Acid soil Formation

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Contents

Acid soil

- Soil with low pH contain relatively high amounts of exchangeable **H^+ & Al^{3+}** considered as the acid soil.
- Ultra acidic : 3.3
- Extremly acidic : 3.5 to 4.5
- Very strong acidic: 4.5 to 5.0
- Strong acidic : 5.1 to 5.5
- Moderately acidic: 5.6 to 6.0
- Slightly acidic : 6.1 to 6.5

Occurrence

- 157 M ha cultivable land in India **49 M ha** of land are acidic
- pH >5.6= 26 M ha
- pH 6.5= 23 M ha
- Acid soil occupies only **8%** of total geographical area in India.

✓Arunachal Pradesh - 6.79 M ha

✓Assam - 4.66 M ha

✓Manipur - 2.19 M ha

✓Meghalaya - 2.24 M ha

✓Mizoram - 2.05 M ha

✓Tripura - 1.05 M ha

Rain fall

- Mostly found in excess rain fall areas (Hilly areas).
- Excess rain fall leaches base cation from the soil.
- Additionally rain water has a slightly acidic **pH is 5**
- Creates base unsaturation.
- Increase the percentage of Hydrogen and Aluminium ion in soil

Parent materials

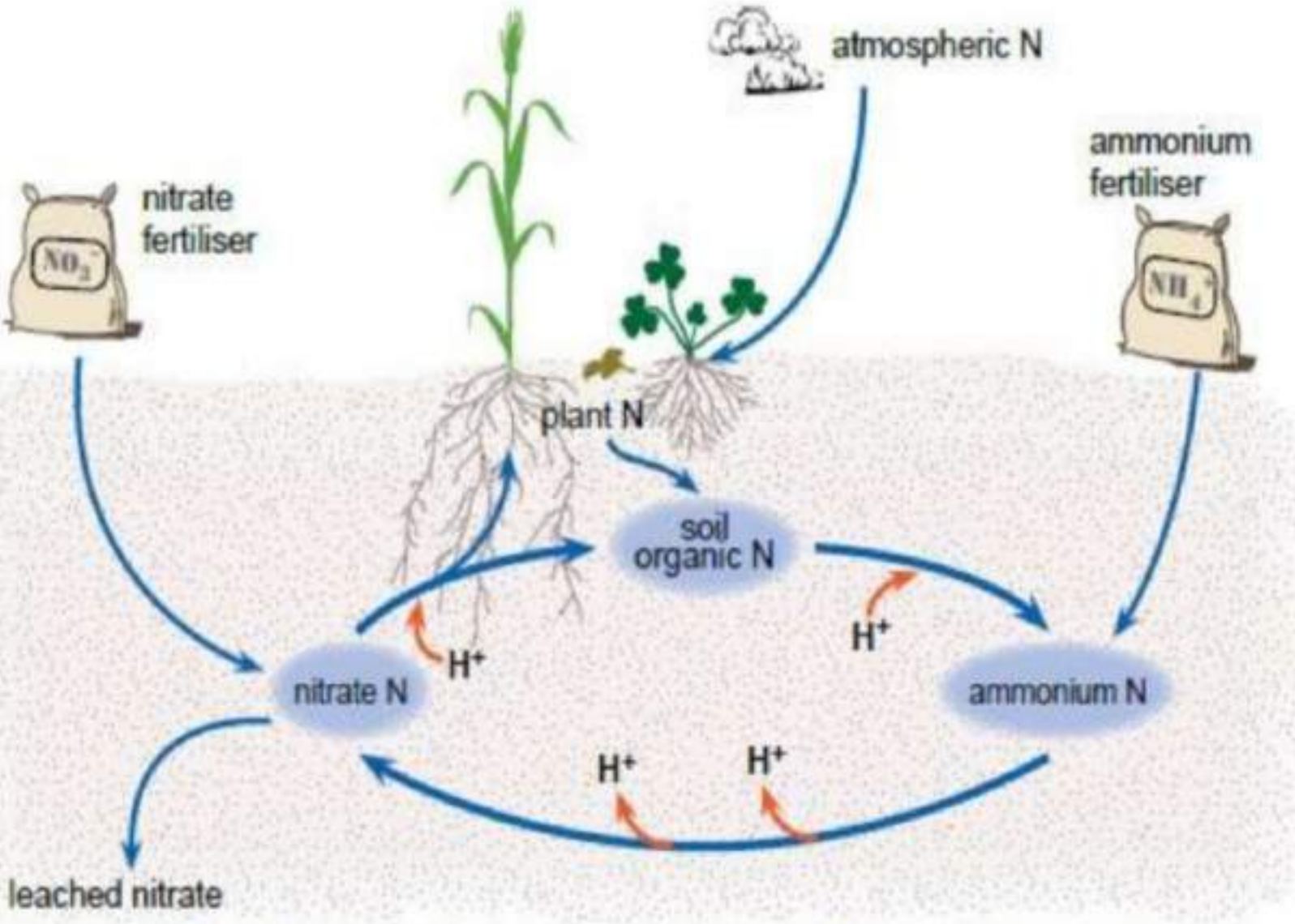
- ✓The development of acid soil on acidic rocks like Granite, Gneiss, quartz silica.
- ✓When these rocks lacks bases, produce acidity in soil after decomposition by weathering
- ✓ Silicic acid- Orthosilicic acid & trisilicic acid

Reason for development of acid soil from parent material

- ✓Parental rock with simple composition.
- ✓Less adsorbed cation.
- ✓Poor buffering capacity.
- ✓Quick percolation of water through them.

Fertilizer use

- Repeated application of ammoniacal fertilizer leads to formation of acid soil.
- Ammonium sulphate & Ammonium nitrate fertilizer reacts in the soil process is called nitrification to form a nitrate.
- This process release the Hydrogen ions.



34 The main pathways showing the involvement of nitrogen (N) fertilisers in soil acidification

Plant root activity

- Plant uptake nutrients in the forms of both anion and cation
- Plant must maintain a neutral charge in their roots
- In order to compensate the extra positive charge- they release the H^+ ions.
- Some plants roots produce the organic acid – acid soil.

Decomposition of organic matter

Decomposition process requires the microorganism

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Microorganism - release the CO_2

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CO_2 reacts with soil water can produce the carbonic acid.

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Acid soil

Climate

- Humid region development of acid soil good because where evaporation is less than precipitation
- Acid soil must receive more than 750 mm annual rainfall.
- Temperate region the acid soil can develop even if rain fall scanty.
- Hilly region evaporation is very slow due to very low temperature.

Vegetation cover

- Temperate region areas covered with conifers - acid soil develop easily.
- Foliage of conifers lacks alkali substances.
- Leaf-litter on ground is degraded organic acids (fulvic acid) produced its makes soil become acidic.
- Coastal region & marshy places plants after the death & decay produce acid which render the acidic

Topography

- Sloppy places with good drainage condition are supposed to be development of acid soil.
- Development of acid soil is very easy in hill slope
- In plains with good drainage condition enhance the acid soil.

Human interferences

- Improving drainage in submerged lands
- In Cauvery delta region acid soil is formed due to application ammoniacal fertilizer.
- Regular use of nitrogen fertilizers.
- Industrial wastes containing sulphur / Sulphur dioxide contribute acid soil.

Laterization

- Occurs in tropical and sub tropical.
- Laterites are formed from the leaching of parent rocks (Granite, Basalts, schist, sandstone).
- Laterites soils are rich in Al & Fe- Acidic in nature.
- Aluminium ore exist in clay minerals.
- Due to leaching acid dissolving the parent mineral lattice.
- Easily leached ions of Ca, Mg, Na, K.

Podzolisation

- Process of soil formation especially in humid region.
- It involves mobilization and precipitation of dissolved organic material and soluble mineral like Al & Fe are leached from A horizon to B horizon.
- Its formed under moist, cool & acidic condition.
- Especially where the parent material such as quartz.
- Siliceous material creates strong acidic

Reference

Hand book of soil science