

- Pedogenesis:- The process of soil formation.

Soil forming factors are:-

(A) - Parent material: (mainly derived from rocks).

The parent material determines the colour, texture and mineral composition of soil.

- Ancient crystalline and metamorphic rocks, mainly made up of granites, gneisses and schists are rich in the ferromagnesian materials gives "red soil" on weathering.
- The Cuddapah and Vindhyan rocks have weathered to give calcareous and argillaceous soils. These soils are quite native.
- The Gondwana rocks give rise to comparatively less mature soils of more or less uniform character but low fertility.
- The Deccan trap are composed of Basalt which is rich in titanium, magnetite, aluminium & magnesium. After the pedogenesis they give rich black cotton soil or "regur".
- The tertiary and mesozoic sedimentary rocks of central peninsula give rise to soils with high porosity & immature soils.
- Recent and sub-recent rocks result in alluvial soil on weathering.
- The soils of northern plains are mainly alluvial soils & they have little relation with parent rocks. White soils of peninsular plateau are generally coarse grained and are closely related to parent rocks. The peninsular soils are generally less fertile.

(B) Relief:- The degree of slope determines the thickness and fertility of soil. There are thick layers of fertile alluvial soils in the northern plain of India where as the soils are generally shallow in plateau areas. Only exception in plateau areas are river basins.

(C) CLIMATE:- It is the single most important factor in the soil formation. mainly temp & rainfall. climate controls the type and effectiveness of weathering of the parent material.

- the quantity of water seeping through the soil and the type of micro-organisms present therein.
- In areas of heavy rainfall and high temperature the soils are red or laterite.
 - In arid and semi-arid regions soils are invariably of light colour & excess of evaporation makes soil lime accumulating. They are Pedocal in nature. They are in western India.
 - In cold climatic of Himalayan region the process of vegetation decay is very slow and the soils are formed under such circumstances are acidic in nature.

⑤ Natural vegetation: The natural vegetation provides the humus so densely forested areas contains some of the best soils. There is close relationship between vegetation type and soil type.

Major soil groups of India:-

Geologically → soils of peninsular India
 ↳ soils of extra-peninsula (Azonal soils)

⇒ ICAR set up an All India soil survey committee in 1953, which divided the Indian soils in eight major groups.

- (i) Alluvial soils (ii) Black soils (iii) Red soils (iv) laterite & lateritic soil (v) forest and mountain soil (vi) Arid and the desert soil (vii) Saline & Alkaline soil (viii) Peaty and the marshy soil.

① ALLOUVIAL SOIL:- Largest & most important 45.6%.

- most of the alluvial soils are derived from the sedimentary deposits by river in Indo-ganga plains & coastal areas.

⇒ The alluvial soils are yet immature and have weak profiles.

⇒ Chemically:- proportion of nitrogen is generally low, but potash phosphoric acid and alkalies are adequate.

They are found in Indo-ganga plain & delta areas & coast.

Geologically → Bhangar (older alluvium)
 ↳ Khadar (younger alluvium).

Khadar soil:- Found in low areas of valley bottom which are flooded almost every year. They are pale brown, sandy clays and loams, more or less leached, less calcareous and carbonaceous i.e. they are less kaolinary.

(21)

Bhangar on the other hand is found on the higher reaches or about 20m above flood level. having "kankar formations"

- Along the shivalik foothills there are alluvial fans having coarse to fine pebbly soils. This zone is called bhabar.
- To the south of the bhabar is a long narrow strip of swampy lowland with silty soils. called terai. The
- terai soils are rich in nitrogen and organic matter but are deficient in phosphorus.

② BLACK SOILS:- (Regur) (16.6% of total area)

most of the black soils are derived from two types of rocks the Deccan and Rajmahal trap, & ferruginous gneiss and schists occurring in Tamil Nadu.

- Krebs hold that the regur is essentially a mature soil which has been produced by relief and climate.

These soils are mainly found in Maharashtra, Madhya Pradesh parts of Karnataka, Andhra, Orissa and Tamil Nadu.

- It is "self ploughed"
- Black colour is due to titaniferous magnetite or even to iron and black constituent of parent rock.
- It is highly argillaceous contain 10% alumina, 10% FeO₂, 6-8% lime & magnesium carbonate. Potash is variable. Phosphorus nitrogen & humus are low

- major crops: cotton, wheat, jowar, linseed, Virginia, tobacco, etc

③ RED SOILS :- (10.6%) Largest soil group containing several minor types

The main parent rocks are acidic granites & gneiss, quartzitic and felspathic.

extent:- whole Tamil Nadu, parts of Karnataka, south-east of Maharashtra, Eastern parts of Andhra and Madhya Pradesh, Chhattisgarh, Orissa and Chota Nagpur in Jharkhand, South Bihar, Birbhum and Bankura districts of West Bengal, Mirzapur, Thansi, Banda and Hamirpur districts of U.P. Aravallis and the eastern half of Rajasthan parts of Assam, Nagaland, Manipur, Mizoram, Tripura & Meghalaya.

They are poor in lime, magnesium, phosphorus, nitrogen & humus. It are fairly rich in "potash".

4) LATERITE AND LATERITIC SOIL (Brick forming)

The laterite soil is formed under conditions of high temperature and heavy rainfall with alternate wet and dry periods.

They are rich in oxides of iron & aluminium compared

- Almost all laterite soils are very poor in lime and magnesia & deficient in nitrogen.

Sometimes the phosphate content may be high, probably present in the form of iron phosphate but potash is deficient.

They cover an area of 2.48 km².

extent:- Summits of Western Ghats 1000-1500 m AMSL, Eastern Ghats, the Rajmahal hills, Vindhyas, Satpuras and Malwa plateau. They are well developed in south Maharashtra, parts of Karnataka, Andhra, Orissa, West Bengal, Kerala, Jharkhand, Assam and Meghalaya.

- They lack fertility due to intensive leaching.

Can be cut with spade but hardens like iron when exposed to air.

5) Forest and Mountain soil (2.67%)

Generally north facing slope support soil.

- Himalaya & Eastern & Western Ghats

- The forest soils are very rich in humus but are deficient in potash, phosphorus & lime, so they require good deal of fertilizers.

extent:- Tea plantation, coffee & spices in Karnataka.

Tamil Nadu & Kerala & wheat, maize, barley and temperate fruits in Jammu & Kashmir, Himachal Pradesh & Uttarakhand.

6) Arid & Desert soil:- (1.32%) (Thar & Punjab Karpyal)

contain high percentage of soluble salts are alkaline with varying degree of calcium carbonate and are poor in organic matter.

- The presence of phosphates and nitrates make them fertile soils wherever moisture is available.

⑦ Saline and Alkaline Soil:- Lachhmanji,

"Red, Kallar, Usar, Thar, Rottar, Karl & Chopab"

There are many uncomposd rock and mineral fragments which on weathering liberate sodium, magnesium & calcium salts & sulphurous acid. The accumulation of salts makes the soil infertile and renders it unfit for agriculture.

⑧ Peaty and marshy soils:- Peaty soils originate in humid regions as a result of accumulation of large amounts of organic matter in soils.

extent:- Kottayam & Appuzha in Kerala where it is called Kari. coastal Orissa & Tanjil Nadu, Sunderbans of West Bengal in Bihar & Almora in Uttarakhand.

- The peaty soils are black, heavy and highly acidic. They are deficient in potash & phosphate.

* Rill → Gully → ravine → sheet erosion.

Areas under ravines:	Salinity Affected areas:-
UP - 12.30 lakh hectares	(i) UP - 12.95 lakh hectares
MP - 6.83 "	(ii) Punjab - 12.25
Rajasthan - 4.52	(iii) Gujarat - 12.14
Gujarat - 4.00	(iv) West Bengal - 8.50
Punjab - 1.26	(v) Rajasthan - 7.28
	(vi) Maharashtra - 5.34

- Erosion by "Chos" is most marked in Hoshiarpur district of Punjab.

Thar - Rajasthan, Karal - Karnataka, Usar - UP.

Dhaincha (green fodder) is very helpful for salinity of soil.

ex. Dhaincha rice in UP.

- Application of gypsum reduces alkalinity.