

# Shiksha Classes, Bhandara

## Biology

### Mineral Nutrition

- (1.) Nitrifying bacteria
- (a.) convert free nitrogen to nitrogenous compounds      (b.) convert protein to ammonia
- (c.) reduce protein into nitrogen      (d.) oxidize ammonia to free nitrogen
- (2.) All green plants obtain their nutrition from inorganic elements, taken from the soil in the form of
- (a.) colloid      (b.) mineral nutrients
- (c.) solution      (d.) none of these
- (3.) Micronutrients are essential and are present in plant tissues in concentration less than \_\_\_\_\_ of dry matter
- (a.) 100 mg/kg      (b.) 10 mg/kg
- (c.) 1000 mg/kg      (d.) 0.10 mg/kg
- (4.) In which of the following, all three are macronutrients?
- (a.) Iron, copper, molybdenum      (b.) Molybdenum, magnesium, manganese
- (c.) Nitrogen, calcium, phosphorus      (d.) Boron, zinc, manganese
- (5.) Select the mismatch.
- (a.) Frankia –Alnus      (b.) Rhodospirillum – Mycorrhiza
- (c.) Anabaena – Nitrogen-fixer      (d.) Rhizobium –Aya-aya
- (6.) On which surface of cell,Donnan equilibrium occurs?
- (a.) Cell wall      (b.) Plasma membrane
- (c.) Transport      (d.) Nuclear membrane
- (7.) 'X' is essential micronutrient required in leaves and roots. Major function of 'X' is to perform metabolism of urea and uric acid and its deficiency causes leaf tip necrosis. It is
- (a.) sulphur      (b.) magnesium
- (c.) zinc      (d.) nickel
- (8.) Which is essential for the growth of root tip
- (a.) Zn      (b.) Fe
- (c.) Ca      (d.) Mn

- (9.)** The plant ash indicates
- (a.) organic matter of plants                      (b.) mineral salts absorbed by plants  
(c.) both mineral salts and organic matter      (d.) silica absorbed by plants
- (10.)** The function of manganese (Mn) in green plants is
- (a.) photolysis of water                              (b.) Calvin cycle  
(c.) nitrogen fixation                                  (d.) water absorption
- (11.)** In which of the following form, iron is absorbed by plants?
- (a.) Free element                                      (b.) Ferrous  
(c.) Ferric    (d.) Both ferric and ferrous
- (12.)** A nitrogen-fixing microbe associated with Azolla in rice fields is
- (a.) Spirulina    (b.) Anabaena  
(c.) Frankia    (d.) Tolypothriz
- (13.)** Boron is essential nutrient for plants for the
- (a.) growth of pollen tub                              (b.) formation of root nodules  
(c.) meristematic activity                              (d.) All of these
- (14.)** Minerals are absorbed by plants in
- (a.) colloidal form                                      (b.) ionic form  
(c.) precipitated form                                  (d.) None of these
- (15.)** Which one of the following microbes forms symbiotic association with plants and helps them in their nutrition?
- (a.) Azotobacter                                        (b.) Aspergillus  
(c.) Glomus    (d.) Trichoderma
- (16.)** Which of the following elements in plants is not remobilized
- (a.) Calcium    (b.) Potassium  
(c.) Sulphur     (d.) Phosphorus
- (17.)** Study the following statements and choose the one which explains the term critical concentration of an essential element?
- (a.) Essential element concentration below which plant growth is retarded.                      (b.) Essential element concentration below which plant growth becomes enhanced.  
(c.) Essential element concentration below which plant remains in the vegetative phase.                      (d.) None of these.

- (18.)** The minerals involved in water splitting reaction during photosynthesis are
- (a.) magnesium and chlorine                      (b.) potassium and manganese  
(c.) manganese and chlorine                      (d.) molybdenum and manganese  
(e.) copper and chlorine
- (19.)** Statement-I: Mineral salts are absorbed by the plants from soil, where these are dissolved in soil solution.  
Statement-II: The rate of mineral absorption is usually independent of its concentration in the soil.  
Which of statements given above are correct?
- (a.) Statement I is correct while statement II is incorrect.      (b.) Statement I is incorrect while statement II is correct.  
(c.) Both statements I and II are correct.                      (d.) Both statements I and II are incorrect.
- (20.)** Minerals known to be required in large amounts for plant growth include
- (a.) Phosphorus, potassium, sulphur, calcium                      (b.) Calcium, magnesium, manganese, copper  
(c.) Potassium, phosphorus, selenium, boron                      (d.) Magnesium, sulphur, iron, zinc
- (21.)** Which of the following elements is responsible for causing toxicity and deficiency of iron, magnesium calcium in plants, when absorbed in higher amounts?
- (a.) Boron                      (b.) Copper  
(c.) Manganese                      (d.) Sulphur
- (22.)** Which one of the following elements is responsible for maintaining turgor presence in cells?
- (a.) Potassium                      (b.) Sodium  
(c.) Magnesium                      (d.) Calcium
- (23.)** Purification of water and nutrient salts is so important in studies involving mineral nutrition using hydroponics
- (a.) because water becomes dirty                      (b.) to remove toxic substances from the culture medium  
(c.) because it gets depleted of oxygen                      (d.) none of these
- (24.)** Which of the following micronutrient helps in nitrogen fixation?
- (a.) Mo                      (b.) Ca  
(c.) Bo                      (d.) Na

- (25.)** The technique of Hydroponics can be used to know  
(I) The essentiality of mineral elements for plant growth  
(II) Toxicity of minerals to plant when is present in excess.  
(III) The essential pole of element in the metabolism of plant.  
(IV) The symptoms produced due to deficiencies. Which of the statements given above are correct?
- (a.) I and II (b.) II and III  
(c.) III and IV (d.) I, II, III and IV
- (26.)** Identify the correctly matched pairs:
- (a.) Abscission – late flowering process (b.) Necrosis – loss of internal cork  
(c.) Aeroponics – a soil-less culture of plants (d.) Chlorosis – tissue death
- (27.)** Which one of the following elements is not due to manganese toxicity in plants?
- (a.) Calcium translocation in shoot apex is inhibited. (b.) Deficiency in both iron and nitrogen induced.  
(c.) Appearance of brown spot surrounded by chlorotic veins. (d.) None of these.
- (28.)** Which is essential for the growth of root tip?
- (a.) Zn (b.) Fe  
(c.) Ca (d.) Mn
- (29.)** Statement-I: Mineral salt absorption is an active process. Statement-II: Metabolic energy is not used in active absorption.
- (a.) I is correct, II is incorrect (b.) I is incorrect, II is correct  
(c.) I and II both are correct (d.) I and II both are incorrect
- (30.)** With regard to the biological nitrogen-fixation by Rhizobium in association with soybean, which one of the following statements does not hold true?
- (a.) Nitrogenase may require oxygen for its functioning. (b.) Nitrogenase is Mo-Fe protein.  
(c.) Leghaemoglobin is a pink coloured pigment. (d.) Nitrogenase helps to convert  $N_2$  gas into two molecules of ammonia.
- (31.)** Plants can be grown in
- (a.) soil with essential nutrients (b.) water with essential nutrients  
(c.) either water or soil with essential nutrients (d.) water or soil without essential nutrients



(38.) Match columns I and II which mention mineral element and its category.

**Column-I**

- (A) Mn
- (B) Mg
- (C) P
- (D) N

**Column-II**

- (1) Micro nutrient
- (2) Component of bio molecular
- (3) Micronutrient
- (4) Needed in ATP synthesis

Codes	A	B	C	D
(a.)	4	3	1	2
(b.)	4	2	3	1
(c.)	1	3	4	2
(d.)	3	1	4	2

(39.) Match the following columns

**Column-I**

- (a.) Found in some vitamins (thiamine, biotin, co-enzyme A)
- (b.) Required for photolysis of water
- (c.) Not important for plants
- (d.) Present at the center of porphyrin ring in chlorophyll

**Column-II**

- (1) Mg
- (2) I
- (3) S
- (4) Mn

Codes	A	B	C	D
(a.)	4	1	2	3
(b.)	3	4	1	2
(c.)	1	2	4	3
(d.)	3	4	2	1

(40.) Gray spots of oat are caused by the deficiency of

- (a.) manganese
- (b.) iron
- (c.) copper
- (d.) zinc

(41.) Non-essential mineral nutrients (elements) are required by

- (a.) all plants to perform their metabolic activities
- (b.) certain plants, but not all, to perform their metabolic activities
- (c.) all plants to complete their life cycle
- (d.) Both (a) and (c)

- (42.) Assertion:** Plants absorb nitrogen in the form of nitrate and nitrite only.  
**Reason:** Nitrogen is the minor element.
- (a.) Both Assertion and Reason are true and Reason is correct explanation of Assertion.      (b.) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
- (c.) Assertion is true, but Reason is false.      (d.) Assertion is false, but Reason is true.
- (43.)** An essential element is that which
- (a.) improves health of a plant      (b.) indispensable for growth of plant  
(c.) is found in plant ash      (d.) is available in the soil
- (44.)** Which of the following is an incorrect statement?
- (a.) Anabaen and Nostoc are capable of nitrogen in a free-living state also.      (b.) Root nodule forming nitrogen fixers live as aerobes under free-living conditions.  
(c.) Phosphorous is a constituent of cell membranes, certain nucleic acids and all proteins.      (d.) Nitrosomonas and Nitrobacter are chemoautotrophs.
- (45.) Assertion:** Plants absorb nitrogen in the form of ammonia.  
**Reason:** Nitrogen is one of the important macro elements.
- (a.) Both Assertion and Reason are true and Reason is correct explanation of Assertion.      (b.) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.  
(c.) Assertion is true, but Reason is false.      (d.) Assertion is false, but Reason is true.
- (46.)** Read the statements and choose the option for correct statements.  
(I) Sulphur element is required as one the building blocks of the body.  
(II) Sulphur is important for ring structure of chlorophyll.  
(III) Sulphur is responsible for smell in onion. Options
- (a.) Only I      (b.) I and II  
(c.) III and IV      (d.) Only IV
- (47.)** Which of the following is correct? Hydroponics helps to know
- (I) The importance of minerals  
(II) The toxicity level of minerals  
(III) The role of minerals in metabolism  
(IV) Symptoms of mineral deficiency
- (a.) I and II      (b.) II and III  
(c.) III and IV      (d.) All of these

(48.) **Assertion:** Magnesium plays an important role in photosynthesis and carbohydrate metabolism.

**Reason:**  $Mg^{2+}$  is involved in the synthesis of nucleic acid and carbohydrate metabolism

- (a.) Both Assertion and Reason are true and Reason is correct explanation of Assertion.      (b.) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
- (c.) Assertion is true, but Reason is false.      (d.) Assertion is false, but Reason is true.

(49.) Read the following statements about the function of some nutrient carefully and choose the right option.

(I) During cell division, it is used for cell wall

(II) Also needed during the formation of mitotic spindle

(III) Activates certain enzymes

(IV) Plays an important role in regulating metabolic activities Options

- (a.) I and II are the functions of molybdenum while III and IV are the functions of calcium.      (b.) All are the functions of calcium.
- (c.) I and II are functions of calcium while III and IV are the functions of molybdenum.      (d.) All are functions of molybdenum.

(50.) **Assertion:** In 1860, Julius von Sachs grew plant without soil.

**Reason:** Method of growing plant in a nutrient solution is called hydroponics.

- (a.) Both Assertion and Reason are true and Reason is correct explanation of Assertion.      (b.) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.
- (c.) Assertion is true, but Reason is false.      (d.) Assertion is false, but Reason is true.



## ANSWER

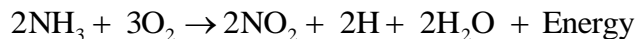
(1.)	d	(2.)	b	(3.)	a	(4.)	c	(5.)	b
(6.)	b	(7.)	d	(8.)	c	(9.)	b	(10.)	a
(11.)	c	(12.)	b	(13.)	d	(14.)	b	(15.)	c
(16.)	c	(17.)	b	(18.)	c	(19.)	c	(20.)	a
(21.)	a	(22.)	a	(23.)	d	(24.)	c	(25.)	d
(26.)	c	(27.)	c	(28.)	c	(29.)	a	(30.)	a
(31.)	b	(32.)	b	(33.)	c	(34.)	a	(35.)	c
(36.)	b	(37.)	a	(38.)	d	(39.)	d	(40.)	a
(41.)	b	(42.)	c	(43.)	b	(44.)	c	(45.)	c
(46.)	d	(47.)	d	(48.)	b	(49.)	c	(50.)	b

Shiksha Classes, Bhanu

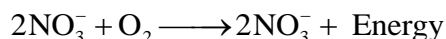
## EXPLANATION

**(1.)** (d) The nitrifying bacteria like Nitrosomonas, Nitrococcus, nitrocystis, etc. convert ammonia to nitrate. It occurs as given below reaction in two steps.

(i) Conversion of ammonia to nitrite



(ii) Conversion of nitrite into nitrate



The process of converting ammonia to nitrate is known as nitrification.

**(2.)** (b) The green plants derive their nutrition from inorganic elements, present in the soil in the form of mineral nutrients

**(3.)** (a) Micronutrients are required by plants in traces, i.e., less than 100 mg/kg of dry matter.

**(4.)** (c) N, Ca, P, S, Mg, K are macronutrients and Fe, Mn, Mo, B, Zn, Cu, Cl are micronutrients.

**(5.)** (b) Rhodospirillum is a free-living nitrogen fixing bacteria. Mycorrhiza is the symbiotic association of a fungus with the root of a higher plant.

**(6.)** (b) Donnan equilibrium occurs at the plasma membrane. It takes into account the transport of non-diffusible ions.

**(7.)** (d) Nickel is a micronutrient. It helps enzyme urease to perform its activity. Thus, it is involved in metabolism of urea and uric acid.

**(8.)** (c) Calcium is needed by the growing root tip. It is required in the formation of middle lamella of the cell wall. It is found to be present in the form of calcium pectate in the cell wall.

**(9.)** (b) The plant ashes indicate the mineral salts absorbed by plants. The plant ash left behind forms a very small proportional of plants dry weight. Analysis of plant ash shows that about 92 mineral elements are present in different plants.

**(10.)** (a) The most important function of manganese in green plants is photolysis of water. This process requires light energy, an Oxygen Evolving Complex (OEC) and electron carrier. OEC complex formerly called Z-enzyme contains four Mn ions. Light energy brings about changes in Mn ( $\text{Mn}^{+2}$ ,  $\text{Mn}^{+3}$  and  $\text{Mn}^{+4}$ ), which helps in removing electrons from OH component of water, forming oxygen. Liberation of oxygen during photosynthesis also requires  $\text{Cl}^-$  and  $\text{Ca}^{+2}$ .

**(11.)** (c) According to Donnan equilibrium, the plants absorb iron in the ferric form  $\text{Fe}^{3+}$ . However, plants growing in the acidic soil can absorb iron in Ferrous ( $\text{Fe}^{2+}$ ) as well as Ferric ( $\text{Fe}^{3+}$ ) form. It is an important constituent of proteins involved in the transfer of electrons like ferredoxin and cytochromes. It is reversibly oxidized from  $\text{Fe}^{2+}$  to  $\text{Fe}^{3+}$  during electron transfer. It activates catalase enzyme. It is essential for the formation of chlorophyll.

**(12.)** (b) Anabaena azollae is a free-living nitrogen living fixing blue green algae (BGA) but it may also live symbiotically in leaf cavities of Azolla, an aquatic, free floating freshwater fern.

**(13.)** (d) Boron element is essential for meristematic activity, growth of pollen tube and formation of root nodules in leguminous plants.

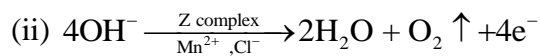
**(14.)** (b) Plants absorb the minerals in form of ions. The inorganic essential elements which are obtained from soil are called mineral elements. The movement of ions is called flux.

**(15.)** (c) Several species of fungi Glomus including G .aggregatum, are cultured and sold as mycorrhizal inoculant for agricultural soils. Being endomycorrhiza, it helps the plants for absorption of nutrients especially phosphorus from soil.

**(16.)** (c) Some of the elements like calcium (Ca<sup>+</sup>) are a part of structural component of the plant. Hence, are not released or can not be remobilized in plants. They are found as calcium petals in the middle lamella of plants.

**(17.)** (b) Changing the soil chemistry is not a role of the essential element; whereas, rest all are the characteristics of an essential element. These are directly involved in the metabolism of plants.

**(18.)** (c) The process of photolysis of water or water splitting reaction during photosynthesis is always associated with pigment system-II and catalyzed by the presence of Manganese (Mn<sup>2+</sup>) and chloride Cl<sup>-</sup> ions. The reaction can be written in the following way



**(19.)** (c) Both the statements hold true because mineral salts are absorbed by the plants from soil. These are dissolved in soil. These are absorbed in ionic forms. i.e., anions or cations. The rate of mineral absorption is usually independent of its concentration in the soil.

**(20.)** (a) Minerals known to be required in large amounts for plant growth are macronutrients, i.e., phosphorus, potassium, sulphur, calcium, etc.

**(21.)** (a) Manganese elements competes with iron and magnesium elements for binding with enzymes while these catalyze form reactions. It also inhibits calcium translocation in shoot-apex. It becomes toxic when absorbed in higher amount and toxicity is expressed by plants in the form of brown spots, surrounded by chlorotic veins.

**(22.)** (a) Among the given elements, potassium (K<sup>+</sup>) is responsible for maintaining turgor pressure in cell because it regulates the proton pumps involved in opening and closing of stomata. Magnesium (Mg<sup>2+</sup>) is a constituent of chlorophyll pigment which helps in photosynthesis in green plants. Calcium (Ca<sup>2+</sup>) provides selective permeability to the cell membrane. All of these, i.e., K<sup>+</sup>, Ca<sup>2+</sup> and Mg<sup>2+</sup> are essential elements. Sodium (Na<sup>+</sup>) is involved in membrane permeability. It is a non-essential element.

**(23.)** (d) The essential elements, which are required by plants in very small amount, are called micronutrients or microelements. These are Fe, B, Mn, Zn, Cu, Ni, Mo. Magnesium is a macro element.

**(24.)** (c) Nitrogenase enzyme is required for nitrogen fixation. It consists of two components Fe containing unit and Mo containing unit. Hence, Fe and Mo are important for nitrogenase.

**(25.)** (d) The soilless production of plants is called hydroponics. In this method plants are raised in small tanks of concrete or metal, filled up with a water solution. The solution contains appropriate quantities of all mineral elements. Hydroponics helps to know:

(I) The essentiality of mineral elements.

(II) Toxicity to plant when element is present in excess.

(III) The role of essential element in the metabolism of plant.

(IV) The deficiency symptoms. (V) Possible interaction among different elements present in plants.

**(26.)** (c) Aeroponics is the technique of growing plants without soil. In this roots remain suspended in nutrient solutions. The other correct version of pairs is as follows.

**Necrosis** Death of tissues, stunted growth, due to deficiency of Ca, Mg, Cu, K.

**Abscission** Premature fall of flowers and fruits, leaf-fall, leaf-curl.

**Chlorosis** Loss of chlorophyll that causes yellowing of leaves.

**(27.)** (c) Appearance of brown spot surrounded by chlorate veins is not due to the manganese toxicity induced symptoms.

**(28.)** (c) Calcium (Ca) is essential for the growing root tip. It is required in the formation of middle lamella of the cell wall present in the form of calcium pectate.

**(29.)** (a) Mineral salt absorption mainly occurs actively. Active process requires expenditure of energy. Thus, mineral salt absorption is an energy consuming process.

**(30.)** (a) The element given in option (a) is not true. Nitrogenase does not require presence of  $O_2$  for its activity.

**(31.)** (b) All essential element are not taken up by plants from the soil only, e.g., carbon, hydrogen and oxygen are taken up from air and water.

**(32.)** (b) Magnesium activates the enzyme of respiration, photosynthesis and is involved in the synthesis of DNA and RNA. Manganese activates many enzymes involved in photosynthesis, respiration and nitrogen metabolism.

**(33.)** (c) A-2, B-3, C-4, D-1

**(34.)** (a) When chlorosis occurs due to deficiency of nitrogen, then first older leaves become yellow.

**(35.)** (c) Cadmium (Cd) is not an essential element for plants. An essential element is the one without which the plant cannot complete its life cycle and has a specific structural or physiological role. These elements are further categorized into macroelements and microelements.

**(36.)** (b) Essential element has following features: It is indispensable for the growth of plants. Cannot be replaced by any other element. The absence/deficiency produces disorders. Has nutritive value.

**(37.)** (a) Deficiency of both nitrogen (N) and potassium (K) are visible first in senescent leaves. The deficiency of N causes chlorosis, while the deficiency of K causes inhibition of protein synthesis and scorching in older leaves.

**(38.)** (d) A-3, B-1, C-4, D-2

**(39.)** (d) A-3, B-4, C-2, D-1

**(40.)** (a) In the grey spots of oat, there is always the deficiency of Manganese (Mn). This disorder is characterized by greenish grey oval-shaped spots on the basal region of young leaves.

**(41.)** (b) Some mineral (nutrients) elements that are required in metabolic activities of certain plants, but not all are called non-essential mineral elements, e.g., cobalt, silicon, sodium, cadmium, etc.

**(42.)** (c) Assertion is true but Reason is false as nitrogen is a major macronutrient.

**(43.)** (b) An essential element is indispensable for the growth of plants.

**(44.)** (c) Phosphorus is a component of DNA and RNA, but not proteins.

**(45.)** (c) Plants absorb nitrogen in the form of  $-N_3$  (nitrate) or  $NH_4^+$  (ammonium ion). They can absorb (nitrite) as well but the same does not accumulate in the soil. Only a small quantity of

nitrate or ammonium is available in the lithosphere. Therefore, nitrogen is the most critical element. Other critical elements are phosphorus and potassium.

**(46.)** (d) Sulphur is a constituent of some amino acids like methionine, cysteine. Some vitamins (thiamine and biotine) coenzyme A and ferredoxin. It is a constituent of allyl sulphide of onion and garlic (responsible for peculiar smell).

**(47.)** (d) Hydroponics (soilless production of plants) helps to know –

- (I) The important of minerals
- (II) The toxicity level of certain minerals
- (III) The role of minerals in metabolism
- (IV) Symptoms of mineral deficiency

**(48.)** (b) Magnesium is a part of the chlorophyll without which photosynthesis would not occur. Many enzymes involved in carbohydrate metabolism also require magnesium as an activator. Magnesium is also an activator for those enzymes which are involved in the synthesis of nucleic acid (DNA and RNA).

**(49.)** (c) The role of calcium is as follows:

- It is an important component of middle lamella of cell wall as calcium pectate.
- During cell division it forms the mitotic spindle.
- It activates certain enzymes and plays an important role in regulating metabolic activities.

**(50.)** (b) The first attempt to grow plants without soil was made by Julius Von Sachs in 1860. He prepared a nutrient solution to grow plants by their method.

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