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ASAC 1101 : FUNDAMENTALS OF SOIL SCIENCE (2+1)

Level : B.Sc (Ag), I semester

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Topic

Soils of India



SOILS OF INDIA

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WHAT IS SOIL?

SOIL IS THE THIN LAYER OF LOOSE MIXTURE OF SMALL ROCK PARTICLES AND ROTTING ORGANIC MATTER THAT COVERS MUCH OF THE WORLD'S LAND SURFACE.

The major soil groups are:

- ▶ Alluvial soil
- ▶ Black soil
- ▶ Red soil
- ▶ Laterite soil
- ▶ Desert soil
- ▶ Mountain soil
- ▶ Saline & Alkali soil
- ▶ Peaty & Marshy soil

Black Soil



- ▶ Black soils are mainly found over the Deccan lava tract (Deccan Trap) including Maharashtra, Madhya Pradesh, Gujarat and Andhra Pradesh.
- ▶ These soils are found in river valley of Narmada, Tapi, Godavari and Krishna.
- ▶ These soils have been formed due to the weathering of the lava rocks.
- ▶ This is also known as the Regur soil and Cotton soil. These soils are rich in lime.

Black Soil






- ▶ Iron, magnesia and alumina but lack in the phosphorus, nitrogen and organic matter.
- ▶ It is formed by the weathering of igneous rocks and the cooling of lava after a volcanic eruption.
- ▶ In India, extensive deposits of black soil are found in the Deccan Plateau which includes parts of Maharashtra, Madhya Pradesh, Gujrat, Andhra Pradesh, parts of Tamil Nadu. In the upper parts of Godavari and Krishna, the north western part of Deccan Plateau, black soil is very deep.

BLACK SOIL IS:-

- ▶ High clay content
- ▶ They swell and become sticky when wet and shrink when dried
- ▶ During dry season, these soils develop wide cracks.
- ▶ Rich in lime and iron, magnesia and alumina
- ▶ Also contain potash
- ▶ Lack phosphorus, nitrogen and organic matter
- ▶ Colour of the soil ranges from deep black of grey. Highly moist retentive.

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- ▶ Known as Black Cotton Soils.
 - ▶ Dark in colour, suitable for cotton cultivation Are residual soils, i.e. they are formed at the place of their origin over the underlying rocks.
 - ▶ Are formed in situ, i.e. formed where they are found. Therefore, they are essentially formed by weathering of Deccan Trap.
 - ▶ Spread over an area of 5.4 sq. km., i.e. 16.6 % of the total land area of the country.

CHARACTERISTICS:



- ▶ Fine textured and clayey in nature .
- ▶ Has high qualities of lime, iron, magnesium, and generally poor percentage of phosphorous, nitrogen and organic matter.

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- ▶ Black in colour as it is formed from weathered lava rocks
 - ▶ Soil's colour also varies from Black to Chestnut brown
 - ▶ Very clayey and therefore highly retentive of water. Because of high clay content, these soils expand when wet and become difficult to plough.
 - ▶ During dry season, black soils shrink and develop big cracks which help in air circulation .
 - ▶ Soil is very fertile in most of places.
 - ▶ Poor in nitrogen, phosphorous, potassium, and organic matter and rich in potash and lime.
 - ▶ Needs irrigation support for cultivation
 - ▶ Contains soluble salts in small quantities.
 - ▶ Cultivation is done with the help of fertilizers .
 - ▶ Suited for dry farming as it does not require much moisture.

CROPS:



- ▶ Cotton cultivation
- ▶ Suitable for growing cereals, rice, wheat, jowar, oilseeds, citrus fruits and vegetables, tobacco and sugarcane.
- ▶ Their moisture –retentiveness makes them suitable for dry farming.

BLACK SOIL (SUMMARY)

- ▶ Black soil is made from lava-solidified rocks and is also called as 'Black Cotton Soil' or 'Regur Soil'.
- ▶ The black colour of regur soil is due to its iron content, deriving from plutonic lava materials.
- ▶ Mainly found in the Deccan region which includes the major part of Maharashtra, Gujarat and part of Tamil Nadu, Andhra Pradesh and Madhya Pradesh.
Cotton is most important crop

RED SOIL



- ▶ These soils are found in Chhotanagpur plateau, Telangana, Nilgiris, Tamil Nadu, Karnataka, Andhra Pradesh and periphery areas of Deccan Plateau.
- ▶ These soils have been formed due to decomposition of underlying igneous rocks under heavy rainfall.
- ▶ These are suitable for the cultivation of millets, pulses. Lin-seed, tobacco etc. These soils are poor in Lime, Nitrogen and humus.

RED SOIL




CHARACTERISTICS:



- ▶ Red soils are reddish in colour due to the presence of iron.
- ▶ This type of soil is found in south India as well as in the Chota Nagpur Plateau.
- ▶ Formed due to weathering of ancient crystalline and metamorphic rocks.

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- ▶ Parent rocks are acid granites and gneisses.
 - ▶ Occupy an area of about 3.5 lakh sq km – 10.6% of the total land area of the country .
 - ▶ These are transported type soils.
 - ▶ Found to a depth of 500 meters.
 - ▶ Coarsest in the upper section of the valley, medium in the middle and finest in the delta region.
 - ▶ Are mostly light to dark colour depending on new or old alluvium.


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- ▶ Rich in potash and become fertile with the proper use of fertilizers and irrigation.
 - ▶ Deficient in nitrogen, lime, magnesia, humus and phosphate
 - ▶ Found mainly on the plateau region of peninsular India, the Malwa Plateau and the Chotanagpur Plateau.
 - ▶ It covers almost the whole of Tamil Nadu, Karnataka, Andhra Pradesh, south-eastern Maharashtra, eastern parts of Madhya Pradesh, parts of Orissa, Jharkhand and Bundelkhand.


LATERITE SOIL

- ▶ **Laterite** = brick (Latin word)
These soils are formed under conditions of high temperature and heavy rainfall with alternate wet and dry periods.
- ▶ Thus its formation takes place strictly under monsoon conditions. Residual soils formed by leaching in areas of heavy rain.
- ▶ Leaching is a process in which the nutrients get percolated down below the soil due to heavy rainfall; thus leaving the top soil infertile. Also called DESILICATION.

LATERITE SOIL



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- ▶ Laterite soils are found in elevated areas which receive very high rainfall as a result, top soil gets washed away.
 - ▶ This process is called leaching. The soil, therefore, loses its fertility to a great extent.
 - ▶ It covers an area of about 2.4 lakh sq km. These soils are found in the north- eastern state of Meghalaya in India.

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- ▶ coarse texture, soft and friable.
 - ▶ red due to the presence of iron oxide which is formed by leaching. The soluble plant foods like potash are removed from the top soil leaving alumina and iron oxide.
 - ▶ a porous soil, silica is removed from it by chemical action. Is poor in lime and magnesium, and deficient in nitrogen.
 - ▶ Laterite soil is formed by weathering of lateritic rocks, low temperature and heavy rainfall with alternating dry and wet periods.


Types of Laterite soil

TWO TYPES :

- ▶ Upland Laterites and Lowland Laterites
- ▶ Upland laterite:- are formed over hills and uplands. From they were transported by steams towards lowlands.
- ▶ Such transported soils are known as Lowland Laterites.

- ▶ Laterite soil does not retain moisture and hence is not fertile. It suits only special crops like Tapioca, Cashew nuts, etc. It is acidic in nature as alkalis are leached.
- ▶ Laterite soils are found on the highland areas of the plateau. These are found in Karnataka, Kerala, Tamil Nadu and hilly regions of Assam, Raj-mahal hills and Chhotanagpur plateau.



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- ▶ These are shallow, acidic and less fertile soils.
 - ▶ These soils are poor in lime but rich in iron.
 - ▶ So these are suitable for plantation of crops like tea, rubber, coffee etc.
 - ▶ Since low fertility because of high acidity and low moisture retention, manuring and other activities are required to make them suitable for growing crops such as rice and sugarcane.
 - ▶ Paddy is grown on lower elevations whereas tea, cinchona, rubber, and coffee are grown on higher elevations.
 - ▶ It is also suitable for building purpose.

ALLUVIAL SOILS

- ▶ Alluvial Soil (Riverine soil)
It covers about 40 percent of land area of the country.
- ▶ They are depositional soils, transported and deposited by rivers and streams.
- ▶ Through a narrow corridor in Rajasthan, they extend into the plains of Gujarat.
- ▶ These soils are formed by the deposition of fine sediments and silt by the rivers along their banks.
- ▶ In India, alluvial soils are mostly found in the Great Northern Plains, the coastal plains and river deltas


ALLUVIAL SOILS




In Peninsular region, they are found in deltas of the east coast and in the river valleys. These soils originate from the transported alluvium brought by the rivers. They can be divided into two types:

1. **Young Khadar soils**: these are newer alluvium of sandy, pale brown composition, found in lower areas of valley bottom which are flooded almost every year.
2. **Old Bhangar soils**: these consist of older alluvium of clayey composition and are dark in colour.



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- ▶ They are coarse in nature, contain kankar (lime nodules), pebbles, gravels. They are found 30 m above flood level of the rivers. They represent the 'riverine alluvium' brought down by Satluj, Yamuna, Ghagra and other rivers of Indo-Gangetic Plains.
 - ▶ These soils are the most widespread soils covering an area of 8 lakh sq. km from Punjab to Assam.
 - ▶ These are found in the river basin, flood plains and coastal areas.
 - ▶ These soils are deep soils rich in potash but poor in nitrogen.

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- ▶ These soils are covering 22.16 per cent of total area of India.
 - ▶ The major rivers which are contributing in the formation of the alluvial soils are :Ganga river, Brahmaputra river, Sutlej river, Mahanadi river , Godavari river , Krishna river


AREA/STATES

- ▶ Alluvial soils of two types: deltaic coastal and inland alluvial. Found in Uttaranchal, U.P., Bihar, W. Bengal, Punjab, Haryana & Assam.
- ▶ In south, found in the plains and deltas in Andhra Pradesh, Orissa, Tamil Nadu.
- ▶ Useful for agriculture since it is fertile.
- ▶ Soil is rich in potash and lime but poor in nitrogen and humus.
- ▶ Important crops – wheat, rice, sugarcane, cotton and jute.
- ▶ It is very suitable for jute.

SUMMARY - ALLUVIAL SOIL

- ▶ Alluvial soils are most extensive soil – most part
- ▶ It is formed due to deposition of the rivers brought down from the upper course of the river.
- ▶ It is found on the combined plain land of the Indus and the Ganga-Brahmaputra rivers which includes Punjab, Haryana, U.P., Bihar and West Bengal.
- ▶ The Deltaic alluvium is found in deltas of the Ganga-Brahmaputra, Godavari, Mahanadhi and Kaveri rivers.
- ▶ The Coastal alluvium is found in coastal sides of Peninsular India.

Called 'Riverine Soils' – it is originally found in river basins .



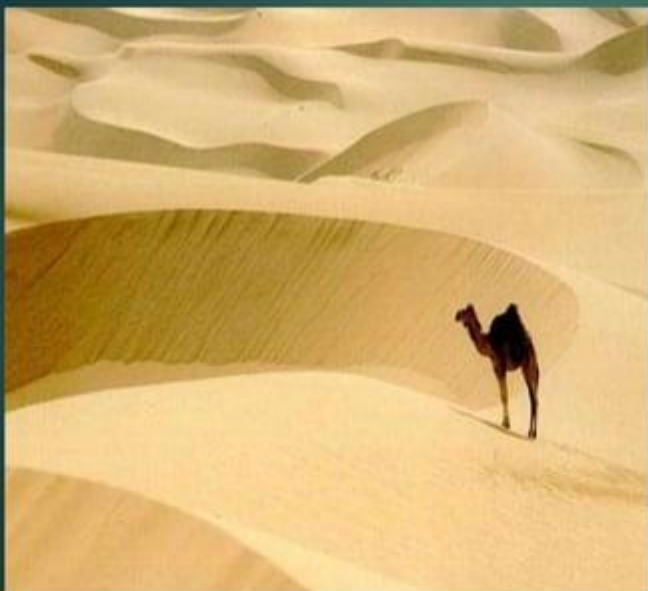
Rice and wheat – 2 main crops being cultivated in the alluvial soil.

- ▶ Deltaic alluvium is more fertile than the coastal alluvium because as the coastal alluvium being mixed with sands, has been lacked the meagre power of water-preserving than its counter parts.
- ▶ The deltaic alluvium has been rich with newly river-deposited alluvial components.
- ▶ The economy of India, Pakistan and Bangladesh are dependent on alluvial soils.

Inland alluvium and Coastal Alluvium

- ▶ Inland Alluvium soil is found in Indus river plains and the Ganga-Brahmaputra river plains whereas Coastal alluvium is found on the coastal regions of peninsular India.
- ▶ Inland Alluvium soil is found in Punjab, Haryana, U.P. Bihar, W. Bengal and Coastal Alluvium is found in Gujarat plains

Desert soil






- ▶ **DESERT SOIL** Contains soluble salts. Originated by Mechanical disintegration & wind deposit. Porous and coarse. 90% sand & 5% clay. Rich in Nitrates & Phosphates. Poor in Nitrogen & Humus. Friable, sandy & low moist content. 1.4 Lakh sq km.

Mountain soil



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- ▶ MOUNTAIN SOIL Found in hill slopes.
 - ▶ Formed by deposition of organic matter from forest.
 - ▶ Rich in humus.
 - ▶ Poor in Potash and Lime.
 - ▶ Areas: Assam, Kashmir, Sikkim & Arunachal Pradesh.
Crops: Tea, Coffee, Spices & Tropical Fruits.

Saline and Alkaline soil






- ▶ SALINE & ALKALINE SOIL Contains salts like Sodium, Magnesium, Calcium. Infertile, unfit for cultivation. Sandy to loamy in texture.
- ▶ Areas: Parts of Gujarat, Rajasthan, Punjab, Haryana, U.P & Maharashtra.

Peaty & Marshy soil



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- ▶ PEATY AND MARSHY SOIL Occur in Humid region.
 - ▶ Formed by accumulation of organic matter. Black in colour.
 - ▶ Highly acidic and heavy. Areas: Kottayam & Alleppey in Kerala, Coastal Orissa, Sundarbans of W.B

Thank You 😊