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Elementary Crop Physiology - Unit - 8  
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## Nitrogen Metabolism

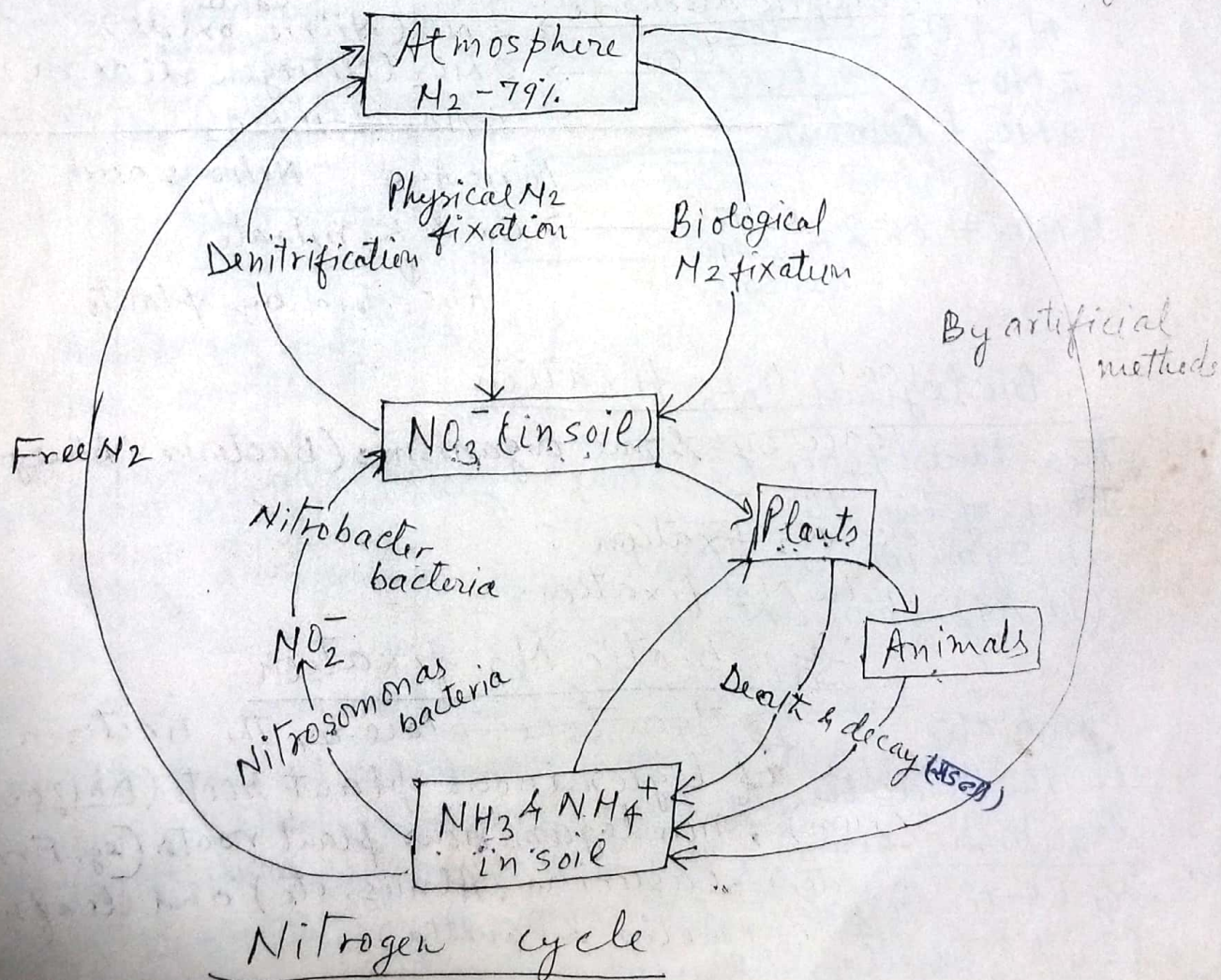
(1)

In atmosphere  $N_2$  is about 79%. (Free nitrogen) and in soil it is about .11%. (organic compounds). All living being (Mainly plants) can not make use this free  $N_2$  directly. Plants can use  $N_2$  only in Ammonical or nitrate form.

Atmospheric  $N_2$  reaches to soil by natural or artificial processes, due to which soil does not become deficient for  $N_2$  (Because  $N_2$  deficiency may be due to continuous use of  $N_2$  by plants)

In this way the cycling of  $N_2$  takes place as follows —

The circulation of  $N_2$  between biotic (plants, animals & microbes) and abiotic components (soil and atmosphere) is called  $N_2$ -cycle.





## Nitrogen fixation

The conversion of atmospheric free  $N_2$  into usable form of  $N_2$  is called nitrogen fixation (For plants)

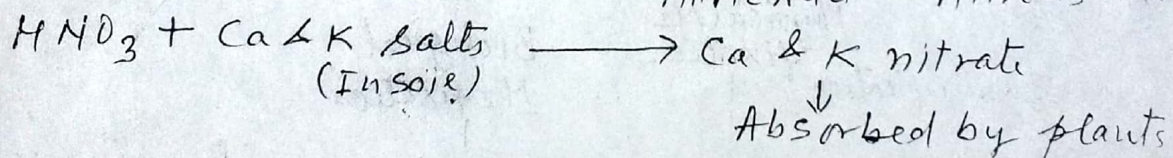
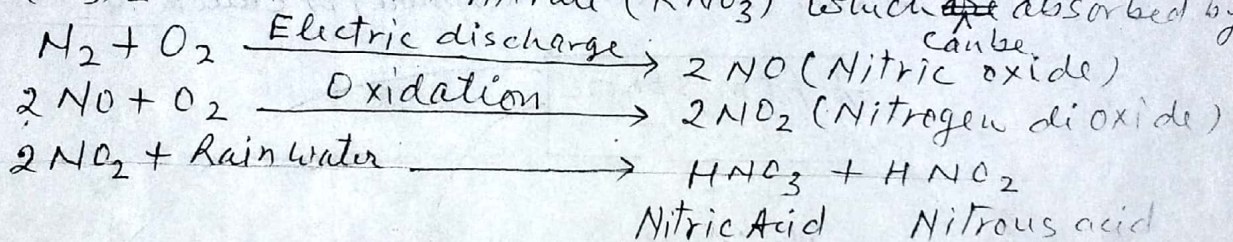
$N_2$  fixation is of two types -

- (1) Non-biological  $N_2$  fixation (Physical  $N_2$  fixation)
- (2) Biological  $N_2$  fixation.

### Physical (Non-biological) $N_2$ fixation

Atmospheric  $N_2$  combines with oxygen and forms Nitrogen oxides of nitrogen. These oxides react with rain water & form Nitric acid.

Nitric acid reacts with Ca & K forming Calcium nitrate  $Ca(NO_3)_2$  & Potassium nitrate ( $KNO_3$ ) which ~~are~~ <sup>can be</sup> absorbed by plants.



### Biological $N_2$ - fixation

This takes place by some organisms (Bacteria & Bluegreen algae)

It is of two types -

- (1) Symbiotic  $N_2$  fixation.
- (ii) Asymbiotic  $N_2$  fixation.

#### Symbiotic $N_2$ fixation

Symbiotic  $N_2$  fixation takes place by the bacteria found in the nodules of leguminous plant roots (Rhizobium leguminosarum), non leguminous plant roots (eg. Frankia sp. (Actinomycetes), casurina, Alnus, etc) and leaf nodules (In Klebsiella, Chomelia & Pavetta)