Mineral Nutrition

Biological nitrogen fixation

- Biological nitrogen fixation is the process whereby atmospheric nitrogen (N≡N) is reduced to ammonia in the presence of enzyme nitrogenase (exclusively present in prokaryotes).
- Enzyme nitrogenase is a Mo – Fe protein and catalyses the conversion of atmospheric nitrogen to ammonia.
- Nitrogen fixing microbes such as *Azotobacter* and *Beijernickia* are aerobic nitrogen fixers. *Rhodospirillum* is anaerobic nitrogen fixer and *Bacillus* is a free-living nitrogen fixer.

Symbiotic nitrogen fixation

- Legume-bacteria relationship is an example of symbiotic biological nitrogen fixation.
- Nitrogen fixing bacteria (eg. *Rhizobium*) live in the root nodules of leguminous plants.
- *Frankia* produces nitrogen-fixing nodules in non-leguminous plants.
- Leghaemoglobin pigment helps in the process of nitrogen fixation.
- Reaction of nitrogen fixation-

$$N_2 + 8e^- + 8H^+ + 16\ ATP \rightarrow 2NH_3 + H_2 + 16\ ADP + 16P_i$$

- The ammonia produced by the above reaction is used to synthesize amino acids in plants.
- Conversion of ammonia to amino acids takes place by either reductive amination or transamination.