



# PARISHRAMA NEET ACADEMY

## TARGET NEET - 2022

### BIOLOGY

#### TOPIC: MINERAL NUTRITION

31. (2)

In lichens, the association between an algae and a fungus is considered to be a symbiotic one. In this association, algae provides food to fungi.

32. (3)

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  $NO_3^-$  (nitrate) by nitrifying bacteria called *Nitrobacter*.

*Thiobacillus* carries out denitrification, a process where  $NO_2^- / NO_3^-$  is converted to  $N_2$ .

33. (3)

Ammonia and Hydrogen



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.



The enzyme nitrogenase is highly sensitive to the molecular oxygen; it 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 leg-haemoglobin.

34. (4)

*Thiobacillus denitrificans*, a type of denitrifiers, converts nitrates in soil to free atmospheric nitrogen, thus depleting soil fertility and reducing agricultural productivity.

Nitrates(soil)  $\xrightarrow{\text{denitrification}}$  Nitrogen

↓

*Pseudomonas denitrification and  
Thiobacillus denitrificans*

*Thiobacillus* is a genus of Gram-negative Betaproteobacteria. *Thiobacillus* oxidizes thiosulphate and elemental sulphur to sulphate, and *A. ferrooxidans* oxidizes ferrous ions to the ferric form. This diverse oxidising ability allows *A. ferrooxidans* to tolerate high concentration of many different ions, including iron, copper, cobalt, nickel, and zinc.

35. (4)

*Thiobacillus denitrificans* cause denitrification i.e., conversion of oxides of nitrogen to free  $N_2$ .

36. (1)

Ammonia is the first stable compound produced in fixation of atmospheric nitrogen in leguminous plant. A molecule of nitrogen is changed into two molecules of ammonia. It requires 16ATP, a source of electron donor ferredoxin, hydrogen donor NADPH or  $FMNH_2$  and dinitrogenase enzyme.

37. (1)

In the global nitrogen cycle, bacterial denitrification is recognised as important

process that converts fixed nitrogen to atmospheric nitrogen gas,  $N_2$ . In marine nitrogen cycle, anaerobic oxidation of ammonium coupled to nitrate reduction, contributes substantially to  $N_2$  production in marine sediments.

38. (2)

Phosphorous is a constituent of nucleic acids of both DNA and RNA but absent in cell membranes and cell proteins.

39. (3)

Polyandrous condition (having large and indefinite number of stamens) is present in *Gloriosa* (family Liliaceae) and *Petunia* (family solanaceae). Nitrogen fixation is the conversion of inert atmospheric nitrogen into utilizable compounds of nitrogen like nitrate, ammonia, amino acids, etc. Biological nitrogen fixation is performed by free living and symbiotic bacteria and cyanobacteria. Symbiotic nitrogen fixers occur in association with roots of higher plants. For e.g., *Rhizobium* is nitrogen fixing bacterial symbiont of papilionaceous roots and *Frankia* is symbiont in root nodules of several non-leguminous plants like *Casuarina*. Both *Rhizobium* and *Frankia* live free as aerobes in the soil and develop the ability to fix nitrogen only as symbionts when they become anaerobic.

40. (3)

Nitrogenases are the enzymes used by some organisms to fix atmospheric nitrogen gas. It is the only known family of enzymes that accomplish this process. Nitrogenase requires high input of energy and anaerobic condition.