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EVALUATION OF THE POTENTIAL LAND USE PRACTICES UNDER DIFFERENT DEPTH AND DRAINAGE CONDITION OF SOME MADHUPUR TRACT SOILS

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Land and soil are the most valuable natural resources in Bangladesh. But they are either over-exploited or under-utilized due to poor resource management.(1) Man's demand for food from the natural resources that sustain his existence has increased enormously in recent years. FAO's projection in "Agriculture towards 2000" reveals that 50% more food will have to be grown by the end of this century just to meet the present nutritional levels. To attain self-sufficiency in food and improved living standard of the people, optimum use of land and maintenance of its productivity at a sustained level are desired.

Land use is mainly determined by climate, physiography and hydrology; to some extent dependent on soil and economic factors such as marketing and transport facilities of agricultural products. For any land use planning, it is imperative to diagonose the nature of the different soils, delineate problem areas and know the extent of their distribution, so as to develop suitable measures for their amelioration and rational land use plan. The depth and nature of the profile have obvious effect on fertility. Very shallow soils are generally unproductive, since they provide little room for crop anchorage and extraction of nutritents and water.(2) The prediction of soil behavior serve as an useful tool in land use classification.(3)

Within 20 physiographic unit of Bangladesh,(4) terrace areas include two physiographic units and occupied about 8% of the total land area. The soils of terrace areas are fertile and have widespread potentialities. But in this respect, information are limited. Therefore, the present piece of work has been undertaken to investigate the properties of the soils collected from Madhupur Tract areas of Dhaka district and also to study the potential land use practices due to variation of profile depth and drainage conditions in these soils.

Three soil series of different depth and drainage were selected within the Madhupur tract area of Dhaka district. The series were taken primarily on the basis of the drainage conditions of that area which helped to form deep and well drained

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(Tejgaon series), moderately deep and moderately well drained (Gerua series), and shallow and poorly drained (Bhatpara) soils. The sites of study were firstly selected by interpretating the aerial-photos of that area.

Pits were excavated manually. The pit of Tejgaon series was excaveted from surface to 120 cm depth; Gerua series was excavated up to 118 cm and Bhatpara series was excavated up to 102 cm depth. The soil profiles were studied morphologically in the field according to USDA system[5,6] and samples were collected from surface (Tejgaon 0 - 15 cm; Gerua series 0 - 15 cm and Bhatpara series 0 - 8 cm) and subsurface (Tejgaon-16-36 cm; Gerua 16 - 36 cm; Bhatpara 9 - 17) horizons. The soil consistence was studied in the field by feel. The particle size distributions of the soils was determined by the pipette sampling method.[7] The pH of the soil sample was determined with a pH meter at a soil water ratio of 1 : 2.5.[8] Organic carbon is soils was determined by Colorimetric wet-oxidation method.[9] The organic matter percentage was calculated by multiplying with 1.724.[9]

Depending on the field observation and data of laboratory analysis, the land qualities such as textural classes, soil consistence, soil depth, soil drainage class, soil reaction and organic matter status were assessed according to Islam,[10] FAO,[11] Brammer[12] and SRDI.[13]

The land qualities e.g. morphology, physical, chemical and environmental conditions of the selected soils have been presented in Table 1. For a non-saline terrace soils, the following characteristics were considered to evaluate the land qualities e.g. land type, slope, texture, consistence, soil depth, soil dranage, soil reaction and organic matter status of the soils.[10]

The textural class of the surface horizon of Tejgoan soils was silt loam which was medium texture soils as like as loam. The textural classes of surface horizon of Gerua soils was clay loam and Bhatpara soils was silty clay loam, respectively which were moderately fine textured soils, but the texture of the sub-surface horizons of Tejgaon and Gerua soils were silty clay and Bhatpara soils was silty clay loam (moderately fine) which might be due to the shallow depth of the surface horizon. Tejgaon soils were deep and well-drained, Gerua soils were moderately deep and moderately well-drained and Bhatpara soils were shallow and poorly drained. The soils reaction of the surface and sub-surface horizons of Tejgaon soils was highly acidic, Gerua and Bhatpara soils was moderately acidic. The organic matter status of both surface and sub-surface horizons of Tejgaon soils was low, Gerua and Bhatpara soils was medium and low, respectively (Table 1).

The qualities of the surface and sub-surface horizons were described in Table 1. Since the root zone of major field crops is within the surface soils, the land qualities

Table 1. Land qualities of three selected profiles of Madhupur tract.

Map unit No.	Physio-graphy	Soil series	Land type	Slope	Soil depth	Soil drainage	Horizon position	Soil texture	Soil consistency	Soil reaction	Organic matter status (%)
1	Madhupur tract	Tejgaon	High land	Flat/almost flat	Deep	Well	Surface	Silt loam	Friable	4.9 highly acidic	1.41 Low
							Sub-surface	Silty clay	Friable	5.5 Highly acidic	0.9 Low
2.	Madhupur	Gerua	High land	Flat/almost flat	Mod. deept	Mod. well	Surface	Silt loam	Firm	5.6 Mod. acidic	1.78 Medium
							Sub-surface	Silty clay	Friable	5.7 Mod. acidic	1.08 Medium
3.	Madhupur	Bhatpara	High land	Flat/almost flat	Shallow	Poor	Surface	Silt loam	Firm	6.0 Mod. acidic	1.87 Medium
							Sub-surface	Silty clay	Firm	6.1 Mod. acidic	1.08 Low

Table 2. Potential land use practices of the selected soil series of Madhupur tract.

Mapping unit No.	Soil series	Kharif-1	Rabi	C) Annual and perennial crops
1.	Tejgoan	(a) Vegetable crops : (i) Leafy vegetables: red amaranth, Indian spinach, spinach, stem amaranth (ii) Veine crops: cucumber, snake gourd, teasle gourd, bitter gourd, ridgel gourd, string bean (iii) Fruit vegetables: chilli, brinjal, bhindi (b) Field crops: (i) Cereals: maize (ii) Fibre crops: jute (Tossa), cotton	(a) Vegetable crops: (i) Leafy vegetables red amaranth, Indian spinach, spinach, stem amaranth (ii) Vine crops: Bottle gourd, water melon, musk melon (iii) Fruit vegetables: Tomato, brinjal, chilli (iv) Others: Root crops: Turnip, raddish, carrot, sugar beet. Cole crops: Cabbage, cauliflower, broccoli. Bulb vegetable: Onion, garlic. Tuber crops: Potato (b) Field crops: (i) Cereals: Wheat, maize, (ii) Fibre crops: Cotton. (iii) Pulses: Lentil, chickpea, mungbean, green gram, pegion pea (iv) Oils seed crops: Groundnut, mustard, sunflower, soybean	(i) Annual crops, Sugar crops: Sugarcane, Fruits: papaya, banana, pineapple (ii) Perennial crops spices: Ginger, turmeric. Fruit: Guava, lemon. Fruit trees: Jackfruit, sapoto, mango
2.	Gerua	(a) Vegetable crops: (i) Leafy vegetables: red amaranth, Indian spinach, spinach. stem amaranch (ii) Vine crops: Cucumber, snake gourd, Teasle gourd, Bitter gourd, Ridgel gourd	a) Vegetable crops: (i) Leafy vegetables: Red amaranth, Indian spinach, spinach, stem amaranth (ii) Vine crops: Bottle gourd (iii) Fruit vegetable: tomato, Bringal, Chilli, (iv) Others: Cole crops: Cabbage, Cauliflowr, Broccoli	(c) Annual crops: Fruits: Papaya, banana, pineapple (ii) Perennial crops: Fruits: Guave, lemon, Fruit trees: Jackfruit, mango, sapoto
3.	Bhatpara			a) Grasses and pastures

of the surface horizons have been taken into considerations for crop suitability assessment. The land qualities of different crops were assessed using data from 13 different sources as evaluated by SRDI.[13] The potential land use practices of the selected areas have been presented in Table 2.

It is evident from data that the effective solum depth and drainage condition of the studied soils were different, which showed a distinct variation in soil properties (Table 1) and their potential land use practices (Table 2). The deep, well-drained Tejgaon soils were suitable for the production of any type of crops after adopting some improvement measures such as fertilization, manuring, liming and irrigation etc. and Gerua soils were moderately deep and moderately well-drained which were suitable for the production of some selected crops. But, only grasses and pastures were economically profitable for production in Bhatpara soils (Table 2).

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