Mineral Nutrition

Question1

Which micronutrient is required for splitting of water molecule during photosynthesis?

[NEET 2023]

Options:

A.

Molybdenum

B.

Magnesium

C.

Copper

D.

Manganese

Answer: D

Solution:

Solution:

Manganese plays a major role in the splitting of water to liberate oxygen during photosynthesis.
Copper is essential for the overall metabolism in plants.
Molybdenum is included in nitrogen metabolism.
Magnesium activates several enzymes involved in photosynthesis and respiration.

Question2

Match List I with List II:

List I	List II
A. Iron	I. Synthesis of auxin
B. Zinc	II. Component of nitrate reductase
C. Boron	III. Activator of catalase
D. Molybdenum	IV. Cell elongation and differentiation

Choos the correct answer from the options given below:

[NEET 2023]

Options:

A.

A-II, B-III, C-IV, D-I

B.

A-III, B-I, C-IV, D-II

C.

A-II, B-IV, C-I, D-III

D.

A-III, B-II, C-I, D-IV

Answer: B

Solution:

Solution:

Iron activates catalase enzyme.
Zinc is needed in the synthesis of auxin.
Boron is required for cell elongation and cell differentiation.
Molybdenum is component of nitrogenase and nitrate reductase enzyme.
Therefore, option (2) is correct.

Question3

Which of the following mineral ion is not remobilized in plants?

[NEET 2023 mpr]

Options:

A.

Potassium

B.

Calcium

C.

Nitrogen

D.

Phosphorus

Answer: B

Solution:

Mineral remobilization is a process in which nutrients are transported from older tissues (like mature leaves) to newer ones (like young leaves or developing seeds). Most mineral ions like potassium, nitrogen, and phosphorus are remobilized in plants. However, calcium, once incorporated into plant tissue, generally remains immobile. Therefore,

calcium is considered a mineral ion that is not remobilized in plants.

Question4

Match Column I with Column II.

	Column - I		Column - II
(A)	Nitrococcus	(I)	Denitrification
(B)	Rhizobium	(II)	Conversion of ammonia to nitrite
(C)	Thiobacillus	(III)	Conversion of nitrite to nitrate
(D)	Nitrobacter	(IV)	Conversion of atmospheric nitrogen to ammonia

[NEET 2023 mpr]

Options:

A.

(A)-(III), (B)-(I), (C)-(IV), (D)-(II)

B.

(A)-(IV), (B)-(III), (C)-(II), (D)-(I)

C.

(A)-(II), (B)-(IV), (C)-(I), (D)-(III)

D.

(A)-(I), (B)-(II), (C)-(III), (D)-(IV)

Answer: C

Solution:

Explanation :

(A) Nitrococcus - (II) Conversion of ammonia to nitrite: Nitrococcus is a type of bacteria involved in the nitrification process, specifically, it converts ammonia into nitrite.

(B) Rhizobium - (IV) Conversion of atmospheric nitrogen to ammonia: Rhizobium is a type of bacteria found in soil that fix nitrogen after becoming established inside root nodules of legumes. They convert atmospheric nitrogen into ammonia, a process known as nitrogen fixation.

(C) Thiobacillus - (I) Denitrification: Thiobacillus is involved in denitrification, the process of reducing nitrates and nitrites to nitrogen gas and returning it to the atmosphere.

(D) Nitrobacter - (III) Conversion of nitrite to nitrate: Nitrobacter is a genus of bacteria that play an important role in the nitrogen cycle, where they convert nitrite to nitrate.

Question5

List -I	List -II
(a) Porins	(i) Pink coloured nodules
(b) leg haemoglobin	(ii) Lumen of thylakoid
(c) $H+$ accumulation	(iii) Amphibolic pathway
(d) Respiration	(iv) Huge pores in outer membrane of mitochondria

Choose the correct answer from the options given below : [NEET Re-2022]

Options:

A. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

B. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

C. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

D. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

Answer: C

Solution:

(a) Porins-Types of proteins which forms pores of large size in the outer membranes of plastids such as chloroplast, mitochondria and membranes in bacteria.

(b) Leg-Haemoglobin-Pink pigment in root nodules of leguminous plants, as soybean, that is essential for N_2- fixation. It acts as O_2-scavenger

(c) H^+-accumulation → lumen of thylakoid.

(d) Respiration-Amphibolic pathway → a biochemical pathway that includes both anabolic and catabolic processes.

Question6

Which of the following protects nitrogenase inside the root nodule of a leguminous plant? [NEET Re-2022]

Options:

A. Glutamate dehydrogenase

B. Catalase

C. leg haemoglobin

D. Transaminase

Answer: C

Solution:

The enzyme Nitrogenase is highly sensitive to the molecular oxygen square It acquires anaerobic condition. The nodules have adaptations that ensure that the enzyme is protected from oxygen. To protect these enzymes, the nodule contains an oxygen scavenger called leghaemoglobin.

Question7

Which of the following pair represents free living nitrogen fixing aerobic bacteria?
[NEET Re-2022]

Options:

A. Pseudomonas and Thiobacillus

B. Rhizobium and Beijernickia

C. Azotobacter and Beijernickia

D. Anabaena and Rhodospirillum

Answer: C

Solution:

Solution:

Atmospheric N_2 cannot be utilized by living organisms. Few prokaryotes can reduce nitrogen (N_2) into ammonia- Biological Nitrogen Fixation.

N_2 fixing bacteria can be free living or symbiotic.

Azotobacter, Beijernickia - Free living N_2 fixers.

Question8

Which one of the following produces nitrogen fixing nodules on the roots of Alnus?
[NEET-2022]

Options:

A. Rhizobium

B. Frankia

C. Rhodospirillum

D. Beijerinckia

Answer: B

Solution:

The microbe, Frankia, produces nitrogen fixing nodules on the roots of non-leguminous plants (e.g.Alnus)

Question9

Match Column-I with Column-II.

	Column-I		Column-II
(a)	Nitrococcus	(i)	Denitrification
(b)	Rhizobium	(ii)	Conversion of ammonia to nitrite
(c)	Thiobacillus	(iii)	Conversion of nitrite to nitrate
(d)	Nitrobacter	(iv)	Conversion of atmospheric nitrogen to ammonia

Choose the correct answer from options given below. [NEET 2021]

Options:

A. (a)-(ii) (b)-(iv) (c)-(i) (d)-(iii)

B. (a)-(i) (b)-(ii) (c)-(iii) (d)-(iv)

C. (a)-(iii) (b)-(i) (c)-(iv) (d)-(ii)

D. (a)-(iv) (b)-(iii) (c)-(ii) (d)-(i)

Answer: A

Solution:

Solution:
• Nitrogen fixation is conversion of atmospheric N_2 to NH_3 (ammonia). It is carried out by N_2 fixers such as Rhizobium.
• NH_3 is converted to NO_2^-(nitrite) by nitrifying bacteria such as Nitrococcus.
• Then $NO_2^-$is converted to NO_3^-(nitrate) by nitrfying bacteria called Nitrobacter.
• Thiobacillus carries out denitrification, a process where NO_2^- / NO_3^- is converted to N_2.

Question10

Match the following concerning essential elements and their functions in plants

(a) Iron	(i) Photolysis of water
(b) Zinc	(ii) Pollen germination
(c) Boron	(iii) Required for chlorophyll biosynthesis
(d) Manganese	(iv) IAA biosynthesis

Select the correct option

	(A)	(B)	(C)	(D)
(a)	(iv)	(iii)	(ii)	(i)
(b)	(iii)	(iv)	(ii)	(i)
(c)	(iv)	(i)	(ii)	(iii)
(d)	(ii)	(i)	(iv)	(iii)

[2020]

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: B

Solution:

Solution:
(b) Iron is essential for the formation of chlorophyll. Zinc is needed for synthesis of auxin. Boron plays a role in pollen grain germination. Manganese is involved in the splitting of water to liberate O_2, during photosynthesis.
Iron (Fe) deficiency is a plant disorder also known as “lime-induced chlorosis”. Zinc deficiency occurs when plant growth is limited because the plant cannot take up sufficient quantities of this essential micronutrient from its growing medium. boron deficiency are expressed at growing tips of the root or shoot, and generally include stunting and distortion of the growing tip that can lead to tip death, brittle foliage, and yellowing of lower leaf tips. Manganese deficiency causes yellowing of leaves and undergoes interveinal chlorosis.

Question11

The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plants is/are
[2020]

Options:

A. Nitrate alone

B. Ammonia and oxygen

C. Ammonia and hydrogen

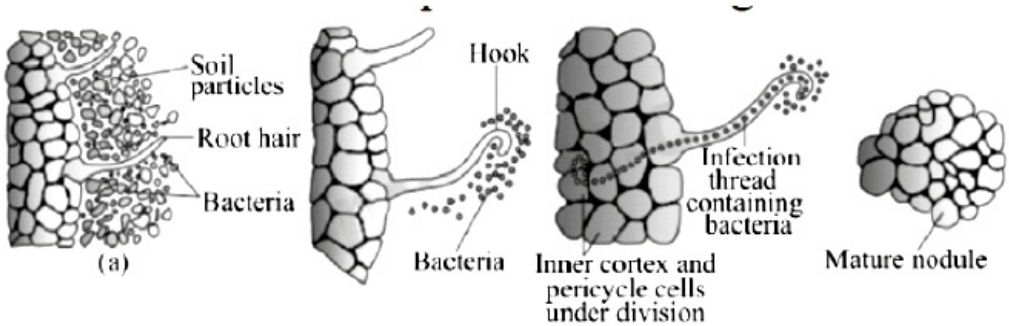
D. Ammonia alone

Answer: C

Solution:

Solution:
(c) Ammonia and Hydrogen.
$N_2 + 8e^- + 8H^+ + 16ATP \rightarrow 2NH_3 + H_2 + 16ADP + 16Pi$
The steps involved in the process of nitrogen fixation are as follows:
The steps involved in the process of nitrogen fixation are as follows:

- Rhizobia multiply and colonise the surroundings of roots and get attached to epidermal and root hair cells.
- The root-hairs curl and the bacteria invade the root-hair.
- An infection thread is produced carrying the bacteria into the cortex of the root, where they initiate the nodule formation in the cortex of the root.
- Then the bacteria are released from the thread into the cells which leads to the differentiation of specialised nitrogen fixing cells.
- The nodule thus formed, establishes a direct vascular connection with the host for exchange of nutrients.
- The nodule contains all the necessary biochemical components, such as the enzyme nitrogenase and leghaemoglobin.
- The enzyme nitrogenase is a Mo-Fe protein and catalyses the conversion of atmospheric nitrogen to ammonia, the first stable product of nitrogen fixation.



Question12

In which of the following forms is iron absorbed by plants?
[2018]

Options:

A. Ferric

B. Ferrous

C. Both ferric and ferrous

D. Free element

Answer: A

Solution:

Solution:
(a) Iron is absorbed by plants in the form of ferric ions.
Plants uptake iron in its oxidized forms, Fe^{2+} (ferrous form) or Fe^{3+} (ferric form). Another mechanism involves the release of protons (H^+) and reductants by the plant roots, to lower pH levels in root zone. Iron is considered a micro-nutrient because only small amounts are required to aid in normal plant growth. Plants can suffer iron deficiency with symptoms of chlorosis and stunted growth, but plants can also take in too much iron, especially under certain growing conditions.

Question13

Which of the following elements is responsible for maintaining turgor in cells?
[2018]

Options:

A. Magnesium

B. Sodium

C. Calcium

D. Potassium

Answer: D

Solution:

Solution:
(d) Plants require potassium ions (K+) for protein synthesis and for the opening and closing of stomata, which is regulated by proton pumps to make surrounding guard cells either turgid or flaccid.

Question14

Which is essential for the growth of root tip?
NEET II 2016

Options:

A. Z n

B. F e

C. Ca

D. M n

Answer: C

Solution:

Solution:
(c) : Calcium (Ca) is necessary for the proper growth and functioning of root tips and meristems.

Question15

In which of the following all three are macronutrients?
NEET I 2016

Options:

A. Molybdenum, magnesium, manganese

B. Nitrogen, nickel, phosphorus

C. Boron, zinc, manganese

D. Iron, copper, molybdenum

E. None of the above

Answer: E

Solution:

Solution:
None of the options is correct. Macronutrients are essential elements which are present in easily detectable quantities, 1-10 mg per gram of dry weight. The macronutrients include carbon, hydrogen, oxygen, nitrogen, phosphorous, sulphur, potassium, calcium and magnesium. Micronutrients or trace elements, are needed in very small amounts (equal or less than 0.1 mg/gm of dry matter). These include iron, manganese, copper, molybdenum, zinc, boron, chlorine and nickel.

Question16

The oxygen evolved during photosynthesis, comes from water molecules. Which one of the following pairs of elements is involved in this reaction?
NEET 2015

Options:

A. Magnesium and Molybdenum

B. Magnesium and Chlorine

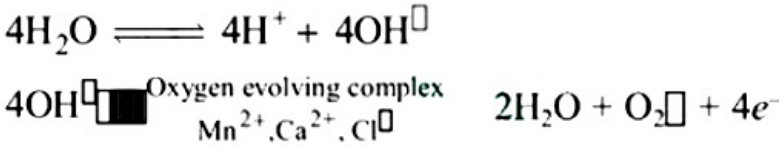
C. Manganese and Chlorine

D. Manganese and Potassium

Answer: C

Solution:

(c) : Oxygen is evolved during photosynthesis by the process of photolysis of water taking place in the membranes of grana thylakoids. The phenomenon of breaking up of water into hydrogen and oxygen in the illuminated chloroplasts is called photolysis or photocatalytic splitting of water. Light energy, an oxygen evolving complex (OEC) and electron carrier Y_z are required for this process. Oxygen evolving complex is attached to the inner surface of thylakoid membrane and the enzyme has four Mn ions. Light energised changes in Mn (Mn^{2+}, Mn^{3+}, Mn^{4+}) remove electrons from OH^- component of water forming oxygen. Liberation of O_2 also requires two other ions, Ca^{2+} and Cl^-



Question17

During biological nitrogen fixation, inactivation of nitrogenase by oxygen poisoning is prevented by
NEET 2015

Options:

A. carotene

B. cytochrome

C. leghaemoglobin

D. xanthophyll

Answer: C

Solution:

Solution:
(c) : Leghaemoglobin is a pinkish pigment present in the root nodules of leguminous plants. It acts as oxygen scavenger and prevents the inactivation of nitrogenase enzyme by oxygen poisoning.

Question18

Minerals known to be required in large amounts for plant growth include
2015 cancelled

Options:

A. potassium, phosphorus, selenium, boron

B. magnesium, sulphur, iron, zinc

C. phosphorus, potassium, sulphur, calcium

D. calcium, magnesium, manganese, copper

Answer: C

Solution:

Solution:
(c) : Macroelements (macronutrients) are those essential elements which are present in easily detectable quantities, i.e., $1-10mg$ per gram of dry matter. Macroelements are usually involved in the synthesis of organic molecules and development of osmotic potential. They are nine in number $-C$, H , O, N , P, K , S, Mg and Ca

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Question19

Deficiency symptoms of nitrogen and potassium are visible first in 2014

Options:

A. senescent leaves

B. young leaves

C. roots

D. buds

Answer: A

Solution:

Solution:
(a) : Deficiency symptoms appear first in young leaves and young tissues in case of elements which are relatively immobile inside the plant e.g., Ca, S For mobile elements like N and K , deficiency symptoms first appear in old and senescent leaves as the elements are mobilised from senescing regions for supply to young tissues.

Question20

The deficiencies of micronutrients, not only affects growth of plants but also vital functions such as photosynthetic and mitochondrial electron flow. Among the list given below, which group of three elements shall affect most, both photosynthetic and mitochondrial electron transport? 2005

Options:

A. Co, Ni, Mo

B. Ca, K, Na

C. Mn, Co, Ca

D. Cu, Mn, Fe

Answer: D

Solution:

Solution:
(d) : Iron is mainly available in the ferrous form and it is absorbed in the ferric form, also. It is a part of catalases, peroxidases, cytochromes etc. and plays a role in electron transport system in photosynthesis. Manganese is absorbed by the plants when it is in the bivalent form. Manganese participates in the photolysis of water in pigment system II during photosynthesis and thus it helps in the electron transport from water to chlorophyll. Copper is absorbed on the clay particles as divalent cations, from where it can be absorbed by the plants by exchange mechanism. It is constituent of plastocyanin which takes part in electron transport during photosynthetic phosphorylation.

Question21

The first stable product of fixation of atmospheric nitrogen in leguminous plants is
2013

Options:

A. NO_3^-

B. glutamate

C. NO_2^-

D. ammonia

Answer: D

Solution:

Solution:
(d) : The enzyme nitrogenase is a Mo- Fe protein and catalyses the conversion of atmospheric nitrogen to ammonia, the first stable product of nitrogen fixation. Nitrogen fixation is the conversion of inert atmospheric nitrogen or dinitrogen (N_2) into utilisable compounds of nitrogen like nitrate, ammonia, amino acids etc. There are two methods of nitrogen fixation abiological and biological. Biological nitrogen fixation is performed by both free living and symbiotic forms. Symbiotic nitrogen fixing organisms hand over a part of their nitrogen to the host in return for shelter and food. The nodule of leguminous plants contains all the necessary biochemical components, such as the enzyme nitrogenase and leghaemoglobin, for nitrogen fixation.

Question22

Specialized cells for fixing atmospheric nitrogen in Nostoc are
KN 2013

Options:

A. heterocysts

B. hormogonia

C. nodules

D. akinetes

Answer: A

Solution:

Solution:
(a) : Certain species of cyanobacteria (Nostoc) possess some special cells called heterocysts which occur in terminal, basal and intercalary positions. Heterocysts are yellowish in colour and contents are homogenous. Heterocysts are now known as sites of nitrogen fixation. Atmospheric nitrogen is made available in the form of ammonia by cyanobacteria.

Question23

Which of the following elements is a constituent of biotin?
KN 2013

Options:

A. Magnesium

B. Calcium

C. Phosphorus

D. Sulphur

Answer: D

Solution:

Solution:
(d) : Sulphur is present in two vitamins of B complex, thiamine and biotin. Biotin is important to hair. It is normally found in protein foods, such as eggs, lettuce, sprouts etc.

Question24

Which two distinct microbial processes are responsible for the release of fixed nitrogen as dinitrogen gas (N_2) to the atmosphere?

KN 2013

Options:

A. Aerobic nitrate oxidation and nitrite reduction

B. Decomposition of organic nitrogen and conversion of dinitrogen to ammonium compounds

C. Enteric fermentation in cattle and nitrogen fixation by Rhizobium in root nodules of legumes

D. Anaerobic ammonium oxidation and denitrification

Answer: D

Solution:

Solution:
(d) : Denitrification is a chemical process in which nitrates in the soil are reduced to molecular nitrogen (N_2) which is released into the atmosphere. It is done by denitrifying bacteria like Pseudomonas denitrificans. Anaerobic oxidation of ammonium (NH_4) also releases nitrogen in the atmosphere.

Question25

Best defined function of manganese in green plants is
2012

Options:

A. photolysis of water

B. Calvin cycle

C. nitrogen fixation

D. water absorption.

Answer: A

Solution:

Solution:
(a) : Manganese (Mn^{2+}) is used for photolysis of water to produce oxygen and electrons during light reaction of photosynthesis. It is the phenomenon of breaking up of water into hydrogen and oxygen in the illuminated chloroplast. It acts as an essential cofactor.

Question26

Which one of the following is correctly matched?
2012

Options:

A. Passive transport of nutrients - ATP

B. Apoplast - Plasmodesmata

C. Potassium - Readily immobilisation

D. Bakane of rice seedlings $-\mathrm{F}$. Skoog

Answer: C

Solution:

Solution:
(c) : Immobilization or fixation of a nutrient means that the nutrient becomes unavailable for plant. The process of converting exchangeable or water soluble potassium to its non exchange or water insoluble form is known as potassium immobilisation. Potassium is present in relatively large quantities in soil (averaging about 1.9 %). Depending on the circumstances, soil potassium may be not easily available, slowly available or readily available. The first category accounts for 90 to 98 % of the total soil potassium, which is only slightly soluble, the second category constitutes 2-10 % of total mineral soil and third category makes up for about 1%

Question27

For its action, nitrogenase requires
Mains 2012

Options:

A. high input of energy

B. light

C. $\mathrm{M\,n}^{2+}$

D. super oxygen radicals

Answer: A

Solution:

Solution:
(a) : Nitrogenase enzyme is present in prokaryotic nitrogen fixers. The enzyme nitrogenase requires a high input of energy to carry out biological nitrogen fixation. This can be illustrated by the following equation.

$$\mathrm{N_2 + 8e^- + 8H^+ + 16\,ATP \xrightarrow{Nitrogenase} 2\,NH_3 + H_2 + 16\,ADP + 16P_i}$$

Question28

Which one of the following elements in plants is not remobilised?

2011

Options:

A. Phosphorus

B. Calcium

C. Potassium

D. Sulphur

Answer: B

Solution:

Solution:
Calcium is the element in plants which is not mobilised.
This is because it is a structural component and hence needs to be localised.
Phosphorus, Sulphur and Potassium are not structural elements and hence can be remobilised based on their need.
Thus the element in plants is not remobilised is calcium.

Question29

Nitrifying bacteria
2011

Options:

A. oxidize ammonia to nitrates

B. convert free nitrogen to nitrogen compounds

C. convert proteins into ammonia

D. reduce nitrates to free nitrogen

Answer: A

Solution:

Solution:
(a) : Nitrifying bacteria involves the oxidation of ammonia to nitrates through nitrites called nitrification. Nitrite bacteria (Nitrosomonas and Nitrococcus) convert ammonia to nitrites whereas, nitrate bacteria (Nitrobacter and Nitrocystis) convert nitrite to soluble nitrates.

Question30

The function of leghaemoglobin in the root nodules of legumes is
2011

Options:

A. inhibition of nitrogenase activity

B. oxygen removal

C. nodule differentiation

D. expression of nif gene

Answer: B

Solution:

Solution:
(b) : The root nodule of legume contains enzyme nitrogenase and leghaemoglobin. Nitrogenase catalyses the conversion of atmospheric nitrogen to ammonia. It is highly sensitive to the molecular oxygen and requires anaerobic conditions. The nodules have adaptations that ensure that the enzyme is protected from oxygen. To protect these enzymes, the nodule contains an oxygen scavenger called leghaemoglobin.

Question31

Which one of the following helps in absorption of phosphorus from soil by plants?
2011

Options:

A. Glomus

B. Rhizobium

C. Frankia

D. Anabaena

Answer: A

Solution:

Solution:
(a) : Some fungi form symbiotic associations with plants (mycorrhiza). Many members of the genus Glomus form mycorrhiza. The fungal symbiont in these associations absorbs phosphorus from soil and passes it to the plant. Plants having such associations show other benefits also, such as resistance to root borne pathogens, tolerance to salinity and drought, and an overall increase in plant growth and development.

Question32

Which one of the following is not an essential mineral element for

plants while the remaining three are?
Mains 2011

Options:

A. Iron

B. Manganese

C. Cadmium

D. Phosphorus

Answer: C

Solution:

Solution:
(c) : C, H, O, N, P, K, S, M g, C a, F e, B, M n, C u, Zn, Mo, Cl, Ni are essential elements, which has a specific structural or physiological role and without which plant cannot complete their life cycle.

Question33

An element playing important role in nitrogen fixation is
2010

Options:

A. molybdenum

B. copper

C. manganese

D. zinc.

Answer: A

Solution:

Solution:
(a) : Molybdenum is a micronutrient which is required in very minute amount by the plants. It is responsible for nodulation in legumes. It is part of nitrate reductase enzyme which helps in nitrogen fixation.

Question34

Which one of the following is not a micronutrient?
2010

Options:

A. Molybdenum

B. Magnesium

C. Zinc

D. Boron

Answer: B

Solution:

Solution:
Macronutrients are essential elements which are present in easily detectable quantities, 1-10 mg per gram of dry weight. The macronutrients include carbon, hydrogen, oxygen, nitrogen, phosphorous, sulphur, potassium, calcium and magnesium. Micronutrients or trace elements, are needed in very small amounts (equal or less than 0.1 mg/gm of dry matter). These include iron, manganese, copper, molybdenum, zinc, boron, chlorine and nickel.

Question35

Leguminous plants are able to fix atmospheric nitrogen through the process of symbiotic nitrogen fixation. Which one of the following statements is not correct during this process of nitrogen fixation? Mains 2010

Options:

A. Leghaemoglobin scavenges oxygen and is pinkish in colour.

B. Nodules act as sites for nitrogen fixation.

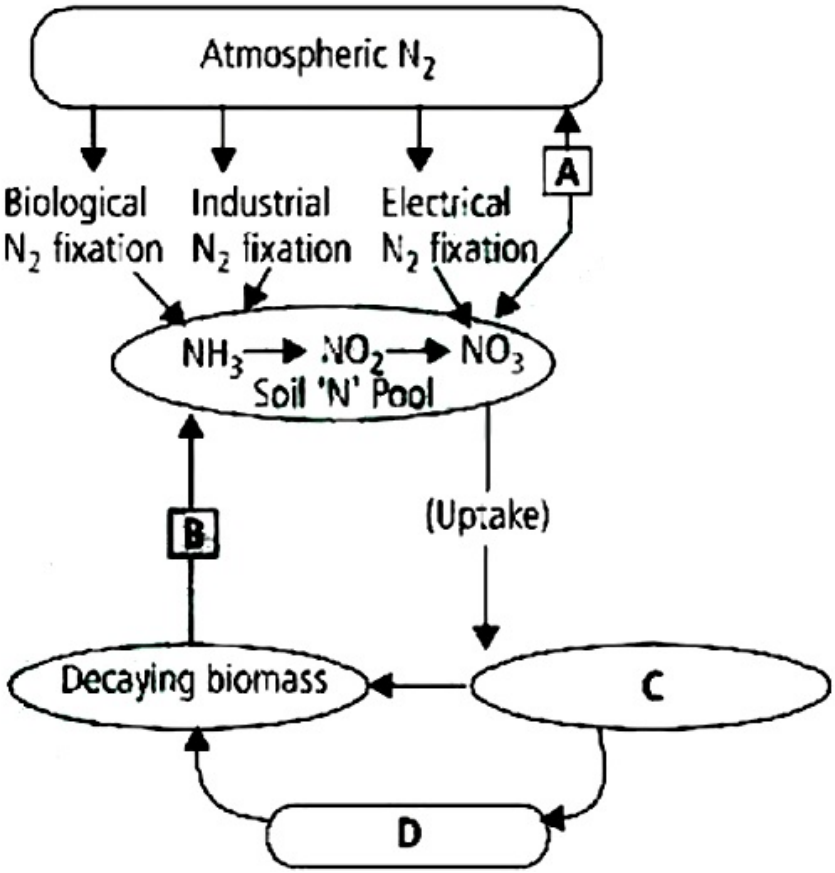
C. The enzyme nitrogenase catalyses the conversion of atmospheric N_2 to NH_3.

D. Nitrogenase is insensitive to oxygen.

Answer: D

Question36

Study the cycle shown below and select the option which gives correct words for all the four blanks mathrm A, mathrm B, mathrm C and mathrm D



	A	B	C	D
(a)	Nitrification	Ammonification	Animals	Plants
(b)	Denitrification	Ammonification	Plants	Animals
(c)	Nitrification	Denitrification	Animals	Plants
(d)	Denitrification	Nitrification	Plants	Animals

Mains 2010

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: B

Solution:

(b) : A - Denitrification
B - Ammonification
C - Plants
D-Animals

Question37

Manganese is required in
2009

Options:

A. plant cell wall formation

B. photolysis of water during photosynthesis

C. chlorophyll synthesis

D. nucleic acid synthesis

Answer: B

Solution:

(b) : Manganese (Mn^{2+}) is used for photolysis of water to produce oxygen and electrons during light reaction of photosynthesis. It is the phenomenon of breaking up of water into hydrogen and oxygen in the illuminated chloroplast. It acts as an essential cofactor.

Question38

Which one of the following elements is not an essential micronutrient for plant growth?
2007

Options:

A. Z n

B. Cu

C. Ca

D. M n

Answer: C

Solution:

Solution:
(c) : Calcium is an essential macronutrient for plant growth. Macronutrients are essential elements which are required by plants in quantity more than 1mg/g dry matter. It is used as a calcium pectinate for the formation of middle lamella in cell wall for lipid metabolism, for cell division and cell enlargement, helps in translocation of carbohydrates and also activates enzyme activity in plants. All other like Zn, Cu and Mn are micronutrients of plants.

Question39

A plant requires magnesium for
2007

Options:

A. protein synthesis

B. chlorophyll synthesis

C. cell wall development

D. holding cells together

Answer: B

Solution:

Solution:
(b) : Magnesium is an important constituent of chlorophyll, found in all green plants and essential for photosynthesis. The chlorophyll molecule has a tetrapyrolic or porphyrin head and a phytol tail. Mg atom is present in the centre of porphyrin head. It is like tennis racket.

Question40

Sulphur is an important nutrient for optimum growth and productivity in
2006

Options:

A. oilseed crops

B. pulse crops

C. cereals

D. fibre crops

Answer: A

Solution:

Solution:
(a) : Sulphur is present in all the cells of the body in association with proteins made of sulphur containing amino acids, viz., cystine, cysteine and methionine. Members of Cruciferae and animal proteins are rich sources of sulphur; other vegetable proteins (e.g., pulses) have only little sulphur. Plants absorb sulphur from soil in the form of sulphate ions (SO_4^{--}). It is a constituent of ferredoxin and some of the lipids present in chloroplasts. Pungent floroue and odour of mustard, cabbage, turnip etc. of Family Brassicaceae is due to the presence of sulphur containing oils. Application of $40 \mathrm{kg} / \mathrm{ha}$ to oilsed based cropping system is found to increase the yield, oil and protein content of the seeds.

Question41

If by radiation all nitrogenase enzyme are inactivated, then there will be no
2004

Options:

A. fixation of nitrogen in legumes

B. fixation of atmospheric nitrogen

C. conversion from nitrate to nitrite in legumes

D. conversion from ammonium to nitrate in soil.

Answer: A

Solution:

Solution:
(a) : The process by which N_2 is reduced to NH_4^+ is called nitrogen fixation. Nitrogenase enzyme catalyzes this reduction. It is only carried out by prokaryotic microorganisms. Principal N_2 -fixers include certain free living cyanobacteria in symbiotic associations with fungi in lichens or with ferns, mosses, and liverworts, and by bacteria or other microbes associated symbiotically with roots, especially those of legumes. About 15 percent of the nearly 20,000 species in the Fabaceae (Leguminosae) family have been examined for N_2 fixation, and approximately 90 percent of these have root nodules in which fixation occurs. So without active nitrogenase enzyme there will be no N_2 fixation in legumes.

Question42

Gray spots of oat are caused by deficiency of
2003

Options:

A. Cu

B. Z n

C. M n

D. F e

Answer: C

Solution:

Solution:
(c) : Gray spot diseases of oat is caused due to deficiency of manganese. Its symptoms include greyish - brown elongated specks and streaks, empty panicles, interveinal chlorosis on stem and leaves. The symptoms that occur only on leaves are irregular, greyish brown lesions which coalesce and bring about collapse of leaf. This is called grey speck symptom.

Question43

Boron in green plants assists in
2003

Options:

A. activation of enzymes

B. acting as enzyme co-factor

C. photosynthesis

D. sugar transport.

Answer: D

Solution:

Solution:
(d) : Boron occurs in the soil as a part of silicates, boric acid, calcium borate and magnesium borate. It is available to the plants as boric acid and borates of calcium and magnesium. It plays a role in carbohydrate metabolism and translocation of sugar is facilitated through the cell membrane through the agency of borate ion as it forms complexes with the carbohydrates.

Question44

Choose the correct match. Bladderwort, sundew, Venus flytrap
2002

Options:

A. Nepenthes, Dionea, Drosera

B. Nepenthes, Utricularia, Vanda

C. Utricularia, Drosera, Dionea

D. Dionea, Trapa, Vanda.

Answer: C

Solution:

Solution:
(c) : Bladderwort or Utricularia is a rootless free floating insectivorous plant. Its stem is green and bears green lobed or dissected leaves. Some lobes of the leaves become modified into bladder like structures for catching insects. Sundew or Drosera is another insectivorous plant which has leaves that are green and bear many glandular hairs or tentacles having shining droplets to attract the insects and later trap them. Venus flytrap or Dionea is also an insectivorous plant in which the leaf is modified into two jaw like structures. Each jaw has long sensitive hairs on its upper surface and also has many digestive enzymes. These jaws interlock to trap the insect that enters in it. Thus Utricularia, Drosera and Dionea are all insectivorous plants.

Question45

Roots of which plant contains a red pigment which have affinity for oxygen?
2001

Options:

A. Carrot

B. Soybean

C. Mustard

D. Radish

Answer: B

Solution:

Solution:
(b) : Leghaemoglobin is a red respiratory pigment found in the root nodules of leguminous plant if Rhizobium is present. Soybean is a legume plant so it contains leghaemoglobin in its root nodules.

Question46

Which aquatic fern performs nitrogen fixation?
2001

Options:

A. Azolla

B. Nostoc

C. Salvia

D. Salvinia

Answer: A

Solution:

Solution:
(a) : Azolla is an aquatic fern which is inoculated in the rice field to increase the yield. Azolla contains Nostoc and Anabaena (BGA) in its leaf cavities which perform nitrogen fixation.

Question47

M g is a component of
2000

Options:

A. chlorophyll

B. cytochrome

C. haemoglobin

D. haemocyanin.

Answer: A

Solution:

Solution:
(a) : Magnesium is an important constituent of chlorophyll, found in all green plants and essential for photosynthesis. The chlorophyll molecule has a tetrapyrolic or porphyrin head and a phytol tail. Mg atom is present in the centre of porphyrin head. It is like tennis racket.

Question48

Plants take zinc in the form of
2000

Options:

A. $ZnSO_4$

B. Zn^{++}

C. ZnO

D. Zn

Answer: B

Solution:

Solution:
(b) : Zinc is available to the plants for absorption in the divalent form. The availability of soil decreases when the pH of soil shifts towards alkaline side. Zinc may form zinc phosphate in the soil which is insoluble and in that case, it is not available to the plants. It is essential for synthesis of tryptophan amino acid, which forms IAA (Indole Acetic Acid) its deficiency causes chlorosis of older leaves.

Question49

When the plants are grown in magnesium deficient but urea rich soil, the symptoms expressed are
2000

Options:

A. yellowish leaves

B. colourless petiole

C. dark green leaves

D. shoot apex die.

Answer: A

Solution:

Solution:
(a) : Magnesium is important constituent of chlorophyll, thus it is found in all green plants and is essential for photosynthesis. It also helps in binding of ribosomal particles where protein synthesis occurs. It is also part of many enzymes of respiration. The deficiency symptoms of magnesium includes interveinal chlorosis in leaves and yellowing of leaves starting from basal to younger ones.

Question50

Which of the following is not caused by deficiency of mineral nutrition? 1997

Options:

A. Etiolation

B. Shortening of internode

C. Necrosis

D. Chlorosis

Answer: A

Solution:

Solution:
(a) : When the plants are kept in dark, they become pale yellow in colour and also become abnormally long with considerable internodal elongation, it is called etiolation. It is because 'flavonoids', which are inhibitors of GA are not formed in dark and hence in absence of flavonoids, GA show their full effect, i.e., elongation (etiolation). Chlorosis involves non-development or loss of chlorophyll. It occurs due to deficiency of nitrogen and sulphur. Necrosis involves death of tissues. It occurs due to deficiency of copper. Stunted growth occurs due to deficiency of potassium.

Question51

Which one of the following elements is almost non-essential for plants? 1996

Options:

A. Zn

B. Na

C. Ca

D. Mo

Answer: B

Solution:

Solution:
(b) : The 16 elements necessary for plants called essential elements, are as : C, H , O, N , P, S, K , M g, Ca, F e, Cu, B, Z n, M n, M o and Cl Zn is essential for the synthesis of tryptophan amino acid.
Ca is the part of middle lamella, it stabilizes the structure of chromosomes. Mo is responsible for nodulation in legumes. It is a part of nitrate reductase enzyme which helps in nitrogen fixation. Na is a non-essential element. It seems to be involved in membrane permeability but its essentiality has not been proved.

Question52

Which of the following elements plays an important role in biological nitrogen fixation?
1995

Options:

A. Copper

B. Molybdenum

C. Zinc

D. Manganese

Answer: B

Solution:

Solution:
(b) : Molybdenum is a micronutrient which is required in very minute amount by the plants. It is responsible for nodulation in legumes. It is part of nitrate reductase enzyme which helps in nitrogen fixation.

Question53

Which one is an essential mineral, not constituent of any enzyme but stimulates the activity of many enzymes?
1989

Options:

A. Z n

B. M n

C. K

D. M g

Answer: C

Solution:

(c) : Potassium is an essential mineral. It is not a constituent of any enzyme but accelerates the rate of activity of many enzymes. Potassuim is rich in actively dividing cells of buds, young leaves root tips. It is needed for proper growth and development. It regulates movement of stomata. A high amount of potassium is required in the process of protein synthesis.

Question54

Phosphorous and nitrogen ions generally get depeleted in soil because they usually occur as
1989

Options:

A. neutral ions

B. negatively charged ions

C. positively charged ions

D. both positively and negatively charged but disproportionate mixture.

Answer: B

Solution:

(b) : Phosphorus and nitrogen ions generally get depleted in soil because they usually occur as negatively charged ions. Both the elements are essential for plants and acts as macromolecules which are required in large quantities.
