

# Soil Types in India

There are 10 Types of Soil in India out of which more than 40% area is covered by the Alluvial Soil. Soil is formed after the weathering of big rocks due to the extreme climatic changes like rainfall heat etc. Due to diverse and vast geography and demography, Soil Types in India vary drastically.

Soil is a material composed of five ingredients — minerals, soil organic matter, living organisms, gas, and water. Soil minerals are divided into three size classes — clay, silt, and sand. Variations in ingredients, rock debris, organic matter and climatic conditions leads to different types of soil in India.

## Types of Soil in India

There are a huge variety of types of soil in India. Some of the major soil types in India are mentioned below-

1. Alluvial soil
2. Red soil
3. Black / Regur soil
4. Arid / Desert soil
5. Laterite soil
6. Saline and Alkaline Soil
7. Peaty and Marshy soil
8. Forest soil
9. Sub-mountain soil
10. Snowfields

In ancient times, India's classification of soil types was based on fertility -

- If the soil type was sterile or not fertile, it was called Usara.
- If the soil type was fertile, it was called Uvara.

According to geographical location, Soil Types in India are classified as -

- Peninsular soil: This type of soil is also known as sedentary soil. This type of soil is carried and deposited repeatedly due to natural courses.
- Extra peninsular soil: Also known as azonal soil, is heavier and on the deeper layers due to wind and water movement.

## Soils of India with States

Based on scientific work, this classification of Soil Types in India is based on parameters such as time, topography, source of origin, natural factors, climatic conditions and biological factors. It is widely accepted throughout the world. Below is a table that explains the different types of soil and presents you with a systematic state-wise list;

Soil Types in India	Description of Soils in India	Properties of Indian Soil	Soil Distribution in India (State-Wise)
Alluvial Soil	Widely found in north India, it constitutes 43% of India's surface	Highly fertile  Clay-like texture  Grey  Potash rich, phosphorus deprived	Narmada Tapi Plain  Eastern coastal plains of India  Deltas of rivers Mahanadi, Godavari river, Krishna river and Kaveri
Arid or Desert Soil	Found in semi to fully arid conditions  Transported by wind and lacks moisture	Poor in nitrate  High salt content  Prevents water infiltration  Sandy in texture  Colour can vary from red to brown	Desert regions of India covering Western India  Western Rajasthan, Haryana, and Punjab and extends up to the Rann of Kutch in Gujarat
Black Soil or Regur Soil	Mature soil with water retaining and self-ploughing capacity  When wet, it swells up. When dry, it shrinks, forming cracks on the surface	Best suited for cotton cultivation  Clay-like texture  Black  Rich in iron, calcium etc.; Poor in nitrogen, phosphorous etc.	Deccan Region Gujarat, Maharashtra, Karnataka, and Madhya Pradesh on the Deccan lava plateau and the Malwa Plateau

Laterite Soil	<p>Found during monsoons</p> <p>Cover 3.7% of the country</p> <p>Works well with fertilisers; else are lowly fertile</p>	<p>Rich in iron oxide and potash</p> <p>Lack nitrogen, calcium etc</p> <p>Dries when exposed to air and used to form bricks</p>	<p>Madhya Pradesh Karnataka, Kerala, Tamil Nadu</p> <p>the Western Ghats, Eastern Ghats (Rajamahar Hills, Vindhyas, Satpuras, and Malwa Plateau)</p>
Mountain/Forest Soil	<p>Grown in hilly regions</p>	<p>Acidic Soil due to less humus</p> <p>Can be silty or coarse-grained depending upon elevation</p>	<p>Northern India, like Kashmir, Himachal Pradesh and North East India</p>
Peaty Soil	<p>Grown in areas with high rainfall</p>	<p>Rich in humus</p> <p>Suitable for vegetation</p>	<p>Southern Uttarakhand, Odisha, Tamil Nadu</p>
Red Soil	<p>Widely found in low rainfall areas</p> <p>It constitutes 18.3% of Indian soil</p>	<p>Porous structure</p> <p>Sandy texture</p> <p>Red due to ferric oxide or high presence of iron</p> <p>Potash, phosphorus, and nitrogen deprived</p>	<p>Eastern India</p> <p>Tamil Nadu Parts of Karnataka, southeastern Maharashtra, eastern Andhra Pradesh and Madhya Pradesh, Orissa, Chhattisgarh, Chota Nagpur (Jharkhand), south Bihar, West Bengal (Birbhum and Bankura)</p>

Saline/Alkaline Soil	Found in dry climate areas  Usually infertile due to high salt content	Sandy in texture  Low in calcium and nitrogen	West Bengal's Sundarban area, East Coast deltas, Western Gujarat
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## What is Soil and How is it Formed?

Earth is divided into three parts: the Crust Core and Mantle. Typically composed of very small bits of particles and humus, the soil is the loose upper layer of the mantle rock that supports plant growth. There are many types of soil but it, in general, is composed of mineral or rock particles, dead and decaying organic matter, moisture, and air. In addition to all these the other factors which influence soil formation are the parent material of the soil, the climate, vegetation, life forms, and the period.

Generally, the soil is composed of four main elements which are-

1. Air
2. Water
3. Organic and inorganic matter
4. Rocks

The formation of soil follows a complex process known as pedogenesis in which under specific climatic conditions the rocks and other elements of the natural environment break down and contribute to the soil formation. The type and texture of the soil are not the same everywhere. It depends on the density and profile of the soil and varies from region to region. For example, the eastern and southern part of the Deccan Plateau is rich in red soil, whereas Gujarat is rich in black soil. Every soil has a different level of fertility and our best for some or the other type of

## ICAR Soil Classification

ICAR, or the Indian Council of Agricultural Research, provides the modern classification of Soil Types in India.

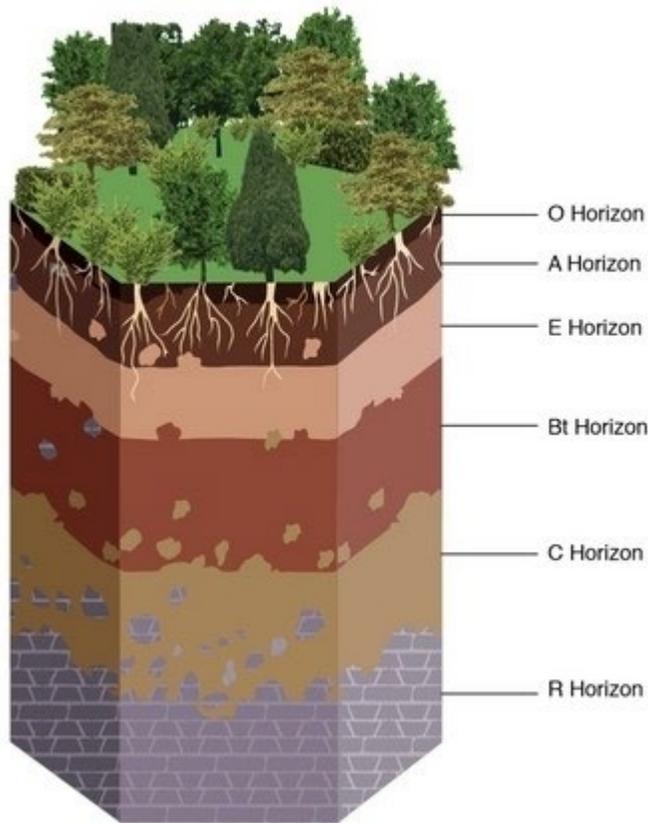
S.No	Order	Percentage
1.	Inceptisols	39.74
2.	Entisols	28.08

3.	Alfisols	13.55
4.	Vertisols	8.52
5.	Aridisols	4.28
6.	Ultisols	2.51
7.	Mollisols	0.40
8.	Others	2.92
		Total – 100

## What is the Soil Profile?

There are distinct layers in the soil as we have already learned that the soil formation process happens by breaking down the rocks due to the extreme climatic conditions along with strong winds and water. This process is called weathering. Now the nature of the soil entirely depends on the process by which it is formed and the environment in which it stays.

- The soil profile is the vertical section having different layers of soil where each layer is different from the other in terms of texture, colour and chemical composition.
- The uppermost layer of the soil, which is generally dark in colour, is rich in Minerals and humus. Humus is the dead and decaying matter found in the soil that increases the fertility of the soil and carries the nutrients from the soil to plants. Ideally, there are 4 layers of soil.
  - The uppermost layer is the topsoil, which is quite soft and called the A Horizon. The topsoil is the shelter for many living organisms like rodents, beetles, moles, and worms.
  - The layer next to the topsoil is known as the middle layer or B Horizon, which is slightly harder and more compact than the topsoil. Also, the amount of humus and Minerals found in the middle layer is considerably lesser.
  - The next Layer to the middle layer in the soil profile is the C Horizon, in which many small lumps of rocks have cracks in them. It is interesting to know that Horizon see or the third layer in soil formation is actually the first stage of the formation of soil.



## Alluvial Soil

Alluvial Soil in India is the most widespread soil in the Northern region of India. Deposition of materials by sea and river is called alluvium, and the soil formed due to the alluvium deposition is called alluvial soil.

- The Alluvial soil comprises 40% of the total soil in the country. This type of soil is mainly found in the Indo-Ganga and Brahmaputra plain, i.e. the whole northern plain and in some parts of the river basin in the south and some plateau region.

## Types of Alluvial Soil

Alluvial soil can be broadly categorised into two types, i.e. New alluvial soil and old alluvial soil.

- Old alluvial soils are found in slightly elevated areas far away from the river and are clayey and sticky.
- The new alluvial soil is found in the river's floodplain and is more fertile than the old alluvial soil.
- Alluvial soil is composed of debris and rock particles brought down by the rivers running from the Himalayas.
- Alluvial soil looks more like ash grey in colour and gives the texture of sandy loam to clay.
- Alluvial soil is poor in Phosphorus but is a rich source of Potassium.

- Crops Grown: Alluvial soil is suitable for the rabi and Kharif crop like cereals, cotton, oilseeds and sugarcane. Crops like wheat, maize, sugarcane, oil seed, and pulses are mainly cultivated in Alluvial soils.

## Laterite Soil

Laterite soil is primarily found in the region of Kerala, Tamil Nadu and Andhra Pradesh and is the best-suited soil for cultivating tree crops like cashew nuts.

- The Laterite soil comprises 3.7% of the total soil in the country.
- Laterite is a clayey rock or soil formed under high temperature and high rainfall and with an alternate dry and wet period.
- An interesting feature about Laterite soil is that it is called the monsoon soil as after the rain lime and silica get washed away and the soil left behind is rich in iron oxide and aluminium ultimately leads to the formation of Laterite soil.
- Minerals like potash and iron oxide are abundant in the laterite soil, whereas the organic matter phosphate, calcium and nitrogen are highly deficient in the soil.
- This type of soil is unsuitable for agriculture due to the high content of acidity and inability to retain moisture.

## Red Soil

Red soil is also known as yellow soil. These soils are red in colour due to the high concentration of Iron Oxide. It covers about the total land area of 18% of the country.

- Red soils develop on granite and gneiss rocks under low rainfall conditions, i.e. due to weathering of the metamorphic rocks.
- The red soil is best for crops like wheat, tobacco, oil seed, millets, and cotton.
- Red Soil is friable and medium fertile and found mainly in the Western Ghats, some parts of Odisha, Chhattisgarh, Tamil Nadu, and South-eastern Karnataka.
- It is also found in North-eastern and South-eastern Madhya Pradesh, Jharkhand and the Hills and Plateaus of North-east India.
- During monsoon or when the red soil is in its hydrated form, then it appears in yellow colour. The soil is red due to the excessive presence of iron in Metamorphic and crystalline rocks.

## Black Soil in India

Black soil is also called black cotton soil as it is the best-suited soil for cotton crops. The regur or black soils have developed extensively upon the Lava Plateaus of Maharashtra, Gujarat, Madhya Pradesh, and mainly Malwa and are formed due to volcanic activities.

- Black cotton covers a total land area of 15% of the country.
- Black soil can be found in the states of Andhra Pradesh, Tamil Nadu Maharashtra, Gujarat, Madhya Pradesh etc.
- As the same name, the colour of the soil is black but varies from black to grey.
- The black soil is rich in minerals like Iron lime magnesium aluminium and potassium but it lacks phosphorus nitrogen and organic matter.

- Apart from cotton other cash crops like pulses, castor, tobacco, sugarcane citrus fruits and linseed are cultivated in black soil.

## Mountain Soil

As the name says mountain soil is the soil that is found in hilly areas. Also, the texture of the mountain soil may vary from region to region. The characteristics of this type of soil are changed according to the altitudes.

- The mountain soil is loamy and silty in the valleys and coarse-grained on the upper slopes.
- The soil found in the lower valleys is highly fertile in nature and is also known as forest soil.
- In the snowy areas of the Himalayan range, the soil is acidic in nature and has much lesser humus as compared to the plain areas.

## Saline Soil

Saline soil is also called alkaline soil because it has a higher percentage of potassium magnesium and sodium and therefore is very infertile in nature. The presence of excess salt in the soil is due to the poor drainage and dry climate in the region.

- Since the soil has a higher percentage of sodium in it therefore it lacks nitrogen and calcium.
- Saline soil can be found in the Sundarban area of West Bengal, the Rann of Kutch Western Gujarat deltas of the eastern coast.
- Saline soil can be used to grow leguminous crops.

## Peaty and Marshy Soil

Marshy soil can be found in the regions which receive rich rainfall. Since they are highly moisturized in soil and are rich in water content the Marshy soil is very rich in humus and organic matter.

- Marshy soils are dense in nature due to the presence of water and appear black in colour.
- This type of soil can be found in the states of Bihar, Bengal, Tamilnadu, and Odisha.
- Crops like paddy rice cassava maize and fruits like Cranberries and sweet potatoes are grown in the Marshy soil.

## Desert Soil

Desert soil is found mainly in the state of Rajasthan and covers a total land of 4.42% of the country. In the absence of sufficient wash by rainwater, soils have become saline and rather unfit for cultivation.

In spite of that cultivation can be carried on with the help of modern irrigation.

- The colour of desert soil may vary from brown to Red and vice-versa.
- Desert soil is saline in nature because the salt content in the soil is very high in it.
- Desert soil is rich in phosphate but lacks nitrogen.
- The kankar layers are created which is caused of the presence of higher calcium concentration in the soil which lowers the soil horizons. This kankar layer prevents the water from penetrating deep. So when water is supplied by irrigation methods, the moisture of the soil is available for long-term plant development.

## Soil Erosion

The phenomenon of removal of the topsoil from the soil profile due to natural or man-made reasons is called soil erosion. Generally, the process of weathering rocks and formation of soil and erosion of soil goes hand in hand, but under certain extreme climatic conditions like heavy rainfall or floods, the topsoil gets eroded.

- The areas that receive heavy rainfall, the water is the main reason for soil erosion.
- As the result of soil erosion, the eroded materials are carried downstream by the water bodies. This results in the reduction of the capacity of the water body to carry water and creates damage to the crops, thereby increasing the flooding.
- Deforestation is another highly talked about the reason for soil erosion. The roots of please find the soil with it and anchor itself. When the trees are slashed down then the soil becomes loose and ultimately gets eroded..

## Soil Conservation

A technique called "soil conservation" is used to keep the soil fertile, stop soil erosion, and restore deteriorated soil. By avoiding or reducing soil particle separation and its transport in air or water, farming operations and management measures known as soil conservation practices aim to mitigate soil erosion.

- Some of the corrective procedures used to stop soil erosion include contour bunding, contour terracing, controlled grazing, regulated forestry, cover crops, mixed farming, and crop rotation.
- In addition to stopping the uncontrolled cutting down of trees, afforestation (tree planting) aids in minimising soil erosion.
- Floods and the issue of soil erosion go hand in hand. Floods typically happen during the wet season. Therefore, efforts for the storage of floodwater or the redirection of additional rains must be done. The Ganga-Kaveri connection Canal Project is one example of how rivers might be connected.
- To solve the issue of soil erosion, ravines and gullies need to be restored. In the Chambal ravines in Madhya Pradesh, a number of such programmes that involve plugging gully mouths, building bunds across the gullies, levelling the gullies, and planting cover plants are being implemented.