QB365

Important Questions - Mineral Nutrition

11th Standard CBSE

Biology Reg.No. : | | | | | | |

Time : 01:00:00 Hrs

Total Marks : 50

Section-A

1) Which macronutrients do plants take from the air? **1**

2) Decreased availability of the element results in early fall of fruits and flowers. Identify the element **1**

3) A particular macroelement is obtained by the plants from both mineral and nonmineral sources.Identify the element. **1**

4) Name the macronutrient which is component of all organic compounds, but is not obtained from soil. **1**

5) The deficiency of this particular element causes the condition of little leaf or mottle leaf in the plants.Name the element. **1**

6) Which are the two immobile elements found in plants? **1**

7) Deficiency of nitrogen in plants induces stems, petioles and lower leaf surface of plants to get purplish in appearance.Analyse the statement and the reason behind the fact. **1**

8) Every mineral element that is present in a cell is needed by plant, comment **1**

9) Mention any two role of K^+ ion in plants **1**

10) Complete the equation for reductive amination **1**

$\ldots\ldots\ldots + NH_4^+ + NADPH \xrightarrow{\cdots\cdots} Glutamatic \quad acid + H_2O + NADP$

Section-B

11) Identify and complete the equations given below. **2**

$(i) \quad 2NH_3 + 3O_2 \xrightarrow{?} 2NO_2^- + 2H^+ + 2H_2O$

$(ii) \quad \underset{-}{?} + O_2 \xrightarrow{Nitrobacter} 2NO_3^-$

12) 'All elements that are present in a part in a plant need not be essential to its survival'.Comment. **2**

13) How is sulphur important for plants?Name the amino acid in which it is present. **2**

14) Plants of leguminous family usually contain more amount of protein than other plants? If yes, justify. **2**

15) Mention the difference between passive and active salt absorption. **2**

16) Write two names for each of the following **2**

(i) Free-living, nitrogen-fixing cyanobacteria.

(ii) Free-living, aerobic, nitrogen-fixing bacteria

(iii) Symbiotic, nitrogen-fixing bacteria.

17) Describes nitrification along with the equations and the organisms involved in each step. **2**

18) Name the most crucial enzyme found in root nodules for N_2-fixation. Does it require a special pink coloured pigment for its functioning? Elaborate. **2**

19) In what form do plants absorb phosphorus from the soil?Name one cell organelle and one organic molecule that require phosphorus in the cell.List any two phosphorus deficiency symptoms in leaves. **2**

20) Describe two important functions of each of the element P,Fe and Zn in green plants.Mention deficiency symptoms of any two of these elements. **2**

Section-C

21) How are the terms critical concentration and deficient different from each other in terms of concentration of an essential element in plants?Can you find the values of critical concentration and deficient minerals FE and Zn. **5**

22) Why is that certain plants deficiency symptoms appear first in younger parts of the plant, while in others they do so in mature organs? **5**

23) A farmer adds/supplies Na, Ca,Mg and Fe regularly to his field and yet he observes that the plants show deficiency of Ca,Mg and Fe.Give a valid reason and suggest a way to help the farmer to improve the growth of plants. **5**

24) Explain with examples macronutrients,micronutrients,beneficial nutrients,toxic elements and essential elements. **5**

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Section-A

1) Crabon, oxygen, sulphur **1**

2) Phophorus, magnesium, copper,(any one) **1**

3) Nitrogen is the element which is obtained from both mineral and non mineral sourecs. **1**

4) Nitrogen **1**

5) Deficiency of elements zinc **1**

6) Calcium and sulphur are two immobile elements. **1**

7) The appearance of purplish colour in different parts of plant occurs due to accumulation of anthocyanin. **1**

8) **1**

No, every mineral present in a cell is not needed by the plant body because all of them are not essential to its survival because they are not directly involved in the composition of their body.

9) Role of K^+ in plants **1**

(i) Ppotassium ion helps in regulating stomatal opening and closing.

(ii) Helps in activating many growth related enzymes in plants

10) $\alpha - ketoglutarate + NH_4^+ + NADPH \underset{Dehydrogenase}{\overset{Glutamate}{\longrightarrow}} Glutamate + H_2O + NADP$ **1**

Section-B

11) (i) Nitrosomonas **2**

(ii) $2NO_2^-$

12) **2**

All elements that are present need not be essential to its survival because they are not directly involved in the composition of their body.

However, if the concentration of micronutrients such as Fe,Mn,Cu,Zn,Cl,etc rise above their critical values, they appear to be toxic for the plant.

13) **2**

Plants obtain sulphur in the form of sulphate (SO_4^{2-}) and is the main constituent of several coenzymes, vitamines(thiamine,biotin,coenzymeA) and ferredoxin.It plays role in the synthesis of chorophyll.It is essential for nodulation in legumes.It determines the structure of protein.Sulphur is present in two amino acids, i.e cysteine and methionine.

14) **2**

Plants of leguminous family have root nodules in which the symbiotic bacteria Rhizobium fix atmospheric nitrogen into ammonia. The ammonia is subsequently available for many important biological molecules such as amino acids. proteins, vitamins and nucleic acids

15) Differences between passive and active salt absorption are **2**

Passive Salt Absorption	**Active Salt Absorption**
Does not need energy	Requires expenditure of energy
Occurs along Chemical and electrochemical gradient	Occurs against chemical and electrochemical gradient
Passive salt absorption is a physical process in which accumulation of salts is less.	Active salt absorption is a biochemical process in which accumulaion of salts is more.

16) **2**

(i) Nostoc, Anabaena

(ii) Azotobacter, Beijerinckia

(iii) Frankia, Rhizobium

17) **2**

(i) Nitrification is the process of oxidation of ammonia, first into nitrite and then into nitrate.

(ii) Ammonia is oxidised into nitrite, by bacteria like Nitrococcus and Nitrosomonas.

$2NH_3 + 3O_2 \longrightarrow 2NO_2^- + 2H^+ + 2H_2O$

(iii) Nitrite is further oxidised to nitrate with the help of bacteria Nitrobacter. $2NO_2 + O_2 \longrightarrow 2NO_3$

18) **2**

Nitrogenase enzyme is found in root nodules for N_2-fixation. Enzymes responsible for nitrogenase action are very susceptible to destruction by oxygen

This enzyme requires a special pink coloured pigment for its functioning. Many nitrogen-fixing organisms exist only in anaerobic conditions, respire to bring down oxygen levels or bind the oxygen with protein such as leghaemoglobin.

19) **2**

Plants absorb from the soil in the form of phosphate ions(either as $H_2PO_4^-$ or as $H_2PO_4^{2-}$ .Phosphate is a constituent of cell membrane.

It is constituent of nucleic acids, proteins and the nucleotides.

Two phosphorus deficiency symptoms are following

(i)Delay in seed germination.

(ii)Purple spots on the leaves of the plants.

20) **2**

(i)**Phosphrous** (P) It forms the constituent of cell membrane protein, nucleic acids,nucleotides, ATP,NADP and energy rich compounds.

Deficiency symptoms It causes poor, leaves become dull green and chlorosis occurs.

(ii) **Iron** (Fe) Itbhelps in chorophyll synthesis, cytochrome synthesis,ferredoxin synthesis,activities enzyme and activates catalase.

(iii)**Zinc(Zn)** It activates enzyme synthesis.It is a constituent of carbonic anhydrase.This is also a constituent od dehydrogenase.

Section-C

21) **5**

The concentration of the essential element below which plant growth is retarded is termed as critical concentration.The element is said to be deficient when present below the critical concentration.

Yes , we can find the values of critical concentration and deficient for minerals Fe and Zn by absorbing the morphological changes.If the concentrations of these elements are present below the critical values, then it may eventually lead to the death of the plant.Morphological changes are indicative of certain element deficiencies and are called deficiency symptoms.

22) **5**

For elements that are actively mobilised within the plants and exported to young developing tissues, the deficiency symptoms tend to appear first in the order tissues.

e.g., the deficiency symptoms of nitrogen, potassium and magnesium are visible first in the senescent leaves.In the older leaves,biomolecules containing these elements are broken down making these elements available for mobilising to younger leaves.

The deficiency symptoms tend to appear forst in the young tissues, whenever the elements are relatively immobile and are not transported out of the mature organs,e.g, elemnts like sulphur and calcium are a part of the structural component of the cell hence, are not easily released.

23) **5**

It is important to know that manganese completes with iron and mahnesium for the uptake and with magnesium for binding with enzymes.Manganese also inhibites calcium translocation in shoot apex therefore,excess of mangganese may , infact, induces deficiency of iron, magnesium and calcium.

Thus, what appears as symptoms of manganes toxicity may actually be the deficiency symptoms of iron, magnesium and calcium.

The farmer should not add excess manganese in the soil to prevent manganese toxicity.

24)

(i)**Macronutrients** These are generally present in plant tissues in large amount(in excess 10m mole Kg^{-1} of dry matter).The macronutrients include carbon,hydrogen, oxygenn,nitrogen,phosphorous,sulphur,potassium,calcium and magnesium.

(ii)**Micronutrients** Micronutrients or trace elements, are needed in very small amount (less than 10m mole g^{-1} of dry matter).These include iron,manganese,copper,molybdenum,zinc,boron,chlorine and nickel.

(iii)**Beneficial nutrients** The elements which are not essential for plants, but their presence are beneficial for the growth and development.Such, elements are called beneficial elements.

Toxic elements Any mineral ion concentration in tissues, that reduces the dry weight of issues by about 10% is considered toxic.e.g., Mn inhibits the absorption of other elements.

(iv)**Essential elements** The macronutrients including carbon,hydrogen ,oxygen,nitrigen,phosphorus,sulphur,potassium,calcium and magnesium, which are required directly for the growth and metabolism of the plants and whose deficiency produces certain symptoms in the plants are known as essential elements.