SNS COLLEGE OF ENGINEERING

(An Autonomous Institution)
COIMBATORE-107
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

19BY701 / Biology For Engineers
IV YEAR / VII SEMESTER
UNIT-II: BIODIVERSITY

PLANT NUTRIENTS

Plant Nutrients

- Nutrients in the soil can be supplemented through the application of fertilizers or manures.
- Nutrient management includes the type of fertilizer to be applied, rate of application and method of application.
- Nutrients are taken up by the fine root hairs, not by the big roots.
- Even the very largest of trees have many small, fine root hairs to absorb the nutrients and water they need.
- The larger roots are used for supporting the tree and for storage of water and other plant food.
- There are a total of 17 nutritive elements, which are necessary for the growth of plants.

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- All elements are equally important irrespective of their requirement or presence in a plant. According to **Arnon and Stout (1939)**, an element must meet the following three criteria:

a. **A plant cannot complete its life cycle in the absence of that mineral element.**

b. **The element is specific and cannot be replaced.**

c. **The element must be directly**

Classification of Plant Nutrients

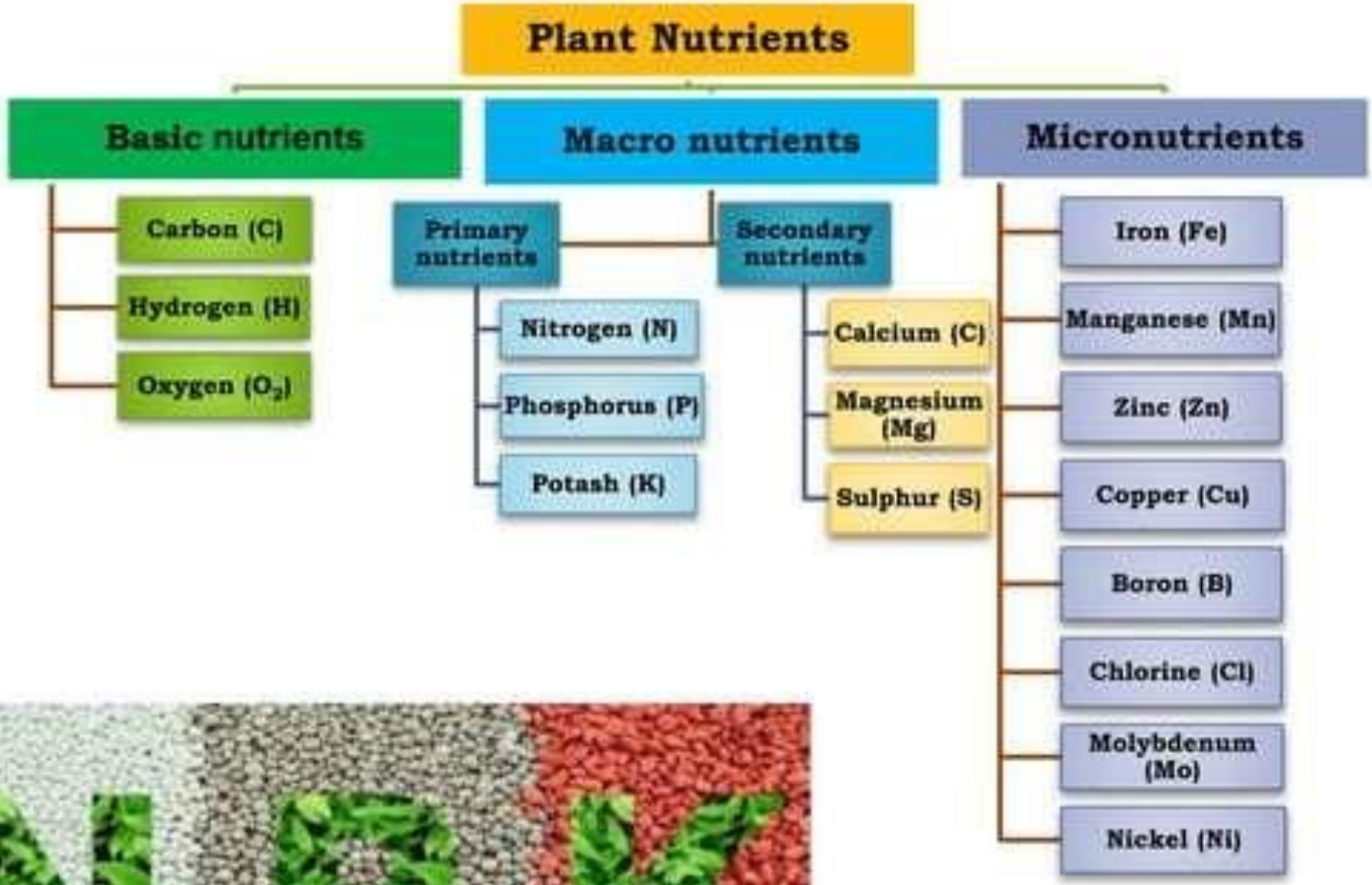

Illustration by: Dr.Sunil Prajapati, MUJ

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- Nutrients can be classified according to their requirement and importance in plant life.
- They can be classified into basic nutrients, macro-nutrients and micro-nutrients.

Basic nutrients: Carbon (C), Hydrogen (H) and Oxygen (O). These elements are obtained from air and water.

Macro-nutrients:

- **Primary nutrients**: These consist of Nitrogen, Phosphorus and Potassium. These nutrients are supplied through fertilizers.
- **Secondary nutrients:** Calcium, Magnesium and Sulphur.

Micro-nutrients:

- They are also known as minor or trace elements. They include Iron (Fe), Manganese (Mn), Copper (Cu), Zinc (Zn), Chlorine (Cl), Boron (B) Molybdenum (Mo) and Nickel (Ni).

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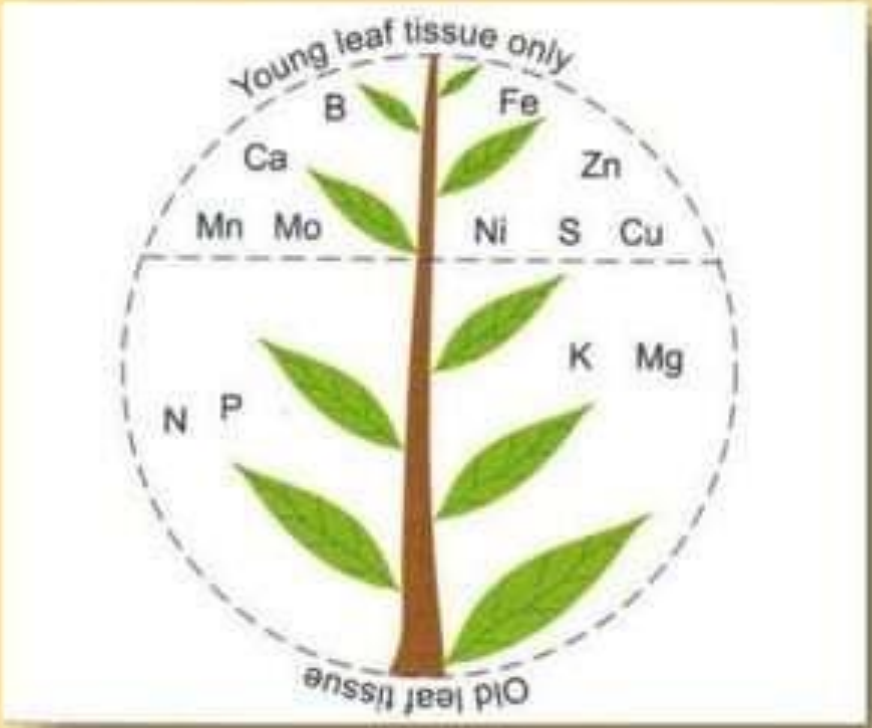
- Non-mineral elements: Carbon (C), Hydrogen (H) and Oxygen (O).
- Primary nutrients: Nitrogen (N), Phosphorus (P) and Potassium (K).
- Secondary nutrients: Calcium (Ca), Magnesium (Mg) and Sulphur (S).
- Energy exchange: Hydrogen (H) and Oxygen (O).



Plant Nutrient Deficiency Terminology

- Burning: severe localized yellowing; scorched appearance.
- Chlorosis: general yellowing of the plant tissue; lack of chlorophyll.
- Generalized: symptoms not limited to one area of a plant, but rather spread over the entire plant.
- Immobile nutrient: not able to be moved from one part of the plant to another.
- Interveinal Chlorosis: yellowing in between leaf veins, yet veins remain green.
- Localized: symptoms limited to one leaf or one section of the leaf or plant.
- Mobile nutrient: able to be moved from one plant part to another.
- Mottling: spotted, irregular, inconsistent pattern.
- Necrosis: death of plant tissue; tissue browns and dies.
- Stunting: decreased growth; shorter height of the affected plants.
- Hidden hunger: plants that shows no symptoms of deficiency.

Nutrients, functions and deficiency symptoms

Nitrogen (N)

Functions:

- Promotes the growth of leaves and stems.
- Enhances the dark green colour in plants and improves the quality of foliage.
- Necessary for the development of cell protein and chlorophyll.
- Improves the uptake of other nutrients, like phosphorus, potassium, magnesium and sulphur.

Deficiency symptoms

- Loss of vigour and yellowing of green parts.
- Shortening of the stem, leaves become pale yellow and remain small in size.
- Slow growth and a plant becomes dwar
- On excess show dark green color and luxurious vegetative growth.

Nutrients, functions and deficiency symptoms

Phosphorus (P)

Functions:

- Stimulates early formation and growth of roots.
- Provides for fast and vigorous growth and speedy maturity.
- Increases number of tubers.
- Necessary for the enzyme action of many plant processes.

Deficiency Symptoms

- Growth of plant is retarded at early stages.
- Older leaves are curled and purplish color.
- Some time marginal scorching.
- Slow maturity vegetative growth continues beyond normal time.
- Delayed tuberization.

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Potassium (K)

Functions

- Helps in carbohydrates and protein synthesis.
- Helps in the transfer of carbohydrates from leaves to roots.
- Increases disease resistance, vigour and hardiness to drought and frost.
- Increases yield by increasing the size of tubers, hence, important for processing cultivars.

Deficiency symptoms

- Coincides with the onset of tuber initiation.
- Deficiency symptoms appear as dark bluish green leaves and shortened internodes.
- Terminal leaves show bronzing accompanied by necrotic spots.

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Sulphur (S)

Functions

- Promotes root growth and vigorous vegetative growth.
- Essential for protein formation .

Deficiency symptoms

- Shoots become light green; veins on the leaves also turn yellowing of leaves.
- Yellowing starts from upper leaves and the plant shows chlorosis.
- Severe deficiency results in reddening of the stem and curling of leaves inwards.

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Calcium (Ca)

Functions

- Improves plant vigour .
- Influences the intake and synthesis of other plant nutrients
- Improves specific gravity of tubers, and thus, enhances tuber quality for processing.

Deficiency symptoms

- Failure of development of terminal buds at apical tips
- Small leaves.
- leaves do not develop normally and have wrinkled appearance.
- In mild deficiency, a light green band appears along the margin of leaves of terminal buds.

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Magnesium (Mg)

Functions

- Influences the intake of other essential nutrients
- Helps in the assimilation of fats.
- Assists in the translocation of phosphorus and fats

Deficiency symptoms

- green parts between veins in leaves become pale, though the veins remain green (Interveinal chlorosis).
- leaf tips curl up.
- leaflets become thick and roll upwards.

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Zinc (Zn)

Functions

- Synthesis of tryptophan.
- Helps in enzyme action.
- Essential for protein synthesis and seed production. Fastens the rate of maturity.

Deficiency symptoms

- Younger leaves become yellow.
- Leaves show inter-veinal necrosis, while midrib remains green.
- In tomato, small narrow yellow leaves with black spots appear and there is stunted growth in plants.