CBSE TEST PAPER-01
CLASS - XI BIOLOGY
(Mineral Nutrition)

General Instruction:

- All questions are compulsory.
- Question No. 1 to 3 carry one marks each. Question No. 4 to 6 carry two marks each. Question No. 7 and 8 carry three marks each. Question No. 9 carry five marks.

1. Name a soil bacteria which is capable of converting ammonia to nitrates.

2. Which macronutrient is essential for synthesis of auxin.

3. What do you mean by “chlorosis”?

4. A farmer adds azotobacter culture to the soil before sowing maize. How does it increase the yield of maize?

5. Name the pigment found in root nodules of legumes. What is its function?

6. What is hydroponics? Mention its uses?

7. What do you understand by “Donnan Equilibrium?

8. What are essential mineral elements?

9. Describe the process of development of root nodules in leguminous plant. Name the oxygen scavenger molecule present in root nodules?

10. What is the Fate of ammonia formed during nitrogen cycle?

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[ANSWERS]

Ans 01. Nitrosomonas.

Ans 02. Zinc

Ans 03. Lack of development of chlorophyll in the leaves.

Ans 04. Azotobacter provides nitrogen fixing bacteria which converts free nitrogen into nitrous and nitrites. It increases soil fertility. So it increases yield of maize.

Ans 05. Root nodules of leguminons plants contain pigment leghaemglobin. Its function is to protect nitrogenase from oxygen. Hence called 'oxygen scavenger'.

Ans 06. Hydroponics is the cultivation of plants in the nutrient solution by placing their rooted part in nutrient solution. By hydroponics or water culture experiment, essentiality of an element for plant growth can be determined by exceeding a particular element in culture solution and by observing the symptoms caused by its deficiency.

Ans 07. This theory explains that the passive accumulation of ion that are fixed on non-diffusible, against an ecp gradient. A membrane that separates a cell from the external medium and allows exchange of some ions and not the other. On the inner side of this membrane are anions (fixed & non-diffusible). The membrane becomes impermeable to these anions. In such condition (for equilibrium) mobile cations are needed to balance the negative charges of the anions. According to it Donnan equilibrium is reached, if the product of anions and cations is the internal solution becomes equal to the product of anions and cations in the external solution.

$[Ci^+]\ [Ai^-] = [Co^+]\ [Ao^-]$

Where Ci^+ = cations inside

Ai^- = Anions in side

Co^+ = Cations outside

Ao^- = Anions outside.

Ans 08. Mineral elements found in soil which may enter plants through the roots. More than 60 elements of 105 discovered so far occur in different plants. Some accumulate selenium but some others gold. Some plants growing near nuclear test sites takes up radioactive strontium.

Ans 09. Formation of root nodules in a leguminous plant:

1) When a root hair of a leguminous plant comes in contact with Rhizobium, the root hair becomes curled or deformed, due to chemicals secreted by bacterium.

2) At the site of curling or deformation, the bacteria invade the root and multiply within the root hair.

3) Some of the bacteria enlarge to become membrane – bound structures known as bacteroids, which help in spreading infection.

4) An infection thread made of plasma membrane is formed by the host that separates the infected cell from rest of the tissue.

5) Cell division is stimulated in the infected tissue and more bacteria enter the newly formed cells.

Leghaemoglobin (Lb) is the oxygen scavenger found in root nodules of legume plants.

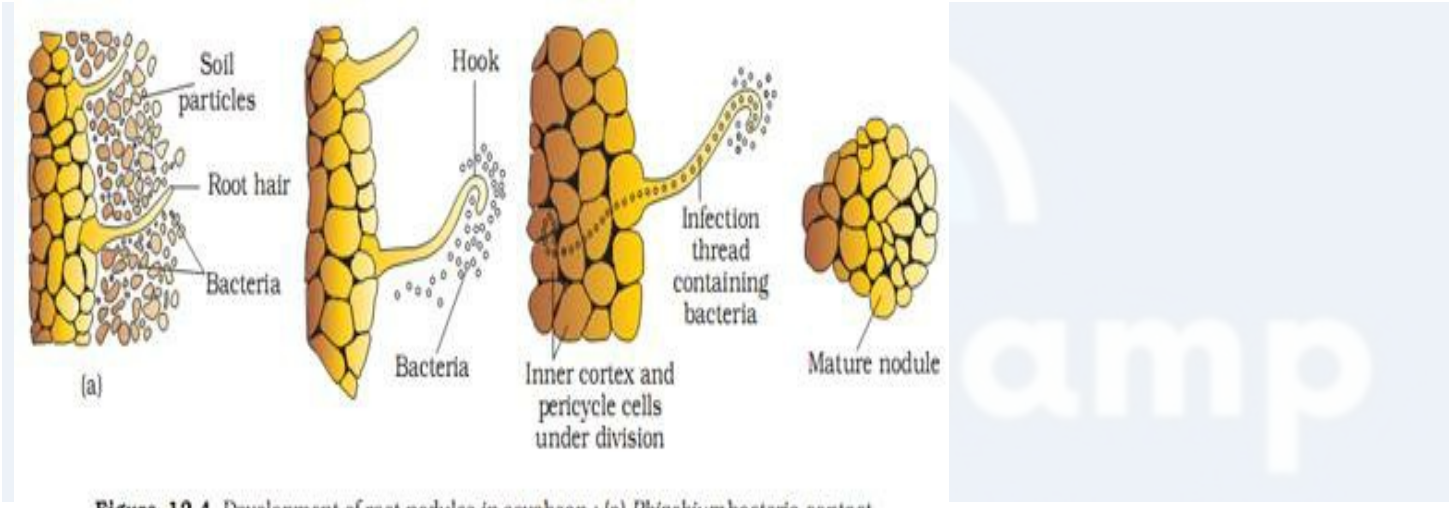

Figure 12.4 Development of root nodules in soyabean : (a) *Rhizobium* bacteria contact a susceptible root hair, divide near it. (b) Upon successful infection of the root hair cause it to curl, (c) Infected thread carries the bacteria to the inner cortex. The bacteria get modified into rod-shaped bacteroids and cause inner cortical and pericycle cells to divide. Division and growth of cortical and pericycle cells lead to nodule formation. (d) A mature nodule is complete with vascular tissues continuous with those of the root

Ans 10. At physiological pH ammonia is protonated to form ammonium ($NH_4^{+)}$ ion. Since ammonium is toxic to plant and hence cannot accumulate. So ammonium ion is used to synthesise amino acids in plants. This involves two main ways:

a) Reductive amination- In this ammonia reacts with alpha-keto glutaric acid and forms glutamic acid

b) Transamination- it invovles transfer of amino group from one amino acid to the keto group of a keto acid. Glutamica cid is the main amino acid from which transfer of NH_2, the amino group takes place and another amino acid is formed. Transaminases catalyses such reactions.

eg. Aaparagine and glutamine two most important amides are fromed from aspartic acid and glutamic acid respectively through transamination.

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