PARMAR SSC

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Topic : Soil



Soils



The Study of soil is called Pedology.

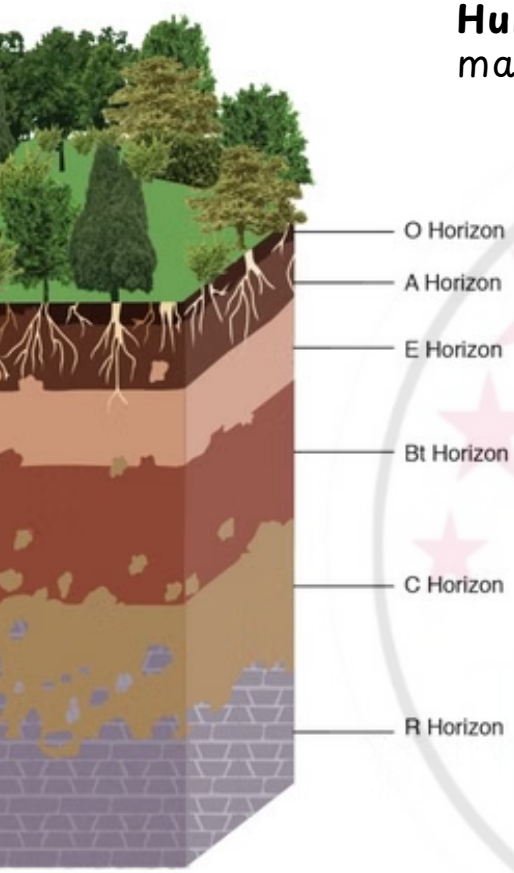


Soil is a renewable natural resource made up of organic (Humus) and inorganic materials.

Soil Profile

A soil profile Consists of several soil horizons.

Humus : A soil component that is dark, organic matter from decomposing plants and animals



O Hoziron :
- Humus on the Ground Surface

A Horizon:
- Top soil
- Typically Dark in colour.
- Rich in organic matter
- Minerals with Humus

E Horizon
- Leached Minerals and organic matter

B Horizon
- Subsoil
- Also called zone of accumulation
- May contain soluble minerals such as calcite in arid climates.

C Horizon
- Weathered bedrock (rotten rock)
- Bedrock lies below this soil profile

R Horizon
- Bedrock: unweathered parent Rock

Leaching

It is a process where all important minerals of soil wash away or percolate underground

Factors Affecting Soil Formation

1 Parent Rock

It determines soil color, texture, mineral content, and permeability.

2 Climate

Temperature and rainfall affect the rate of weathering and humus formation.

3 Biological Factors

Plants, animals, and microorganisms significantly affect soil formation by breaking down parent material

4 Relief

It affects soil accumulation and erosion.

5 Time

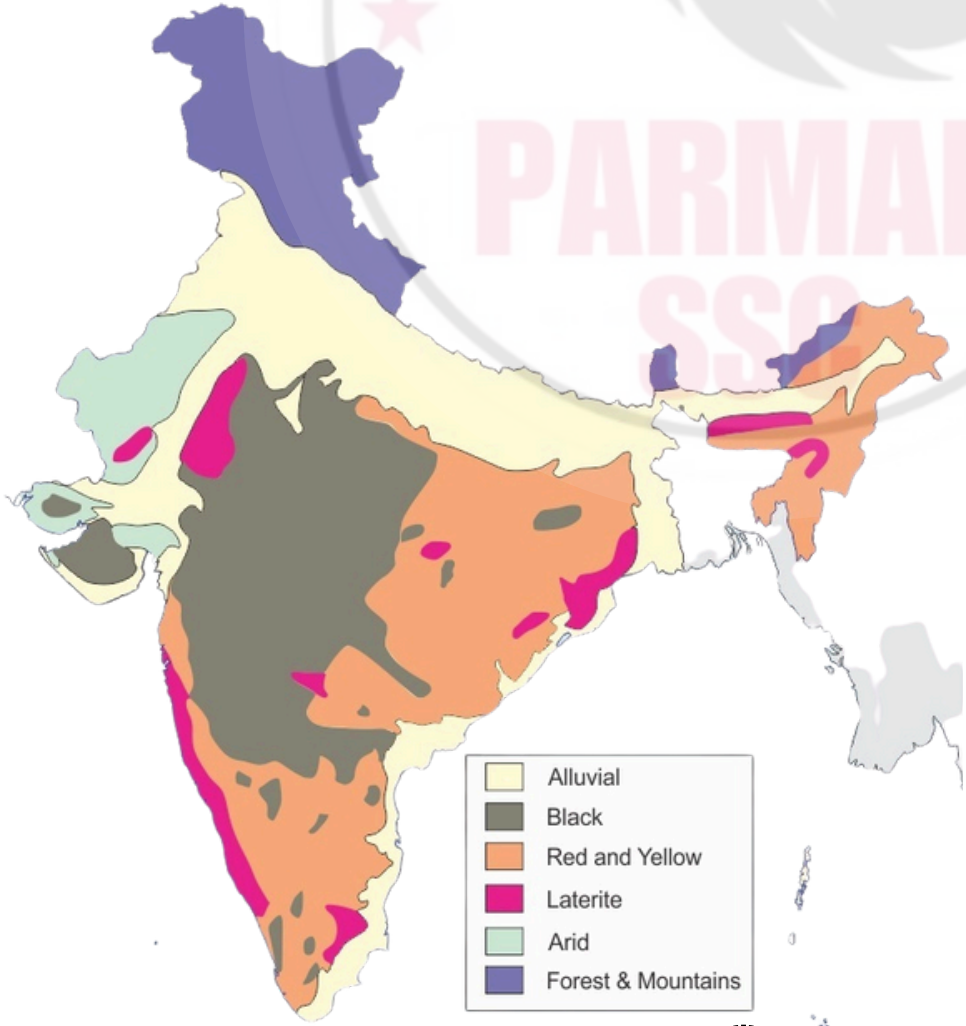
It determines the thickness of soil layers.

ICAR (Indian Council of Agricultural Research)

- **HQ**: New Delhi
- This institute has categorized Indian soils into 8 types.
- Soil can be divided into certain types on the basis of factors responsible for soil formation, colour, thickness, texture, age, chemical, and physical properties.

Types of Soil in India

1. Alluvial Soil
2. Red Soil
3. Black Soil
4. Montane Soil
5. Laterite Soil
6. Marshy / Peaty soil
7. Saline / Alkaline
8. Arid Soil

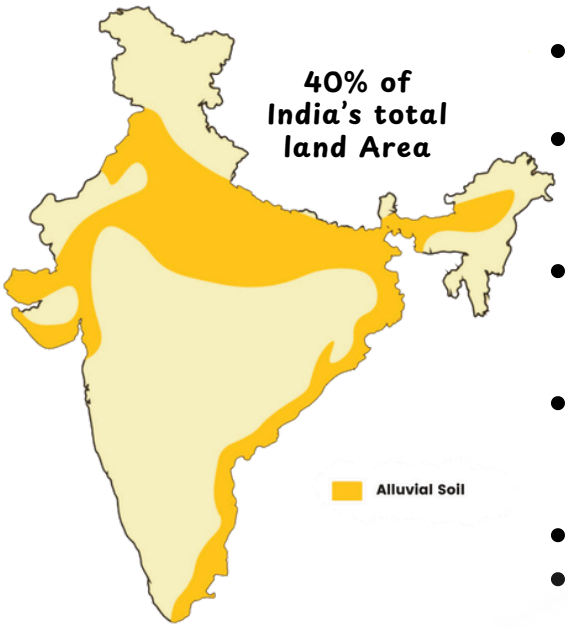




Colluvium Soil

It is Loose, unconsolidated sediments that have been deposited at the base of hillslopes

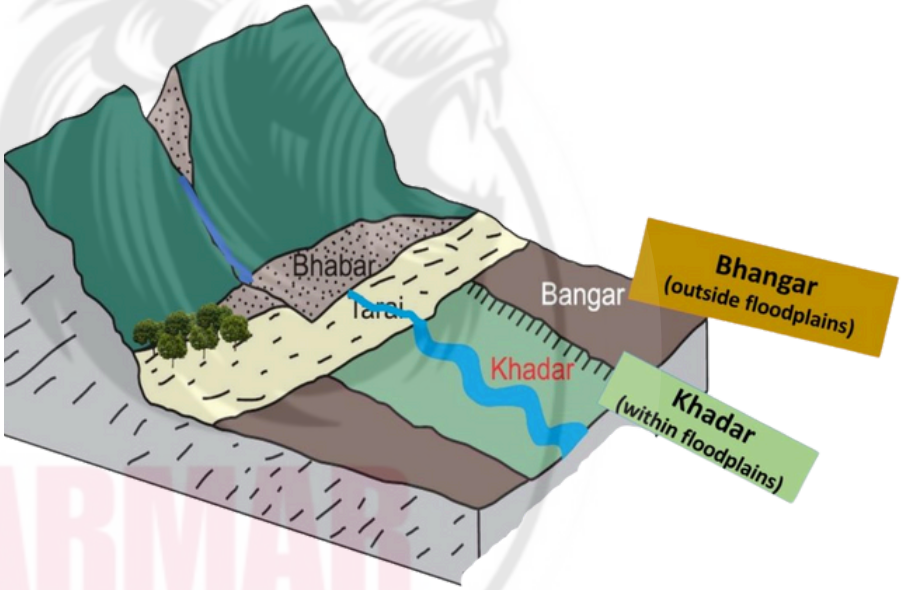
Alluvial Soil



- Alluvial soil is the most widely spread soil (40%) in India.
- It is found in the Northern Plains (Uttar Pradesh, Bihar, West Bengal, Assam) and Deltas of Peninsular rivers.
- It is formed due to deposition of three important Himalayan river system: Indus, Ganga, and Brahmaputra.
- Alluvial soil is found in eastern coastal plains Deltas of Mahanadi, Godavari, Krishna, Kaveri.
- It is rich in potash and poor in phosphorus.
- Sand content decreases from west to east of the plains.

Types of Alluvial Soil

- **Old Alluvium**: **Bhangar** Calcareous concentration; poor in humus and nitrogen (less fertile).
- **New Alluvium**: **Khadar**; More suitable for agriculture (more fertile). Its colour varies from light grey to ash grey.



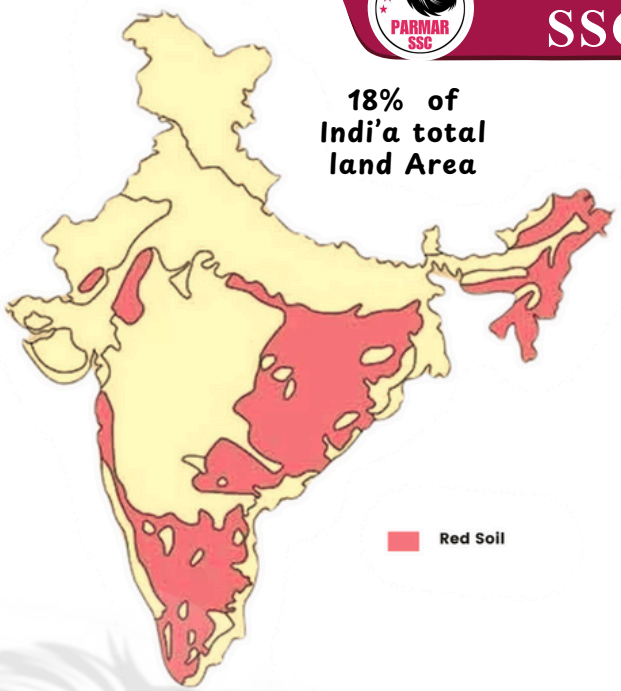
Black Soil

- Black soil is also known as 'Regur' and has volcanic origin.
- It is ideal for cotton cultivation (Cotton requires 210 frost free days).
- It is found in Northwestern part of Peninsular Plateau (also known as Deccan Traps) → Maharashtra, Gujarat & some parts of Madhya Pradesh.
- It is clayey in nature (made of extremely fine materials).
- This soil has self-ploughing characteristics (It develops cracks when dry and becomes sticky when moist). The soil is also impermeable in nature (water does not percolate easily).
- It is rich in iron, calcium carbonate, magnesium, potassium, lime, alumina and poor in humus, nitrogen, phosphate.

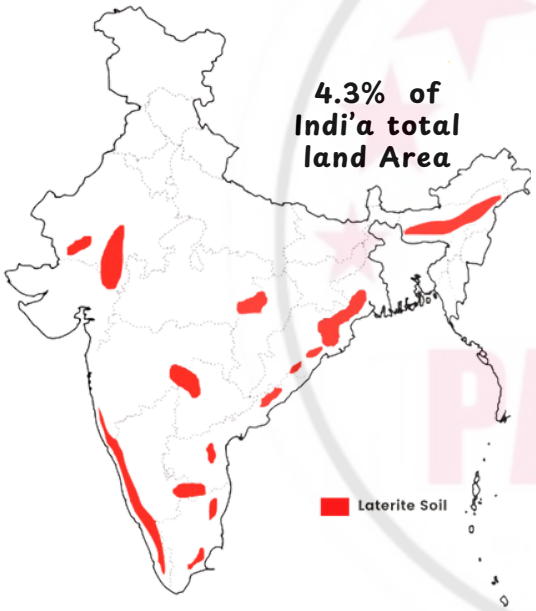


Red Soil and Yellow Soil

- It is formed due to weathering of metamorphic rock.
- It is red due to presence of iron oxide in the soil.
- It develops on crystalline igneous rocks, especially in areas of low rainfall such as Tamil Nadu, Karnataka, Maharashtra, Odisha, Chhattisgarh and Piedmont zone of Western Ghats.



Laterite Soil



- The name is derived from Latin word 'later' which means 'brick'
- Laterite soil is also considered as deep Red Soil.
- It is formed as a result of intense leaching process (where important mineral such as silica washes away with the water)
- This type of soil is found in regions of high temperature and heavy rainfall such as Karnataka, Kerala, Tamil Nadu, Madhya Pradesh, and hilly areas of Odisha and Assam
- These are slightly acidic in nature, hence possesses very less fertility.
- Laterite soil is also suitable for growing tea and coffee (Karnataka).

Laterisation

This happens because intense rainfall leaches away soluble minerals like silica, calcium, and magnesium, leaving behind a concentration of iron and aluminum oxides

Podsolisation

Podsolisation is a soil formation process that occurs in cool, humid climates, particularly under coniferous forests. It involves acidic water leaching (eluviation) nutrients, iron, and aluminum from the topsoil, leaving behind a bleached, ash-like layer

Montane Soil



- Montane soil is found in mountainous region.
- This type of soil is more acidic, with decreased mineral nutrients.
- Montane soil is rich in organic matter (has high humus content).

Arid Soil



- Arid soil range from red to brown in colour.
- It is generally sandy in texture and saline in nature (rate of evaporation is greater than the rate of precipitation).
- Arid soil is found in parts of Rajasthan and Gujarat.
- The Kankar layer formation in bottom horizon restrict the infiltration of water.

Marshy/Peaty Soil

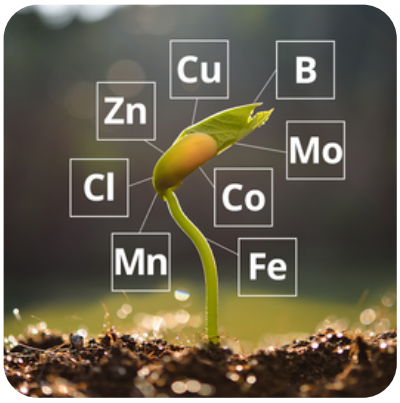
- Marshy/Peaty soil is primarily found in coastal areas of West Bengal, Odisha, and Tamil Nadu.
- It develops in waterlogged areas with high organic matter accumulation due to decaying vegetation.
- It is also seen in regions of high humidity and high rainfall.

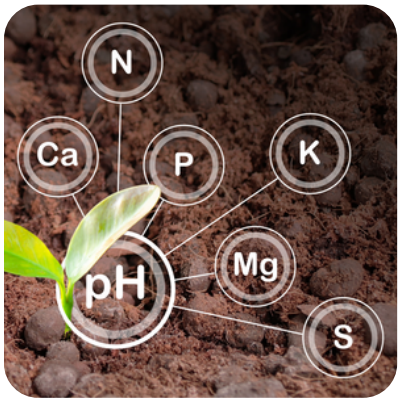


Desert Soil

- Desert soil is dry, sandy and low in organic matter.
- It is seen in extremely arid, low rainfall areas (rainfall: less than 50 cm) → Western Rajasthan, Gujarat, Haryana.







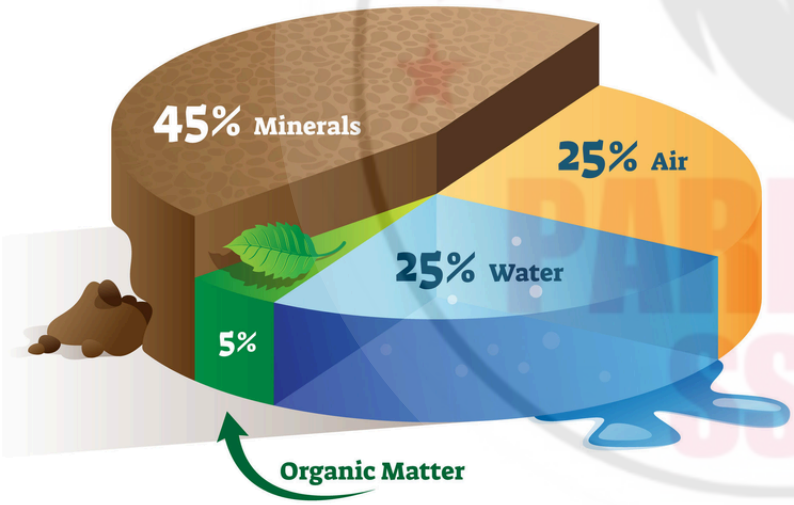
Micronutrients

- Chlorine
- Iron
- Boron
- Mangnese
- Zinc
- Copper
- Molybdenum

Macronutrients

- Nitrogen
- Phosphorous
- Potassium
- Sulfur
- Calcium
- Magnesium

Soil Composition



- 45% Minerals
- 25% Air
- 25% Water
- 5% Organic Matter

DID YOU KNOW?

- **Saline Soil is treated with Gypsum ($CaSo_4.2H_2O$)**
- **Acidic Soil is treated with Lime.**
- **Loess is a type of soil that consist of Silt and Dust**

USDA (United States Department of Agriculture)

- It is a Soil Classification System



Entisol
Weakly developed soil with no horizon.



Inceptisol
Recently formed soil that has weakly or quickly developed horizons. It covers the largest geographical area of India.



Vertisol
Vertisols are clay-rich soil and tend to swell when wet and shrink upon drying. They are also called inverted soils because the name comes from the Latin word vertere, which means "to invert". E.g. Black soil.



Alfisol
Alfisols are a type of soil that are rich in clay and minerals, and are found in humid and semi-arid regions.



Oxisol
Oxisols are highly weathered soils that are mainly found in tropical and subtropical regions.



Gelisols
Gelisols are soils that contain permafrost within 2m of the soil surface.



Histosol
Histosols are soils that are made up mostly of organic matter, like peat and muck. They are found in wetlands, like swamps.

Soil Erosion

The denudation of soil cover and subsequent washing down is described as soil erosion.

Soil Erosion due to Water

Sheet Erosion
When top soil gets washed away due to heavy shower.

Gully Erosion
It is a permanent process when surface water run-off cuts deeply into soil, removin it along drainage lines.



1. Contour Bunding/ Ploughing

Contour Bunding/Ploughing: A land management practice for marginal, sloping and hilly land where the soil productivity is very low. It involves placement of the lines of stone along the natural rises of a landscape.



2. Mulcing

The process of covering the top soil, with plant material, such as leaves, grass, crop residue, etc.



3. Shelter Belts

It involves planting rows of trees on one side of an area that prevents the wind from eroding the soil.



4. Terrace Farming

It is the practice of cutting flat areas out of a hilly or mountainous landscape in order to grow crops. Mostly practised in hilly region, such as Himachal Pradesh, Uttarakhand, and certain North-Eastern provinces.



5. Strip Farming

It is a type of farming that involves dividing fields into long, narrow strips, and alternating crops in a rotation system.