**Advanced soil fertility and fertilizers FOR MASTERS Degree 2023-2024**

**Soil department and water resources**

**First lecture**

**NITROGEN**

**Introduction**

**Nitrogen occurs in many forms in agricultural ecosystems**

**Why ??**

**Because Nitrogen can exist in a number of valence states within an ecosystem.( how can happened ?)**

**The valence state in which nitrogen exists depends primarily on the ambient environment at micro-sites** within the soil

The transformations and flow of nitrogen from one valence state to another constitute .

For example ,

N2 atmospheric (78%),

( 0 charge ) gas is converted by lightening to various oxides and finally to nitrate NO3-1 ( +5 charge ) , which falls with the rain and Is taken up by growing plants

**Also** ,

N2 gas can be converted to ammonia(NH3) (3charge) by microbial fixation , with NH2 being used in various biochemical reactions within plants .

When plant residues decompose, much of the N they contain will undergo several Microbial conversion and will eventually end up back **As nitrates**

Also,

Under anaerobic conditions , nitrates can be reduced to various oxides and Ultimately to N2 gas again .

Nitrogen **in inputs** such as fertilizers and manures is also subjected to these same Microbial transformations .

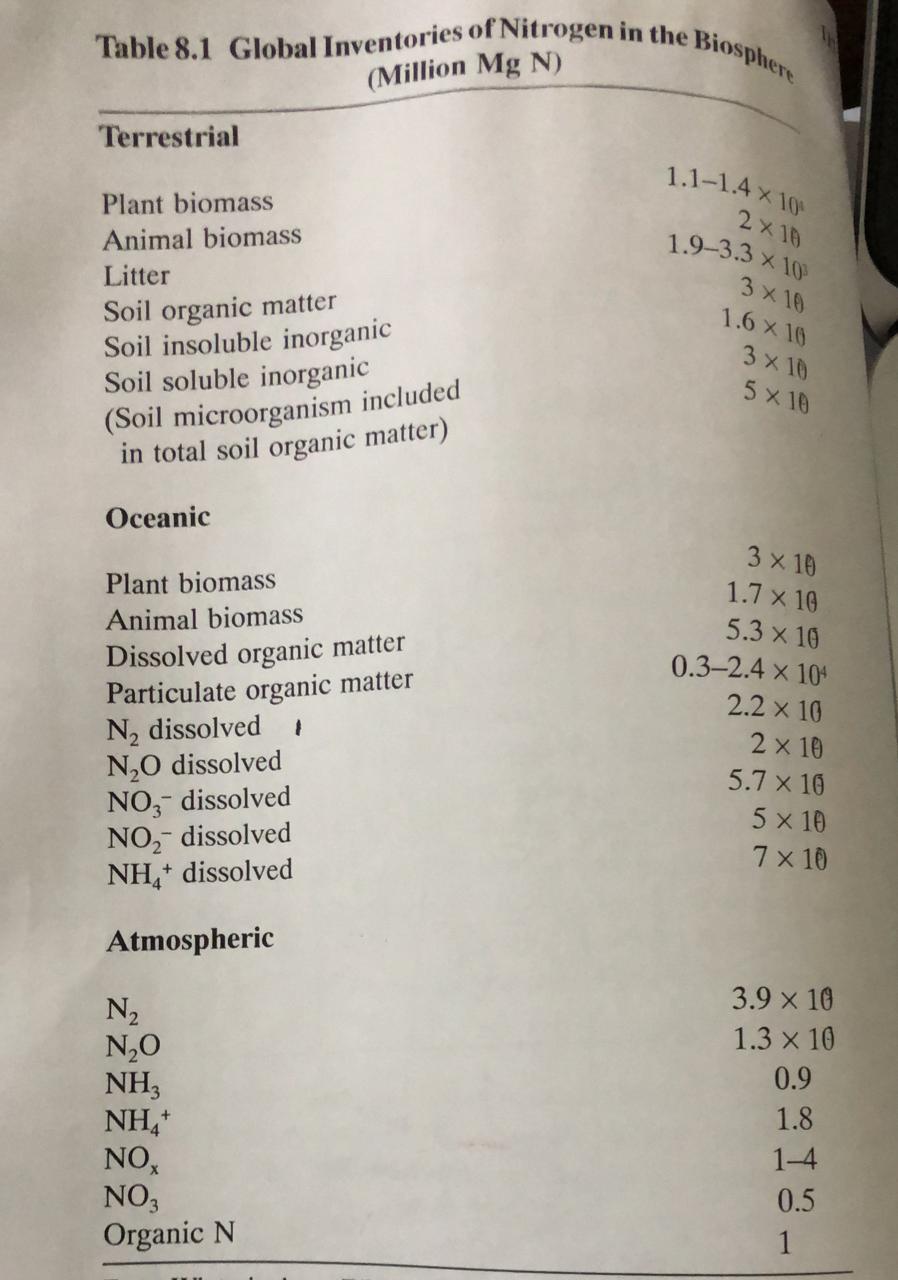
**Globally where can N in the biosphere show ?**

**As table 8.1 : referred to global inventories of nitrogen in biosphere(million mg N) ) المخزون العالمي للنتروجين في المحيط الحيوي )**

**There are three main resources for nitrogen as table 8.1**

**At three phases ( solid , liquid and gases )**

1. **Terrestrial include----**
2. **Oceanic ----**
3. **Atmospheric ----**



**N is distributed in terrestrial , oceanic and atmospheric components**

**Note ,**

**The bulk of biosphere -N is in atmosphere , the atmosphere column hectare of on an land will contain approximately 8.4\*10 4 mg ha-1 N**

**Yet , for growing most cereals and nonlegume forage crops**

**So, has to apply large amounts of manure and / or fertilizer N**

**Nitrogen in soil originates from plants and animals residues , from fixation By leguminous plants and trees.**

**Total N content in the top 15 to 20 cm of surface soil ranges from 0.01 % to more than 2.5% in peat**

**N content in the subsurface of any soil is generally less than in the surface Layer , since most organic residues are deposited on soil surface Under suitable conditions some of organic legume mineralized** Into inorganic form and may be present in ammonium (NH4+) and nitrate (NO3-) form .

**Soil organic N**

**Soil organic N consists of proteins (20-40%) , amino sugars such as purine and pyrimidine (1%or Less) and condensation Of sugar and amines .**

**part of organic -N is also present as clay -humus complexes , which are resistant to decomposition .**

**So ,**

**This would explain why only a very small part of immobilized Fertilizer N becomes available to growing crop plants**