

# CLASSIFICATION OF SOIL IN BHAGALPUR DIARA LANDS

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## ABSTRACT

Soils of the study area may be broadly put under two from their genesis point of view, viz., (a) Alluvial and (b) Sedentary. Alluvial soils have developed on the alluvium brought down by the river Ganga and its numerous right and left bank tributaries. This soil may again be sub divided into two categories viz., recent and old alluvium. But the study area is mainly concerned with recent alluvium soil only.

**Keywords :** *Alluvium, Old Alluvium Soils, Entisols, Inceptisole and Alfisols etc.*

## Introduction :

The soils of Ganga Diara of Bhagalpur District are controlled mostly by the river Ganga. The soils occurring north of the Ganga river are recent alluvium and may be grouped in "Entisol" while the southern portion contains recent alluvium and old alluvium soils, almost in sequence.

These three groups of soils in the south may generally be classified in order of Entisols, Inceptisole, and Alfisols as per soil taxonomy soil survey staff, (1975). In addition, black soils of strong vertic nature also occur in south portion and they resemble to 'vertisols', especially in areas locally known as the Tal land, where backwater accumulates in basin shaped depression. The 'Entisols' occurring in Bhagalpur district is mostly known as Diara land soil which is broadly designated as recent alluvium. As one goes to south the soil profile indicates horizon differentiation which is generally the characteristic of the old alluvium. These soils known as old alluvium are mostly 'Inceptisols'.

## Recent Alluvial Soil:

These soils are found north of the Ganga river contensive in areas comprising Bihpur, Naugachhia and Gopalpur Blocks of the Naugachhia Sub-division. Generally, soils are of light texture near the river courses and these away from them are relatively heavy. They are characterized by well-drained or moderately well drained light yellowish brown, single grained silty and sandy surface soil. The pH of the soil varies neutral to strongly alkaline. The soil usually exhibits multiple horizons with alternative layers of silt and sand. Each layer is clearly differentiated from the other in colour, texture, etc. Bhadaï crops are grown on them profitably. With the help of irrigation these soils may become more suitable for growing a great variety of crops.

Diara lands occur within the two banks of the river. In the process of silting and scouring, these soils have developed in between the natural levee that usually get inundated mainly during June-October and are periodically subjected to erosion, meandering, braiding and shifting of courses. Soils are generally coarse textured and surface texture changes with the distance from riverbank where they develop into heavy texture. Close to the banks the soils are predominantly light textured owing to an admixture of silt and sand. They are alkaline in reaction (pH 7.6 to 8.6), pale alive (D5Y 6/3) to white (D5Y 8/2) in colour with higher value (6-8) and lower value (1-4), low in organic carbon content (0, 04-0.52 percent) The uneven distribution of mechanical separates shows the stratification depending upon the mode of deposition of soil particles. This is an indication that soil is of recent origin. Soils are of low to high fertility level depending upon the sediments carried and deposited by currents of rivers/streams. (Singh, R.N. and Diwakar, D.P.S., 1989)<sup>1</sup>. The important Diaras of the Ganga are Shankarpur and Chawania. Usually Diara lands are almost monocropped and in great majority of the cases, the crops are raised only in the Rabi season due to inundation of the tract with flood waters for nearly 3 to 4 months, *i.e.* from July to October. If rains do not occur in the Diara strips early, the Bhadai crop of maize may be grown advantageously even on lowlands. The Diara suffer from hot and dry summer leading to moisture stress, poor water retention capacity of the light textured soils, highly permeable sandy soils near the banks and in those areas which are still in formative phases and where erosion and deposition are the usual phenomena.

### Old Alluvial Soils

These soils are usually found on the southern bank of the river Ganga in an elongated form generally known as Tal land. They comprise nearly flat lands away from the source rivers and get flooded once or twice in a year. The sediments deposited are of fine materials. The soils are medium to heavy textured and of grey to greyish-yellow in colour. The fertility status is fairly good. In reaction these soils are neutral to slightly alkaline. Such soils are example of centenary soils. The soils are mostly imperfectly drained to moderately and moderately well drained (Jha, P.P., 1969)<sup>2</sup> Soils of these areas differ from Diara land but has nexus with the economy of that area because these soils most suited to paddy are grown in medium upland to lowland. These paddy fields either remain fallow during the Rabi season or grow paira (catch) crops of Khesari, Gram and linseed during the Rabi harvest. The moisture range in which physical condition of such soil is fairly suitable for tillage and sowing operations is quite narrow. These soils have impeded drainage and poor water retention. In these soils, only Rabi and occasionally Bhadai crops are grown.

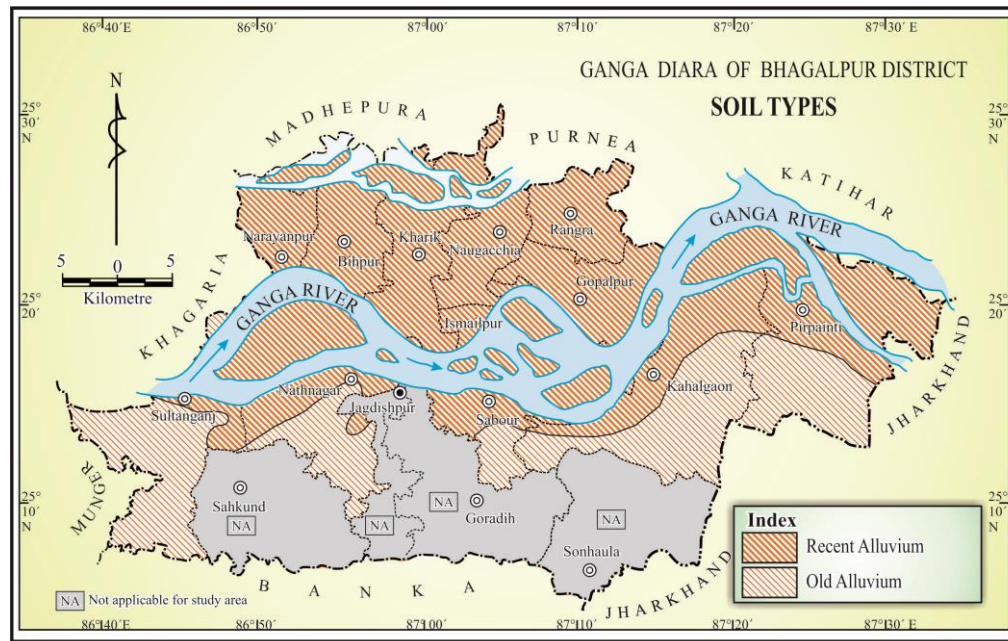
### Recent Alluvium:

The Ganga Diara soils are genetic alluvial all devoid of distinct horizons. Such soils show definite layering. The topsoils vary from pure sand to clay and are invariably underlain by sand layers at varying depths. Usually, texture is coarse and light at the proximity of the rivers and becomes heavier as the distance from the river beds increases. Since Diara soils are light textured with preponderance of sand and silt, their nutritional capacity, particularly if phosphorous is limited. However, these soils are fairly productive if nutrients are supplemented.

## Soil Association

A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and is named for the major soil group. The soil in one association may occur in another, but may reveal a different pattern. The soils in one association may be more or less the same or may be different, but the pattern in which they occur is fairly uniform (Jha, 1966). The following soil associations of the district have been identified.

It is now worthwhile to present a vivid picture of the soil association that has been found in the Ganga Diara of Bhagalpur District. (Fig. 1.1).



**Fig. : 1.1**

**(i) Parsandih-Mairwa-Narayanpur-Kamlakund Association:**

This association occupies the Diara portion of the Ganga in Bihpur and Kahalgaon revenue lands. The soil is of recent origin, Hence, amount and nature of deposits vary from place to place. At some place, silty clay has been deposited while at other place, sandy silt to loam soils are found. This association occupies Amapur, Birbanna, Sahabad Gangpur, Jairampur, Chakrami and Bihpur Panchayats. The reaction is slightly alkaline. These soils are somewhat poorly to excessively drain. The soils of this association generally get inundated during the rainy season<sup>3</sup>.

**(a) Mairwa Series:**

This series is characterized by sandy sub-soil and forms part of new alluvium. It occurs on alluvial fan and slightly alkaline in reaction (pH 7.4 to 7.8). It is well drained soil. The important soil types are sandy silt, silt, loam, and light textured group.

**(b) Narayanpur Series:**

The soils of this series are of recent origin and have preponderantly Diara characteristics. The surface texture of soils is light and is underlain by medium or light medium sub-soils. The pH is slightly alkaline (pH 7.4 to 7.8) and the soil is well drained. The colour varies between olive and light grey.

**(c) Kamlakund Series:**

It occurs along Diara of the Ganga river. The soils are of recent origin and light throughout the profiles. They remain inundated during rainy season, where silt is deposited all the year round along the rivers. The pH of the soils of this series is alkaline. The percentage of calcium carbonate varies between 5 and 10 whereas colour of the soil differs from pale olive-to-olive grey.

**(ii) Motichak-Milki-Sarwasa Association:**

This association occurs in the Diara area of the Kosi and Ganga river in north east. The soils are light throughout and are subject to inundation for some period of the year. Erosion also takes place here and there along the courses and may cause change in river courses. The soil is alkaline in reaction and the deposition of sand, silt and clay takes place. The association is found in Kahalgaon, Bihpur and part of Bhagalpur revenue thana. This is very fertile soil and Wheat, Maize, Gram, Khesari, Peas, Black gram *etc.* are grown on this soil.<sup>4</sup>

This association is found in Amapur Diara, Budhuchak, Birbanna, Sahabad Gangapur, Bihpur, Bishunpur, Nuruddinpur, Chak Rami and Jairampur Panchyats.

**(a) Motichak Series:**

This series occurs in the vicinity of rivers. The soils are of recent origin and are characterized by light textured surface soils which are underlain by medium textured sub-surface soil or vice-versa. The pH is slightly alkaline and percentages of free calcium carbonate are less than 5. The colour varies between pale yellow and olive grey.

**(b) Milki Series:**

The surface soil of these series comprises of medium one underlain by medium and light sub-soil. They are slightly alkaline and the percentage of free calcium carbonate is less than 5. The soils reveal more or less Diara characteristics, and are usually almost an annual feature.

**(c) Sarwasa Series:**

Light coloured and light textured layers throughout the profile depth characterize this series. The soil reaction is neutral to slightly alkaline. The series occupies the central portions of the flat lands of the district and is somewhat poorly drained.

**(iii) Milki-Ratanpur-Sripur Association:**

This association occurs broadly in Kahalgaon, Bihpur revenue thana. The soils are recent alluvium and tend to be slightly alkaline (pH 7.4 to 7.8) in reaction. They are somewhat poorly drained and are prone to occasional flooding. The surface texture is loam and silt loam whereas underlying soils are loam, silt loam and



clay loam. This association occurs broadly in Amapur Diara, Birbanna, Bishanpur Nuruddinpur, Jairampur and Bihpur Panchayats. Generally Bhadaï and Rabi crops are profitably grown.

**(a) Ratanpur Series:**

This series occupies plain positions near rivers and are occasionally flooded during peak storms. It occurs in portions of Bihpur, Kahalgaon revenue thana. The series is characterized by medium textured soils, among which silt loam dominates throughout the profile. The pH is slightly alkaline (pH 7.4 to 7.8). The soils are of recent origin and are influenced by the rivers like the Ganga and Kosi which at places act conjointly.

**(b) Sripur Series:** The series occurs undulating and plain lands capes. It consists of soils having silt loams to silty clay loam as sub-soil. The soils are alkaline in reaction, grey in colour and poorly drained. The series also forms part of the new alluvial found in Bihpur and Kahalgaon revenue thana. The individual soil types of the series are locally known as Sripur silt loam, Sripur silty clay loam.

**(iv) Parasbana-Debipur-Patwa-Ahiro Association:**

This association is mostly found in Amapur Diara, Budhuchak and Birbanna Panchayats. The pH varies from slightly acidic to neutral. The soils are somewhat poorly drained. The lower layers contain a concentration of iron and calcium carbonate and are generally mottled. The main crops are Sugarcane, Maize, Red gram *etc.* grown on upland, whereas paddy wheat, gram, *etc.* are raised on medium uplands and lowlands.

**(a) Parasbana Series:**

The series extends in Kahalgaon thana. The soils occur on plain, terraced and slightly undulating landscape. They show acidic reaction, exhibit brown lineage and are imperfectly drained, medium textured sub-soil the individual soil types of the series are Prasbana sandy loam and Parasbana silt loam<sup>5</sup>.

**(b) Debipur Series:**

This series is characterized by imperfectly drained surface soils having loam texture underlain by day loam as its sub-soils. The soils are neutral in reaction and are co-extensive in the revenue thana of Kahalgaon.

**(c) Patwa Series:**

The soils of the series are characterized by sandy loam as the surface soil underlain by loam as its sub-soil. The layers of clay loam and clay are found below loam.

**(v) Paharpur-Hario-Sripur Association:**

This association is found in Bishunpur, Nuruddinpur, Sahabad Gangpur, Chakrami, Amapur Diara, Budhuchak and Birbanna Panchayats. The soils of Paharpur series are very heavy throughout. The pH is slightly alkaline and percentage of free calcium carbonate is less than 5. The soils are generally moderately well drained. The crops that are grown in this association are Wheat, Gram, Red gram, Peas, Mustard, and Maize *etc.*

**(vi) Sakrawan-Jogia-Khanpur-Gopalpur Association:**

The soils of this association are characterized by silt loam, loam and clay loam as surface soils that are underlain by clay loam and clay. They vary between neutral to slightly alkaline in reaction (reaction (pH 6.6 to

7.8) and are somewhat poorly drained. The lower layers contain concentration of calcium and iron. The crops are grown are usually paddy, wheat, grain, peas *etc.*

**(a) Sakrawan Series:**

This series is co-extensive in Karchi, Sultanganj Amapur Diara, Budhuchak and Birbanna Panchayats. The soils of this series are characterized by poorly drained clay loam sub-soil, which is alkaline (pH to 7.4 and above) in reaction. The colours mostly vary from grey to light yellow. The series is found on plain medium upland and on undulating land. Usually, concentration of iron and calcium carbonate are found in lower layers<sup>6</sup>.

**(b) Jogia Series:**

The series is spread over in Bhagalpur, Sultanganj revenue thana. The sub- soil is clay loam, which culminates into a certain degree of profile development. These soils occur on lowland topography, generally on plain surface that is subject to intermittent flooding<sup>7</sup>. The colour of the soils is brown and is strongly alkaline (pH 8.6 to 9.0) in reaction. The soils are poorly drained and contain a concentration of iron and calcium carbonate here and there, apart from being mottled. The surface soils are clay loam, silt clay loam, loam, and silt. A typical profile of the soil series is given below :

**(c) Khanpur Series:**

This series occurs in Sultanganj block. The soils are generally clay loam, loam and silty clay loam; the sub-soils of the series are clay containing iron and calcium concentration and are often mottles. The soils are neutral in reaction (pH 6.6 to 7.3) and occur on plain to slightly undulating and terraced landscapes<sup>8</sup>.

**(d) Gopalpur Series:**

The soils of the series are characterized by silt loam to loam as surface soil underlain by clay loam sub-soil. They are comparatively of recent origin and are slightly too medium toward alkalinity in reaction. The percentage of free calcium carbonate varies between 0.5 and 0.10. Available phosphorous range is from 3 to 11 ppm. The soils are moderately well drained to somewhat poorly drained, and are co-extensive mostly in Kahalgaon, Bhagalpur and Sultanganj revenue thana.

Texture of the soil refers to the physical parameter determining the relative proportion of sand silt and clay. It is an expression to indicate the coarseness or fineness of the soil, as determined by the relative proportion of the various sized primary particles in a soil mass.<sup>9</sup> The texture of soils in the study area varies generally from sandy through loam to clay loam. They have been grouped under (i) light (ii) medium and (iii) heavy textured varieties. The chief textural classes and their subheads within the scheme of grouping have been done according to the size of grains and separates, *e.g.*, sand, silt, and clay. Out of these eleven broad textural classes *viz.* sand, loamy sand, sandy loam, silty sand and sandy silt (light textured), loam and silt loam and clay loam (heavy textured) soils have been recognized in the region. It is only in the general sense that a particular type of soil is uniform, extensive over large areas. One textural variety generally covers small patches and merges very imperceptively into the other. Thus, within the same Panchayat, clay loam is not widespread nor is all of it loamy or sandy. Small patches of heavy medium or light textured soils are rather commonly found than a particular soil type, being extensive nature as the land change. Thirdly, due to fluvial morphology and behaviour of drainage courses, soil texture is changeable in nature as the land change gradually into silt loam, silt clay loam and even

clay loam showing thereby a conspicuous increase in their fitness of grain. (Lyron, T.L., 1952)<sup>10</sup>. The truth of the above fact is also corroborated by the report of Royal commission on Agriculture in India. In any particular area, the variations are usually associated with the depth of soil and lateral changes are not rapid but when subjected to the action of flooding water, texture may vary within the confines of the land of the one village.

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