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FEASIBILITY STUDY FOR SMALL HOLDING TEA PLANTATION IN MADHUPUR UPAZILA OF TANGAIL DISTRICT

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ABSTRACT

Saha AK, Biswas A, Khan AQ, Motalib MA, Dey DC (2012) Feasibility study for small holding tea plantation in Madhupur upazila of Tangail district. *J. Soil Nature* 6(1), 26-31.

Tea occupies an important position in Bangladesh economy. Before some days a huge amount of produced tea was exported after meet the internal demand. But at present the growth of tea production is 1% per year whereas consumption of tea is increasing @3.5% per year although per capita consumption in Bangladesh as compared to other country is less. If this situation will continue then in near future tea have to be import to fulfill the internal demand. Now there are two ways is open, one is increase of tea production and another is extension of tea plantation in new areas. Small holding tea cultivation can play an important role in the development of national economy and alleviation of poverty. For these reasons a feasibility study for tea plantation in Madhupur Upazila of Tangail district was carried out in the year 2009. Land condition and principal characteristics of soils of Madhupur upazila are suitable for tea cultivation. By considering land class, irrigation & drainage condition, soil texture, structure, available moisture condition, physiographic and agricultural climatic information indicate Madhupur area is medium suitable for tea cultivation.

Key words: tea plantation, small holding, madhupur upazila

INTRODUCTION

Tea has come to occupy an important place among plantation crops of the world and it is known world over as one of the healthy beverages. Tea plantation is a wonderful agro-asset and does not cause any imbalance in the eco-system; rather it really contributes a lot in maintaining ecological balance. The lush green tea plantation retains the soil cover, checks soil erosion and also conserves the soil moisture. Tea is cultivated in 31 countries, scattered from 45° north to 33° south of the equator. Because of the long history and the large-scale production, trade and consumption, tea occupies an important place in the world agricultural economy. Tea is one of the most important cash crops in Bangladesh and south Asia. Tea cultivation can maintain the ecological balance and also ensure proper land use. It can play an important role in human employment and income generation. In Bangladesh, first tea cultivation was started in 1840 in Chittagong and commercial tea plantation was started in 1857 in Sylhet. At present there are 163 tea estates in Bangladesh. The tea estate covers an area of 1,14,014.39 ha of which 44.27% i.e. 50,470.05 ha are under total plucking area. The very old tea occupied 10,887 ha (9.6%). The rest 18,412.78 ha (16.15%) is occupied by factories, banglows, labour lines, paddy land and non-tea crops (BTB 2002). It can be said that if we do not go for further development of tea industry, it may so happen that tea would be required to be imported to meet the local consumption of the growing population of the country and this will remain little or no scope for export after 2015 as opened by the exporters. On an average, Bangladesh produces 58 million kilograms tea annually. It may be mentioned here that the growth of tea production is 1% per year where as consumption of tea is increasing @3.5% per year although our per capita consumption as compared to other country is less (Khan and Alam, 2002). On the other hand, owing to urbanization and change in the socio-economic condition of the people, per capita consumption of tea will increase from the present consumption 0.266 per year head of much higher quality. In the year 2010 total production of tea in Bangladesh was 59.27 million kilograms. Export of Bangladesh tea gradually decreasing due to the increasing of local consumption. In the year 2007, Bangladesh exported 10.56 million kilograms of tea but in the year 2008, 2009 and 2010 it decreased to 8.39, 3.15 and 0.91 million kilograms respectively (ITC 2011). So, in order to increase the tea production, new avenues for tea cultivation need to be assessed which will decrease poverty through new employment opportunity and improve socio-economic condition of the country.

MATERIALS AND METHODS

The ecological soil survey of the Madhupur Upazila of Tangail district had been conducted in the year 2009 to assess the feasibility study for growing tea. Climatological data was collected from the Upazila Agriculture Office, Madhupur, Tangail. Soil profile study and measurement of water table was done. Soil samples were collected from different topographical zone to determine the physico-chemical properties of the selected areas. During profile study soil colour was measured by Munshell soil colour chart. Soil samples were collected from three different depths (0-9", 9-18" and 18-36") of different locations. Soil texture, pH, amount of organic carbon, total nitrogen, available

phosphorus, potassium, calcium, magnesium, C/N ratio of the soil samples was determined. Soil texture was determined by hydrometer method, pH was determined by using pH meter (Soil : distilled water = 1 : 2.5). Soil organic carbon (in %) was determined following Walkley and Black Wet Oxidation method. For determination of total nitrogen, Micro kjeldahl steam distillation method was adopted (Imamul and Alam, 2005). Available phosphorus was done colorimetrically. For determination of available potassium, calcium, magnesium and zinc soils were extracted with 77% ammonium acetate solution and then potassium was determined by flame photometer, and calcium and magnesium were determined by AAS (Atomic Absorption Spectrophotometer).

RESULTS AND DISCUSSION

When site for establishment of new estates of tea garden are to be selected, the climatic requirements is the first consideration because these have great influence on growth, yield and quality of tea plant. Laycock (1964) described a 'good growing season' for tea as one having 'warm days, long sunshine hours, high humidity and adequate rainfall, preferably in overnight showers'.

Madhupur Upazila is situated in the northern part of Tangail district which is in approximately 24°31' to 24°47' north latitude and 89°57' to 90°10' east longitude. Total area of this upazila is approximately 478 square kilometer. Climatological data study indicates that climate of this upazila is tropical monsoon like other area of this country. Among six seasons of the monsoon climate three seasons are very dominate here. In this area, rainy season starts from May and it continues upto the month of October. In this period 92% rainfall occurs. Winter season starts from November and it finishes in the month of February. This season is very dry and cold, sometimes rainfall occurs. March and April consider as summer, it also called pre-monsoon. In this time air is very hot and it contains very low amount of water vapour. From the temperature data it observed that, in Madhupur Upazila lower temperature prevails in December and January which is 12.25°C in average. Very hot temperature prevails in March and April which is 36.35°C in average and very cold temperature prevails in the month of January and February which may be upto 11.6°C.

Table 1. Month wise highest and lowest average temperature (°C) at Madhupur Upazila

Month/Year	2005		2006		2007		2008	
	Highest	Lowest	Highest	Lowest	Highest	Lowest	Highest	Lowest
January	19.51	18.90	25.35	11.16	25.10	11.06	25.58	12.55
February	17.03	16.14	32.64	17.71	26.89	14.96	26.06	13.96
March	22.19	20.48	35.67	19.58	32.35	19.13	33.26	20.70
April	28.46	24.06	34.05	23.06	37.23	23.40	37.23	24.20
May	31.51	23.93	35.29	25.48	36.26	26.77	37.10	25.74
June	34.13	27.13	35.06	25.29	34.50	25.83	33.37	26.70
July	31.45	26.12	34.60	27.41	34.52	26.65	31.65	26.87
August	30.16	26.54	35.25	26.48	34.84	27.48	32.26	26.90
September	33.56	26.36	33.70	25.63	33.27	26.27	35.65	29.23
October	31.00	24.00	35.09	25.03	34.32	24.35	32.16	24.45
November	31.03	18.36	30.83	19.56	32.83	19.70	31.47	18.73
December	29.41	14.25	27.83	13.70	28.35	14.29	26.61	16.48

(Source: Upazila Agriculture Office, Madhupur 2009)

Table 1 shows month wise highest and lowest average temperature (°C) at Madhupur Upazila. From these data it is revealed that from the year 2005 to 2008 averages lowest temperature was 11.06°C and average highest temperature was 37.23°C. Temperature is one of the most important factors for the growth and development of tea plants. Photosynthesis and respiration of plants are influenced by temperature and light intensity. Tea, being a perennial plant is grown under a wide range of temperature regimes in the tea world. It is cultivated best in temperatures ranging from 12.7°C to 28°C (Sana 1989). So, temperature of the Madhupur upazila is moderately suitable for tea cultivation.

The distribution of rainfall plays a vital role on the growth of tea plant. It is found that 1270 mm annual rainfall is marginal for tea cultivation (Sana 1989). Rainfall data shows that average rainfall in winter season is ranges from 0 to 39.5 mm which is much lower than the evaporation loss at this time. Longtime statistics shows that, in winter season it has taken excessive rainfall. From November to March monthly rainfall takes place lower than 75 mm therefore these months entitle dry month.

Table 2. Month wise rainfall (mm) at Madhupur Upazila

Month/Year	2005	2006	2007	2008
January	00	00	00	37
February	24	00	30	10
March	174	00	40	47
April	351	177	141	59
May	819	246	119	184
June	550	352	816	389
July	836	252	637	445
August	288	214	363	356
September	311	378	296	91
October	356	58	208	218
November	00	00	115	00
December	00	00	00	00
Total	3709	1677	2765	1836

(Source: Upazila Agriculture Office, Madhupur 2009)

Table 2 shows month wise rainfall (mm) at Madhupur Upazila. From these data it is revealed that from the year 2005 to 2008 the annual average rainfall was 2496.75 mm. So, rainfall pattern of Madhupur Upazila is suitable for tea plantation. Relative humidity (RH) is the moisture content of a volume of air expressed as percentage of the maximum quantity that the air can hold at the prevailing temperature. Relative humidity of 80-90% is favourable during the growth period of tea plants, below 50%, shoot growth is inhibited and below 40% growth is adversely affected (Huang 1989). High humidity reduces water loss and low humidity increases loss of water, induces leaf water stress and causes reduction of growth rate of tea during dry period. Low humidity decreases photosynthesis probably because of rapid evaporation from guard cells and causing stomata to close (Rosenberg 1974). An overall relative humidity in Sylhet and Chittagong tea zone of Bangladesh varies from 56 to 80% and 68 to 80%, respectively (Hajra 2001).

Table 3. Month wise relative humidity (%) at Madhupur Upazila

Month/Year	2005	2006	2007	2008
January	74.32	87.45	88.10	88.39
February	79.96	90.14	86.46	88.31
March	80.55	83.74	90.58	87.71
April	80.23	87.27	91.73	85.53
May	74.48	89.65	87.58	87.29
June	79.30	92.07	91.43	89.40
July	88.39	92.13	92.10	90.45
August	90.45	92.00	92.52	91.03
September	92.00	92.00	92.27	92.17
October	84.48	91.81	91.87	91.03
November	90.07	80.77	90.50	90.10
December	88.68	89.03	88.67	89.52

(Source: Upazila Agriculture Office, Madhupur 2009)

Table 3 shows month wise relative humidity (%) at Madhupur Upazila. From these data it is revealed that from the year 2005 to 2008 month wise lowest and highest relative humidity was 74.32% and 92.27%, respectively. So, it is favorable for the growth of tea plants.

In the forest of Madhupur upazila various types of timber plants such as shal, gozari, shegun, mehogoni, koro, epil epil and bamboo plant was found which indicates that soil of this area is deep and in well drained condition. A plenty of humidity indicator plants such as mango, ginger and turmeric was found there. Acidity indicator plant such as deki shak and getu plant also observed. But during the survey tea indicator plant nishi (*Melastroma malabathricum*) was not found. If nishi plant was available there it could be said undoubtedly that tea plantation is

possible in Madhupur Upazila. Due to the depth and well drained condition of soil, presence of humidity and acidity indicator plants, it is possible to prefer tea plantation in high flat land of Madhupur Upazila.

The main physical characteristics of Madhupur soils as identified on soil profile as well as from the soils collected by auger boring showed that the soils are mostly deep brown to reddish brown in colour. The texture of soils are loam, clay loam and clayey in nature. Soils of Madhupur upazila are well aerated and no hardpan or impervious layer was observed during boring. Tejgaon, Belabo, Noadda, Chandra and Kolma are the soil series which were found in the study area.

Table 4. Topo sequence of selected soils in Madhupur Upazila

Location	Depth (cm)	Colour	Topography	Texture
Alokdia Union	0-23	Deep Brown	High Flat	Clay Loam
	23-46	Deep Brown	High Flat	Clay Loam
	46-92	Reddish Brown	High Flat	Clay Loam
Laofola, Alokdia Union	0-23	Deep Brown	High Flat	Clay Loam
	23-46	Red	High Flat	Clay Loam
	46-92	Light Brown	High Flat	Clay Loam
Dewan gram, Agarokain, Ghatail	0-23	Deep Brown	High Flat	Clay Loam
	23-46	Deep Brown	High Flat	Clay Loam
	46-92	Grey	High Flat	Clay Loam
Rosulpur	0-23	Reddish Brown	High Flat	Clay Loam
	23-46	Reddish Brown	High Flat	Clay Loam
	46-92	Reddish Brown	High Flat	Clay Loam
Telki, Oronkhola Union	0-23	Reddish Grey	High Flat	Clay Loam
	23-46	Reddish Brown	High Flat	Clay Loam
	46-92	Deep Brown	High Flat	Clay Loam
Charaljani, Forest Research Center, Oronkhola Union	0-23	Deep Brown	High Flat	Clay Loam
	23-46	Reddish Grey	High Flat	Clay Loam
	46-92	Reddish Grey	High Flat	Clay Loam
Moter Bazar, Ayushnara Union	0-23	Brown	High Flat	Clay Loam
	23-46	Brown	High Flat	Clay Loam
	46-92	Deep Brown	High Flat	Clay

Table 4 shows the topo sequence of the sampling areas in Madhupur Upazila. The soils of different horizons of the sampling spots were deep brown, reddish brown, brown, red and grey in colour. Clay loam texture was found in different horizons. The colour of tea soils is sometimes considered to be the indicator of suitability of tea cultivation. Tea soils of Sri Lanka, Java, South India, North-East India (Assam) and Bangladesh are red in colour and famous tea growing areas. However, tea soils of many parts of North-East India and Bangladesh are grey in colour and perhaps derived from the grasslands (Sana 1989). So, from the topo sequence study of the soils of Madhupur Upazila it is clear that the colour of the soils of the survey area is more or less similar to the colour of the soils of tea growing areas. The reddish brown colour of the soils of survey area also indicates a high state of oxidation of iron compounds and well drained condition.

Tea soils are highly weathered, extremely acidic and low of fertility status. Furthermore these soils do not receive deposits of fertile silt by flooding; rather they suffer from erosion. Sana (1989) reported that the most suitable tea soil is thought to be light, friable and well drained having soil pH from 4.5 to 5.8. The critical values have been fixed at 0.1% for nitrogen and 1% for organic matter. The minimum level of nutrient status of tea soil should be 10µg/g for P, 80µg/g for K, 25µg/g for Mg and 90µg/g for Ca (Alam 1999).

Table 5 shows the chemical properties of soils of Madhupur upazila. pH of the soils ranges from 4.5 to 5.2. Organic carbon (in %) of the surface soils ranges from 0.88 to 1.46 and subsurface soils also contained above 1% organic carbon. Total nitrogen (in %) and organic matter (in %) content varies from 0.061 to 0.141 and 1.08 to 2.51, respectively. Available phosphorus content varies from 0.50 to 22.60 ppm. Available potassium, calcium and magnesium content vary from 48.11 to 127.14 ppm, 59.80 to 972.40 ppm and 8.20 to 54.80 ppm, respectively. Soil profile study and chemical analysis of the collected soil samples shows that pH of the area is within the critical limit. Organic carbon and other essential elements are in satisfactory level. So, soils of the survey area are suitable for tea cultivation.

Table 5. Chemical properties of soils of Madhupur Upazila

Location	Depth (cm)	pH	OC (%)	Total N (%)	OM (%)	Av. P (ppm)	Exchangeable Cation (ppm)			C/N ratio
							K	Ca	Mg	
Alokdia Union	0-23	4.6	1.27	0.123	2.18	1.18	48.11	59.80	8.20	10.3
	23-46	4.5	1.07	0.104	1.84	0.63	54.98	133.60	9.00	10.3
	46-92	4.7	0.63	0.061	1.08	0.66	58.42	421.60	24.80	10.3
Laofola, Alokdia Union	0-23	4.7	0.88	0.085	1.51	6.97	99.66	445.20	31.40	10.4
	23-46	4.8	0.96	0.093	1.65	4.22	123.71	551.40	45.20	9.9
	46-92	4.9	0.71	0.068	1.22	4.53	127.14	557.00	46.60	10.3
Dewan gram, Agarokain, Ghatail	0-23	4.8	1.11	0.108	1.91	5.47	99.66	463.20	35.20	10.1
	23-46	4.9	1.11	0.107	1.91	2.53	72.16	522.60	34.00	10.3
	46-92	5.0	1.04	0.101	1.79	1.80	68.73	509.00	34.40	9.8
Rosulpur	0-23	4.7	1.08	0.105	1.86	22.60	68.73	253.80	22.80	10.1
	23-46	4.7	1.03	0.101	1.77	11.74	75.60	664.60	41.20	9.8
	46-92	5.0	0.96	0.093	1.65	2.13	65.29	972.40	52.20	10.1
Telki, Oronkhola Union	0-23	5.2	1.22	0.120	2.11	0.92	79.03	432.60	49.20	10.2
	23-46	5.1	1.23	0.101	1.77	0.50	72.16	405.40	54.80	10.2
	46-92	5.1	1.03	0.090	1.60	0.59	75.60	401.00	52.80	10.1
Charaljani, Oronkhola Union	0-23	4.8	1.46	0.141	2.51	21.15	72.16	259.20	19.00	10.4
	23-46	4.7	1.07	0.104	1.84	5.39	106.53	456.00	29.00	10.0
	46-92	4.9	1.08	0.105	1.86	1.54	106.53	599.40	45.40	10.3
Moter Bazar, Ayushnara Union	0-23	4.7	1.26	0.121	2.17	1.91	68.73	193.60	22.40	10.4
	23-46	4.7	1.10	0.105	1.89	0.66	68.73	102.40	17.20	10.5
	46-92	4.8	0.81	0.078	1.39	0.55	72.16	119.00	17.80	10.4

During survey the socio-economic condition of Madhupur Upazila seems to be improved. A plenty of pine-apple, ginger, turmeric and banana are cultivating here. By the discussion with the farmers it is known that cultivation of these crops is not profitable and free of danger all time. Because every year these crops are not getting good market price which falls farmers in a great uncertainty. In every year same crops are cultivating in same fields which decreasing fertility status of the land. There are many fellow lands in the survey area of Madhupur Upazila. In this situation small holding tea cultivation can be profitable in this area and farmers can utilize family labours which will ensure their economic profitability. Tea itself an unknown crop in the greater Tangail district. Farmers and investors should give idea about the profitability of tea cultivation and production, impact of the extension of small holding tea cultivation on the economy. To give a practical idea about tea cultivation to the farmers of the survey area a demonstration plot should be established. It is very difficult for the small growers to cultivate tea after raise tea plant in the nursery. A nursery should be established in the survey area for extension of small holding tea cultivation. For this reason in Madhupur Upazila a nursery can be established by the interested and experienced farmers. High yielding and quality tea plants should be supplied with the minimum cost and technical support should be given to the interested farmers. With low interest and easy conditions, loan should be ensuring to the farmers. First three years no crops will get from the tea plantation, so subsidy should be given to the farmers. A central factory should be established for selling and processing of green leaves produced by the farmers.

CONCLUSION

From the study it was observed that texture of the soils of survey area is heavy in nature. So, proper drainage condition should be developed. Otherwise tea plants will not survive in water logging condition. There are many dead rivers and canal in Madhupur area. These dead rivers and canals should be kept under renovation to maintain the proper water flow and reserve sufficient water for irrigation in dry season. From the collected data and experience of survey team concluded that land condition and principal characteristics of soils of Madhupur Upazila are suitable for tea cultivation. By considering land class, irrigation & drainage condition, soil texture, structure, available moisture condition, physiographic and agricultural climatic information indicate Madhupur area is medium suitable for tea cultivation.

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