

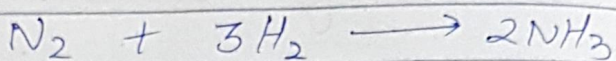
Q. Discuss the role of Microbes in N_2 -fixation giving suitable diagrams

INTRODUCTION → Plants have been chemically analysed and it has been worked out that Nitrogen is the most important element occurring in living cells. It forms 1.2% on a dry weight basis. Nitrogen occurs in all most all major compound of the living system such as DNA, RNA, chlorophyll, cytochromes, alkaloids, vitamins and phytohormones. It plays a central role in metabolism, growth, reproduction and heredity. It is such an important element that life is not possible without it. The atmosphere forms the chief source of nitrogen but this nitrogen is inert and highly inactive. It is use only by some micro organism. such as fungi, bacteria and blue green algae. Similarly soil and sedimentary rocks also contain small percentage of nitrogen.

DEFINITION → It is defined as the conversion of free nitrogen into nitrogenous salts to make it available for absorption by plants.

It can be also defined as

the reduction of nitrogen into ammonia



ROLE OF MICROBES IN N_2 - FIXATION

The conversion of atmospheric nitrogen into inorganic or organic usable form through the agency of living organisms is called biological nitrogen fixation.

The organisms include some bacteria, fungi and heterocyst bearing blue green algae. These organisms have been divided into two important classes.

- I) Asymbiotic biological Nitrogen Fixers
- II) Symbiotic biological Nitrogen Fixers

I) Asymbiotic biological Nitrogen Fixers

These microorganisms are free and asymbiotic. They have been classified as follows -

- a) Free living aerobic N_2 fixing bacteria
Azotobacter.
- b) Free living anaerobic N_2 fixing bacteria
Clostridium.
- c) Free living photosynthetic bacteria
Chlorobium.
- d) Free living Chemosynthetic bacteria
Desulphovibrio.
- e) Free living Fungi \rightarrow Puccinia and Yeast.
- f) Heterocyst bearing blue green algae

(Cyanophyceae) → Nostoc, Anabaena.

II) **Symbiotic biological N_2 fixers** → These N_2 fixers live as symbionts. They form more use in plant parts. The nodule bacteria includes many species of the genus Rhizobium. They are host specific. They have been divided into following classes.

Ⓐ Root nodules of Leguminous plants - All those plants included in family Leguminosae.

Ⓑ Root nodules of non-leguminous angiosperms - Casuarina, Alnus etc.

Ⓒ Root nodules of Gymnosperms - Podocarpus.

Ⓓ Mycorrhizal plant - Pinus micorrhiza

Ⓔ Leaf nodules - Pavetta

Ⓕ Coralloid root of Cycads - Cycads

Ⓖ Phyllosphere association - The nitrogen fixers are found associated with moist leaf surfaces.