in terms of element uptake by autotrophs is nitrogen. As well, it gives plant green colour formation and aid out leaf development and has main role to play in photosynthesis. With its help, the seed will germinate and gain growth speed.

2) **Phosphorus (P)** - The other element which also require extensively is the phosphorus. It facilitates root growing and flower or fruit bearing. In some cases, pollination is necessary so that seeds can be produced. Phosphorus aids in the survival of plants under the worst conditions as it prevents plant death.

3) **Potassium (K)** - Plants posed particular need for potassium. Potassium basically protect and also potentiate the plants' vegetative growth and water holding capacity, which further increase drought resistance. Moreover, supplementing necessary nutrition for the plant as well as preventing the fungal diseases and pests to attack the plant also.

4) Calcium (Cl) - It is actively involved in the formation and development of cell wall. Resisting diseases is one of the many benefits of the cell wall plant. It also improves the absorption of nitrates as well. Listen to the given audio and repeat the given sentence.

5) Magnesium (Mg) – The magnesium molecule is known for facilitating plant chlorophyll production. It also conducted nucleic acid and RNA synthesis. H2O, CO2, and magnesium take part in the activation of an enzyme in the processes of respiration and photosynthesis.

6) Sulphur (S) - Sulphur is an essential building block of amino acids, proteins, enzymes, and vitamins as well. The soil provides the plant with germination medium, while at the same time assists in repelling the diseases that can afflict the crop.

MICRONUTRIENTS

1) **Iron (Fe) –** Iron is necessary for energy transfer, nitrogen reduction and fixation. Moreover, iron acts as a catalyst in sulphur formation of other reactions.
2) **Manganese (Mn) -** Manganese is required for photosynthesis and nitrogen metabolism. It also enhances disease resistance by strengthening cell walls. It is important for overall plant growth.
3) **Zinc (Zn) –** Zinc helps in photosynthesis, energy production and growth control. Important for seed development. Enhances root development and nutrient uptake.
4) **Copper (Cu) -** Copper is essential for efficient photosynthesis, grain production and to the strengthening of a cell wall. Aids in root metabolism and helps in the utilisation of proteins.
5) **Boron (B) –** Boron required for proper forming and strengthening of the cell wall. The role of boron in flowering, fruiting, cell division and pollen germination cannot be overemphasised.
6) **Molybdenum (Mo) –** Molybdenum is responsible for pollen formation. It also plays a role in nitrogen fixation.
7) **Chlorine (Cl) -** It helps to balance osmosis and ionic nutrients are regulated by chlorine this nutrient element in addition to playing an important role in photosynthesis process. The deficiency of only one nutrient burdened each area of the leaf, stem, root, morphology and the overall behaviour of plant. Interpreting these signs should be the core of the diagnostic pathway involving

appropriate course of action to correct the problem.

DEFICIENCY SYMPTOMS

Nitrogen (N) Deficiency:

- Older leaves like to look whiter than normal, which is caused by the lack of chlorophyll in the contained cells.
- Stunted growth
- Reduced leaf size

Phosphorus (P) Deficiency:

- About that time, the redevelopment of the leaves begins to adopt a purple shade.
- Delayed flowering
- Poor root development

Potassium (K) Deficiency:

- Smoke or marginal scorching is demonstrated by black particles at the leaf margins and fewer amount of the narrow line pointing towards the bud.
- Weak stems
- Reduced fruit quality

Calcium (Ca) Deficiency:

- Stunted root growth
- Formation of the leaf tip or necrosis is the most common symptom of potassium deficiency.
- Distorted new leaves

Magnesium (Mg) Deficiency:

- Between the veins, chlorosis interveinal sets in which demonstrates a disorder of iron.
- Leaf curling
- Reduced fruit yield

Sulphur (S) Deficiency:

- Pale-green to dark-yellow new foliage.
- Reduced plant growth

• Delayed maturity

• Stems are woody and small in diameter

Iron (Fe) Deficiency:

• The younger leaves take on a paler or yellow color while the leaf veins remain darker.

• Shoots dying off, starting at the tip.

• Severe iron deficiency will lead to your leaves turning white.

Manganese (Mn) Deficiency:

• Interveinal chlorosis in younger leaves.

• Leaves may also take on dark or necrotic spots.

• Reduced plant size and decreased fruit production, also impacting roots, shoots.

Zinc (Zn) Deficiency:

• Zinc deficiency may cause slower maturity.

• Leaves may develop spots of necrosis and may also look smaller than expected, with a mottled or bronzed appearance.

• Zinc deficiencies often occur during the cold, wet spring season.

• Yellowing occurs between the veins of new leaves- interveinal chlorosis.

Copper (Cu) Deficiency:

• Yellowing of crop leaves, but the veins remain green.

• The new leaves will take on a stunted or wilted appearance, with spots of necrosis.

• Mature leaves may begin to fall off and flower development will be impaired.

Boron (B) Deficiency:

• Terminal buds may die.

• Plant shows stunted and deformed growth.

• Boron deficiency affects plants' roots and shoots, where roots become thick and short with swollen root tips.

• Older leaves will look dark green. Newer leaves may also take on a rust-like appearance.

Molybdenum (Mo) Deficiency:

• Necrosis of the leaf edges and leaves can take on a narrow or deformed appearance.
• Older leaves of the plants, which begin to take on a mottled yellow color at the edges.

Chlorine (Cl) Deficiency:

• Younger leaves will be chlorotic and plants will easily wilt.
• Root growth is slow.
• Chloride deficiencies have been reported on sandy soils, humid region with high rainfall area.

CONCLUSION:

What is also important is that one should know the basic plant nutrients, be able to recognise damage caused by deficiency of these elements and what they can lead to. In this case, a high production can be ensured. Testing soil every once in a while, applying fertilisers, and soil review at the appropriate time are some methods for nutrients correction, or providing nutrients to the plant and letting it grow healthily. Consequently, growers should cultivate at a close level and have to be sensitive to plant health. Furthermore, finding a remedy for nutrient deficiency as quickly as possible is essential to develop a flourishing and profitable plant cultivation system.

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