

BIOLOGY



Important Questions

➤ Multiple Choice Questions:

Question 1. Name the scientist who first showed that plants obtain minerals from the soil for their growth and development.

- (a) Woodward
- (b) de-Saussure
- (c) Armon
- (d) Stout.

Question 2. A mineral element is considered essential for plant if it fulfills the need for

- (a) Specific symptoms
- (b) Normal growth and development
- (c) Direct nutrition of plant
- (d) All of these

Question 3. An element which is constituent of every enzyme and is thus essential for all biochemical reactions in plants is

- (a) Nitrogen
- (b) Sulphur
- (c) Phosphorus
- (d) Carbon

Question 4. An element which is constituent of chlorophyll and also acts as a co-factor for various enzymes taking part in cellular respiration is

- (a) Magnesium
- (b) Nitrogen
- (c) Carbon
- (d) Iron.

Question 5. Main source of nitrogen for plants is

- (a) Atmosphere
- (b) Soil
- (c) Nitrifying bacteria
- (d) Water soluble nitrites nitrates.

Question 6. Animal and other heterotrophic organisms obtain nitrogen from

- (a) Atmosphere
- (b) Plants
- (c) Nitrifying bacteria
- (d) All of these.

Question 7. Elements obtained by plants from the soil are known as

- (a) Mineral elements
- (b) Non-mineral elements
- (c) Both (a) and (b)
- (d) None of these.

Question 8. Elements obtained by plants from atmosphere of water are known as

- (a) Mineral elements
- (b) Non-mineral elements
- (c) Gases
- (d) Both (a) and (b)

Question 9. Non-mineral elements of plants are

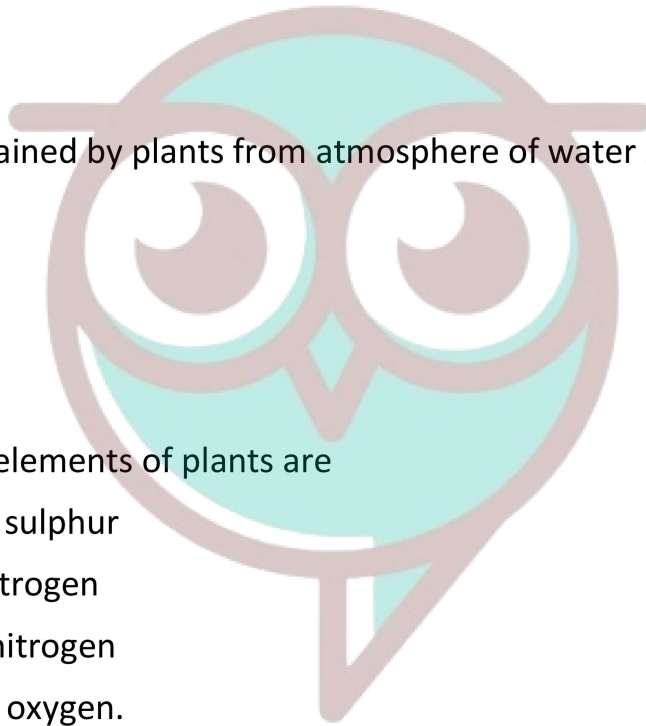
- (a) Carbon, hydrogen and sulphur
- (b) Carbon, oxygen and nitrogen
- (c) Sulphur, chlorine and nitrogen
- (d) Carbon, hydrogen and oxygen.

Question 10. An element of plants which is derived both from mineral and non-mineral resources is

- (a) Carbon
- (b) Sulphur
- (c) Nitrogen
- (d) Hydrogen.

Question 11. The technique of growing the plants by placing their roots in nutrient solution instead of growing in soil is called

- (a) Water culture
- (b) Hydroponics
- (c) Soilless culture
- (d) All of these.



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Question 12. Phosphorus is very essential for

- (a) Photosynthesis and respiration as carbohydrates taking part in different reactions react in phosphorylated form
- (b) It is constituent of NADP which plays crucial role in light reaction of photosynthesis.
- (c) Helps in storing chemical energy in glucose.
- (d) All of these.

Question 13. Loss of chlorophyll that leads to yellowing of entire leaf or part of it is called

- (a) Chlorosis
- (b) Necrosis
- (c) Abscission
- (d) Mottling

Question 14. Appearance of patches of green and non-green areas on the leaves are called

- (a) Necrosis
- (b) Chlorosis
- (c) Curling
- (d) Mottling.

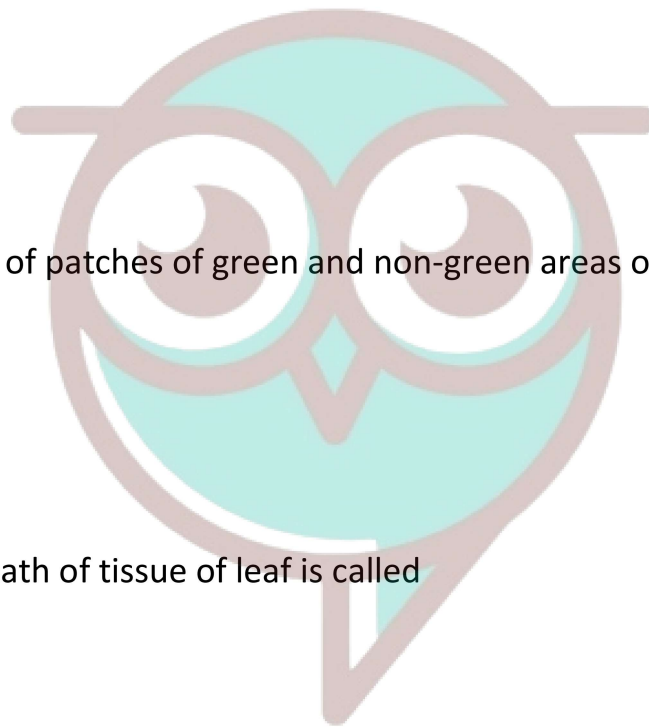
Question 15. Localised death of tissue of leaf is called

- (a) Chlorosis
- (b) Necrosis
- (c) Mottling
- (d) Dieback.

➤ **Fill In the Blanks:**

1. Julius Sachs technique of growing plants in a nutrient solution is known as
2. The element must be necessary for supporting normal growth and reproduction.
3. The requirement of the element and not by another element.
4. The element must be in the metabolism of the plant.
5. must generally be present in plant tissues in concentration of 1 to 10 mg/L of dry matter.
6. or trace elements, are needed in very small amount (equal to or less than 0.1 mg/L of dry matter).

➤ **True or False:**



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1. Chlorine is absorbed in the form of chloride anion (Cl^-).
2. Boron is required for uptake and utilisation of Ca^{2+} , membrane functioning, pollen germination, cell elongation, cell differentiation and carbohydrate translocation.
3. Plants obtain it in the form of molybdate ions (MoO_4^{2-}).
4. The concentration of the essential element below which plant growth is retarded is termed as critical concentration.
5. The toxicity symptoms are very easy to identify.
6. The process of conversion of nitrogen (N_2) to ammonia is termed as nitrogen fixation.

➤ **Very Short Question:**

1. What is tank farming?
2. Name any nitrogen-fixing symbiotic bacteria.
3. What is necrosis?
4. Name the bacteria which convert ammonia into nitrite.
5. What is the major role of calcium?
6. What is chlorosis?
7. From where do the plants get hydrogen?
8. What are hunger signs?
9. What is premature abscission?
10. Name two micronutrients.

➤ **Short Questions:**

1. What are chelators or chelating agents?
2. What type of condition is created by leghaemoglobin in the root nodules of the legume?
3. What are micronutrients? Give examples.
4. Some bags of fertilizers are labeled 15 – 15 – 15. What does it mean?
5. What do you mean by mineral nutrition?
6. Mention symptoms of any four mineral deficiencies in plants.
7. Write a short note on Industrial Apological Nitrogen fixation.
8. What is ion-exchange absorption?

➤ **Long Questions:**

1. What is water culture? How will you determine the essentiality of mineral elements experimentally?

2. Make a list of macronutrients and mention their major function.
3. Define the following:
 - (i) Nutrients,
 - (ii) Nutrition,
 - (iii) Micronutrients
 - (iv) Macronutrients,
 - (v) Active absorption,
 - (vi) Passive absorption,
 - (vii) Symplastic movement and
 - (viii) Apoplastic movement.
4. What do you understand by heterotrophic mode of nutrition? Elaborate your answer with suitable examples.

Assertion Reason Question-

1. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.
 - (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 - (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 - (c) If Assertion is true but Reason is false.
 - (d) If both Assertion and Reason are false.

Assertion: Hydroponics is used for solution culture.

Reason: A balanced nutrient solution contains both essential and nonessential elements.

2. In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.
 - (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 - (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 - (c) If Assertion is true but Reason is false.
 - (d) If both Assertion and Reason are false.

Assertion: In solution culture of plants, iron is added in the form of Fe-EDTA.

Reason: Hydroponics setup is costly.

✓ **Answer Key-**

➤ Multiple Choice Answers:

1. (a) Woodward.
2. (d) All of these.
3. (a) Nitrogen.
4. (a) Magnesium.
5. (a) Atmosphere.
6. (b) Plants.
7. (a) Mineral elements.
8. (b) Non-mineral elements.
9. (d) Carbon, hydrogen and oxygen.
10. (c) Nitrogen.
11. (d) All of these.
12. (d) All of these.
13. (a) Chlorosis
14. (d) Mottling.
15. (b) Necrosis.

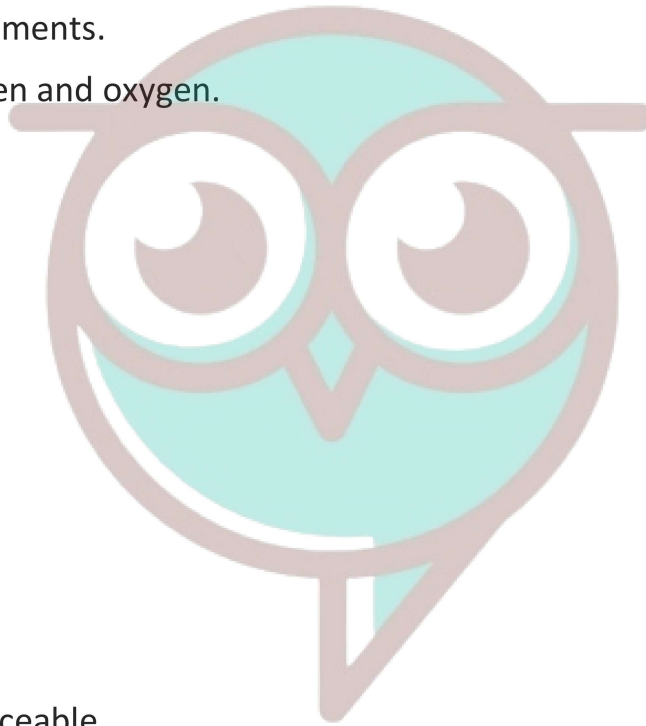
➤ **Fill In the Blanks:**

1. hydroponics
2. absolutely
3. must be specific, replaceable
4. directly involved
5. Macronutrients
6. Micronutrients

➤ **True or False:**

1. True
2. True
3. True
4. True
5. False
6. True

➤ **Very Short Answers:**



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1. Answer: It is growing plants in water or solution culture.
2. Answer: Rhizobium.
3. Answer: The death of tissues and cells and usually results in holes in the leaves is called necrosis.
4. Answer: Nitrosomonas.
5. Answer: It is a constituent of calcium pectate of the middle lamella of a cell wall.
6. Answer: Yellowing of leaves in a distinctive pattern due to lack of one or two other elements is called chlorosis.
7. Answer: From the water absorbed by the plants.
8. Answer: Morphological abnormalities caused due to the deficiency of one or- the other essential elements.
9. Answer: Fall of leaves, flowers, or fruits before their maturation is called premature abscission.
10. Answer: Boron, Copper

➤ Short Answer:

1. Answer: These are usually organic chemicals that hold or bind iron in the form of soluble complexes to make available iron to the plant. The chelator itself is not taken up by the plant. EDAA (Ethylene Diaminotetra Acetic Acid) is a commonly used chelator in water culture experiments.
2. Answer: Leghaemoglobin is an oxygen scavenger, it creates anaerobic conditions in the cells of root nodules and protects the nitrogen-fixing enzyme nitrogenase of the bacteroids.
3. Answer: The elements that are required by the plants in fewer amounts or traces are called micronutrients e.g. B(Boron). Mo (Molybdenum). Mn (Manganese). Cl (chlorine). These elements are present in plant tissues. They mostly act as cofactor or activator of enzymes.
4. Answer: The number 15 – 15 – 15 on the bags indicates the percentage by weight of nitrogen, phosphorus, and potassium in the chemical fertilizer. The majority of the fertilizers contain these elements in bulk such fertilizers are called complete fertilizers. Common fertilizers consist of chemicals either singly or in various compositions like urea, nitrate of soda, ammonium sulfate, etc.
5. Answer: The utilization of minerals by plants for growth and development is called mineral nutrition. The minerals are obtained from the soil for their growth. Plant analysis reveals the presence of a large number of minerals and nutrients in the soil. The number and amount of the mineral elements present varies from plants to plant/
6. Answer:
 - i. Chlorosis: Nondevelopment or loss of chlorophyll that leads to yellowing the entire leaf or

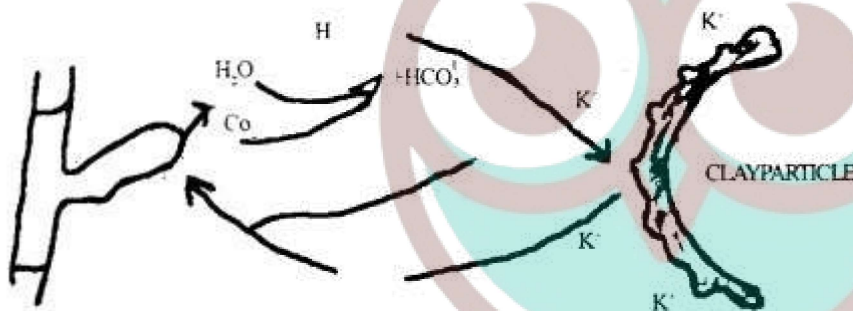
part of it is termed chlorosis.

ii. Mottling: It is the appearance of patches of green and non-green areas on leaves.

iii. Necrosis: It is the localized death of tissue of the leaf.

iv. Curling: It is caused due to unequal growth of the leaf.

7. Answer: Ammonia is produced industrially by a direct combination of nitrogen and hydrogen (obtained from H_2O) at high temperatures and pressure. Subsequently, NH_3 is converted into various types of fertilizers such as urea, potash, etc which are used for plant growth and protein synthesis.'
8. Answer: Ions, both cations and anions, have a tendency to get absorbed on the surfaces of the cell walls and exchange with ions present in the soil solution. The process of exchange between absorbed ions and ions in solution is known as ion exchange.



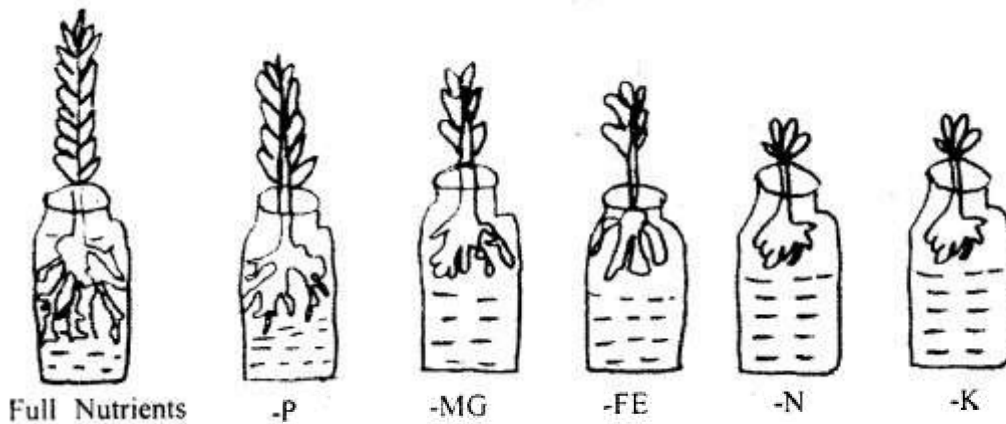
Mode of Iron- absorption carbonic acid exchange

➤ Long Answer:

1. Answer: The technique of growing the plants by placing their roots in different nutrient solution instead of growing in soil is termed hydroponics or water culture. For determining the essence of the mineral element, seedlings are grown in a balanced nutrient solution, are taken as control solution, lacking one or another element.

The growth of the plants grown in containers containing nutrient solution deficient in one or the other mineral element is compared to that of seedling grown in the balanced nutrient solution. If the plant shows some deficiency symptoms, it implies that the mineral element which was lacking in that culture set is an essential element.

However, the mineral element is a non-essential element if by eliminating that element from the nutrient solution, the growth is comparable to that of the control set.



An experiment set up to determine the essentiality of minerals by water-culture technique.

2. Answer: The macronutrients are carbon, hydrogen, oxygen, nitrogen, phosphorus, sulfur, potassium, calcium, magnesium, and silicon.

Carbon: It regulates the metabolic activities required by meristematic and differentiating tissues.

Carbon, hydrogen, and oxygen: These elements are absolutely essential for plant growth. These enter into all chemical compositions of all types of organic compounds like carbohydrates, proteins, lipids, organic acids, amino acids, enzymes, nucleic acids, hormones, etc. These are protoplasmic and formwork elements.

Nitrogen: Nitrogen is essential for all metabolic activities as various biochemical reactions occur in the presence of enzymes. It plays an important role in cell division, vegetative, and reproduction growth.

Phosphorus: It is the structural component of nucleic acids. Phospholipids, nucleoproteins, ATP, NADP⁺, sugar phosphates, and a number of co-enzymes. Phosphorus plays an indispensable role in energy, metabolism. It plays an active role in metabolic processes like photosynthesis, respiration, and protein synthesis.

Potassium: It is essential for the functioning of a large number of enzymes taking part in different metabolic activities like photosynthesis, respiration, starch synthesis, synthesis of nucleic acids. It controls the closing and opening of stomata.

Calcium: It is essential for the control of carbohydrate metabolism. It plays some role in binding nucleic acids and proteins in chromosomes.

Magnesium: It is essential for binding together two subunits of ribosomes. It is essential for fat metabolism, carbohydrate metabolism. It is also an activator of enzymes involved in the synthesis of nucleic acids.

Silicon: It plays an important role in the Biological activities of the plants.

3. (i) Answer: Nutrients: The chemical substances used by living organisms as raw materials for metabolic activities are termed nutrients.

(ii) Answer: Nutrition: The uptake and utilization of both inorganic and organic raw materials by

living organism for their growth, various metabolic activities, and development is called nutrition.

(iii) Answer: Micronutrients: Micronutrients are the essential elements present in plant tissues in relatively lesser amounts i.e. less than 1 mg per gram of dry matter. These mostly act as cofactors or activators of enzymes. These are iron, copper, zinc, manganese, molybdenum, boron, and chlorine.

(iv) Answer: Macronutrients: Macronutrients are the essential elements present in plant tissues in relatively larger concentrations, i.e. at least 1 mg per gram of dry matter. These are carbon, hydrogen, oxygen, nitrogen, sulfur, phosphorus, calcium, magnesium, and potassium.

(v) Answer: Active absorption: It is observed that the concentration of K^+ ions in vacuolar sap was found to be 1000 times more than the pond water. This can occur by utilization of metabolic energy only. The absorption of minerals by the plant against the concentration gradient involving the expenditure of energy is termed active absorption. Inactive absorption, the minerals move from the soil water from low concentration to higher concentration within the cell.

(vi) Answer: Passive absorption: Passive absorption is the absorption of minerals by physical processes not involving the direct expenditure of metabolic energy. A substance moves passively from higher concentration to lower concentration. Ions can also be absorbed and accumulated against an F.C.P (Electro Chemical Potential) gradient without the use of metabolic activities. Several theories have been proposed to explain the movement of ions such as ion exchange, Donnan equilibrium and mass flow of ions.

(vii) Answer: Symplastic Movement: It is the type of movement in which, ions entering the cell wall of the epidermis move across the cell wall of the cortex, cytoplasm of endodermis, the cell wall of the pericycle, and finally in the xylem vessels.

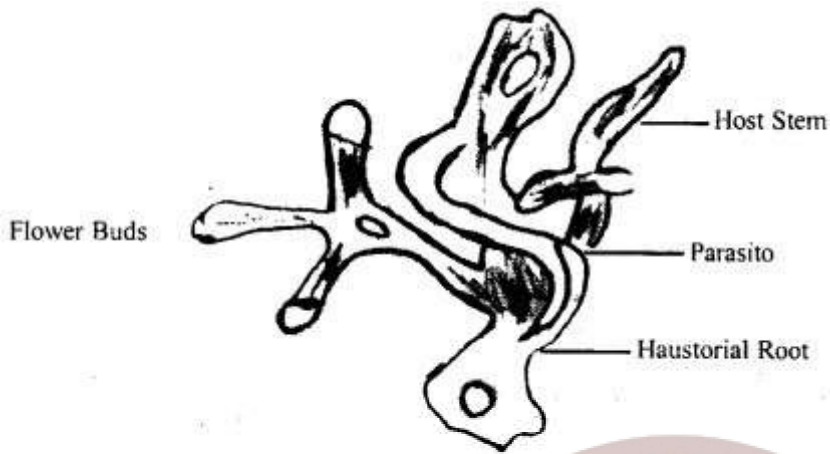
(viii) Answer: In apoplastic transport, water and minerals flow in an upward direction via the apoplast to the xylem in the root. The concentration of solutes transported in aboveground organs is established through a combination of import from the xylem, absorption by cells, and export by the phloem.

4. Answer: This is the type of nutrition, in which organisms obtain readymade organic food material from some other source and are not capable of synthesizing these from inorganic raw materials of their own. The organisms, which show this type of mode is known as Heterotrophs.

The heterotrophs are divided into two main types:

- i. parasites
- ii. saprophytes.

Parasites obtain readymade organic food material from other living plants or animals. The plant or animal which provides food to the parasite is termed the host. Many bacteria and fungi are parasites. They cause various diseases in their hosts.



Total Stemparasite

Some flowering plants also show parasitic modes of nutrition. These plants send haustorial or parasitic roots into the host to draw nutrients from it. Depending upon the organ of the host on which parasite is attached, it may be a stem parasite or root parasite.

Saprophytic plants such as *Morotropa*, bacteria, fungi grow on decaying animal and vegetable matter and absorb the organic food from it.

Heterotrophic plants could be symbiotic and insectivorous also.

Assertion Reason Answer-

1. (c) If Assertion is true but Reason is false.

Explanation: Solution culture is being used for raising flowers and vegetables at home. This soilless production of plants is called hydroponics. A solution having all the essential elements in proper proportion is called normal or balanced nutrient solution.

2. (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

Explanation: In solution culture, iron is added as Fe-EDTA. The agent which keeps metals in the soluble state is called chelating agent or ligand. Fe-EDTA complex is called chelate. The soilless production of plants is called solution culture or hydroponics. The cost of setting up a hydroponic system is very high.