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Physical and Chemical Properties of Some Selected Soils of Bangladesh

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Abstract: The soil samples were collected at different depths from 48 locations at 16 thanas under 7 districts. The soils were silt loam and silty clay loam in texture. The pH of the soils varied from 4.9- 7.9, 4.9-8 and 5.0-7.9 at D_1, D_2 and D_3 depths, respectively. The highest pH value of 8.0 was found at Saramongal from Rajair thana under Madaripur district at D_2 depth. On the basis of 0-45 cm depth, an average pH values for 7 districts can be placed in the following order: Gopalgonj > Rajbari > Madaripur > Faridpur > Moulavibazar > Habigonj > Sylhet. Most of the soils were slightly alkaline in reaction. The organic matter content in soils ranged from 0.69 –2.45%, 0.51 – 2.73%, 0.89 –2.83%, 0.83 – 2.56%, 0.55 – 1.98%, 0.51 – 2.00% and 0.55 – 2.45% in Gopalgonj, Faridpur, Rajbari, Madaripur, Moulavibazar, Habigonj and Sylhet districts, respectively. The highest organic matter (2.83%) was found in Tipuragram at Rajbari Sadar thana under Rajbari distirct at D_1 depth (0 – 15 cm) and the lowest organic matter (0.51%) was found in Pitua at Nabigonj thana under Habigonj district and Deura in Faridpur district at D_3 depth (30 – 45 cm). The EC value of Gopalgonj, Faridpur, Rajbari, Madaripur, Moulavibazar, Habigonj and Sylhet district soils ranged from 1.73 – 2.83, 1.24 – 3.84, 1.45 – 2.01, 1.30 – 3.52, 0.27 – 0.90, 0.37 – 0.41and 0.26 – 1.17 dsm^{-1}, respectively. An average EC values for 7 districts can be placed in the following order: Gopalgonj > Madaripur > Faridpur > Rajbari > Moulavibazar > Sylhet > Habigonj. Most of the soils were alkaline in nature and it may be reduced through the application of Gypsum and other practices.

Key words: Physical and chemical properties, soil EC, orgenic metter

Introduction

Bangladesh is primarily an agro-based country. Economic development of the country is basically depended on agricultural development. But the agriculture of the country is suffering from various problems such as nutrient deficiency/toxicity in soil, natural calamities, insect and disease hazards, in proper soil and crop managements etc. Bangladesh has a wider range and greater complexity of lands. Earlier, soils of Bangladesh were divided into 7 tracts, then into 21 general soil types and 537 soil series. At present the soils of Bangladesh are divided into 30 Agro-Ecological zones (AEZ) (Hussain, 1992). For research planning and better crop production, the basic data on physical and chemical properties of different AEZ are very much important to determine the types of crop to be grown. Now a days, the farmers of the country are trying to increase the crop yield by applying more and more inorganic chemicals, mainly nitrogenous fertilizers, pesticides etc. For these reasons, reserve of nutrient depleted and available nutrient become unavailable and toxic to plants. Again excessive amount of applied fertilizers hinder the availability of other nutrients too. The farmers do not know the inherent nutrient status of soils and the use fertilizers blindly and uneconomically. In order to minimize these problems, it is very important to evaluate the fertility status of soils at the farmers level (Ahsan and Karim, 1986 ; Bhuiyan, 1987). Soil is a heterogeneous body and varies in composition both horizontally and vertically. Different soils have different requirements for fertilizers, liming, irrigation and tillage practices, depending on the physical and chemical properties of soil. Evaluation of physical and chemical characteristics of soil is helpful for economic use of fertilizer and irrigation water supply and thereby, it can be used to maximum crop production (Scotter *et al.*, 1979). Root growth of rice and upland crops are affected by physical properties, such as soil texture, structure, density and pore space. The proper fertilizer use depends on the nutrient contents of the soil. So, a person dealing with soil should be acquainted with the physical and chemical properties and he has to decision whether the soil is suitable for crop production or other non-agricultural purposes (Reza, 2001). A Judicial application of fertilizers depends on nutrient status of a land. Thus the physical and chemical properties or fertility levels play a significant role in achieving higher crop yields. Most often crop yields are limited by physical and hydrophysical conditions of soil rather than its nutrient values. The deterioration of soil physical conditions during crop production is a common problem, particularly in the tropical countries (Ahn, 1968). In the past, research on studies of physical and chemical properties of Bangladesh soil has been neglected. Recently different research organizations of Bangladesh namely, SRDI, BINA, BAU, BARI, BRRI and DU have taken extensive programmes to study in detail the physical and chemical properties of many soil series for better land use, classification, agricultural planning and better management of soil. In view of above facts, the present study was undertaken using 15 representative soil series, which covers 5 Agro-Ecological Zone (AEZ) of Bangladesh. In order to ascertain their potentiality for efficient use of land resources for crop production in the country the objectives of the study was: to determine the physical and chemical characteristics of those soils.

Materials and Methods

Site selection: The soil sampling sites were selected with the help of the staffs of the Department of Soil Resources Development Institute (SRDI). Three locations were selected from each thana. The general information covering on location, Agroecological zone (AEZ), land type, soil series and general soil classes of each sample are recorded in Table 1.

Collection of soil samples: For this study 16 thanas representing 7 districts of Bangladesh have been selected. The selected thanas are Gopalgonj Sadar, Tungipara under Gopalgonj district; Faridpur Sadar, Sadarpur, Bhanga, Nagarkanda under Faridpur district; Rajbari Sadar, Goalaundha under Rajbari district; Madaripur Sadar, Rajair under Madaripur district; Mulavibazar Sadar, Srimangal under Moulavibazar district; Habilgonj Sadar, Nabiganj under Habilgonj district and Sylhet Sadar and Golapganj under Sylhet district. Soil samples were collected from three locations of each thana. Thus, a total of forty eight composite soil samples were collected from 16 thanas. The samples were collected at three different depths viz. 0-15, 15-30 and 30-45 cm. Bulk soil samples were collected from the selected locations on the basis of composite sampling method as suggested by the Soil Survey Staff of the USDA (1961). Each composite sample was a combination of three individual soil sample collected from different spots of the same field. The area from where one composite sample was taken ranged from 0.5 to 5 ha of land and the plant roots, leaves, gravels etc. were picked up and discarded. Finally, about one kg of each soil was put into the plastic bag labelled properly and then carried to the laboratory of the Department of Soil Science, Bangladesh Agricultural University, Mymensingh for subsequent

physical and chemical analyses.

Preparation of soil samples: The collected soil samples were dried at room temperature, ground well and sieved through a 2mm sieve. Then the entire amount of soil was thoroughly mixed. The prepared samples were preserved in polythene bags after proper labelling for laboratory analysis.

Methods of analysis

Soil texture: Sand, silt and clay contents were determined by hydrometer method as outlined by Piper (1950). The percentage of sand, silt and clay contents were calculated as follows:

$$\%(\text{Silt} + \text{Clay}) = \frac{\text{Corrected hydrometer reading after 40 seconds}}{\text{Oven dry weight of soil}} \times 100$$

$$\%\ \text{Clay} = \frac{\text{Corrected hydrometer reading after 2 hours}}{\text{Oven dry weight of soil}} \times 100$$

% Sand = 100 - (% Silt + % Clay)
% Silt = (% Silt + % Clay) - % Clay

The textural classes of soils were determined by plotting the results on triangular diagram designed by Marshall (1947).

Soil pH: Soil pH was determined by glass electrode pH meter as described by Jackson (1962). The result was reported as "soil pH measured in water" (soil-water ratio being 1:2.5).

Organic carbon: Organic carbon was determined titrimetrically by using Walkely and Black method with oxidation of organic carbon with potassium dichromate ($K_2C_{r2}O_7$). The organic matter content of each sample was calculated by multiplying the content of organic carbon by Van Bemmelen factor, 1.73 (Page *et al.*, 1982).

Soil EC: Soil EC was determined by glass electrode EC meter following by soil water ratio of 1:5 as described by Page *et al.* (1982).

Results and Discussion

Physical characteristics of soils

Soil texture: It was observed (Table 2) that the percentage of sand, silt and clay contents varied widely within different districts. In Gopalgonj, Faridpur, Rajbair, Madaripur, Moulavibazar, Habilgonj and Sylhet districts sand particle varied from 3.8-9.8 %, 9.2-21.2%, 19.8-29.8%, 7.8-27.8%, 9.2-33.2%, 9.2-13.2% and 9.2-25.8%, silt particles 52-66%, 52-72%, 58-68%, 58-72%, 56-68%, 56-58% and 52-58% and clay particles 26.2-38.2%, 10.8-38.8%, 10.2-14.2%, 10.2-26.2%, 10.8-32.8%, 28.8-32.8% and 20.8-32.8%, respectively (Table 2). The highest sand particles of 33.2% was found in Sherpur at Moulavibazar sadar thana under Moulavibazar district and the lowest of 3.8% was recorded in Charboira at Gopalgonj sadar thana under Gopalgonj. The highest silt particles of 72% was measured in Deura at Faridpur sadar thana under Faridpur district and in Balabdi at Madaripur sadar thana under Maderipur district and the lowest of 52% was observed from 4 locations like Patghati under Turngipara district, Bangalkanda, and Jadurdia under Faridpur district, and Sylhet Polytechnique area under Sylhet district. The maximum clay particles of 38.8% was found in Jadurdia and Dunginagarkanda at Nagarkanda thana under Faridpur district, and the lowest of 10.2% from Tipuragram at Rajbari sadar thana under Rajbari district and Gosalkandi at Rajair thana under Madaripur district. The textural class was silt loam in most soils and few of them were silty clay loam. In the light textured soil the nutrient status and water holding capacity are relatively low (Brady, 1985). Silt loam is good for agricultural point of view (Wier, 1949). In this point of view all the soils are suitable for crop production.

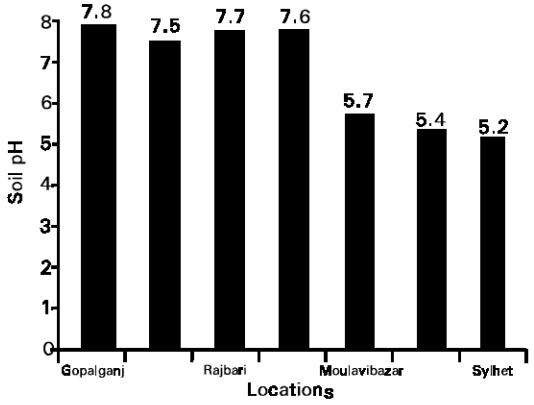

Fig.1: pH content of soil representing 7 districts of Bangladesh

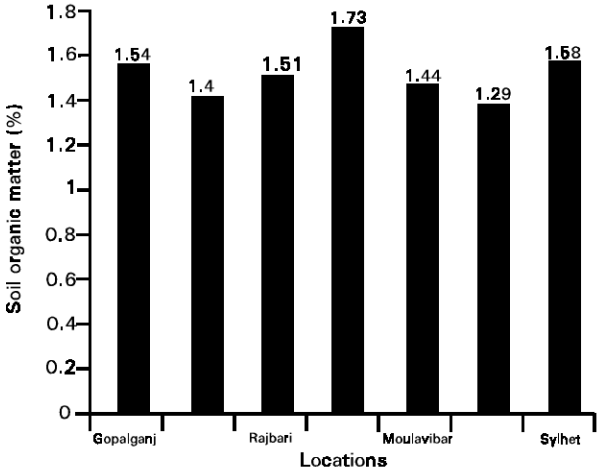

Fig.2: Organic matter contant of soil representing 7 district of Bangladesh

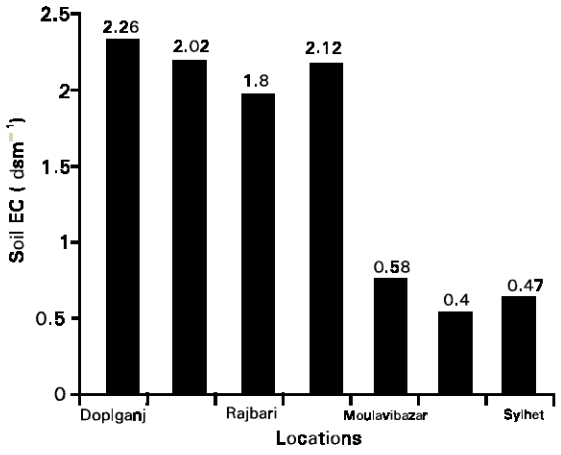

Fig. 3: EC contant of soil representing 7 districts of Bangladesh

Chemical characteristics of soils

Soil pH: The soil pH values varied from 7.3 – 7.9, 7.1-7.8, 7.4-7.9, 7.4 –7.8, 5.3 – 6, 5.0- 6.1 and 4.9 – 5.8 in Gopalgonj, Faridpur, Rajbari, Madaripur, Moulavibazar, Habigonj and calcareous Grey

Table 1: General soil information of sampling sites

District	Thana	Location	AEZ	Land type	Soil series	General soil type
Gopalgonj	Gopalgonj	Charboira	Old Meghna	Medium high land	Ishurdi	Calcareous brown
	Sadar	Ghonapara	Estuarine	"	"	flood plain soil
		Gopalgonj Govt.	flood plain	High land	"	"
		Poultry farm	"		"	"
	Tungipara	Tungipara	"	Medium high land	Sara	"
		Charkushli	"	"	Ishurdi	"
		Patghati	"	Medium low land	"	"
Faridpur	Faridpur	Deura	Low Ganges	Medium high land	"	"
	Sadar	Mamudpur	river plain		"	"
		Bilmamudpur	"	"	Sara	"
	Sadarpur	Satrashi	"	"	"	"
	Bhanga	Atrashi	"	"	"	"
		Baishrashi	"	"	Ishurdi	"
		Bhrammonkanda			"	
		Sadardi	"	"		"
	Nagarkanda	Moheshordi	"	Medium high land	Sara	"
		Bangalkanda	"	"	Ishurdi	"
		Dunginagarkanda	"	"	"	"
		Jadurdia	"	Medium low land	Ghior	
Rajbari	Rajbari	Chaidebpur	Low Ganges	Medium high land	Medium	"
	Sadar		river flood plain		texture	
		Khankhanpur	"		Ganges	
					alluvium	"
		Tipuragram	"		"	"
		Dewanpara	"	Medium low land	Medium	
					texture	
		Dhoulatdia	"	"	Ganges	"
					alluvium	
		Kumrakandi	"	"	"	"
Madaripur	Madaripur	Shirkhara	Ganges river	Medium high land	Gopalpur	"
	Sadar		flood plain	"		"
		Srinadi	"	"	"	"
		Balabdi	"		"	
	Rajair	Saramongal	Low Ganges river	Medium high land	Ghior	Calcareous brown
			flood plain			flood plain soil
		Bowlgram	"	"	"	"
		Gosalkandi	"	Medium low land	"	"
Moulavibazar	Moulavibazar	Sherpur	Eastern Surma	High land	Kushiyara	Non calcareous
	Sadar		Kushiyara			Grey flood
			flood plain			plain soil
		Gaosherpur	"	"	"	"
		Amorkona	"	"	"	
	Srimangal	Srimangal	Northern and	Medium high land	Pritimpasa	"
		Eastern	Piedmont plain			
		Kalighat	"	High land	Srimangal	"
		Kalapur	"	"	Bijipur	"
Habilgonj	Habilgonj	Abdullapur	Old Meghna	Medium low land	Madabpur	"
	Sadar		Estuarine			
		Manikchak	flood plain			
		Shikarpur	"	"	"	"
		Pitua	"	"	"	"
	Nabiganj	Mohammadpur	Eastern Surma	High land	Goyainghat	Non calcareous
			Kushiyara			brown flood
		Bhabanipur	flood plain	"	Phagu	plain soil
			"			"
Sylhet	Sylhet	Khadimpara	Eastern Surma		Bijipur	"
	Sadar			Kushiyara		
			flood plain			
		Sylhet polytech-	"	Medium low land	Ramgarh	"
		nique area				
		Khadimnagar	"	"		
					Bijipur	"
		Sherpur	Eastern Surma	Medium	Balaganj	"
			Kushiyara	high land		
			flood plain			
	Golapganj	Chandanbag	"	"	"	"
		Girdha	"	Medium	Goyainghat	Non calcareous
				low land		Grey flood
						plain soil

Table 2: Percent sand, silt, clay content and textural types of 48 soils

District	Thana	Location	Sand(%)	Silt (%)	Clay (%)	Soil texture
Gopalgonj	Gopalgonj	Charboira	3.8	66	30.2	Silty clay loam
	Sadar	Ghonapara	7.8	66	26.2	Silty loam
		Gopalgonj Govt. poultry farm	5.8	66	28.2	Silty clay loam
	Tungipara	Tungipara	5.8	64	30.2	"
		Charkushli	7.8	60	32.2	"
		Patghati	9.8	52	38.2	"
Faridpur	Faridpur	Deura	7.8	72	20.2	Silt loam
	Sada	Mamudpur	9.8	64	26.2	"
		Bilmamudpur	11.8	58	30.2	Silty clay loam
	Sadarpur	Satrashi	19.2	68	12.8	Silt loam
		Atrashi	21.2	66	12.8	"
		Baishrashi	19.2	70	10.8	"
	Bhanga	Bhrammonkanda	9.2	56	34.8	Silty clay loam
		Sadardi	13.2	56	30.8	
		Moheshordi	9.2	58	32.8	"
	Nagarkanda	Bangalkanda	13.2	52	34.8	
		Dunginagarkanda	11.2	50	38.8	
		Jadurdia	9.2	52	38.8	"
Rajbari	Rajbari Sadar	Chaidebpur	29.8	58	12.2	Silt loam
		Khankhanpur	27.8	60	12.2	"
		Tipuragram	25.8	64	10.2	"
	Goalaundha	Dewanpara	19.8	68	12.2	"
		Dhoulatdia	27.8	60	12.2	"
		Kumrakandi	25.8	60	14.2	"
Madaripur	Madaripur	Shirkhara	7.8	66	26.2	Silt loam
		Srinadi	9.8	64	26.2	"
		Balabdi	7.8	72	20.2	"
		Saramongal	27.8	58	14.2	"
	Rajair	Bowlgram	23.8	64	12.2	"
		Gosalkandi	25.8	64	10.2	"
Moulavibazar	Moulavibazar	Sherpur	33.2	56	10.8	"
	Sadar	Gaosherpur	29.2	58	12.8	"
		Amorkona	31.2	58	10.8	"
	Srimangal	Srimangal	21.2	58	20.8	"
		Kalighat	19.2	68	12.8	"
Habilgonj	Habilgonj	Kalapur	9.2	58	32.8	Silty clay loam
	Sadar	Abdullapur	9.2	58	32.8	"
		Manikchak	11.8	58	30.2	"
		Shikarpur	13.2	58	28.8	"
		Pitua	13.2	56	30.8	"
	Nabiganj	Mohammadpur	9.2	58	32.8	"
		Bhabanipur	13.2	58	28.8	"
Sylhet	Sylhet	Khadimpara	21.2	58	20.8	Silt loam
	Sadar	Sylhet polytechnique area	25.8	52	22.2	"
		Khadimnagar	21.2	58	20.8	"
	Golapganj	Sherpur	9.2	58	32.8	Silty clay loam
		Chandanbag	9.2	58	32.8	"
		Girdha	13.2	56	30.8	"

flood plain soil Sylhet district soils, respectively (Table 3). On average highest pH values was found in Gopalgonj district which was followed by Rajbari, Madaripur, Faridpur, Moulavibazar, Habigonj and Sylhet district (Fig. 1). The pH values ranged at D_1, D_2 and D_3 depths were 4.9- 7.9, 4.9-8.0 and 5.0-7.9, respectively and the average pH value of D_1, D_2 and D_3 depths were 6.7, 6.8 and 6.7, respectively. A pH value of 8.0 was observed at D_2 depth in Saramongal at Rajair thana under Madaripur district and the lowest of 4.9 from D_1 and D_2 depths in Sherpur at Golapgaj thana under Sylhet district. Most soils showed pH values of above 7.0 i. e., slightly alkaline in nature. Tamhane *et al.* (1970) reported pH value from 6.5 to 7.5 was the pH range in which most soil nutrients were available to plants.

Organic matter: The organic matter content in Gopalgonj, Faridpur, Rajbari, Madaripur, Moulavibazar, Habigonj and Sylhet districts ranged from 0.69- 2.45%, 0.51- 2.73%, 0.89 –2.83%, 0.83 – 2.56%, 0.55 – 1.98 %, 0.51 – 2.00% and 0.55 – 2.45%, respectively (Table 3). The organic matter contents ranged from 1.41 to 2.83% at D_1, 0.86 to 2.14% at D_2 and 0.51 to 1.69% at D_3 depth and the average value of D_1, D_2 and D_3 depth were 1.98%, 1.53% and 0.99%, respectively. A variable organic matter content was measured at different depth. The average highest organic matter was found in Madaripur (1.73%) which was followed by Sylhet (1.58%), Gopalgonj (1.54%), Rajbari (1.51%), Moulavibazar (1.44%), Faridpur (1.40%) and Habigonj (1.29%) shown in Fig. 2. At most similar organic matter status was estimated for several areas. The highest organic matter (2.83%) found in Tipuragram in Rajbari Sadar at D_1 depth (0-15 cm) and the lowest from (0.51%) Pitua at Nabigonj thana under Habigonj district, Deura at Faridpur district at D_3 depth. The maximum organic matter was found in 0-15 cm (D_1) depth and minimum from 30-45 cm (D_3) depth. Similar of organic matter status was also reported by Hossain (1989). From the study, it was clear that organic matter content gradually decreased with the increase of soil depth. This is due to decaying of organic substance of soil. Sood and Kanwar (1986), Rajamannar *et al.* (1979) and Soil Survey Staff (1961) also observed the similar trend. During last three decades Sattar (1998) handled lot of work on organic matter situations in Bangladesh which concluded that most of Bangladesh soils contained low organic matter.

Soil EC: The EC of Gopalgonj, Faridpur, Rajbari, Madaripur, Moulavibazar, Habigonj and Sylhet district soil ranged from 1.73 – 2.83, 1.24 – 3.84, 1.45 –2.01, 1.30 –3.52, 0.27 –0.90, 0.37 –0.41 and 0.26 – 1.17 dsm^{-1}, respectively (Table 3). The highest EC (3.84 dsm^{-1}) was found in Bangalkanda at Nagarkanda thana under Faridpur district and the lowest EC (0.26dsm^{-1}) from Khadimpara at Sylhet sadar thana and Girdha at Golapganj thana under Sylhet district. The average highest EC was observed in Gopalgonj which was followed by Madaripur, Faridpur, Rajbari, Moulavibazar, Sylhet and Habigonj (Fig. 3). Measurement of EC helps to identify the level of soil salinity or alkalinity. A soil may defined as saline or alkaline when the EC value is between 2 to 4 dsm^{-1} or above (Richards, 1968). So, three districts soils such as Gopalgonj, Faridpur and Madaripur districts soils are saline or

Table 3: Some chemical properties of 48 soils at 3 different depths

District	Thana	Location	pH			Organic matter (%)			EC dsm^{-1}
			D1	D2	D3	D1	D2	D3	
	Gopalgonj	Charboira	7.7	7.7	7.7	2.12	1.60	0.77	2.82
	Sadar	Ghonapara	7.7	7.8	7.6	1.93	1.45	0.74	1.73
		Gopalgonj Govt.	7.8	7.9	7.9	1.90	1.34	0.69	2.25
Gopalgonj		poultry farm							
	Tungipara	Tungipara	7.6	7.5	7.3	2.31	1.76	0.96	2.83
		Charkushli	7.8	7.8	7.7	2.09	1.66	0.89	2.01
		Patghati	7.8	7.8	7.6	2.45	1.97	1.14	1.88
	Faridpurr	Deura	7.5	7.7	7.7	1.45	0.96	0.51	1.64
	Sadar	Mamudpur	7.7	7.7	7.6	1.62	1.17	0.65	1.82
		Bilmamudpur	7.6	7.8	7.7	2.52	1.97	0.72	2.17
		Satrashi	7.5	7.6	7.4	2.24	1.69	1.10	2.01
		Atrash	7.4	7.5	7.5	2.17	1.52	0.55	2.47
	Sadarpur	Baishrashi	7.2	7.4	7.3	2.73	2.11	1.02	2.13
Faridpur		Bhrammonkanda	7.3	7.1	7.1	1.79	1.24	0.67	1.24
		Sadardi	7.3	7.2	7.1	2.09	1.69	0.81	1.99
	Bhanga	Moheshordi	7.8	7.8	7.6	1.55	1.07	0.72	1.47
		Bngalkanda	7.5	7.5	7.5	1.62	1.24	0.83	3.84
		Dunginagarkanda	7.7	7.6	7.6	1.81	1.47.	0.96	2.01
	Rajbari	Chaidebpur	7.7	7.7	7.5	1.62	7.07	0.91	1.45
	Sadar	Khankhanpur	7.6	7.7	7.7	1.90	1.52	1.10	2
		Tipuragram	7.7	7.8	7.5	2.83	1.00	1.14	2.01
Rajbari Sadar		Dewanpara	7.9	7.9	7.8	1.52	0.89	0.69	1.61
	Goalaundha	Dhoulatdia	7.6	7.5	7.4	0.31	1.93	1.10	1.77
		Kumrakandi	7.7	7.7	7.7	1.97	1.411	0.24	1.98
		Shirkhara	7.7	7.8	7.8	2.35	1.98	1.69	2.13
	Madaripur	Srinadi	7.5	7.5	7.4	2.17	1.79	1.07	2.01
	Sadar	Balabdi	7.6	7.5	7.7	2.45	1.90	1.28	1.77
		Saramongal	7.9	8.0	7.8	2.56	2.14	1.34	3.52
Madaripur	Rajair	Bowlgram	7.9	7.9	7.6	1.41	0.89	0.83	1.3
		Gosalkandi	7.8	7.8	7.5	2.42	1.86	1.24	1.99
		Sherpur	5.5	5.7	5.6	1.66	1.17	0.93	0.55
	Moulavibazar	Gaosherpur	5.5	5.4	5.4	1.71	1.12	0.73	0.27
	Sadar	Amorkona	6.0	5.8	5.9	1.86	1.48	0.55	0.9
Moulavibaza		Srimanga	5.5	5.5	5.5	1.98	1.79	1.62	0.57
		Kalighat	5.4	5.4	5.3	1.9	1.69	1.14	0.34
	Srimangal	Kalapur	5.6	5.6	5.7	1.86	1.69	0.93	0.86
		Abdullapur	5.2	5.2	5.1	2.00	1.62	0.96.	0.35
Habilgonj	Habilgonj	Manikchak	5.1	5.0	5.0	1.93	1.60	0.83	0.41
		Pitua	6.1	6.1	6.0	1.52	0.86	1.51	0.37
		Mohammadpur	5.9	5.8	5.8	1.62	1.10	0.62	0.39
		Bhabanipur	5.5	5.4	5.5	1.59	1.14	0.65	0.41
		Khadimpara	5.3	5.3	5.2	1.55	1.00	.58	0.26
	Sylhet	Sylhet polytech-	5.6	5.8	5.8	1.66	1.07	0.55	1.17
	Sadar	nique area							
Sylhet		Khadimnagar	5.4	5.4	5.2	1.79	1.48	1.07	0.27
		Sherpur	4.9	4.9	5.0	2.45	2.00	1.76	0.52
	Golapganj	Chandanbag	5.1	5.1	5.2	2.17	1.92	1.69	0.36
		Girdha	5.2	5.0	5.1	2.28	1.79	1.66	0.26

D1 = 0-15 cm depth D2 = 15-30cm depth D3 = 30-45cm depth

alkaline and Rajbari, Moulavibazar, Habigonj and Sylhet district soils are non-saline or non-alkaline.

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