

weathered particles of rocks.

- Parent Material
- Relief / Topography
- Climate
- Natural Vegetation
- Time
- Biological Factors.

---

8 types.

①

Alluvial Soil

15 lakh sq. km.



15 lakh sq. km.

alluvium /

46% of the total area.

deltic  
alluvium.

### Characteristics.

1. immature / weak

2. loamy / sandy - loamy / clayey loam

↳ porous  
↳ equal proportion of sand and clay  
deltas.

3. Pebbles (rare).

Kankar (calcareous concretions).

Nitrogen - Low

Adequate - potash, phosphoric acid and  
alkalies

+  
iron oxide, lime.

Found :-

1) Indo - Gangetic - Brahmaputra plains

2)

3)

Crops:

[rice  
wheat, sugarcane, tobacco, cotton, jute, maize,  
oilseeds, vegetables and fruits.]

Khadar

New

Bhangar

Old-

Bhabar Belt

8 - 16 kms —



8 - 16 km —

porous



alluvial fan (pebbly soils)

Teraï

↳ ill drained, damp (marshy),



silty soils.

Teraï soils — nitrogen and organic matter  
deficient in phosphate.

tall grasses + forests + wheat, rice, sugarcane,  
jute.

Khadar

Bhangar



newer alluvium

along the flood plains

most fertile region.

sandy clay, loamy,  
drier, less kankary,

old alluvium.

along the river beds.

more clayey  
composition.

dark coloured.

Kankars present

Alluvial Soil. (Rainfall)

↳ Above 100 cm — paddy

↳ 50 - 100 cms — wheat, sugarcane,  
tobacco, cotton

↳ below 50 cms

— Millets (Coarse grains).

(2)

Black Soil.

weathering of basaltic rocks.

↳ Cretaceous period.

Parent — volcanic rocks.



Deccan Plateau/

Deccan Trap  
or

Rajmahal Trap.

high temp. + low rainfall.

↳ Peninsular region.

Extent — 15% of the area.

titani ferrous magnetic compounds

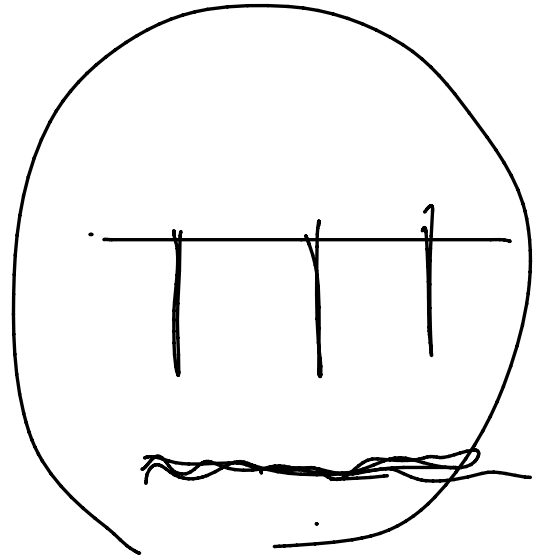
## Characteristics

↳ highly ✓  
retentive in nature

↳ gets very sticky

↳ develops  
deep cracks

↳



self ploughing  
capacity.

## Chemical composition.

10% of alumina

10% of iron oxide

8% of lime and magnesium  
carbonates

potash (0.5%)

phosphates, nitrogen, humus (negligible/  
low)

46 lakh sq km (16% of the total area)

↳ Maharashtra,  
M.P., Karnataka, Telangana  
Gujarat, T.N., A.P.

Black Soil. / Black Cotton soil / Regur

↳ Cotton.

↳ wheat, jowar, linseed, tobacco,  
castor, sunflower, millets,

↳ Rice and sugarcane

---

Red Soil. / Omnibus Soil.

Covering 2<sup>nd</sup> largest area of the country.

ferric oxide

top layer is red

below layer - yellowish.

18.5 % of the area.

① Red and Yellow Soil.

② Red sandy Soil. -  $\rightarrow$  40-60 cms

③ Red Alluvial Soil. - Along the river valleys.

Rich in iron + potash.

Deficient in phosphate, lime, magnesia,  
humus and nitrogen.

$\rightarrow$  Rice, sugarcane, cotton, | millets & pulses.

↳ Rice, sugarcane, cotton, etc.

Kaveri and Vaigai basins  
famous for red alluvium.

Karnataka + Tamil Nadu.

rubber + coffee farming

## Soil

Soil is the **topmost layer of the continental crust having weathered particles of rocks**. The soils of India are the product of **physical factors** as well as **human factors**.

Soil can be simply defined as a **mixture of small rock particles/debris and organic materials/humus** which develop on the earth's surface and **support the growth of plants**.

**Factors that influence soil formation—**

- **Parent Material**
- **Relief/Topography**
- **Climate**
- **Natural Vegetation & Biological factors**
- **Time**

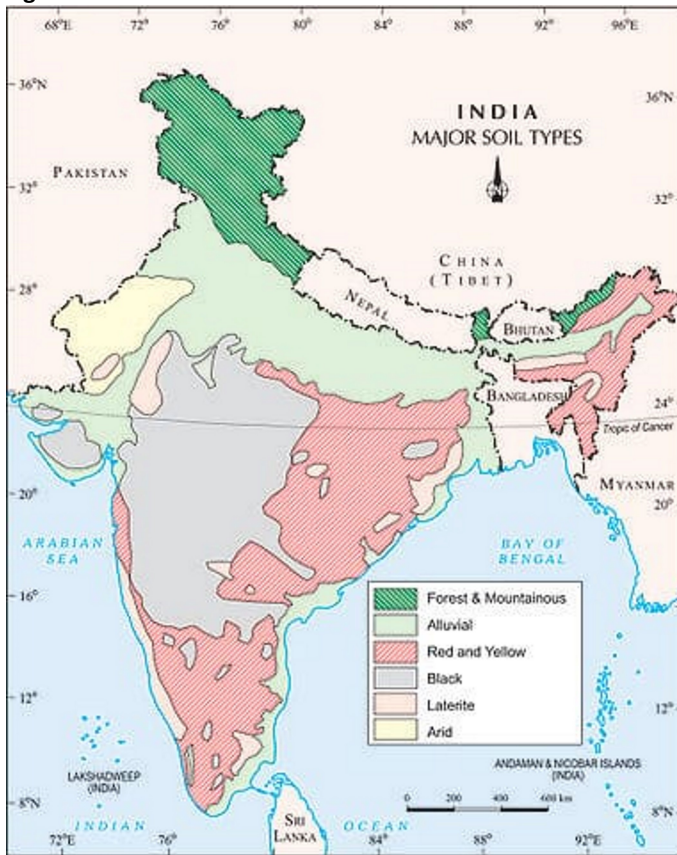
## Soil types in India (Types of Soil)

The first scientific classification of soil was done by **Vasily Dokuchaev**. In India, the **Indian Council of Agricultural Research (ICAR)** has classified soils into **8 categories**.

1. Alluvial Soil
2. Black Cotton Soil
3. Red Soil
4. Laterite Soil
5. Mountainous or Forest Soils

6. Arid or Desert Soil
7. Saline and Alkaline Soil
8. Peaty, and Marshy Soil/Bog Soil

This classification scheme is based on **constitutional characteristics – colour and the resource significance of the soils.**



## Alluvial Soils

- Alluvial soils are formed mainly due to **silt deposited by Indo-Gangetic-Brahmaputra rivers. In coastal regions, some alluvial deposits are formed due to wave action.**
- Rocks of the Himalayas form the parent material. Thus the parent material of these soils is of transported origin.
- They are the largest soil group covering about 15 lakh sq km or about **46 percent of the total area.**
- They **support more than 40% of India's population** by providing the most productive agricultural lands.

## Characteristics of Alluvial Soils

- They are **immature and have weak profiles** due to their recent origin.
- Most of the soil is sandy and clayey soils are not uncommon.
- They **vary from loamy to sandy-loam in drier regions and clayey loam towards the delta.**

- Pebbly and gravelly soils are rare. Kankar (calcareous concretions) beds are present in some regions along the river terraces.
- The soil is **porous** because of its loamy (equal proportion of sand and clay) nature.
- Porosity and texture provide good drainage and other conditions favorable for agriculture.
- These soils are constantly replenished by the recurrent floods.

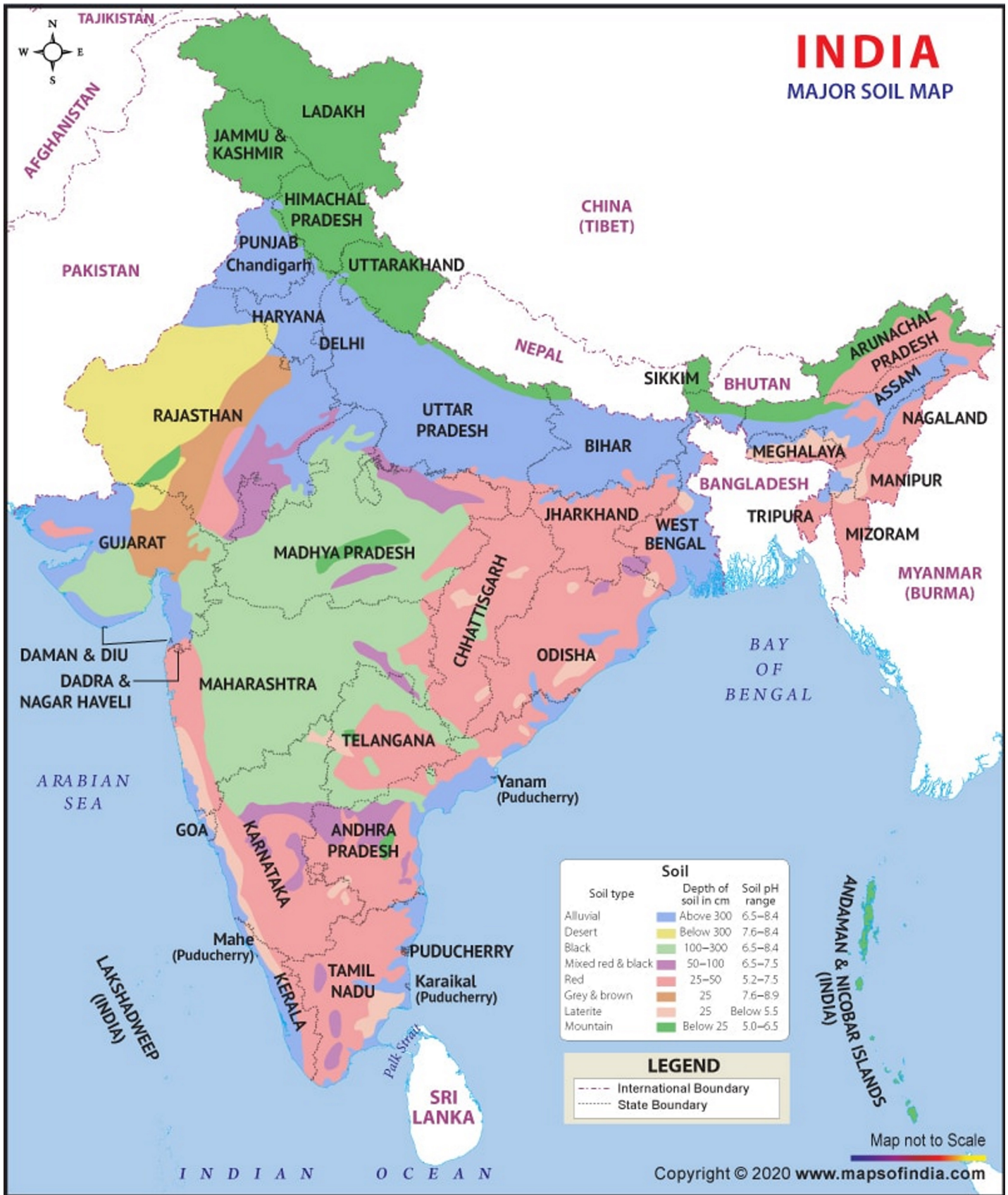
### **Chemical properties of Alluvial Soils**

- The proportion of **nitrogen is generally low.**
- The proportion of **Potash, phosphoric acid, and alkalies are adequate**
- The proportion of **Iron oxide and lime vary within a wide range.**

### **Distribution of Alluvial Soils in India**

- They occur all along the **Indo-Gangetic-Brahmaputra plains except in few places where the top layer is covered by desert sand.**
- They also occur in deltas of the **Mahanadi, the Godavari, the Krishna, and the Cauvery, where they are called deltaic alluvium (coastal alluvium)**
- Some alluvial soils are found in the **Narmada, Tapi valleys, and Northern parts of Gujarat.**





### Crops in Alluvial Soils

- They are mostly flat and regular soils and are best suited for agriculture.
- They are best suited to irrigation and respond well to the canal and well/tube-well irrigation.

- They yield splendid crops of rice, wheat, sugarcane, tobacco, cotton, jute, maize, oilseeds, vegetables, and fruits.

### **Geological divisions of alluvial soils**

- Geologically, the alluvium of the Great plain of India is divided into newer or younger khadar and older bhangar soils.

#### **Bhabar**

- The bhabar belt is about 8-16 km wide running along the Shiwalik foothills. It is a porous, northern most stretch of Indo-Gangetic plain.
- Rivers descending from the Himalayas deposit their load along the foothills in the form of **alluvial fans**. These alluvial fans (often pebbly soils) have merged together to build up the bhabar belt.
- The porosity of bhabar is the most unique feature. The porosity is due to deposition of huge number of pebbles and rock debris across the alluvial fans.
- The streams disappear once they reach the bhabar region because of this porosity. Therefore, the area is marked by **dry river courses** except in the rainy season.
- **The area is not suitable for agriculture and only big trees with large roots thrive in this belt.**

#### **Terai**

- Terai is an **ill-drained, damp (marshy) and thickly forested narrow tract** (15-30 km wide) to the south of Bhabar running parallel to it.
- The underground streams of the Bhabar belt re-emerge in this belt. It is a swampy lowland with silty soils.
- The **terai soils are rich in nitrogen and organic matter** but are **deficient in phosphate**.
- These soils are generally covered by tall grasses and forests but are suitable for a number of crops such as wheat, rice, sugarcane, jute, etc.
- This **thickly forested region provides shelter to a variety of wildlife**.

#### **Bhangar**

- The Bhangar is the **older alluvium along the river beds** forming terraces higher than the flood plain (about 30 meters above the flood level).
- It is of a more clayey composition and is generally dark-colored.
- A few meters below the terrace of the bhangar are beds of lime nodules known as "**Kankar**".

#### **Khadar**

- The Khadar is composed of **newer alluvium and forms the flood plains along the river banks**.
- The banks are flooded almost every year and a new layer of alluvium is deposited with every flood. This makes them the most fertile soils of the Ganges.
- They are sandy clays and loams, drier and leached, less calcareous and carbonaceous (less kankary). A new layer of alluvium is deposited by river floods

almost every year.

### **Alluvial regions with rainfall**

- **Above 100cm** – Suitable for paddy
- **B/w 50-100cm** – Suitable for wheat, sugarcane, tobacco, and cotton
- **Below 50cm**– Course grains (millets)

### **Black Soils**

- **Formation** –formed due to **weathering of these basaltic rocks** which **emerged during fissure eruption of the Cretaceous period.**
- The **parent material for most of the black soil are the volcanic rocks** that were formed in the **Deccan Plateau (Deccan and the Rajmahal trap).**
- **In Tamil Nadu, gneisses and schists form the parent material.** The former are sufficiently deep while the later are generally shallow.
- These are the region of high temperature and low rainfall. It is, therefore, a soil group typical to the dry and hot regions of the Peninsula.
- **Extent – 15 % of the area**
- **Black colour** is ordained by **titani-ferrous magnetic compounds** found in basalt.

### **Characteristics of Black Soils**

- A typical black soil is highly argillaceous [Geology (of rocks or sediment) consisting of or containing clay] with a large clay factor, 62 percent or more.
- In general, **black soils of uplands are of low fertility while those in the valleys are very fertile.**
- The **black soil is highly retentive of moisture.** It swells greatly on accumulating moisture. Strenuous effort is required to work on such soil in rainy season as it gets very sticky.
- In summer, the moisture evaporates the soil shrinks and is seamed with broad and deep cracks. The lower layers can still retain moisture. The cracks permits oxygenation of the soil to sufficient depths and the soil has extraordinary fertility.
- **When dry, it develops cracks and has blocky structure. (Self Ploughing Capacity)**

### **Colour of Black Soils**

- The black colour is due to the presence of a small proportion of **titaniferous magnetite or iron and black constituents of the parent rock.**
- In Tamil Nadu and parts of Andhra Pradesh, the black colour is derived from crystalline schists and basic gneisses.
- Various tints of the black colour such as deep black, medium black, shallow black , a mixture of red and black may be found in this group of soils.

### **Chemical Composition of Black Soils**

- **10 percent of alumina,**

- **9-10 percent of iron oxide,**
- 6-8 percent of lime and magnesium carbonates,
- Potash is variable (less than 0.5 percent) and
- **phosphates, nitrogen, and humus are low.**

Rich in iron and lime but deficient in humus, nitrogenous and phosphorous content.

### **Distribution of Black Soils**

- It is found in the **Deccan lava plateau region of India.**
- Spread over **46 lakh sq km (16.6 percent of the total area) across Maharashtra, Madhya Pradesh, parts of Karnataka, Telangana, Andhra Pradesh, Gujarat, and Tamil Nadu.**

### **Crops in Black Soils**

- These **soils are best suited for cotton crops. Hence these soils are called as regur and black cotton soils.**
- Other major crops grown on the black soils include wheat, jowar, linseed, virginia tobacco, castor, sunflower, and millets.
- **Rice and sugarcane are equally important where irrigation facilities are available.**
- Large varieties of vegetables and fruits are also successfully grown on the black soils.
- This soil has been used for growing a variety of crops for centuries without adding fertilizers and manures, with little or no evidence of exhaustion.

### **Red Soil**

- **This soil developed on Archean granite occupies the second largest area of the country.**
- The **presence of ferric oxides makes the colour of soil red,** ferric oxides occurring as **thin coatings on the soil particles.**
- The **top layer of the soil is red** and the **horizon below is yellowish.**
- **Extent – 18.5 % of the area**
- **Texture:** Sandy to clay and loamy.
- This soil is **also known as the omnibus group.**

### **Characteristics of Red Soils**

- Rainfall is highly variable. Thus, the soil has developed 3 subtypes
- **Red & Yellow soil** – rainfall is 200cm – NE India – Nagaland, Mizoram, Manipur Hills, parts of Malabar coast, quick drainage is needed
- **Red Sandy Soil** – Drier plateaus like Karnataka, TN, Telangana, Rayalseema – rainfall from 40-60cm
- **Red Alluvial Soil** – Along river valleys – has good fertility
- Well drained soil and structure is sandy

- Rich in iron and potash but deficient in other minerals.

### **Chemical Composition of Red Soils**

Generally, these soils are deficient in phosphate, lime, magnesia, humus and nitrogen.

### **Distribution of Red Soils**

They are mainly found in the Peninsula from Tamil Nadu in the south to Bundelkhand in the north and Raj Mahal in the east to Kathiawad in the west.

### **Significance**

- Once irrigated and added with humus, it gives a high yield because the mineral base is rich.
- It supports rice, sugarcane, cotton cultivation
- Millets and pulses are grown in drier areas
- Kaveri and Vaigai basins are famous for red alluvium and if irrigated well, are suitable for paddy
- Large regions of Karnataka and Kerala have developed Red soil regions for rubber and coffee plantation farming.