

SECTION-3

LIFE PROCESSES

CHAPTER-10

FORM AND FUNCTIONS IN

PLANTS

Q1. What is plant nutrition?

Ans: Plants use inorganic minerals for nutrition. Whether grown in the field or in a container. 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 could 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.

**Q2. Define/Describe/Explain briefly:
Nutrients, Nutrition, Macronutrients and Micronutrients.****Ans: Nutrients:**

All those substances that provide necessary elements to the organism for growth and metabolism are called **nutrients** that may be organic or inorganic.

Nutrition:

The term **nutrition** is applied to all the processes that are involved in uptake of nutrients from the environment and their utilization in growth or various metabolic activities of the body. Plants are autotrophs as they obtain inorganic nutrients such as water, carbon dioxide and certain minerals from the environment and convert them into organic compounds.

Macronutrients:

Sixteen elements have been found essential for plant growth. Nine of these are required in fairly large quantities (less than 0.05% dry weights) and therefore known as **macronutrients**.

These include carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, sulphur, calcium and magnesium.

Micronutrients:

The remaining seven elements are needed in traces or small amounts (less than 0.05% dry weight) for normal plant growth and development that are known as **micronutrients**. These include iron, boron, manganese, copper molybdenum, chlorine and zinc.

Q3. Describes the different Diseases in plant due to deficiency of different nutrients.

Ans: Deficiency Diseases:

All these elements have specific functions in plant body therefore, the deficiency of any one of them can cause serious complications that are generally called **deficiency diseases**.

For example:

Deficiency of nitrogen per magnesium causes yellowing of leaves called **chlorosis**. The deficiency of phosphorus causes stunted root growth and deficiency of potassium causes leaf margins yellow or brown and pre-mature death of plant.

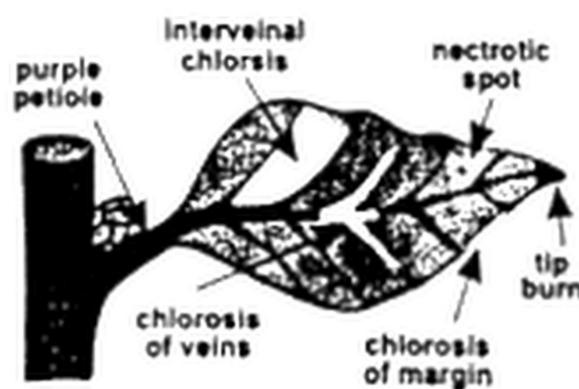
The nutrients may become deficient in the soil if a particular crop is shown again and again in the small soil. Therefore, **crop rotation** (cultivation of different crops alternatively in the same soil) or **addition of fertilizers** in the soil are possible remedies for this problem.

Science Titbits

Hydroponic culture is one the most useful methods to test whether a certain element is essential for plant or not. In this method, plants are cultured or grown on net, which is placed on the surface of aerated water are containing measured quantity of specific nutrients. The samples of water are analyzed time to time to determine which nutrient, the plant has absorbed.

Science, Technology and Society connections

- ◆ Identify some major symptoms of mineral deficiencies in plants, e.g. necrosis, chlorosis, stunted growth etc.



Necrosis: It is the death of a part of plant body. It is due to deficiency of Calcium, magnesium, copper and molybdenum.

Chlorosis: It is the yellowing of the green parts of a plant which shows lack of chlorophyll due to mineral deficiency of nitrogen and magnesium.

Stunted growth: It is less than normal growth due to the deficiency of phosphorus, sulphur, potassium in plants.

Q4. Explain the transport in plants.

Ans: Transport in Plants:

The roots of plant not only anchor the plant body in the soil but also absorb minerals and water from the soil. These nutrients are first absorbed by

root epidermal cells from where these are moved to the xylem and then through xylem nutrients in photosynthetic activity. After photosynthesis, organic solutes are produced that also have to move to different parts of the plant body. All these movements of materials are generally referring to as transport in plants.

Q5. What are the main functions of xylem and phloem?

Ans: Function of Xylem and phloem:

Plants have two systems for the transportation of substances - using two different types of transport tissue.

There are two types of conducting tissues in plants, namely xylem and phloem. These tissues constitute the vascular tissues. Xylem conducts mainly water and minerals from the roots up to other parts of the plants. Phloem conducts organic food from the leaves both up and down the plant.

Teacher's point

Teacher would guide the students to illustrate diagrammatically the pathway of water in root, stem and leaf.

Critical Thinking

In tropical climates, many tall plants shut stomata during the hot days and open at night. If their stomata are closed during day, why doesn't the water within the plant fall down the stem?

Ans: Because of transpiration pull and adhesive and cohesive forces between water molecules and xylem vessel the water doesn't fall down the plant stem even though its stomata are closed during hot summer days.

OR (Second Answer)

Lenticular transpiration keeps going from the stem, so ascent of sap goes on during the day.

Water is stored in parenchyma cells making them succulent plants. Therefore, water is used up and ascent of sap continues. That's why, In spite of the closure of stomata during day time, the water within the plant does not fall down the stem.

Teacher's Point

Teacher would guide the student to:

- ◆ Interpret the adaptive differences through survey of Xerophytic, mesophytic and hydrophytic plants.
- ◆ Illustrate the structure and position of stoma in Xerophytic, mesophytic and hydrophytic plants.

Critical Thinking

Transverse section of stem: Can you find out the approximate age of this plant?



Ans: Approximate age of this plant is 19 years (19 Rings)

Note: If the tree is already dead, you can count the rings on the exposed stump. The number of rings indicates the number of years the tree lived. Keep in mind that most trees produce a two-colored ring per year, within the annual ring the thinner strip is the phloem and the thicker is the xylem. Thinner rings represent colder years whereas thicker rings represent warmer years.

Science Titbits

Different **cytokinins: auxin** ratios change the nature of organogenesis. If kinetin (cytokinins) is high and auxin low, shoots are formed; if kinetin is low and auxin high, roots are formed. Lateral bud development, which is retarded by auxin, is promoted by cytokinins.

Activity

1. Demonstration of the evolution CO_2 from leaf discs placed in dark and light, with the help of indicator (hydrogen carbonate)
2. Microscopic observation of the slide of LS of a dicot stem, identifying and drawing vessel element, vessel, and phloem sieve tubes.

3. Locating annual rings in the log of a tree and calculation of the age of a plant by counting number annual rings.
4. Demonstration of phototropism, geotropism and thigmotropism in plants.
5. Demonstration of the folding of leaf after touch in *Mimosa pudica*.

