Food and Agriculture Organization of the United Nations

IUCN

A Brief Report on

Soil Physico-chemical Properties of Ukhiya and Teknaf Upazila

Building Resilience to Landslides through Land Stabilization, Promotion of Alternative Livelihoods and the Establishment of Early Warning Systems in Cox's Bazar, Bangladesh.

April 2021

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1. Research Background

Soil is the main source of essential plant nutrients and any deficiencies of nutrients may result in poor plant vigour, stunted growth and low yields. Soil fertility is constantly changing as crops uptake nutrients from the soil and those nutrients are replenished through the addition of plant or animal residues and chemical fertilizers. Continuous cultivation of crops has resulted in reduction in soil organic matter and soil physico-chemical properties (Bhattacharya et al., 2007).Imbalance and inappropriate use of chemical fertilizers should be monitored for practicing sustainable agriculture as well as to save our precious soil resource from chemical toxicity.

Agriculture is the main source of livelihood in the south-eastern hilly areas particularly in Ukhiya and TeknafUpazila of Bangladesh. Income generation through non-farm activities is very limited and, in some areas, it has no existence. Different agriculture-related activities contribute to over 50% of the annual net income of all households (UNDP, 2009). A mixed type of farming and production systems are common in hilly areas and more than 35 different types of crops are cultivated annually.

It is a burning issue to improve soil quality to supply essential plant nutrients for better crop production and fulfill crop demands and also to keep soil health goodin condition. Soil testing is pre-requisite to determine the nutrient status of soil which ultimately helps in proper fertilizer recommendation for sustainable crop production and better livelihood in the south-eastern hilly areas of Bangladesh.

2. Objectives

The proposed research was undertaken with a view to fulfill the following objectives:

1. To provide baseline information about the soil properties and to know the soil fertility status of the selected areas.
2. To recommend fertilizer rates for different crops to the farmers.
3. To produce a farmer's friendly mobile app which can recommend fertilizer for particular crops on the basis of soil test value.
4. To find out the changes in soil fertility levels for future management strategies.

3. Soil Sample Collection, Analysis and Mapping

3.1 Selection Criteria

1. Agricultural cropland
2. Predetermined GIS coordinates by Grid Method
3. Maximum number of soil sampling
4. Represents the sampling areas

3.2Soil Sampling by Grid Method

Sampling Grid was prepared on the map for both Upazila (Figure. 1). The sampling point was set at 1 km X 1 km coordinates. The predetermined coordinates which had fallen on the non-agricultural land, hills, settlements, were excluded. One hundred and fifty (150) samples coordinates were selected for each selected Upazila irrespective of agricultural block.

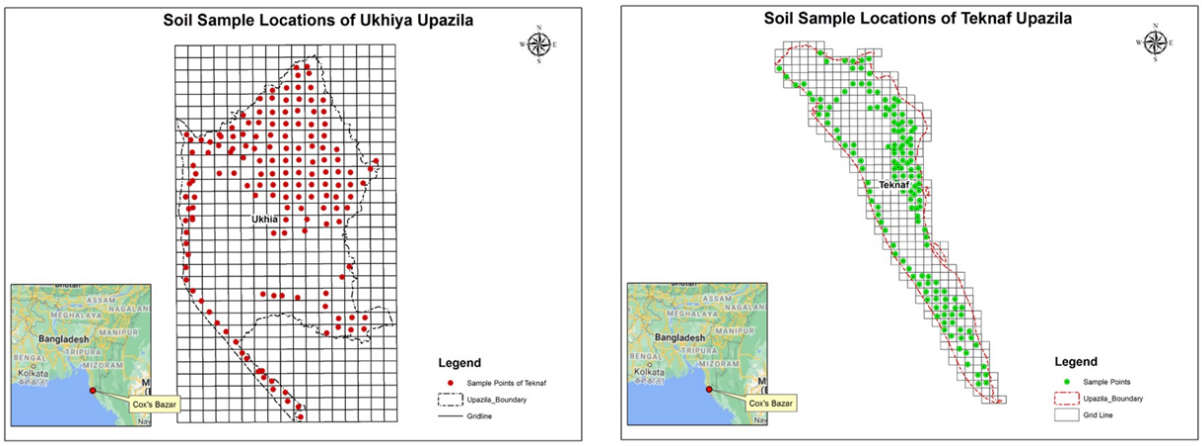

Figure1. Sampling Grid and coordinates of Ukhiya and Teknaf Upazila

3.3 Soil Sampling

Soil samples were collected from the two Upazila in Cox's Bazar i.e., Ukhiya and Teknaf (Figure 2). The samples were taken from crop field. The samples were collected at the predetermined coordinates. Garmin S64 GPS device was used to locate the coordinates and elevation of soil sampling was noted down. The samples were kept in zipper bag. Information such as sample ID, GPS coordinates, crops grown at the time of sampling, moisture conditions, distance from road and elevation from sea level were labeled on the zipper bag using a permanent marker. The information was also recorded in a notebook.

Figure2: Soil sample collection at the predetermined coordinate

3.4 Preparationand Storage

The soil samples were spread on a brown paper in the laboratory for air-drying (Figure. 3). The air-dry soil was ground and passed through a 2-mm sieve to remove roots and other debris. After sieving, the soil samples were kept in plastic containers for physical and chemical analysis with proper labeling.

Air drying of the soil samples | Grinding and sieving with 2 mm sieve | Labeling & storage

Figure 3: Soil sample preparation and storage

3.5 Sampling Equipment

The equipmentwas used in soil sampling are listed below:

1. Auger
2. Garmin S64 GPS Device
3. Zipper bag

3.6 Sampling Depth

The sampling depth was 0-15 cm.

3,7 Parameters and Methods of Determination

Table 1. The selected parameters and the methods of determination

The physical and chemical parameters were selected for the study and their methods of determination (Table 1) are given below:

Parameters	Method	References
Texture	Hydrometer method	Piper (1950)
pH	Glass electrode pH meter (1:2.5 soil water ratio)	McLean, 1982
EC	Electrical Conductivity Meter	HANNA Model HI 933100

Parameters	Method	References
	(1: 5 soil water ratio)	
OC	Wet Oxidation method	Nelson and Sommers, 1982
N	Micro-Kjeldahl method	Bremner and Mulvaney, 1982
P	0.5M $NaHCO_3$, pH 8.5	Olsen and Sommers, 1982
	(neutral & calcareous soils)	Bray and Kurtz, 1945
	0.03N NH_4F+0.025 N HCl	(Ascorbic acid blue color method)
	(acidic soils, <pH 6.0)	
K	NH_4OAc (1N) extraction, pH 7.0	Barker and Surh, 1982
S	$CaCl_2$ extraction (Turbidity method)	Fox et al., 1964
Mg	NH_4OAc (1N) extraction, pH 7.0	Barker and Surh, 1982
B	Hot water-CaCl2 (0.02M) extraction	John et al., 1975
Zn	0.005M DTPA, pH 7.3 extraction	Lindsay and Norvell, 1978

3.8 Laboratory Analysis

The physical and chemical properties such as soil texture, pH, EC, N, P, K, S, B, Mg and Zn of the collected soil samples are being analyzed in the Soil Science Laboratory, BAU (Figure 4).

Figure 4: Chemical analysis of the soil samples

3.9 Analyzing Procedure

Soil Texture

The particle size analysis was done by hydrometer method as described by Piper (1950) and the textural class was determined by plotting the results of % sand, % silt and % clay to the "Marshall's Triangular Co-ordinate" following the USDA system.

Soil pH

Soil pH was measured in a suspension of soil and water on a glass electrode pH meter using a combined glass/calomel electrode, the soil-water ratio being 1: 2.5 (McLean, 1982). Prior to making pH measurement, the electrode was calibrated using standard buffer solution at pH 4.0 and 7.0.

Electrical Conductivity (EC)

The electrical conductivity was determined by HANNA Model HI 933100 conductivity Meter.

Soil Organic Matter

Organic carbon content of the soil was determined by wet oxidation method (Nelson and Sommers, 1982). The organic matter in soil was oxidized by 1N potassium dichromate solution and the amount of organic carbon was determined by titration against 0.5N ferrous sulphate heptahydrate solution in presence of 0.025M ortho-phenanthroline ferrous complex. The organic matter content was calculated by multiplying the per cent organic carbon by 1.73 (Van Bemmelen factor).

Total Nitrogen (N)

Total N content in soil was determined by micro-Kjeldahl method (Bremner and Mulvaney, 1982). Soil samples was digested with conc. H_2SO_4 in presence of K_2SO_4 catalyst mixture (K_2SO_4: Cu_2SO_4, $5H_2O$: Se = 100:10:1). Nitrogen in the digest was estimated by distilling the digest with 10N NaOH followed by titration of the distillate trapped in H_3BO_3 indicator solution with 0.01N H_2SO_4.

Available Phosphorus (P)

Available P content in soil was extracted by shaking the soil with 0.5M $NaHCO_3$ (pH 8.5). The extractable P in solution was then determined colorimetrically at 890 ηm wavelength by developing blue colour with reduction of phosphomolydate complex using molybdate ascorbic acid reagent (Olsen and Sommers, 1982).

Exchangeable Potassium (K)

Exchangeable K content of soil was extracted by ammonium acetate extraction method. Extraction was done by repeated shaking and centrifugation of the soil with neutral 1N NH_4OAc followed by decantation. The K concentration in the extract was determined by flame photometer (Knudsen et al.,1982).

Available Sulphur (S)

Available S content was determined by extracting soil sample with 0.15% $CaCl_2$ solution (1:5 soil-extractant ratio) from $CaCl_2$, $2H_2O$ and was estimated by turbidimetric method using $BaCl_2$ crystals (Fox et al., 1964).

Magnesium (Mg)

Magnesium was determined by ammonium acetate extraction method. The extractable Mg will be measured by atomic absorption spectrophotometer (AAS) (Barker and Surh, 1982).

Available Boron (B)

Available B content of soil was determined by mono-calcium biphosphate [Ca(H2PO4)2] extraction method. The extractable B will be estimated colorimetrically by spectrophotometer at 540 ηm wavelength (John et al., 1975).

Available Zinc (Zn)

Available Zn content in soil was extracted with 0.005M DTPA solution (pH 7.3) and the concentration of Zn in the extract will be measured directly by atomic absorption spectrophotometer at 214 ηm wavelength (Lindsay and Norvell, 1978).

4. Findings

The findings of the research are discussed below and the data are attached in the Annexure 1.

4.1 Soil Texture

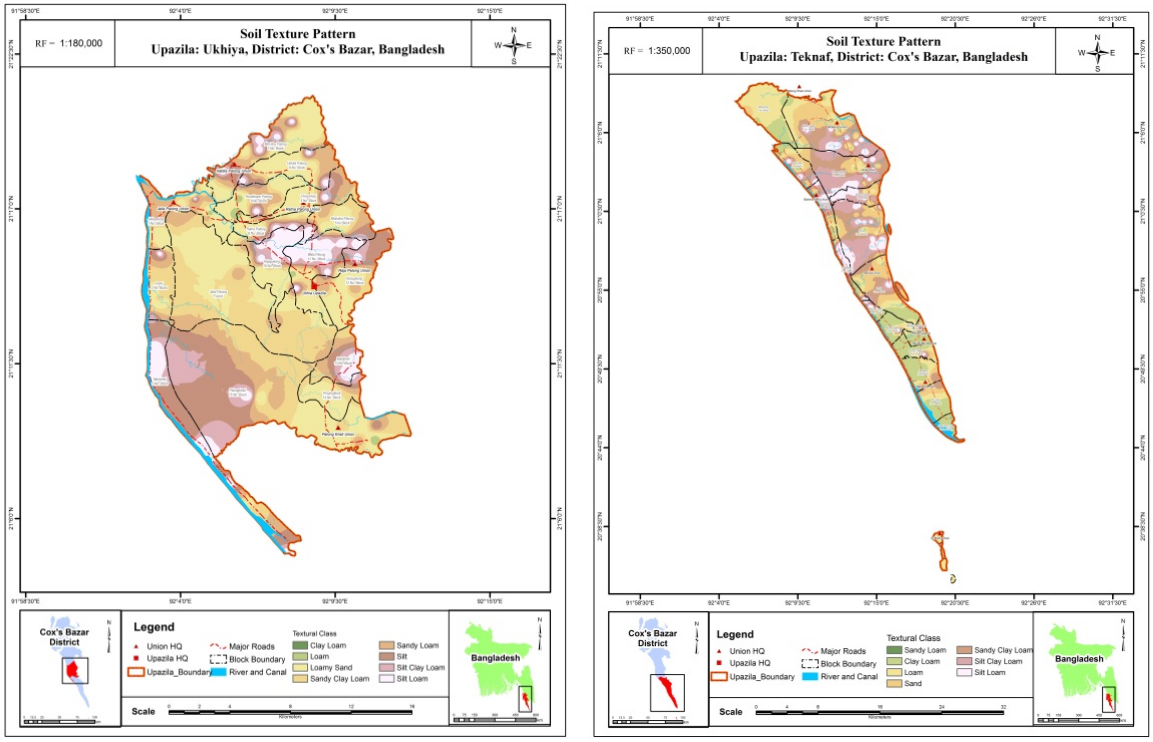

Figure5:Soil Textural classes in Ukhiya and Teknaf Upazila

The texture of the soil samples of Ukhiya and Teknaf were sandy loam to clayey loam (Figure. 5). In Ukhiya, the textural classes were clay loam (4.5%), loam (35.5%), loamy sand (3.2%), sandy clay loam (3.2%), sandy loam (25.8%), silt (1.3%), silty clay loam (0.6%), silt loam (25.8%). In Teknaf, the textural classes wereloamy sand (0.7%), clay loam (11.45%), loam (18.8%), loamy sand (10.7%), sand (0.7%), sandy clay loam (2%), sandy loam (20%), silt clay loam (1.3%), silt loam (28.9%), silty clay loam (4.7%), sandy loam (0.7%).

4.2 Soil pH

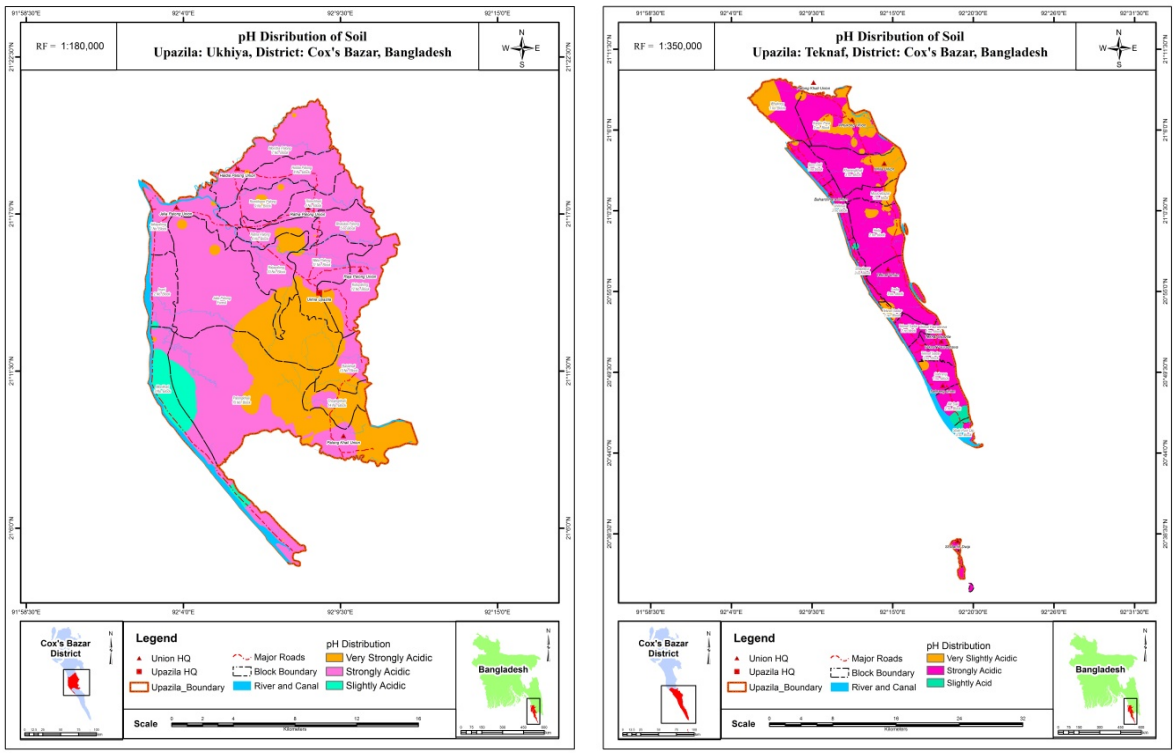

Figure 6: Soil pH status in Ukhiya and Teknaf Upazila

The mean value of pH in Ukhiyaand Teknaf was strongly acidic (4.79 and 4.73, respectively). The values in Ukhiya were ranged from 3.84 to 6.02 (very strongly acidic to slightly acid) and in Teknaf were found 3.6 to 5.74 (very strongly acidic to slightly acid) (Figure. 6). All kinds of crops are grown well in the pH range of 5.6-7.3 (neutral), because all types of essential nutrients are available in this range (BARC, 2018).

4.3 Electrical Conductivity (EC)

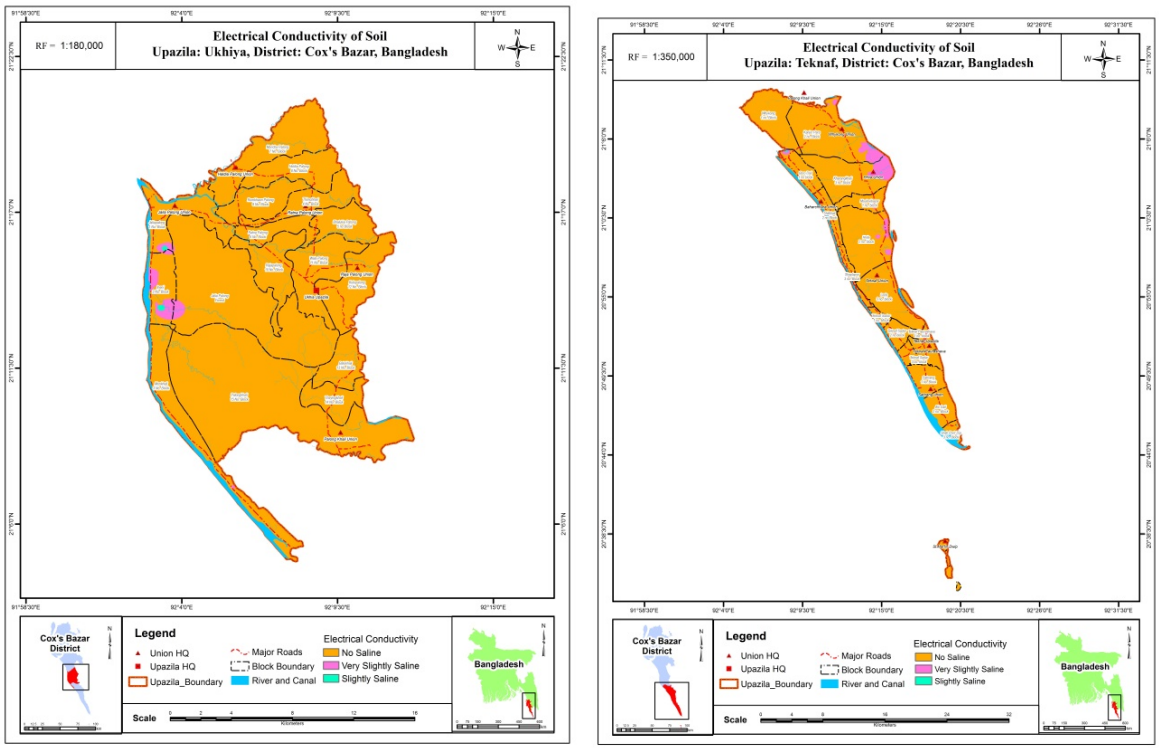

Figure7:Soil EC status in Ukhiya and Teknaf Upazila

The mean value of electrical conductivity (EC) in both Ukhiya and Teknaf was 0.600 and 0.578, respectively which indicated non salinity (Figure 1). The values in Ukhiya were ranged from 0.003 to 4.5 (non-saline to slightly saline) and in Teknaf were found 0.003 to 4.5 (non-saline to slightly saline) (Figure 7). Most of the crops are grown well in the non-saline range of 0-2 dS/m (BARC, 2018).

4.4 Soil Organic Matter

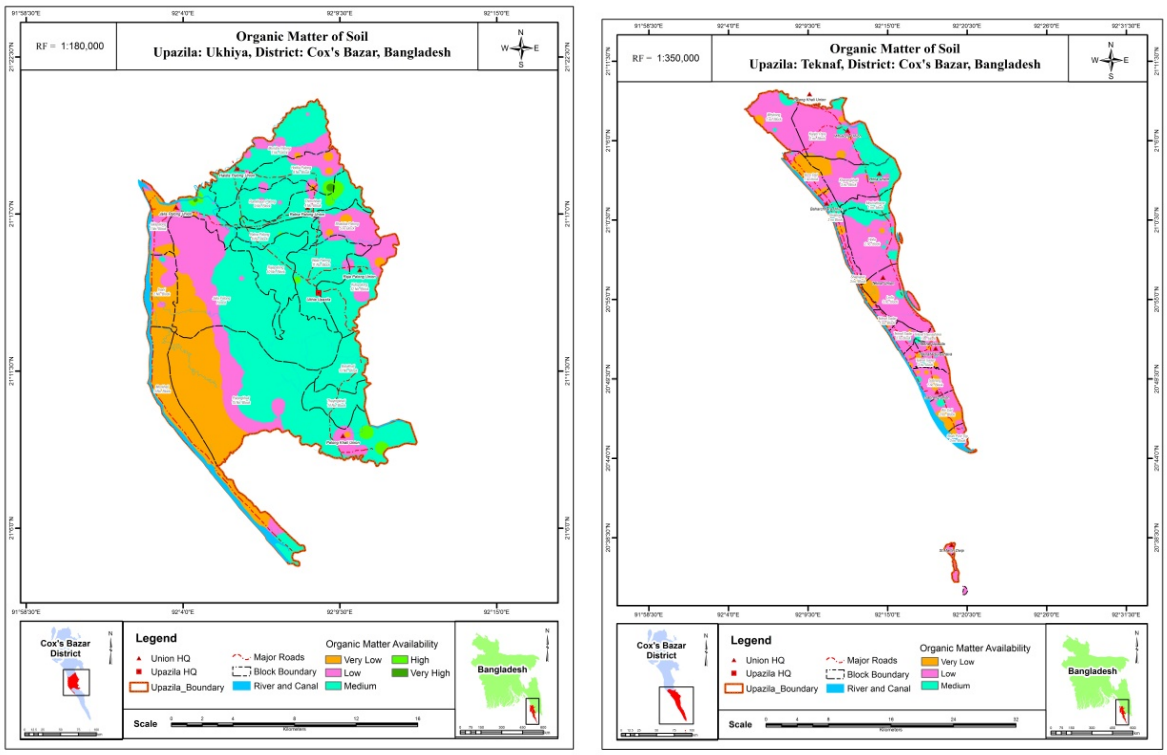

Figure 8: Soil OM status in Ukhiya and Teknaf Upazila

The mean value of soil organic matter (OM) in Ukhiya and Teknaf was low (1.47% and 1.43%, respectively). The values in Ukhiya were ranged from 0.02 to 2.99 (very low to medium) and in Teknaf were found 0.28 to 3.17 (very low to medium) (Figure 8). A healthy soil should have 5% OM for better crop production (BARC, 2018).

4.5 Total Nitrogen (N)

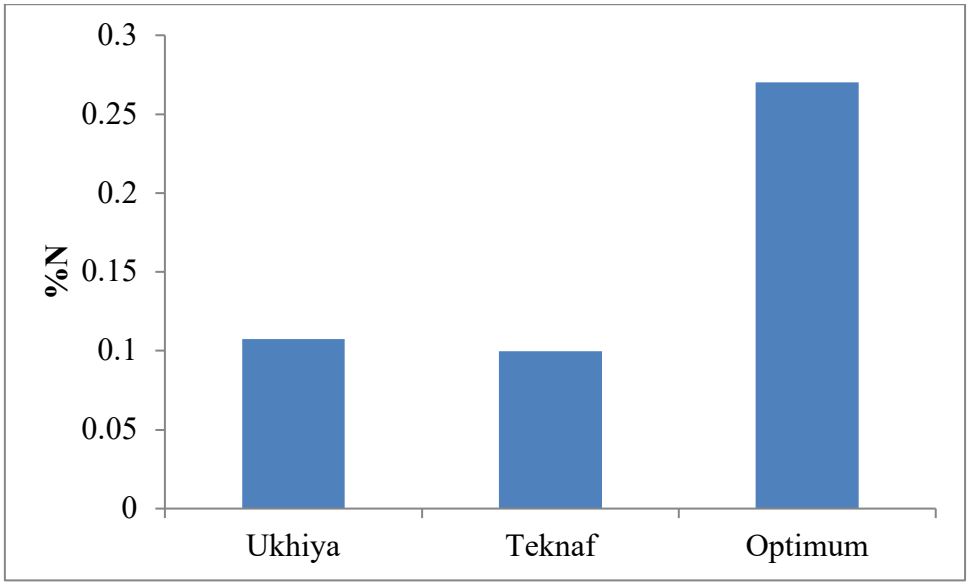

Figure 9: Mean and optimum total N status in Ukhiya and TeknafUpazila

The mean total nitrogen (N) status of Ukhiya was very low (0.01%) but in Teknaf, it was low (0.10%) (Figure9). The total N contents of Ukhiya were ranged from 0.01 to 0.25% (very low to medium) and of Teknaf were ranged from 0.02 to 0.41% (very low to high) (Figure 10). Optimum (>0.27%) N status is the suitable for all kinds of crop production (BARC, 2018).

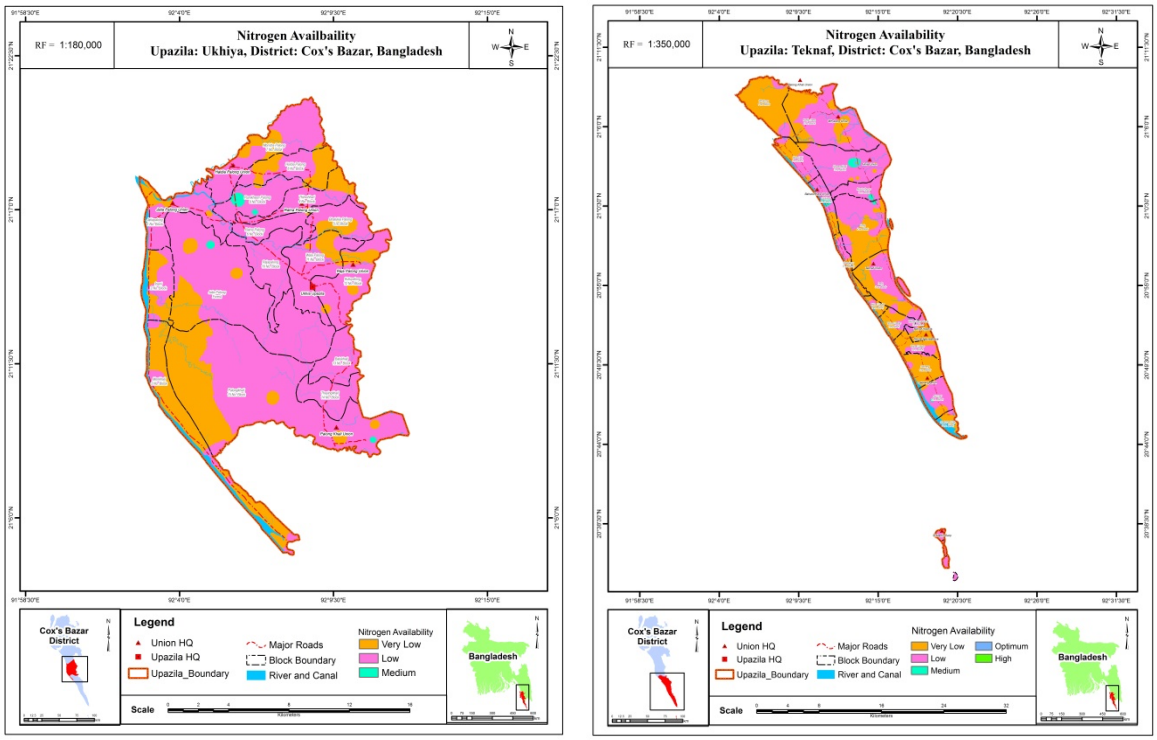

Figure 10:Total N status in Ukhiya and Teknaf Upazila

4.6 Available phosphorus (P)

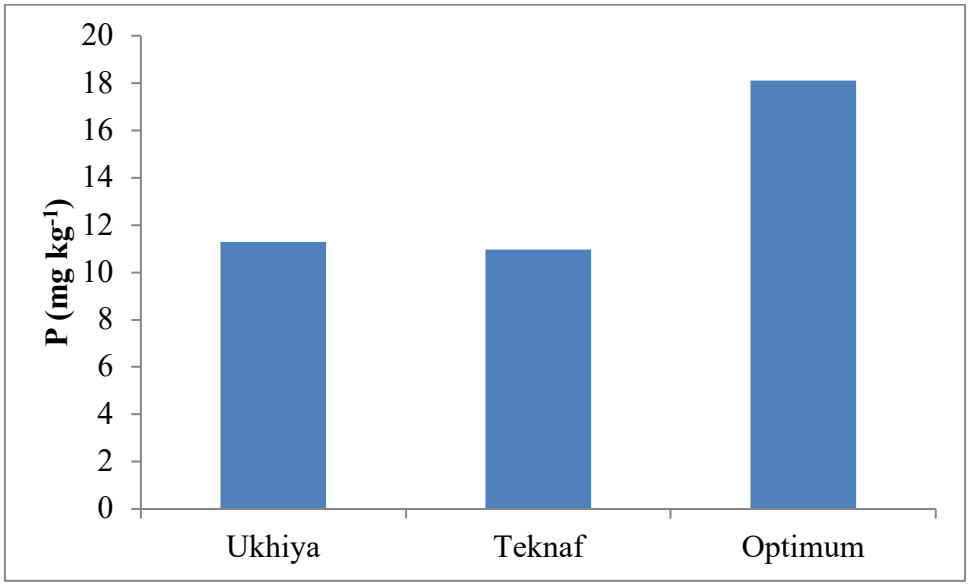

Figure 11:Mean and optimum available P status in Ukhiya and TeknafUpazila

The mean available phosphorous (P) status of Ukhiya was low (11.29mg kg^{-1} soil) but in Teknaf, it was very low (10.95mg kg^{-1} soil) (Figure11). The available P contents of Ukhiya were ranged from 0.82 to 115.99mg kg^{-1} soil (very low to very high) and of Teknaf were ranged from 1.53 to 68.02mg kg^{-1} soil (very low to very high) (Figure12). BARC (2018) reported that the optimum (>18.10mg kg^{-1} soil) status of available P value is suitable for all kinds of crop production.

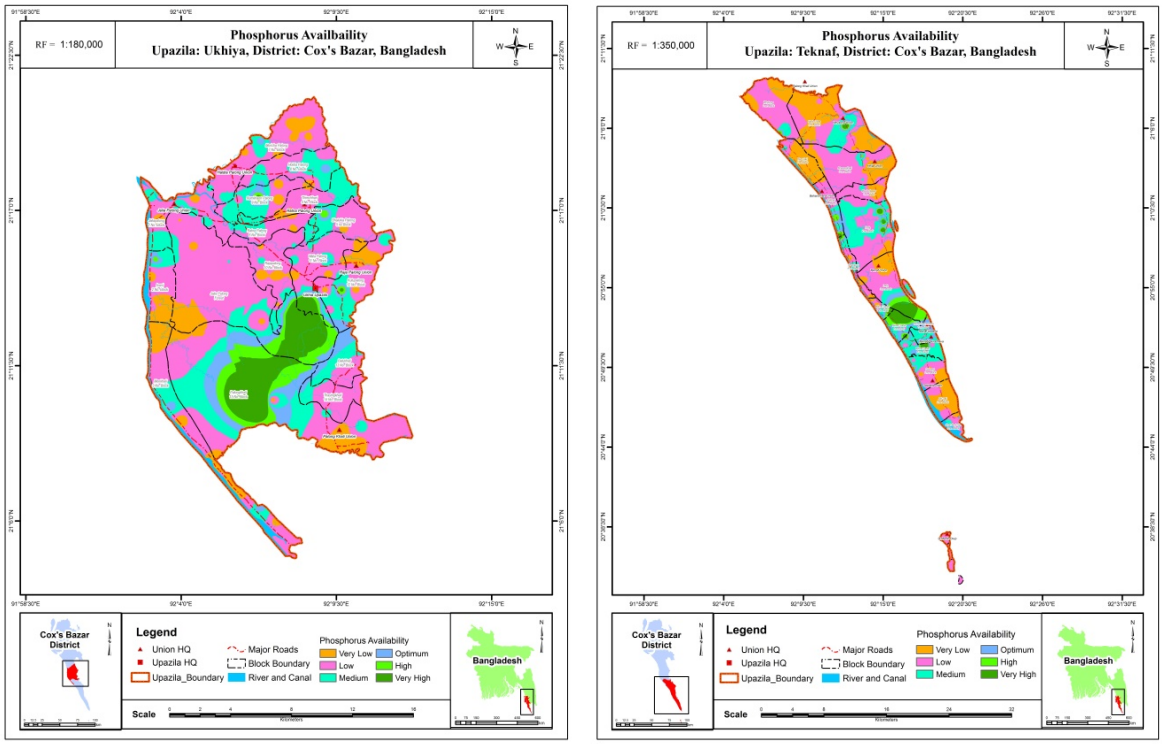

Figure12:Available Phosphorous (P)Status in Ukhiya and TeknafUpazila

4.7 Exchangeable Potassium (K)

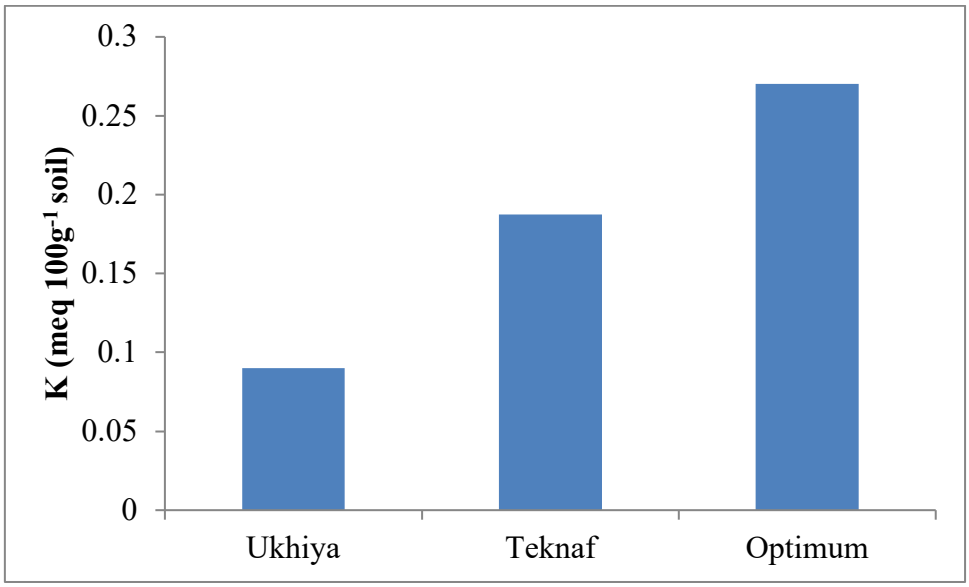

Figure13: Mean and Optimum Available Potassium (K) Status in Ukhiya And TeknafUpazila

The mean exchangeable potassium (K) status of Ukhiya was low (0.09 meq100g^{-1} soil) but it was medium (0.19 meq100g^{-1} soil) in Teknaf (Figure13).The potassium (K) contents of Ukhiya were ranged from 0.02 to 0.34 meq100g^{-1} (very low to high) and of Teknaf were ranged from 0.02 to 0.75 meq100g^{-1} soil (very low to very high) (Figure14). Optimum (>0.27 meq100g^{-1} soil) status of exchangeable K is the suitable for all kinds of agricultural crops production (BARC, 2018).

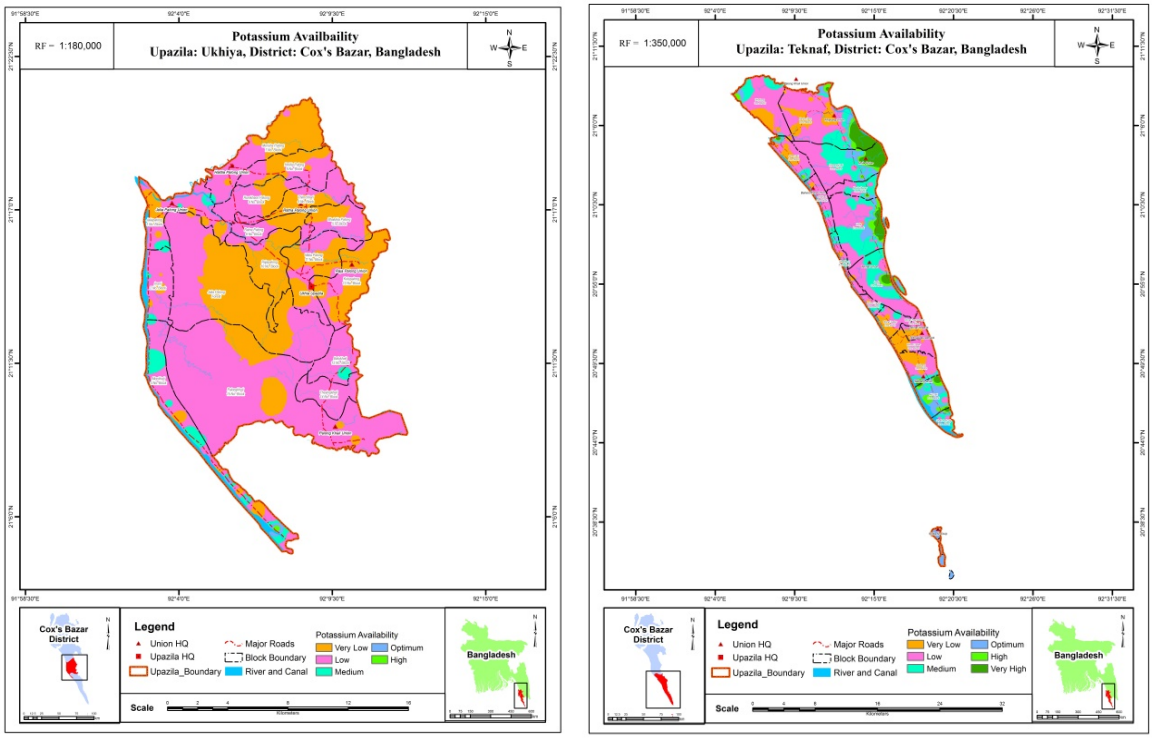

Figure14:Available Potassium (K) Status in Ukhiya and Teknaf Upazila

4.8 Available Sulphur (S)

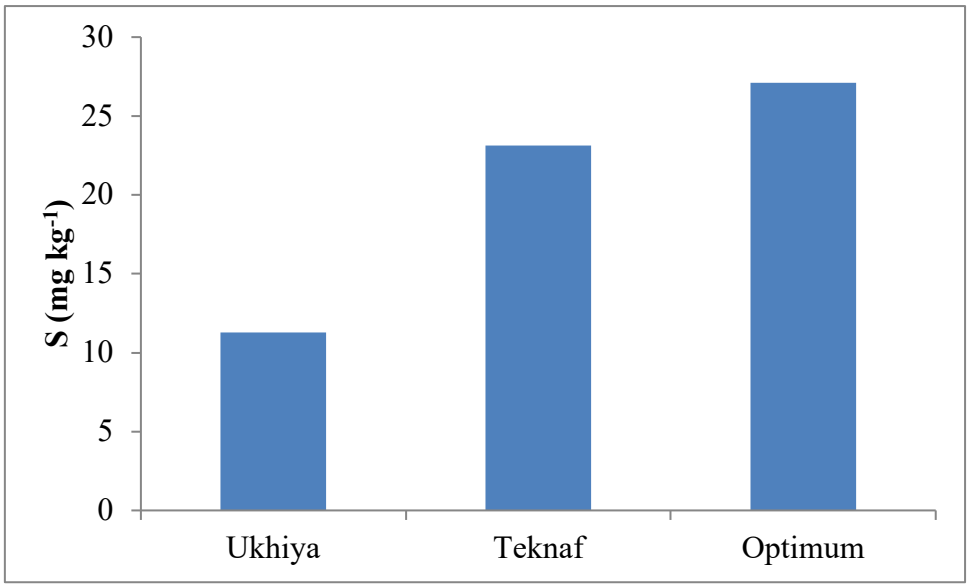

Figure15:Mean and optimum available Sulfur (S) status in Ukhiya and TeknafUpazila

The mean available sulfur (S) status of Ukhiya was low (11.30mg kg^{-1} soil) but it was medium (23.04mg kg^{-1} soil) in Teknaf (Figure15). The available S contents of Ukhiya were ranged from 0.56 to 120 mg kg^{-1} soil (very low to very high) and of Teknaf were ranged from 1.11 to 98.89mg kg^{-1}soil (very low to very high) (Figure 16). Optimum (>22.5 mg kg^{-1} soil) status of S is suitable for all kinds of agricultural crops production (BARC, 2018).

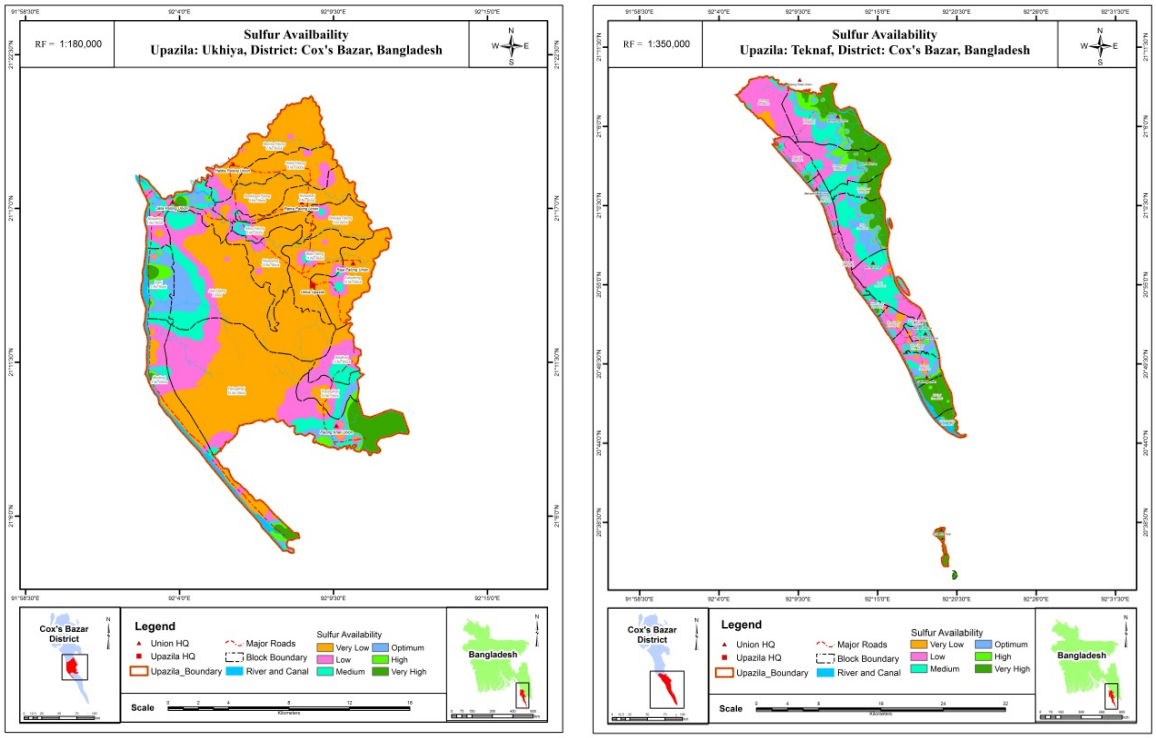

Figure16:Available S status in Ukhiya and Teknaf Upazila

4.9 Magnesium (Mg)

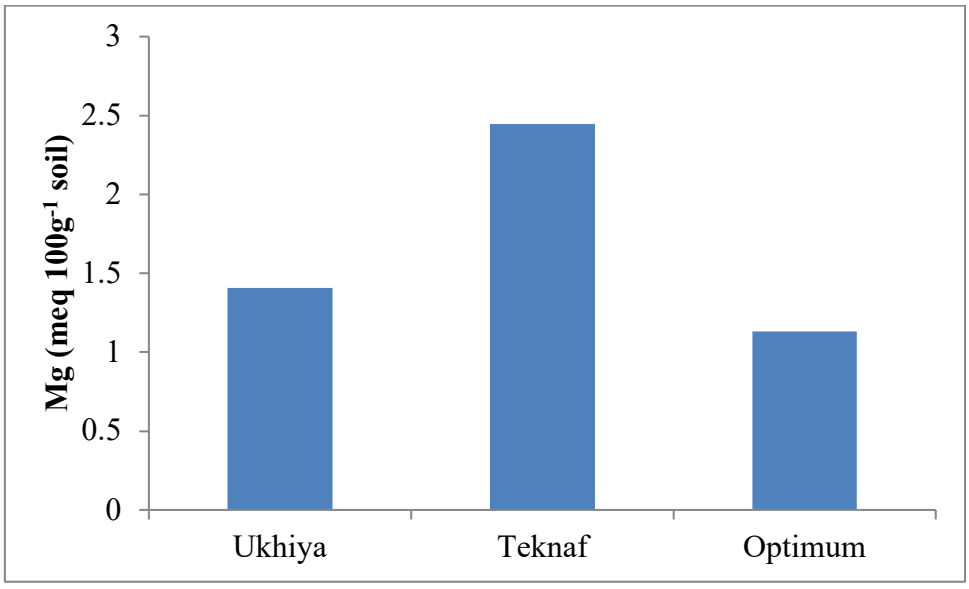

Figure17:Mean and optimum available Mg status in Ukhiya and TeknafUpazila

The mean magnesium (Mg) status of Ukhiya and Teknaf was very low (1.41meq100g^{-1} soil and 2.43 meq100g^{-1}soil, respectively (Figure. 17).The Mg contents of Ukhiya were ranged from 0.09 to 10.42 meq100g^{-1} soil (very low to very high) and of Teknaf were ranged from

0.17 to 8.02 meq100g^{-1}soil (very low to very high) (Figure. 18). Optimum (>1.125 meq100g^{-1} soil) status is suitable for all kinds of agricultural crops production (BARC, 2018).

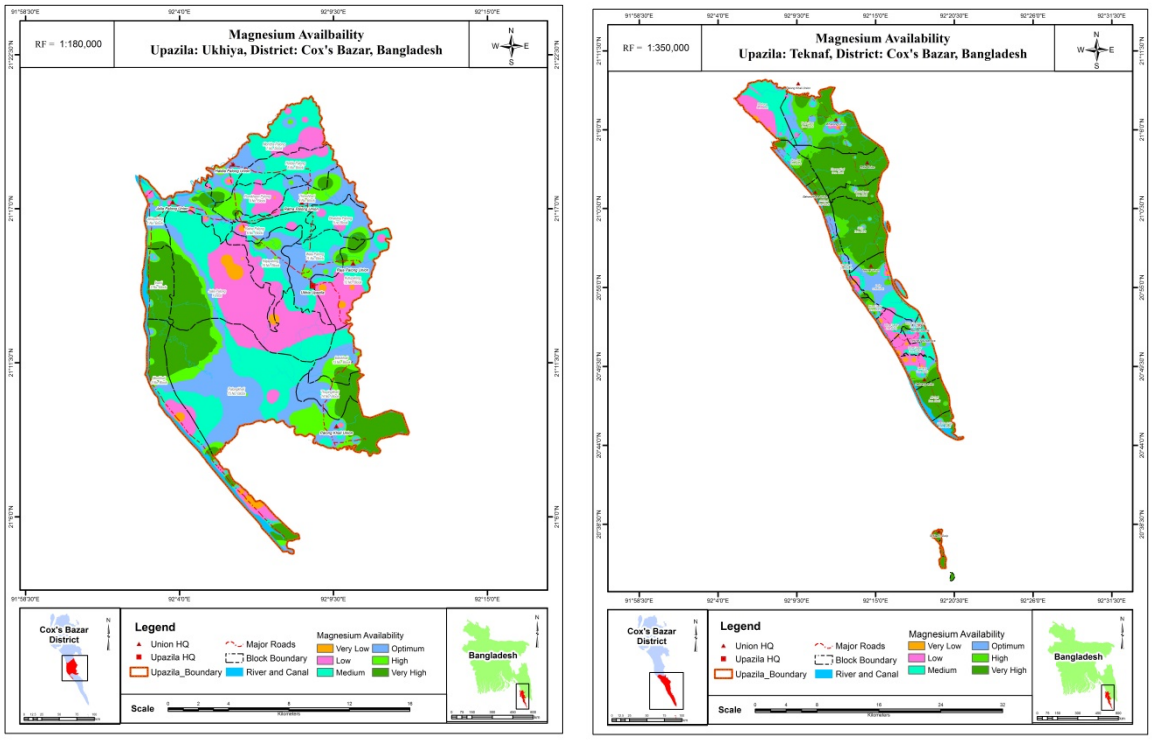

Figure18:Available Mg status in Ukhiya and Teknaf Upazila

4.10 Available Boron (B)

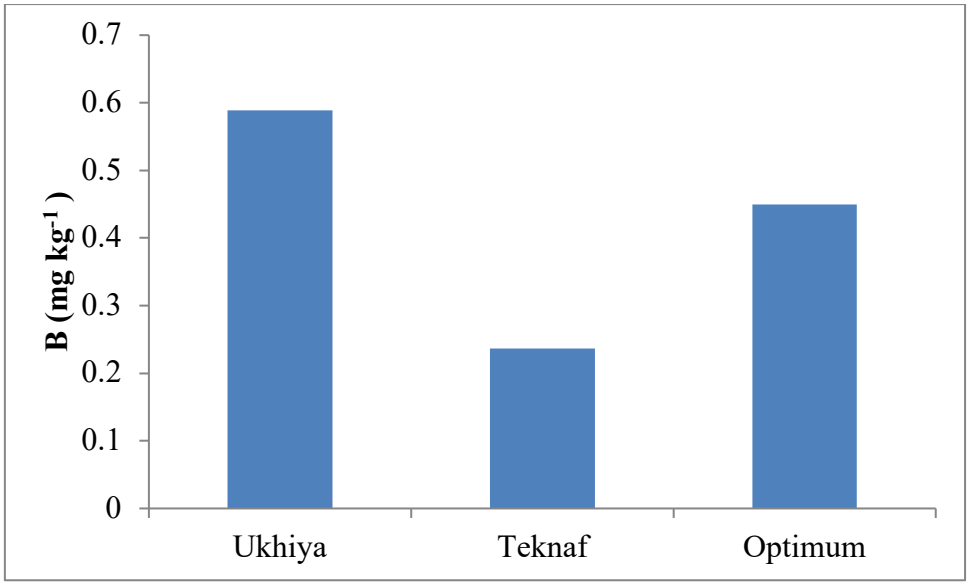

Figure19:Mean and optimum available B status in Ukhiya and TeknafUpazila

The mean available boron (B) status of Ukhiyawas optimum (0.59 mg kg^{-1} soil) and in Teknaf, available B content waslow(0.24mg kg^{-1}soil) (Figure19). The available B contents of

Ukhiyawere ranged from 0.02 to 2.65 mg kg^{-1}soil (very low to very high) and of Teknaf were ranged from 0.03 to 1.18mg kg^{-1} soil (very low to very high) (Figure 20). Optimum (>0.45 mg kg^{-1} soil) status of B is suitable for all kinds of agricultural crops production (BARC, 2018).

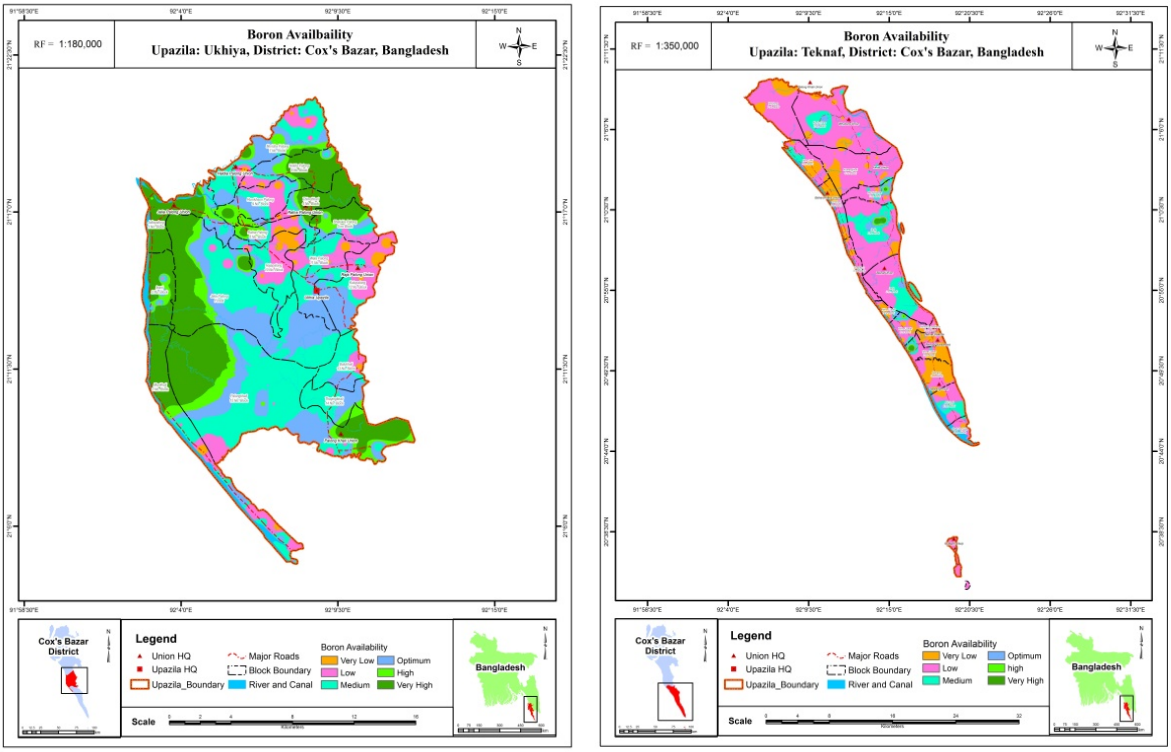

Figure20:Available B status in Ukhiya and Teknaf Upazila

4.11 Available Zinc (Zn)

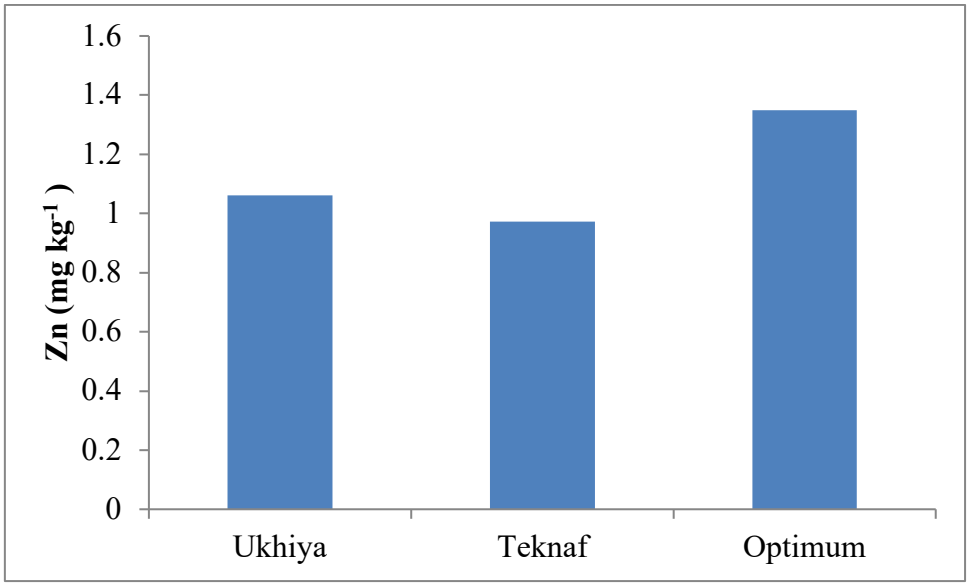

Figure 21: Mean and optimum available Zn status in Ukhiya and TeknafUpazila

The mean available zinc (Zn) status of Ukhiya and Teknaf were medium (1.06and 0.97mg kg^{-1} soil, respectively) (Figure. 21). The available Zn contents of Ukhiya were ranged from 0.09 to 9.83mg kg^{-1} (very low to very high) and of Teknaf were ranged from 0.11 to 5.47mg kg^{-1} (very low to very high) also (Figure. 22). Optimum (>0.1.35 mg kg^{-1}soil) status of Zn is suitable for all kinds of agricultural crops production (BARC,2018).

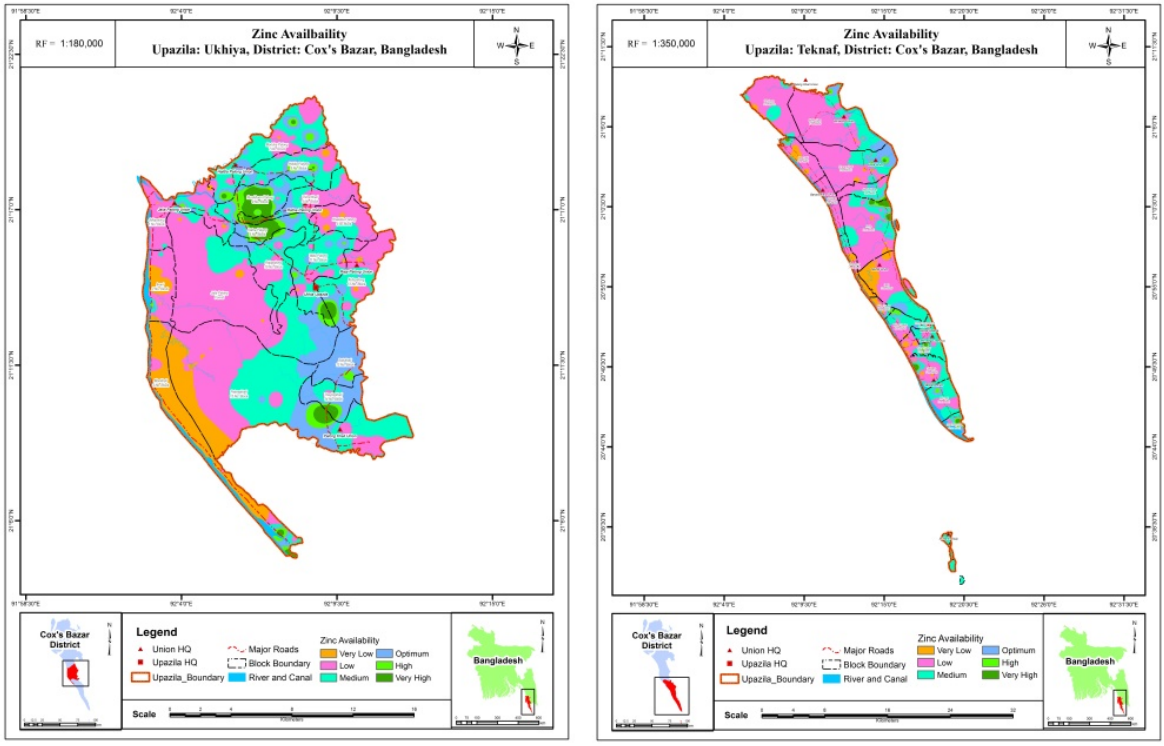

Figure22:Available Zn status in Ukhiya and Teknaf Upazila

5. Android App Development for Fertilizer Recommendation for the Study Area

Amobile app was developed showing the geo-locations with the determined soil properties (Figure. 23). This app will help the stakeholders particularly SAAO and farmers to recommend major fertilizers i.e. Urea (N), TSP (P), MoP (K), and Gypsum (S) for specific crops. This dynamic mobile app was developed for long term use. Users can put the nutrient status and get the recommended doses of the nutrients as fertilizer.

The interfaces of the app are as follows:

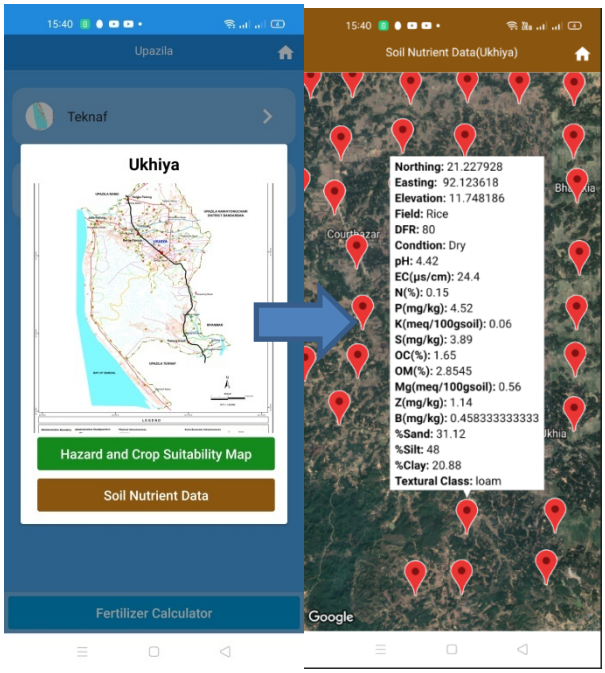

Figure23: The red mark by clicking shows soil properties and other information of particular geo-location

Fertilizer Calculator

A fertilizer calculator was developed to recommend fertilizer dose for different crops (Figure. 24). At the beginning, the crops are selected viz. rice (aus, aman, boro), maize, wheat, betel leaf, watermelon, mustard, onion, garlic, cabbage, cauliflower, potato as data input. Then the users (SAAO, farmers and others) can provide each nutrient status (N, P, K, S etc.) of a specific area and get the recommended doses of the fertilizer for the specific crops.

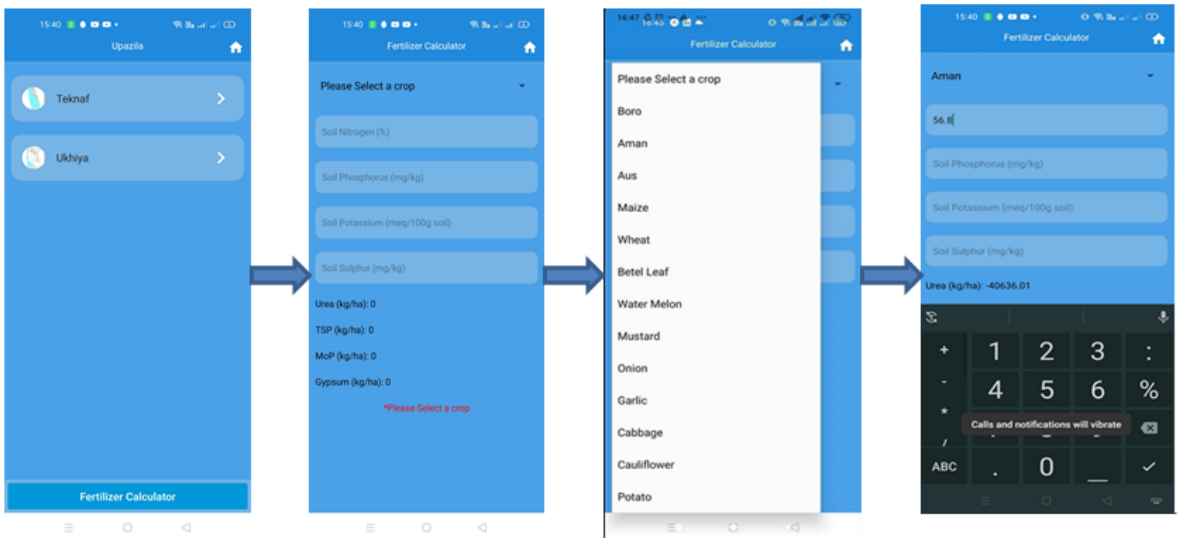

Figure24:Soil test-based fertilizer recommendation mobile app for specific crops

6. Recommendations

1. Application of organic matter in the crop field is highly recommended in the study area. Organic matter can be added to soil by applying compost, well-decomposed cowdung, farmyard manure and green manure etc. Added organic matter in soil will help plant to grow by supplying nutrients and will maintain soil health by restoring physical, chemical and biological properties of soil. Based on the study, we observed that nitrogen (Figure 9), phosphorus (Figure 11) and sulphur (Figure 15) content in soil is lower than the optimum level in both Ukhiya and Teknaf upazilla, which may significantly decrease crop yield. It is well documented that organic matter content in soil increases the availability of nitrogen, phosphorus and sulphur for plant uptake. Thus, we highly recommend applying organic matter in soil to restore soil health and sustain crop productivity.
2. The major challenge is to apply balanced fertilizers for crop production to get maximum economic return. We recommend using fertilizer calculator (an android based mobile application) to determine the amount of required fertilizers for a specific crop for a specific location. Farmers and stakeholders may use this mobile application to calculate the recommended dose of application and avoid unnecessary costs associated with fertilizer application. This can be an integral part of integrative nutrient management system for maximizing crop production with minimum inputs.
3. Crop rotation is an important component that we recommend to practice in the study area to maximize the nutrient use efficiency and get highest economic crop yield. This practice will help to utilize nutrients from different horizons across the soil profile and maintain soil health. Moreover, crop rotation helps to minimize pest infestation for a specific crop in the field, which may lead to sustainable agricultural production system.
4. Saline water is one of the most significant problems in both Ukhiya and Teknaf for agricultural production system. This saline water decreases crop production when it is applied to the crop field as irrigation source. Therefore, we recommend harvesting rainwater for irrigation and drinking purposes. This practice will also need a technical training support for initial establishment of rainwater storage facility at community level.
5. Conservation agriculture can be one of the most important strategies to address the problem of soil fertility of the study area. In a rice-rice cropping pattern, it is very important to minimize conventional tillage operations to minimize soil erosion, and crop rotation practice should be introduced along with conservation agriculture to maintain sustainable agricultural productivity.
6. Application of household ash is highly recommended to minimize salinity stress in both of the upazilas. Household ash is rich in potassium. As the soil of the study area contain very low amount of K, application of ash could contribute to increase K/Na ratio in the soil and minimize crop loss.

7. Conclusion

Soil fertility is a complex and dynamic system that is the important quality indicator of the soil quality. Its maintenance is one of the prime factors for higher yield and sustainable crop production. From the study, it was clearly identified that the textural class was sandy loam to clayey loam, mean value of pH was low, EC was favorable for both Ukhiya and Teknaf Upazila. The mean value of organic matter (OM), total nitrogen (N), phosphorus (P), potassium (K), sulfur (S), zinc (Zn), magnesium (Mg) except boron (B) were lower than the optimum value in both the Upazila. The available B content was low in Teknaf. Therefore, based on the findings of the study it was recommended that proper initiatives should be taken to improve the nutrient status of the studied soils.

REFERENCES

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The results of the analyzed soil sample data for both Ukhiya and Teknaf are given below as Annexure:

ANNEXURE

Analyzed soil sample data of Ukhiya

Sample Code	Northing	Easting	Elevation	Field	DFR	Condition	pH	EC (µs/cm)	EC (dS/m)	N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
UK 01	21.28553	92.06719	8.103725	Rice	150	Wet	4.81	9.26	0.00926	0.18	19.41	0.17	106.67	1.06	1.83	1.24	2.13	0.97	44.56	35.28	20.16	Loam
UK 02	21.28712	92.06058	11.3202	Bettel Nut	700	Dry	5.49	146.1	0.1461	0.07	11.42	0.09	8.33	0.12	0.21	0.65	0.68	0.97	72.56	17.28	10.16	Sandy loam
UK 03	21.27799	92.08242	13.45374	Rice	120	Dry	5.14	155	0.155	0.12	15.33	0.04	6.67	0.59	1.02	0.19	0.67	0.32	60.56	29.28	10.16	sandy loam
UK 04	21.2911	92.04973	14.79665	Vegetable	160	Dry	5.04	151.3	0.1513	0.06	14.03	0.07	12.22	0.39	0.67	0.48	0.5	0.71	64.56	27.28	8.16	sandy loam
UK 05	21.28711	92.05278	14.77601	Rice	130	wet	5.06	132.8	0.1328	0.09	9.14	0.06	33.89	0.23	0.40	1.79	0.44	1.94	72.56	13.28	14.16	sandy loam
UK 06	21.27786	92.05399	15.09717	Rice	200	wet	5.32	421	0.421	0.11	1.96	0.05	5.56	0.74	1.28	0.76	0.45	1.68	54.56	33.28	12.16	sandy loam
UK 07	21.26806	92.05459	14.07454	Rice	150	Dry	5.27	88.7	0.0887	0.12	13.54	0.06	5	0.9	1.56	1.83	0.67	1.16	48.56	29.28	22.16	Loam
UK 08	21.28301	92.07365	13.34267	Rice	150	Dry	5.06	45.9	0.0459	0.1	14.36	0.03	7.22	0.39	0.67	0.25	1.53	1.16	62.56	27.28	10.16	sandy loam
UK 09	21.28963	92.07513	11.145	Rice	50	Dry	5.02	11.28	0.01128	0.15	4.24	0.1	37.78	1.6	2.77	2.48	0.56	1.42	28.56	53.28	18.16	silt loam
UK 10	21.29103	92.07421	11.00707	Bettel Nut	100	Dry	5.01	475	0.475	0.09	3.43	0.1	27.22	0.399	0.69	0.83	0.49	1.03	48.56	39.28	12.16	loam
UK 11	21.29014	92.15219	10.38233	Rice	50	Dry	5.26	38.4	0.0384	0.13	8.97	0.06	0.56	0.227	0.39	1.67	0.58	1.35	22.56	57.28	20.16	silt loam
UK 12	21.28992	92.14252	13.29504	Rice	15	Dry	5.14	13.43	0.01343	0.13	11.09	0.07	3.33	0.7	1.21	1.82	0.59	1.23	30.56	39.28	30.16	Loam
UK 13	21.29862	92.14262	18.40555	Vegetable	120	Dry	4.95	164.9	0.1649	0.07	0.82	0.12	5	0.27	0.47	1.32	0.85	1.29	40.56	45.28	14.16	Loam
UK 14	21.30817	92.14447	18.82546	Rice	150	Dry	4.87	126.8	0.1268	0.11	18.27	0.07	4.44	1.1	1.90	0.81	2.31	1.10	34.56	45.28	20.16	Loam
UK 15	21.30889	92.13228	19.62994	Bettel Nut	300	Dry	4.97	339	0.339	0.11	15.82	0.08	5.56	1.17	2.02	0.94	2.56	0.97	36.56	47.28	16.16	Loam
UK 16	21.31738	92.1335	23	Rice	350	Dry	4.93	51.9	0.0519	0.1	8.81	0.03	2.78	0.43	0.74	0.5	0.4	0.90	38.56	47.28	14.16	Loam
UK 17	21.31672	92.14249	27.0123	Rice	80	Dry	4.68	27	0.027	0.1	14.85	0.07	11.11	0.66	1.14	0.65	0.66	1.23	22.56	64	13.44	silt loam
UK 18	21.31673	92.15142	31.72401	Rice	40	Dry	4.8	29.1	0.0291	0.04	6.53	0.06	6.67	0.43	0.74	0.61	0.23	0.39	76.56	14	9.44	Sandy loam
UK 19	21.30812	92.15182	29.18015	Sugar Cane	100	Dry	5.05	38.1	0.0381	0.06	21.21	0.15	10.56	0.35	0.61	1.09	0.71	1.81	54.56	26	19.44	Sandy loam
UK 20	21.29883	92.15273	23.97895	Rice	50	Dry	4.96	166.5	0.1665	0.06	15.33	0.1	12.78	0.399	0.69	2.65	1.16	1.48	24.56	52	23.44	silt loam
UK 21	21.28001	92.16158	17.76226	Rice	100	Dry	4.81	59.6	0.0596	0.1	8.65	0.06	1.67	0.23	0.40	0.93	0.39	1.61	36.56	46	17.44	Loam
UK 22	21.28258	92.14314	14.70557	Rice	100	Dry	4.92	38.2	0.0382	0.07	7.67	0.05	3.33	0.94	1.63	0.73	0.41	1.81	36.56	46	17.44	Loam
UK 23	21.26206	92.0565	11.55587	Rice	150	Dry	4.78	54.7	0.0547	0.13	16.15	0.23	13.89	0.09	0.16	1.89	0.94	1.74	30.56	48	21.44	Loam
UK 24	21.25463	92.05184	10.28704	Rice	100	Dry	4.78	40.1	0.0401	0.06	27.73	0.12	3.33	0.05	0.09	0.51	0.54	1.55	76.56	14	9.44	Sandy loam

Sample Code	Northing	Easting	Elevation	Field	DFR	Condition	pH	EC (µs/cm)	EC (dS/m)	N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
UK 25	21.24474	92.04896	9.274878	Rice	200	Dry	5.03	48.8	0.0488	0.03	4.08	0.24	44.44	0.1	0.17	3.63	0.2	1.61	82.56	8	9.44	loamy sand
UK 26	21.24488	92.04912	10.41369	Rice	200	Dry	5.31	37.7	0.0377	0.06	5.22	0.08	88.89	0.03	0.05	3.44	0.09	2.65	74.56	14	11.44	Sandy loam
UK 27	21.23601	92.05134	13.30509	Rice	300	Dry	5.47	191.4	0.1914	0.11	6.85	0.09	12.78	0.03	0.05	5.6	0.32	1.48	44.56	26	29.44	clay loam
UK 28	21.22807	92.05411	15.05756	Rice	700	wet	4.8	26.7	0.0267	0.1	6.69	0.12	33.89	0.05	0.09	3.78	0.41	1.35	40.56	34	25.44	Loam
UK 29	21.21849	92.04953	13.28339	Rice	100	Dry	5.75	100.1	0.1001	0.11	2.45	0.19	22.22	0.08	0.14	5.51	0.24	2.00	14.56	56	29.44	silt clay loam
UK 30	21.21021	92.04938	13.343	Rice	200	Dry	4.38	120	0.12	0.09	3.1	0.12	6.67	0.05	0.09	1.09	0.33	1.23	72.56	12	15.44	Sandy loam
UK 31	21.20191	92.05082	11.73995	Rice	100	Dry	5.76	65.5	0.0655	0.06	5.22	0.15	6.67	0.06	0.10	3.11	0.24	1.42	20.56	62	17.44	silt loam
UK 32	21.19249	92.04933	11.70701	Rice	100	Dry	5.69	282	0.282	0.06	9.62	0.19	3.33	0.08	0.14	1.74	0.53	1.61	24.56	60	15.44	silt loam
UK 33	21.18309	92.04941	9.449457	Rice	50	Dry	5.77	60.2	0.0602	0.13	10.93	0.15	52.78	0.06	0.10	3.19	0.36	2.06	24.56	64	11.44	silt loam
UK 34	21.17509	92.05442	9.841325	Rice	200	Dry	5.85	3.35	0.00335	0.08	13.87	0.08	8.89	0.03	0.05	1.03	0.36	1.23	46.56	48	5.44	Sandy loam
UK 35	21.16749	92.06007	11.20474	Rice	10	Dry	5.79	2450	2.45	0.06	20.23	0.16	1.67	0.06	0.10	0.66	0.31	0.67	60.56	34	5.44	Sandy loam
UK 36	21.15933	92.06663	9.562412	Rice	200	Dry	5.59	3820	3.82	0.06	3.1	0.03	1.67	0.01	0.02	0.22	0.45	0.29	74.56	16	9.44	Sandy loam
UK 37	21.15114	92.07246	10.51423	Rice	150	Dry	5.17	1349	1.349	0.04	7.34	0.17	3.89	0.07	0.12	0.58	0.32	0.33	54.56	36	9.44	Sandy loam
UK 38	21.14462	92.07913	9.982542	Rice	10	Dry	5.28	876	0.876	0.06	10.28	0.17	4.44	0.07	0.12	1.05	0.24	0.08	28.56	52	19.44	silt loam
UK 39	21.13712	92.08627	12.41209	Rice	5	Dry	5.14	1481	1.481	0.13	2.28	0.09	26.11	0.03	0.05	2.63	0.31	0.25	10.56	66	23.44	silt loam
UK 40	21.12897	92.09115	12.30682	Rice	100	Dry	5.26	1199	1.199	0.12	3.59	0.09	5	0.04	0.07	0.39	0.55	0.13	70.56	20	9.44	Sandy loam
UK 41	21.12334	92.10001	10.94163	Rice	150	Dry	5.67	159	0.159	0.1	3.59	0.28	1.67	0.11	0.19	3.44	0.28	0.58	22.56	56	21.44	silt loam
UK 42	21.11564	92.10599	10.667	Rice	300	Dry	6.03	700	0.7	0.05	4.89	0.04	10.56	0.02	0.03	0.26	0.21	0.58	74.56	16	9.44	Sandy loam
UK 43	21.12797	92.09048	4.245313	Rice	10	Dry	5.61	585	0.585	0.05	7.5	0.04	11.67	0.02	0.03	0.48	0.33	0.54	78.56	12	9.44	Sandy loam
UK 44	21.27765	92.06582	31.82315	Rice	10	Dry	4.15	70.4	0.0704	0.13	5.68	0.08	20	0.86	1.49	0.85	0.39	0.75	78.56	12	9.44	Sandy loam
UK 45	21.27385	92.09198	17.55931	Rice	500	Dry	4.53	1025	1.025	0.11	11.69	0.05	1.11	0.9	1.56	1.01	0.34	0.38	38.56	48	13.44	loam
UK 46	21.28272	92.09392	11.25062	Rice	15	Dry	4.95	134.1	0.1341	0.12	12.66	0.08	3.33	1.19	2.06	1.76	0.72	0.96	34.56	46	19.44	loam
UK 47	21.29136	92.09166	12.31049	Rice	200	Dry	4.66	101.1	0.1011	0.17	13.31	0.13	13.89	0.181	0.31	1.94	2.53	0.54	28.56	48	23.44	loam
UK 48	21.29621	92.08354	12.09563	Rice	200	Dry	4.69	2140	2.14	0.11	12.99	0.09	15	1.44	2.49	0.32	0.3	0.25	36.56	48	15.44	loam
UK 49	21.29987	92.09592	12.89482	Rice	300	Dry	4.83	2410	2.41	0.09	10.23	0.06	0.56	1.07	1.85	0.26	0.58	0.38	58.56	30	11.44	Sandy loam
UK 50	21.28957	92.10131	11.57713	Rice	350	Dry	4.67	35.9	0.0359	0.25	10.71	0.12	7.22	1.65	2.85	1.75	1.91	0.50	20.56	52	27.44	clay loam
UK 51	21.27167	92.10408	16.21744	Rice	200	Dry	4.96	48.7	0.0487	0.1	12.18	0.15	36.11	1.6	2.77	0.15	1.27	0.88	44.56	36	19.44	loam
UK 52	21.27185	92.11358	14.30096	Rice	150	Dry	4.69	66.3	0.0663	0.09	14.61	0.12	2.78	1.44	2.49	1.11	7.89	0.75	30.56	48	21.44	loam

Sample Code	Northing	Easting	Elevation	Field	DFR	Condition	pH	EC (µs/cm)	EC (dS/m)	N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
UK 53	21.2819	92.11164	12.57585	Rice	50	Dry	4.73	68.1	0.0681	0.19	14.94	0.08	5	1.6	2.77	0.64	1.75	0.58	26.56	54	19.44	silt loam
UK 54	21.29079	92.11227	10.87162	Rice	400	Dry	4.38	1463	1.463	0.1	34.09	0.08	2.78	0.9	1.56	0.46	9.83	0.38	58.56	26	15.44	Sandy loam
UK 55	21.28063	92.10018	6.084538	Rice	200	Dry	4.56	107	0.107	0.18	16.07	0.11	20.56	0.202	0.35	2.07	2.12	0.75	24.56	48	27.44	clay loam
UK 56	21.24473	92.16103	14.43985	Rice	100	Dry	4.83	39.3	0.0393	0.13	16.07	0.11	21.67	1.6	2.77	0.39	1.2	0.38	40.56	42	17.44	loam
UK 57	21.23645	92.16147	20.89419	Rice	150	Dry	5.03	76.3	0.0763	0.11	32.31	0.1	27.22	1.56	2.70	0.63	1.72	0.58	38.56	44	17.44	loam
UK 58	21.22643	92.16332	16.95482	Rice	200	Dry	4.59	38.6	0.0386	0.1	13.15	0.05	1.11	1.28	2.21	0.31	0.63	0.58	44.56	46	9.44	loam
UK 59	21.22473	92.15384	13.81502	Rice	500	Dry	4.28	70.9	0.0709	0.08	7.79	0.08	1.67	1.52	2.63	0.43	3.61	0.46	50.56	34	15.44	loam
UK 60	21.2365	92.15173	13.29916	Rice	400	Dry	4.29	61.1	0.0611	0.16	4.06	0.07	2.22	1.15	1.99	0.18	1.02	0.46	54.56	32	13.44	Sandy loam
UK 61	21.2449	92.14262	10.67977	Rice	50	Dry	4.66	139.1	0.1391	0.14	6.17	0.09	0.56	1.52	2.63	1.79	0.45	0.54	28.56	46	25.44	loam
UK 62	21.25413	92.15307	14.11417	Rice	200	Dry	4.66	154.3	0.1543	0.09	19.97	0.07	1.67	1.11	1.92	0.84	1.24	0.13	34.56	50	15.44	silt loam
UK 63	21.26332	92.15324	14.86977	Rice	100	Dry	4.85	31.9	0.0319	0.06	6.82	0.08	10	1.28	2.21	0.77	1.49	0.42	30.56	56	13.44	silt loam
UK 64	21.27233	92.15214	12.84887	Rice	10	Dry	5.04	88	0.088	0.02	13.8	0.08	3.89	0.37	0.64	1.11	0.25	0.63	32.56	46	21.44	loam
UK 65	21.28127	92.1511	14.21047	Rice	10	Dry	5.13	38.9	0.0389	0.14	30.19	0.06	23.33	0.82	1.42	0.53	0.3	0.50	76.56	14	9.44	Sandy loam
UK 66	21.27067	92.14355	14.52297	Rice	150	Dry	4.49	2040	2.04	0.18	18.51	0.1	1.11	1.32	2.28	1.01	1.31	0.38	32.56	50	17.44	silt loam
UK67	21.26167	92.14304	9.757915	Rice	400	Dry	4.63	2360	2.36	0.08	12.18	0.09	1.11	0.177	0.31	1.02	0.82	0.46	32.56	54	13.44	silt loam
UK68	21.14606	92.17212	12.28412	Rice	100	Dry	4.47	2660	2.66	0.15	2.44	0.07	2.22	0.66	1.14	0.6	0.56	0.83	60.56	26	13.44	Sandy loam
UK 69	21.14665	92.18182	10.90717	Rice	400	wet	3.98	60.7	0.0607	0.19	9.09	0.08	12.443111	0.226	0.39	5.45	0.68	0.33	38.56	32	29.44	clay loam
UK 70	21.15517	92.17289	4.952524	Rice	500	Dry	3.91	1439	1.439	0.16	16.07	0.08	12.109778	0.263	0.45	8.91	1.24	0.88	32.56	46	21.44	loam
UK 71	21.15506	92.18256	8.025156	Rice	1000	Dry	3.84	3160	3.16	0.07	8.6	0.09	12.443111	0.189	0.33	10.32	1.25	1.29	24.56	52	23.44	silt
UK 72	21.14372	92.15398	14.26731	Rice	200	Dry	4.55	41.2	0.0412	0.13	3.9	0.11	43.89	1.15	1.99	0.8	1.73	0.25	44.56	40	15.44	loam
UK 73	21.14794	92.16257	17.3633	Rice	200	Dry	4.84	39	0.039	0.04	2.76	0.09	2.78	0.7	1.21	0.92	1.02	0.25	46.56	36	17.44	loam
UK 74	21.15456	92.16292	7.018772	Rice	300	Dry	4.77	756	0.756	0.1	4.71	0.07	6.67	0.45	0.78	0.29	0.47	1.25	70.56	2	27.44	sandy clay loam
UK75	21.16353	92.15299	8.074101	Rice	150	Dry	4.45	295	0.295	0.17	12.99	0.1	2.78	1.07	1.85	1.42	3.91	0.38	44.56	38	17.44	loam
UK 76	21.17325	92.15346	8.946522	Rice	200	Dry	4.52	1093	1.093	0.16	8.93	0.11	2.22	1.23	2.13	0.94	0.58	0.33	38.56	40	21.44	loam
UK 77	21.18538	92.1655	9.002562	Rice	250	Dry	4.46	124.7	0.1247	0.16	7.31	0.16	24.44	1.56	2.70	1.97	1.88	0.54	18.56	56	25.44	silt loam
UK 78	21.19299	92.17078	8.846652	Rice	100	Dry	4.66	20.8	0.0208	0.11	10.23	0.15	7.78	0.181	0.31	1.42	1.53	0.13	30.56	52	17.44	silt loam
UK 79	21.28959	92.08426	7.99055	Rice	1000	Dry	4.39	94.3	0.0943	0.1	7.31	0.26	46.11	0.95	1.64	4.41	0.53	0.33	54.56	34	11.44	Sandy loam
UK 80	21.28058	92.08402	9.667361	Rice	300	Dry	4.98	113.4	0.1134	0.07	6.98	0.14	8.33	0.9	1.56	1.84	0.95	0.67	38.56	34	27.44	clay loam

Sample Code	Northing	Easting	Elevation	Field	DFR	Condition	pH	EC (µs/cm)	EC (dS/m)	N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
UK 81	21.26234	92.07397	28.07888	Rice	200	Dry	4.82	60.7	0.0607	0.06	4.55	0.09	1.67	0.7	1.21	0.89	0.65	0.50	38.56	40	21.44	loam
UK 82	21.26248	92.08503	17.4337	Rice	400	Dry	4.36	67.1	0.0671	0.2	10.23	0.07	1.67	0.66	1.14	0.88	0.98	0.25	36.56	42	21.44	loam
UK 83	21.30559	92.09184	15.11567	Rice	150	Dry	4.57	197.1	0.1971	0.11	12.18	0.1	5.56	0.202	0.35	1.74	1.28	0.42	18.56	66	15.44	silt loam
UK 84	21.30784	92.10393	17.89613	Rice	50	Dry	4.47	131.1	0.1311	0.15	6.01	0.11	3.33	0.95	1.64	1.16	1.75	0.04	54.56	30	15.44	Sandy loam
UK 85	21.29999	92.10334	13.81818	Rice	300	Dry	4.54	30.3	0.0303	0.15	7.31	0.09	5	1.44	2.49	0.8	0.8	0.13	28.56	56	15.44	silt loam
UK 86	21.29887	92.11364	12.08994	Rice	500	Dry	4.51	111.4	0.1114	0.06	20.62	0.07	6.11	0.82	1.42	0.66	0.43	0.08	32.56	56	11.44	silt
UK 87	21.30769	92.11361	13.31259	Rice	100	Dry	4.51	2090	2.09	0.06	13.47	0.1	8.33	1.07	1.85	1.52	1.15	0.58	42.56	38	19.44	loam
UK 88	21.31823	92.11342	11.73364	Rice	350	Dry	4.57	2430	2.43	0.12	14.45	0.09	4.44	1.15	1.99	1.07	1.24	0.50	30.56	50	19.44	silt loam
UK 89	21.32395	92.11366	10.62419	Rice	300	Dry	4.6	4290	4.29	0.07	20.78	0.07	6.11	0.82	1.42	0.84	1.15	0.54	20.56	64	15.44	silt loam
UK 90	21.31786	92.10447	7.757661	Rice	200	Dry	5.03	3160	3.16	0.07	4.22	0.09	9.44	0.95	1.64	1.33	1.4	1.00	42.56	38	19.44	loam
UK 91	21.11072	92.10723	24.23579	Rice	150	Dry	4.51	29.4	0.0294	0.01	8.6	0.25	5	0.37	0.64	0.31	0.28	0.21	86.56	10	3.44	loamy sand
UK 92	21.10788	92.11313	24.1913	Rice	300	Dry	5.04	25	0.025	0.01	23.05	0.03	1.67	0.53	0.92	0.09	0.25	0.25	78.56	15.28	6.16	lomay sand
UK 93	21.22722	92.049	-0.38895	Rice	50	Dry	4.79	47.7	0.0477	0.02	8.12	0.05	48.89	0.62	1.07	0.65	2.15	0.42	78.56	15.28	6.16	lomay sand
UK 94	21.1019	92.11406	4.719569	Rice	100	Dry	4.5	27.3	0.0273	0.01	13.64	0.02	2.78	0.53	0.92	0.49	0.18	0.33	86.56	9.28	4.16	lomay sand
UK 95	21.09299	92.125	5.600615	Rice	150	Dry	4.49	49.1	0.0491	0.03	11.36	0.34	54.44	1.32	2.28	2.89	2.55	0.50	68.56	23.28	8.16	sandy loam
UK 96	21.08137	92.13466	5.493629	Vegetable	20	wet	5.31	316	0.316	0.1	6.01	0.09	16.67	1.4	2.42	1.12	2.97	0.46	38.56	51.28	10.16	silt loam
UK 97	21.26203	92.11365	16.13184	Rice	16	Dry	4.98	878	0.878	0.12	5.03	0.09	17.78	1.56	2.70	2.05	0.78	0.29	22.56	55.28	22.16	silt loam
UK 98	21.25408	92.12358	15.29665	Rice	100	Dry	5.19	4500	4.5	0.09	8.28	0.05	5	1.23	2.13	1.53	0.83	0.17	28.56	51.28	20.16	silt loam
UK 99	21.25378	92.13322	16.14969	Rice	100	Dry	4.68	56.4	0.0564	0.15	14.61	0.07	6.67	1.73	2.99	1.41	1.13	0.13	24.56	51.28	24.16	silt loam
UK 100	21.25387	92.14281	20.45518	Rice	87	Dry	4.64	28.8	0.0288	0.12	5.84	0.07	31.11	1.6	2.77	1.14	1.68	0.29	26.56	55.28	18.16	silt loam
UK 101	21.24578	92.15391	22.18582	Rice	300	Dry	5.03	30.6	0.0306	0.1	2.92	0.05	1.67	1.44	2.49	1.63	0.73	0.50	30.56	51.28	18.16	silt loam
UK 102	21.25343	92.16271	24.87199	Rice	30	Dry	4.94	46.9	0.0469	0.06	3.57	0.04	7.78	0.66	1.14	2.5	0.33	0.25	58.56	35.28	6.16	sandy loam
UK 103	21.25505	92.18112	39.58764	Rice	50	Dry	4.91	67.5	0.0675	0.08	4.38	0.05	7.78	0.41	0.71	1.01	0.74	0.08	60.56	27.28	12.16	sandy loam
UK 104	21.26557	92.1866	40.35376	Rice	150	Dry	5.01	166.1	0.1661	0.1	4.38	0.09	3.89	0.74	1.28	3.11	0.37	0.67	40.56	39.28	20.16	loam
UK 105	21.2539	92.17166	21	Rice	50	Dry	4.86	1925	1.925	0.07	3.25	0.06	3.33	1.28	2.21	1.79	0.33	0.38	22.56	61.28	16.16	silt loam
UK 106	21.24497	92.17177	18.53156	Rice	500	Dry	4.63	221	0.221	0.17	7.47	0.09	0.56	1.32	2.28	1.01	1.45	0.13	44.56	35.28	20.16	loam
UK 107	21.23662	92.16935	17.20031	Rice	40	Dry	4.61	155	0.155	0.07	3.57	0.03	3.89	0.58	1.00	0.31	0.32	0.17	73.84	18	8.16	Sandy loam

Sample Code	Northing	Easting	Elevation	Field	DFR	Condition	pH	EC (µs/cm)	EC (dS/m)	N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
UK 108	21.26303	92.17168	21.73575	Rice	300	Dry	5.05	24.1	0.0241	0.11	4.38	0.1	7.22	0.66	1.14	3.7	0.65	0.17	25.84	64	10.16	silt loam
UK 109	21.26344	92.16255	13.98946	Rice	200	Dry	4.99	16.64	0.01664	0.12	9.25	0.05	1.11	1.4	2.42	0.9	1.88	0.04	35.84	50	14.16	silt loam
UK 110	21.27236	92.16226	17.33075	Rice	150	Dry	4.48	44.4	0.0444	0.07	3.9	0.14	1.67	0.9	1.56	0.36	1.33	0.17	43.84	40	16.16	loam
UK 111	21.27286	92.19159	20	Rice	100	wet	4.88	25.2	0.0252	0.1	14.12	0.05	0.56	0.66	1.14	0.61	0.46	0.13	71.84	20	8.16	Sandy loam
UK 112	21.25676	92.05428	-14.4294	Rice	100	Dry	4.98	19.27	0.01927	0.09	16.56	0.13	44.44	1.36	2.35	2.7	0.99	1.21	31.84	52	16.16	silt loam
UK 113	21.24467	92.0557	9.043165	Rice	200	Dry	5.15	25.7	0.0257	0.13	6.82	0.07	44.44	0.95	1.64	3.56	0.47	0.17	53.84	24	22.16	sandy clay loam
UK 114	21.23678	92.05441	4.719532	Rice	150	Dry	4.87	16.98	0.01698	0.1	6.82	0.03	15.56	0.66	1.14	0.73	0.28	0.04	73.84	16	10.16	Sandy loam
UK 115	21.22951	92.05399	8.760502	Rice	50	Dry	4.87	29.2	0.0292	0.09	1.79	0.07	16.67	0.99	1.71	1.71	0.47	0.02	53.84	24	22.16	sandy clay loam
UK 116	21.11509	92.10307	7.160892	Rice	100	Dry	5.13	60.04	0.06004	0.16	4.71	0.03	5	0.95	1.64	0.67	0.37	0.17	69.84	22	8.16	Sandy loam
UK 117	21.09956	92.1232	8.885595	Rice	150	Dry	4.88	1589	1.589	0.06	3.08	0.12	6.67	0.86	1.49	0.36	0.71	0.08	53.84	36	10.16	Sandy loam
UK 118	21.08884	92.13292	7.732634	Rice	350	Dry	4.64	94.1	0.0941	0.1	6.49	0.14	56.67	1.28	2.21	2.28	0.78	0.17	53.84	30	16.16	Sandy loam
UK 119	21.3079	92.12317	-0.27322	Rice	150	Dry	5.03	22	0.022	0.08	6.98	0.06	5	1.11	1.92	0.84	1.22	0.71	41.84	38	20.16	loam
UK 120	21.31666	92.12383	11.88338	Rice	100	Dry	4.92	3630	3.63	0.07	2.6	0.06	1.67	1.11	1.92	0.6	0.62	0.42	37.84	48	14.16	loam
UK 121	21.32579	92.12408	14.5841	Rice	50	Dry	4.65	907	0.907	0.03	8.6	0.07	0.56	0.9	1.56	1.05	0.4	0.71	21.84	60	18.16	silt loam
UK 122	21.32617	92.13277	19.95804	Rice	25	Dry	4.66	301	0.301	0.18	5.19	0.06	10.56	1.19	2.06	0.93	0.85	0.42	37.84	44	18.16	loam
UK 123	21.33512	92.13269	21.88966	Rice	150	Dry	4.59	3920	3.92	0.16	3.73	0.07	5.56	0.185	0.32	1.67	2.46	0.25	27.84	54	18.16	silt loam
UK 124	21.33665	92.14092	28.67255	Rice	250	Dry	4.67	203	0.203	0.09	3.73	0.05	2.78	1.07	1.85	0.68	0.58	0.08	43.84	40	16.16	loam
UK 125	21.34149	92.13938	27.39053	Rice	10	Dry	4.69	45.2	0.0452	0.13	10.23	0.05	1.67	0.95	1.64	1.05	0.45	0.50	39.84	44	16.16	loam
UK 126	21.34086	92.13146	18.1996	Rice	70	Dry	4.48	2940	2.94	0.18	7.14	0.08	3.89	0.181	0.31	0.63	1.14	0.13	43.84	40	16.16	loam
UK 127	21.32611	92.14218	20.71771	Rice	400	Dry	4.53	4130	4.13	0.13	5.36	0.07	3.89	0.99	1.71	0.44	2.19	0.25	51.84	32	16.16	loam
UK 128	21.29897	92.13292	10.46005	Rice	70	Dry	4.65	782	0.782	0.18	6.49	0.08	8.33	1.52	2.63	1.56	1.32	0.42	33.84	44	22.16	loam
UK 129	21.29915	92.12371	9.988351	Rice	120	Dry	4.44	971	0.971	0.16	3.07	0.06	7.78	1.44	2.49	1.01	1.14	0.04	31.84	44	24.16	loam
UK 130	21.28996	92.12329	8.124346	Rice	250	Dry	4.66	546	0.546	0.14	3.07	0.06	1.67	0.95	1.64	0.35	0.73	0.17	57.84	28	14.16	Sandy loam
UK 131	21.28075	92.12397	8.459032	Rice	150	Dry	4.64	406	0.406	0.12	3.88	0.02	2.78	1.15	1.99	0.69	1.02	0.13	41.84	46	12.16	loam
UK 132	21.28089	92.13301	9.534054	Rice	400	Dry	4.59	754	0.754	0.18	5.01	0.05	3.89	1.69	2.92	0.91	2.07	0.06	31.84	46	22.16	loam
UK 133	21.27182	92.12344	8.369671	Rice	390	Dry	4.35	78.7	0.0787	0.18	7.27	0.08	7.22	0.202	0.35	1.04	2.34	0.04	35.84	50	14.16	silt loam
UK 134	21.27228	92.13334	14.13428	Rice	160	Dry	4.41	72.2	0.0722	0.13	4.52	0.05	8.33	1.6	2.77	0.49	1.33	0.04	7.84	70	22.16	silt loam

Sample Code	Northing	Easting	Elevation	Field	DFR	Condition	pH	EC (µs/cm)	EC (dS/m)	N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
UK 135	21.26286	92.13323	17.31175	Rice	160	Dry	4.29	60.9	0.0609	0.18	12.44	0.05	0.56	1.48	2.56	1.45	1.16	0.08	19.84	66	14.16	silt loam
UK 136	21.26278	92.12349	16.17636	Rice	300	Dry	4.37	1140	1.14	0.11	6.46	0.06	0.56	1.11	1.92	1.82	0.45	0.13	27.84	54	18.16	silt loam
UK 137	21.26166	92.10518	21.05158	Rice	50	Dry	4.98	469	0.469	0.15	6.95	0.07	1.67	1.4	2.42	0.37	1.67	0.08	59.12	30	10.88	Sandy loam
UK 138	21.25317	92.09494	18.49892	Rice	100	Dry	4.99	738	0.738	0.11	12.12	0.05	9.44	1.11	1.92	0.27	1.32	0.17	47.12	38	14.88	loam
UK 139	21.25371	92.11405	10	Rice	100	Dry	4.83	548	0.548	0.1	14.05	0.05	5	1.32	2.28	0.67	0.95	0.46	31.12	50	18.88	silt loam
UK 140	21.24613	92.11401	12.1718	Rice	20	Dry	4.79	142.1	0.1421	0.14	4.04	0.07	10	1.44	2.49	0.63	0.67	0.13	41.12	38	20.88	loam
UK 141	21.25365	92.10427	15.91959	Rice	100	Dry	4.64	187.1	0.1871	0.11	8.24	0.05	5	1.15	1.99	0.36	0.86	1.63	43.12	38	18.88	loam
UK 142	21.24592	92.10099	20.9658	Rice	400	Dry	4.75	386	0.386	0.07	10.99	0.04	3.33	0.95	1.64	0.17	0.27	0.33	67.12	22	10.88	Sandy loam
UK 143	21.24469	92.12364	6.469259	Rice	200	Dry	4.58	179.9	0.1799	0.17	3.55	0.06	7.22	1.73	2.99	0.82	0.65	0.25	43.12	38	18.88	loam
UK 144	21.2368	92.12469	11.00275	Rice	10	Dry	4.35	66.7	0.0667	0.15	11.31	0.07	5.56	1.52	2.63	0.47	1.17	0.33	43.12	42	14.88	loam
UK 145	21.22793	92.12362	11.74819	Rice	80	Dry	4.42	53.1	0.0531	0.15	4.52	0.06	3.89	1.65	2.85	0.56	1.14	0.46	31.12	48	20.88	loam
UK 146	21.21796	92.12269	14.20726	Rice	100	Dry	4.33	2340	2.34	0.1	14.22	0.03	2.78	1.23	2.13	0.22	0.45	0.42	61.12	22	16.88	Sandy loam
UK 147	21.21783	92.11449	13.30932	Rice	1000	Dry	4.37	972	0.972	0.11	4.52	0.06	3.89	1.15	1.99	0.69	0.44	0.54	59.12	16	24.88	sandy clay loam
UK 148	21.24478	92.13326	20.4759	Rice	128	Dry	4.43	85.1	0.0851	0.13	3.07	0.08	8.33	0.214	0.37	1.48	2.16	0.46	21.12	48	30.88	clay loam
UK 149	21.23627	92.13504	19.69535	Rice		Dry	4.38	87.5	0.0875	0.14	9.05	0.06	4.44	1.32	2.28	1.17	0.4	0.38	29.12	52	18.88	silt loam
UK 150	21.22813	92.13927	18.78001	Rice	300	Dry	4.36	55.5	0.0555	0.13	56.38	0.07	6.11	1.36	2.35	1.49	1.07	0.46	33.12	40	26.88	loam
UK 151	21.21962	92.13771	27.02415	Rice	200	Dry	4.14	40.2	0.0402	0.1	115.99	0.11	6.11	1.19	2.06	0.57	1.41	0.50	57.12	22	20.88	sandy clay loam
UKN 02	21.16036	92.13235	13.90755	Rice	100	Dry	4.2	4.48	0.00448	0.11	54.12	0.24	120	1.44	2.49	3.93	0.86	0.33	34.4	34	31.6	Clay Loam
UKN 03	21.17142	92.11465	18.82359	Rice	50	Dry	4.63	28.3	0.0283	0.13	58.64	0.08	3.89	1.23	2.13	1.35	1.46	0.63	34.4	42	23.6	Loam
UKN 04	21.1726	92.10665	22.59672	Rice	400	Dry	4.29	41.3	0.0413	0.14	55.09	0.11	4.44	1.28	2.21	1.51	1.25	0.38	28.4	52	19.6	Silt Loam
UKN 05	21.17139	92.12073	18.72922	Rice	300	Dry	4.41	24.4	0.0244	0.07	3.39	0.04	7.22	0.86	1.49	0.47	0.59	0.29	62.4	26	11.6	Sandy Loam
Max							6.03	4500.00	4.5	0.25	115.99	0.34	120.00	1.73	2.99	10.32	9.83	2.65	86.56	70.00	31.60	
Min							3.84	3.35	0.00335	0.01	0.82	0.02	0.56	0.01	0.02	0.09	0.09	0.02	7.84	2.00	3.44	
Average							4.79	594.02	0.5775725	0.11	11.29	0.09	11.30	0.85	1.47	1.41	1.06	0.59	43.21	39.87	16.93	

Analyzed soil sample data of Teknaf

Sample Code	Northing	Easing	Elevation	Field	DFR	Condition	pH	EC (µs/cm)		N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
TK 78	20.9136	92.22756	10.43872	Rice	300	Dry	5.48	124.7	0.125	0.04	11.4	0.1	10.31	0.41	0.71	0.49	0.32	0.24	86.4	8	5.6	loamy sand
TK 001	20.9831	92.24968	4.482038	Rice	150	Dry	4.16	1140	1.140	0.12	49.46	0.35	10.00	1.06	1.83	6.03	1.06	0.18	20.4	50	29.6	Clay Loam
TK 002	20.99266	92.25065	13.37496	Rice	500	Dry	4.51	469	0.469	0.1	47	0.21	90.63	0.61	1.06	5.98	0.28	0.21	14.4	50	35.6	Silty Clay Loam
TK 003	21.00451	92.24625	12.56178	Rice	70	Dry	4.48	738	0.738	0.07	48.54	0.06	58.13	0.53	0.92	1.97	0.51	0.27	44.4	46	9.6	Loam
TK 004	21.01222	92.24606	5.117278	Rice	200	Dry	4.34	548	0.548	0.22	9.55	0.22	12.81	1.63	2.82	3.63	2.73	0.45	32.4	36	31.6	Clay Loam
TK 005	21.01392	92.23463	7.075924	Rice	240	Dry	4.56	142.1	0.142	0.13	21.73	0.21	20.63	1.06	1.83	1.95	4.26	0.15	30.4	50	19.6	Loam
TK 006	21.01345	92.22639	11.44884	Rice	750	Dry	4.61	187.1	0.187	0.12	8.47	0.16	20.94	1.14	1.97	3.28	0.66	0.21	15.12	60.72	24.16	Silt Loam
TK 007	21.01479	92.23112	2.798409	Rice	12	Dry	4.49	386	0.386	0.15	8.47	0.12	12.50	1.1	1.90	2.56	0.7	0.18	21.12	58.72	20.16	Silt Loam
TK 008	21.01815	92.22999	3.856894	Rice	15	Dry	4.56	179.9	0.180	0.16	6.78	0.11	11.25	1.55	2.68	2.96	0.73	0.09	19.12	52.72	28.16	Silty Clay Loam
TK 009	21.05139	92.22779	7.307436	Rice	100	Dry	4.77	66.7	0.067	0.1	4.62	0.06	9.38	0.81	1.40	3.67	0.19	0.33	17.12	54.72	28.16	Silty Clay Loam
TK 01	20.83304	92.29468	13	Rice	150	Dry	4.52	9.26	0.009	0.06	11.69	0.02	2.78	0.48	0.83	0.2	0.44	0.07	83.12	6	10.88	loamy sandy
TK 010	21.02294	92.23618	7.09931	Rice	250	Dry	4.75	53.1	0.053	0.13	4.47	0.11	12.19	1.3	2.25	1.86	1.09	0.61	17.12	62.72	20.16	Silt Loam
TK 011	21.01951	92.24186	7.7323	Rice	100	Dry	4.25	2340	2.340	0.24	3.08	0.45	12.81	1.59	2.75	4.95	1.03	0.15	27.12	40.72	32.16	clay loam
TK 012	21.02271	92.2457	6.218435	Rice	10	Dry	4.29	972	0.972	0.14	3.39	0.16	16.25	1.26	2.18	1.2	1.2	0.06	17.12	50.72	32.16	Silty Clay Loam
TK 013	21.03177	92.23627	-1.51659	Rice	120	Dry	4.6	85.1	0.085	0.09	2.77	0.18	14.69	0.61	1.06	1.8	1.8	0.03	29.12	42.72	28.16	Clay Loam
TK 014	21.03163	92.2264	0.883499	Rice	350	Dry	4.53	87.5	0.088	0.11	16.33	0.11	19.06	0.85	1.47	0.47	0.47	0.33	27.12	60.72	12.16	Silt Loam
TK 02	20.84245	92.29418	11.5586	Rice	150	Dry	4.79	146.1	0.146	0.15	13.64	0.11	55.56	1.49	2.58	1.25	2.61	0.11	51.12	32	16.88	loam
TK 03	20.84229	92.30493	10.1451	Rice	400	Dry	4.5	155	0.155	0.12	13.96	0.13	29.44	0.44	0.76	0.7	0.91	0.04	29.12	60	10.88	silt loam
TK 10	20.82461	92.30406	11.10738	Rice	300	Dry	5.3	475	0.475	0.06	5.68	0.04	4.44	0.44	0.76	0.24	0.43	0.07	87.12	6	6.88	loamy sandy
TK 100	21.08533	92.13948	13	Salt	300	Wet	4.15	4500	4.500	0.13	5.86	0.5	15.63	1.03	1.78	6.17	2.87	0.06	66.4	22	11.6	Sandy Loam
TK 101	21.0766	92.14765	16.6041	Vegetable	150	Dry	4.97	56.4	0.056	0.06	2.47	0.06	12.50	0.16	0.28	0.89	0.26	0.21	42.4	46	11.6	Loam
TK 102	21.0669	92.14795	8.983253	Felon	380	Dry	4.81	28.8	0.029	0.04	2.31	0.05	15.31	0.16	0.28	0.87	0.18	0.45	26.4	70	3.6	Silt Loam
TK 103	21.05839	92.15876	11.86629	Rice	200	Dry	4.87	30.6	0.031	0.14	3.08	0.04	10.00	0.58	1.00	1.53	0.54	0.06	52.4	36	11.6	Sandy Loam

Sample Code	Northing	Easing	Elevation	Field	DFR	Condition	pH	EC (µs/cm)		N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
TK 104	21.04109	92.17871	16.78077	Rice	200	Dry	4.77	46.9	0.047	0.11	4.78	0.13	7.81	0.53	0.92	1.57	0.69	0.12	24.4	60	15.6	Silt Loam
TK 105	21.02246	92.18696	14.14208	Rice	100	Dry	4.88	67.5	0.068	0.12	9.24	0.11	35.31	1.36	2.35	2.68	0.87	0.06	20.4	54	25.6	Silt Loam
TK 106	21.01342	92.18886	11.41574	Rice	30	Dry	5.03	166.1	0.166	0.24	8.01	0.09	17.81	1.03	1.78	4.47	0.44	0.27	16.4	56	27.6	Silty Clay Loam
TK 107	21.04043	92.16847	6.67846	Rice	50	Dry	5.21	1925	1.925	0.08	3.24	0.35	58.75	0.53	0.92	4.86	0.52	0.30	32.4	44	23.6	Loam
TK 108	21.04899	92.16097	5.24699	Rice	300	Dry	5.08	221	0.221	0.13	5.55	0.09	13.75	0.82	1.42	2.99	0.41	0.09	28.4	58	13.6	Silt Loam
TK 109	21.07718	92.13745	3.211258	Rice	100	Dry	5.01	155	0.155	0.08	13.71	0.05	23.44	0.66	1.14	1.04	0.67	0.42	82.4	12	5.6	Loamy Sand
TK 11	20.81501	92.30483	10.94445	Rice	150	Dry	5.11	38.4	0.038	0.05	6.82	0.03	2.78	0.48	0.83	1	0.38	0.30	83.12	10	6.88	loamy sandy
TK 110	21.08499	92.15011	16.4564	Potato	350	Dry	4.9	24.1	0.024	0.08	5.24	0.05	14.06	0.58	1.00	0.52	0.45	0.15	66.4	16	17.6	Sandy Loam
TK 111	21.09395	92.15832	9.887145	Rice	250	Dry	4.9	16.64	0.017	0.08	3.7	0.05	9.69	0.58	1.00	0.53	0.78	0.06	36.4	48	15.6	Loam
TK 112	21.09452	92.13942	13.73314	Rice	50	Dry	4.82	44.4	0.044	0.11	13.71	0.05	12.50	0.9	1.56	0.54	0.72	0.30	52.4	36	11.6	Sandy Loam
TK 113	21.09411	92.1304	8.960101	Rice	50	Dry	4.72	25.2	0.025	0.08	35.29	0.05	8.44	0.7	1.21	0.17	0.21	0.27	82.4	10	7.6	Loamy Sand
TK 114	21.10115	92.12661	9.799571	Rice	200	Dry	4.79	19.27	0.019	0.06	5.55	0.05	7.19	0.58	1.00	0.33	0.63	0.27	68.4	24	7.6	Sandy Loam
TK 115	21.11237	92.11997	9.261079	Rice	150	Dry	4.65	25.7	0.026	0.07	5.86	0.05	7.81	1.03	1.78	0.56	1.42	0.15	44.4	40	15.6	Loam
TK 116	21.11101	92.11011	8.049361	Rice	200	Dry	4.78	16.98	0.017	0.09	11.56	0.05	8.13	0.66	1.14	0.18	0.31	0.21	78.4	16	5.6	Loamy Sand
TK 12	20.81 77	92.29324	6.525757	Rice	200	Dry	5.1	13.43	0.013	0.06	4.06	0.09	32.22	0.73	1.26	1.76	0.21	0.07	69.12	16	14.88	sandy loam
TK 13	20.82 46	92.28533	6.020374	Rice	6	Dry	4.53	164.9	0.165	0.12	25.65	0.1	24.44	1.29	2.23	0.78	4.22	0.19	63.12	24	12.88	sandy loam
TK 14	20.86972	92.28512	13.03357	Rice	100	Dry	4.94	126.8	0.127	0.15	16.23	0.13	28.89	1.29	2.23	2.39	1.65	0.11	33.12	46	20.88	loam
TK 15	20.86974	92.27549	14.64554	Rice	300	Dry	5.03	339	0.339	0.15	8.77	0.11	3.33	1.05	1.82	1.82	0.79	0.07	31.12	50	18.88	silt loam
TK 152	21.13972	92.16811	10.63589	Rice	280	Dry	5.08	29.2	0.029	0.09	5.08	0.07	44.69	0.86	1.49	4.28	0.69	0.06	22.4	50	27.6	Clay Loam
TK 157	21.11276	92.1877	2.534824	Rice	146	Dry	4.88	60.04	0.060	0.13	4.47	0.1	89.38	1.19	2.06	4.88	0.87	0.12	24.4	60	15.6	Silt Loam
TK 16	20.88023	92.27546	23.48573	Rice	350	Dry	4.94	51.9	0.052	0.07	48.38	0.23	1.11	0.52	0.90	0.99	1.21	0.07	55.12	36	8.88	sandy loam
TK 17	20.87917	92.26577	17.11216	Rice	20	Dry	4.94	27	0.027	0.06	35.55	0.05	10.00	0.93	1.61	0.55	0.78	0.04	69.12	20	10.88	sandy loam
TK 18	20.88804	92.25893	19.33764	Rice	20	Dry	4.74	29.1	0.029	0.08	34.42	0.21	1.67	0.85	1.47	0.53	2.2	0.56	59.12	32	8.88	sandy loam
TK 19	20.88695	92.26663	23.80151	Rice	500	Dry	4.6	38.1	0.038	0.11	52.27	0.07	29.44	0.69	1.19	0.44	2.15	0.78	63.12	28	8.88	sandy loam
TK 20	20.87803	92.25555	12.058	Rice	300	Dry	4.73	166.5	0.167	0.04	28.9	0.05	15.00	0.6	1.04	0.18	1.08	0.22	83.12	8	8.88	loamy sandy

Sample Code	Northing	Easing	Elevation	Field	DFR	Condition	pH	EC (µs/cm)		N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
TK 21	20.8693	92.26354	9.998327	Rice	300	Dry	5.07	59.6	0.060	0.08	10.71	0.04	5.00	0.73	1.26	0.32	0.46	0.30	79.12	12	8.88	loamy sandy
TK 22	20.8601	92.26526	10.81752	Rice	30	Dry	4.73	38.2	0.038	0.07	17.05	0.03	36.67	0.73	1.26	0.39	0.46	0.07	87.12	6	6.88	loamy sandy
TK 23	20.84068	92.27655	8.841438	Rice	80	Dry	4.76	54.7	0.055	0.07	14.94	0.03	12.22	0.48	0.83	0.23	0.25	0.19	87.12	6	6.88	loamy sandy
TK 24	20.8508	92.27578	5.74086	Rice	200	Dry	4.87	40.1	0.040	0.06	8.28	0.03	10.00	0.56	0.97	0.72	0.31	1.11	83.12	10	6.88	loamy sandy
TK 25	20.86092	92.27545	16.23284	Rice	200	Dry	4.79	48.8	0.049	0.04	36.85	0.05	8.89	0.56	0.97	0.19	0.32	0.41	87.12	4	8.88	loamy sandy
TK 26	20.92402	92.26442	9.471943	Rice	200	Dry	4.74	37.7	0.038	0.11	7.31	0.56	23.33	1.13	1.95	1.66	0.59	0.52	29.12	54	16.88	silt loam
TK 27	20.93333	92.26392	11.56198	Rice	100	Dry	4.77	191.4	0.191	0.14	6.82	0.06	2.22	0.77	1.33	0.2	0.74	0.30	51.12	38	10.88	loam
TK 28	20.9418	92.26228	10.18933	Rice	200	Dry	4.67	26.7	0.027	0.17	4.22	0.08	17.78	0.77	1.33	0.38	0.76	0.15	41.12	46	12.88	loam
TK 29	20.95169	92.2542	18.62478	Rice	400	Dry	4.72	100.1	0.100	0.11	1.95	0.21	17.78	0.85	1.47	4.68	0.36	0.22	35.12	36	28.88	clay loam
TK 30	20.95783	92.25346	17.36894	Rice	150	Dry	4.91	120	0.120	0.04	2.11	0.12	25.56	0.56	0.97	4.92	0.26	0.11	43.12	34	22.88	loam
TK 31	20.96675	92.25234	13.47449	Rice	300	Dry	4.53	65.5	0.066	0.08	4.71	0.09	18.89	1.13	1.95	1.58	0.37	0.15	20.4	62	17.6	silt loam
TK 32	20.96746	92.24662	16.09927	Rice	400	Dry	4.6	282	0.282	0.03	11.69	0.12	3.89	0.64	1.11	1.92	0.45	0.22	24.4	60	15.6	silt loam
TK 33	20.97622	92.25609	10.36972	Rice	500	Dry	4.51	60.2	0.060	0.07	5.52	0.74	54.44	0.6	1.04	4.65	1.56	0.26	16.4	62	21.6	silt loam
TK 34	20.97741	92.2456	10.71948	Rice	500	Dry	5.22	3.35	0.003	0.14	8.6	0.23	10.00	1.05	1.82	2.72	0.54	0.52	22.4	56	21.6	silt loam
TK 35	20.98777	92.2553	6.826502	Rice	50	Dry	4.35	2450	2.450	0.11	2.76	0.74	55.00	0.56	0.97	4.93	1.12	0.19	22.4	44	33.6	clay loam
TK 36	20.99583	92.25516	6.198196	Rice	100	Dry	4.35	3820	3.820	0.12	12.99	0.74	56.11	1.49	2.58	5.04	4.28	0.15	22.4	40	37.6	clay loam
TK 37	20.80252	92.30293	7.028182	Rice	100	Dry	5.33	1349	1.349	0.07	6.88	0.5	90.00	0.57	0.99	2.49	0.88	0.11	48.4	24	27.6	sandy clay loam
TK 38	20.79782	92.31095	9.27372	Rice	400	Dry	4.75	876	0.876	0.11	7.49	0.14	40.00	1.34	2.32	5	2.1	0.11	42.4	36	21.6	loam
TK 39	20.78434	92.31256	12.40071	Rice	200	Dry	5.44	1481	1.481	0.19	1.99	0.35	61.11	0.33	0.57	4.06	0.46	0.56	60.4	28	11.6	sandy loam
TK 4	20.85019	92.29787	14.1298	Rice	500	Dry	4.94	151.3	0.151	0.08	68.02	0.14	1.67	0.81	1.40	0.39	2.64	0.33	73.12	16	10.88	sandy loam
TK 40	20.77196	92.32464	11.75334	Rice	500	Dry	5.73	1199	1.199	0.04	6.73	0.32	82.22	0.49	0.85	2.76	1.15	0.15	70.4	18	11.6	sandy loam
TK 41	20.76152	92.32524	9.985347	Rice	10	Dry	5.74	159	0.159	0.08	16.06	0.13	19.44	0.37	0.64	0.5	0.54	0.19	82.4	8	9.6	loamy sandy
TK 42	20.7627	92.33447	6.294003	Rice	150	Dry	5.28	700	0.700	0.08	8.1	0.12	74.44	0.81	1.40	3.21	2.76	0.11	62.4	20	17.6	sandy loam
TK 43	20.77211	92.33422	6.646015	Rice	200	Dry	5.59	585	0.585	0.11	2.75	0.46	10.53	0.81	1.40	4.96	1.02	0.33	22.4	40	37.6	clay loam
TK 44	20.78143	92.33153	7.995991	Rice	350	Dry	5.58	70.4	0.070	0.11	5.35	0.07	32.22	0.49	0.85	1.44	0.51	0.41	78.4	10	11.6	sandy loam

Sample Code	Northing	Easing	Elevation	Field	DFR	Condition	pH	EC (µs/cm)		N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
TK 45	20.80691	92.3225	8.457911	Rice	250	Dry	5.01	1025	1.025	0.1	4.13	0.48	98.89	0.85	1.47	4.19	1.11	0.19	52.4	24	23.6	sandy clay loam
TK 46	20.81555	92.31686	11.93907	Rice	100	wet	5.22	134.1	0.134	0.08	2.14	0.07	32.78	0.85	1.47	2.38	0.94	0.11	50.4	24	25.6	sandy clay loam
TK 47	21.13125	92.1873	2.883096	Rice	200	Dry	5.19	101.1	0.101	0.13	1.83	0.06	19.44	0.81	1.40	1.83	1.1	0.11	46.4	40	13.6	loam
TK 48	21.13989	92.18801	4.296838	Rice	400	Dry	4.21	2140	2.140	0.13	1.99	0.3	30.00	1.06	1.83	3.81	2.28	0.19	54.4	26	19.6	sandy loam
TK 49	21.14206	92.19635	6.383826	Rice	500	Dry	4.39	2410	2.410	0.13	1.68	0.41	20.00	1.42	2.46	4.87	1.38	0.33	38.4	38	23.6	loam
TK 5	20.85207	92.30564	13.61631	Rice	200	Dry	4.62	132.8	0.133	0.08	5.68	0.07	46.11	1.01	1.75	1.8	0.63	0.07	63.12	20	16.88	sandy loam
TK 50	21.13074	92.17736	17.98529	Rice	400	Dry	4.9	35.9	0.036	0.08	7.03	0.06	20.56	0.73	1.26	0.74	0.44	0.19	46.4	38	15.6	loam
TK 51	21.13917	92.17763	7.864345	Rice	500	Dry	4.63	48.7	0.049	0.05	6.73	0.1	9.44	0.57	0.99	0.63	0.44	0.18	28.4	58	13.6	silt loam
TK 53	21.13909	92.14674	14.83481	Rice	200	Dry	4.4	66.3	0.066	0.02	2.6	0.07	13.33	0.77	1.33	0.65	0.72	0.21	58.4	30	11.6	sandy loam
TK 54	21.14089	92.13941	11.73476	Rice	300	Dry	4.6	68.1	0.068	0.12	2.91	0.23	16.11	1.3	2.25	1.15	0.97	0.06	40.4	38	21.6	loam
TK 55	21.12464	92.19732	3.825253	Rice	200	Dry	4.28	1463	1.463	0.04	6.88	0.06	14.72	0.33	0.57	2.19	0.84	0.15	48.4	38	13.6	loam
TK 56	21.11281	92.19684	2.751575	Rice	200	Dry	4.45	107	0.107	0.17	4.28	0.05	23.89	1.51	2.61	1.76	1.04	0.12	68.4	14	17.6	sandy loam
TK 57	21.11276	92.1877	3	Rice	100	Dry	4.33	39.3	0.039	0.07	1.83	0.06	11.67	0.57	0.99	0.22	0.67	0.42	58.4	28	13.6	sandy loam
TK 58	21.11126	92.17762	2.459815	Rice	100	Dry	4.32	76.3	0.076	0.12	2.29	0.08	13.33	0.94	1.63	1.1	0.51	0.58	40.4	36	23.6	loam
TK 59	21.10359	92.16809	9.891032	Rice	400	Dry	4.33	38.6	0.039	0.09	5.96	0.07	11.67	0.69	1.19	2	0.66	0.52	18.4	56	25.6	silt loam
TK 6	20.86077	92.29758	15.34006	Rice	50	Dry	4.96	421	0.421	0.06	11.04	0.05	20.00	0.48	0.83	0.59	0.56	0.11	69.12	18	12.88	sandy loam
TK 60	21.13046	92.09113	-4.72801	Rice	10	Dry	4.41	70.9	0.071	0.08	5.35	0.37	10.00	0.77	1.33	0.75	1	0.21	50.4	32	17.6	loam
TK 61	21.07638	92.21587	10.55797	Rice	250	Dry	4.36	61.1	0.061	0.11	5.2	0.14	10.00	0.65	1.12	3.48	0.83	0.30	18.4	54	27.6	silt clay loam
TK 62	21.08528	92.20615	11.35841	Rice	250	Dry	4.33	139.1	0.139	0.08	13.3	0.2	15.56	0.61	1.06	2.04	0.65	0.12	30.4	54	15.6	silt loam
TK 63	21.08427	92.1977	16.46386	Rice	200	Dry	4.77	154.3	0.154	0.1	16.67	0.19	17.22	0.37	0.64	3.01	0.53	0.06	22.4	56	21.6	silt loam
TK 64	21.10282	92.20651	16.28367	Rice	200	Dry	4.52	31.9	0.032	0.03	43.27	0.06	16.11	0.45	0.78	0.17	0.99	0.15	58.4	34	7.6	sandy loam
TK 65	21.10384	92.19711	13.38931	Rice	250	Dry	4.32	88	0.088	0.1	13	0.06	16.11	0.9	1.56	0.34	0.61	0.30	38.4	50	11.6	silt loam
TK 66	21.09406	92.21551	6.891791	Rice	25	Dry	4.47	38.9	0.039	0.11	4.74	0.06	11.11	1.23	2.13	1.5	0.73	0.33	18.4	56	25.6	silt loam
TK 67	21.09051	92.22648	4.859192	Rice	100	Dry	3.92	2040	2.040	0.11	1.53	0.46	30.00	1.4	2.42	4.79	1.08	0.24	26.4	44	29.6	clay loam

Sample Code	Northing	Easing	Elevation	Field	DFR	Condition	pH	EC (µs/cm)		N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
TK 68	21.09224	92.23122	5.311416	Rice	20	Dry	4.98	2360	2.360	0.13	3.98	0.72	30.00	1.77	3.06	6.19	1.1	0.15	20.4	56	23.6	silt loam
TK 69	21.0866	92.22561	6.34669	Rice	700	Dry	4.81	2660	2.660	0.13	1.83	0.72	26.39	0.185	0.32	5.99	2.05	0.15	24.4	64	11.6	silt loam
TK 7	20.8605	92.2865	15.41761	Rice	700	Dry	4.88	88.7	0.089	0.09	12.5	0.05	4.44	0.64	1.11	0.45	0.99	0.07	71.12	16	12.88	sandy loam
TK 70	21.08492	92.21645	2.846717	Rice	50	Dry	4.72	60.7	0.061	0.06	6.57	0.05	13.89	0.82	1.42	0.53	0.37	0.21	38.4	26	35.6	clay loam
TK 71	21.07688	92.2261	1.97935	Rice	500	Dry	5.21	1439	1.439	0.12	1.68	0.32	93.33	0.95	1.64	5.87	1.15	0.33	18.4	48	33.6	silt clay loam
TK 72	21.07692	92.23576	2	Rice	1300	Dry	4.71	3160	3.160	0.15	2.14	0.75	20.00	1.69	2.92	5.89	1.42	0.30	20.4	56	23.6	silt loam
TK 73	21.12092	92.09932	-0.49729	Rice	300	Dry	3.36	41.2	0.041	0.03	3.06	0.06	21.67	0.29	0.50	0.35	0.23	0.06	90.4	2	7.6	sand
TK 74	20.83284	92.28499	5.56012	Rice	360	Dry	3.93	39	0.039	0.06	9.63	0.04	13.89	0.49	0.85	0.2	0.31	0.30	84.4	8	7.6	loamy sand
TK 75	20.88707	92.24853	7.37991	Rice	250	Dry	4.22	756	0.756	0.06	15.29	0.17	72.22	0.45	0.78	1.96	0.31	0.06	76.4	10	13.6	snady loam
TK 76	20.89611	92.24356	10.70131	Rice	250	Dry	4.16	295	0.295	0.1	2.75	0.06	12.89	0.74	1.28	1.72	0.39	0.06	32.4	52	15.6	silt loam
TK 77	20.90527	92.23663	13.79387	Rice	100	Dry	4.45	1093	1.093	0.08	3.06	0.15	24.22	0.66	1.14	2.53	0.23	0.15	26.4	54	19.6	silt loam
TK 79	20.92358	92.22511	15.84999	Rice	400	Dry	5.3	20.8	0.021	0.06	4.01	0.06	9.06	0.21	0.36	0.21	0.11	0.21	86.4	8	5.6	loamy sand
TK 8	20.85148	92.28619	18.35105	Rice	200	Dry	5.01	45.9	0.046	0.03	8.6	0.04	5.00	0.36	0.62	0.26	0.11	0.19	85.12	8	6.88	loamy sandy
TK 80	20.94113	92.21553	13.14719	Rice	150	Dry	4.99	94.3	0.094	0.08	16.64	0.19	10.31	0.49	0.85	0.87	0.6	0.30	36.4	50	13.6	silt loam
TK 81	20.95074	92.21072	7.219439	Rice	250	Dry	5.51	113.4	0.113	0.1	3.08	0.05	14.06	0.78	1.35	1.05	0.15	0.30	26.4	58	15.6	silt loam
TK 82	20.95937	92.20742	11.02198	Rice	200	Dry	5.46	60.7	0.061	0.1	10.79	0.09	13.13	0.99	1.71	1.95	0.78	0.09	30.4	52	17.6	silt loam
TK 83	20.96837	92.20719	21.39681	Rice	130	Dry	5.65	67.1	0.067	0.1	15.25	0.25	10.31	0.7	1.21	2.61	1.42	0.18	20.4	54	25.6	silt loam
TK 84	20.97562	92.19942	11.63569	Rice	200	Dry	4.89	197.1	0.197	0.07	36.36	0.23	10.00	0.86	1.49	0.89	1.42	0.09	58.4	32	9.6	sandy loam
TK 85	20.98665	92.19728	10.51788	Rice	320	Dry	5.36	131.1	0.131	0.07	15.25	0.08	20.00	0.66	1.14	1.18	0.82	0.09	58.4	30	11.6	sandy loam
TK 86	20.99684	92.19524	8.235247	Rice	170	Dry	5.29	30.3	0.030	0.07	27.73	0.17	10.94	0.37	0.64	1.17	0.79	0.45	36.4	48	15.6	loam
TK 88	21.03156	92.1781	4.116549	Rice	190	Dry	5.04	111.4	0.111	0.1	10.63	0.05	12.19	0.66	1.14	2.12	0.68	0.06	50.4	38	11.6	loam
TK 89	21.01376	92.25472	8.549136	Rice	400	Dry	5.11	2090	2.090	0.03	19.57	0.33	60.63	0.82	1.42	4.65	5.47	0.42	22.4	54	23.6	silt loam
TK 9	20.84232	92.28511	15.45776	Rice	300	Dry	4.53	11.28	0.011	0.12	20.62	0.06	40.56	0.97	1.68	0.87	0.94	0.15	73.12	16	10.88	sandy loam
TK 90	21.00471	92.25536	9.448618	Rice	350	Dry	4.77	2430	2.430	0.06	8.63	0.38	23.28	0.86	1.49	4.22	1	0.15	42.4	40	17.6	loam

Sample Code	Northing	Easing	Elevation	Field	DFR	Condition	pH	EC (µs/cm)		N (%)	P (mg/kg)	K (meq/100 g soil)	S (mg/kg)	OC (%)	OM (%)	Mg (meq/100 g soil)	Zn (mg/kg)	B (mg/kg)	%Sand	%Silt	%Clay	Textural Class(By Marshall's Triangular Co-ordinate)
TK 91	20.96871	92.2563	9.948432	Rice	100	Dry	4.87	4290	4.290	0.02	3.85	0.42	16.25	1.65	2.85	6.2	0.76	0.03	14.4	64	21.6	silt loam
TK 92	20.98659	92.24585	9.260142	Rice	300	Dry	4.37	3160	3.160	0.02	9.24	0.33	13.13	0.66	1.14	6.01	1.86	0.12	32.4	46	21.6	loam
TK 93	20.98701	92.23658	18.08133	Rice	100	Dry	5.21	29.4	0.029	0.07	6.78	0.05	10.31	0.7	1.21	0.37	0.46	0.33	52.4	38	9.6	sandy loam
TK 94	20.9961	92.24368	5.566641	Rice	700	Dry	4.85	25	0.025	0.11	5.08	0.09	10.31	0.37	0.64	0.71	0.68	1.18	16.4	70	13.6	silt loam
TK 95	20.99526	92.23604	10.30265	Rice	250	Dry	4.7	47.7	0.048	0.07	5.86	0.09	12.81	0.74	1.28	2.35	0.25	1.12	34.4	60	5.6	silt loam
TK 96	20.99664	92.22839	15.58783	Rice	500	Dry	4.7	27.3	0.027	0.14	6.16	0.08	8.44	0.53	0.92	2.01	0.68	0.42	24.4	56	19.6	silt loam
TK 97	21.00437	92.22653	17.82765	Vegetable	400	Dry	4.16	49.1	0.049	0.1	21.26	0.17	11.25	1.15	1.99	2.11	0.49	0.15	34.4	48	17.6	loam
TK 98	21.00483	92.23661	9.389 04	Rice	600	Dry	4.51	316	0.316	0.12	6.63	0.08	19.38	0.62	1.07	2.08	0.96	0.24	36.4	42	21.6	Loam
TK 99	21.03173	92.24569	4.936169	Rice	500	Dry	4.15	878	0.878	0.13	6.01	0.11	25.31	1.32	2.28	5.47	0.7	0.88	30.4	38	31.6	Clay Loam
TKN 01	21.08238	92.2205	7.144766	Rice	150	Dry	4.9	1589	1.589	0.1	5.7	0.13	10.00	1.06	1.83	0.63	0.35	0.18	60.4	26	13.6	Sandy Loam
TKN 02	21.06783	92.22615	7.913582	Rice	150	Dry	4.23	94.1	0.094	0.12	29.58	0.21	10.94	0.98	1.70	0.68	1.25	0.12	32.4	44	23.6	Loam
TKN 03	21.05809	92.22585	14.41488	Rice	150	Dry	4.53	22	0.022	0.41	15.41	0.16	7.50	0.33	0.57	2.02	0.97	0.06	62.4	30	7.6	Sandy Loam
TKN 04	21.05856	92.23593	9.298108	Rice	500	Dry	4.21	3630	3.630	0.18	2.93	0.73	71.88	1.71	2.96	7.97	2.3	0.36	30.4	38	31.6	Clay Loam
TKN 05	21.06509	92.23148	9.016 03	Rice	500	Dry	4.25	907	0.907	0.13	4.16	0.3	25.47	1.75	3.03	6.78	1.94	0.24	28.4	40	31.6	Clay Loam
TKN 06	21.0679	92.23582	9.230555	Rice	60	Dry	4.35	301	0.301	0.12	6.47	0.15	25.63	1.51	2.61	3.14	0.71	0.12	18.4	58	23.6	Silt Loam
TKN 07	21.06795	92.24545	7.568111	Salt	150	Dry	4.25	3920	3.920	0.14	10.32	0.5	22.19	1.59	2.75	8.02	1.6	0.18	16.4	62	21.6	Silt Loam
TKN 10	21.05674	92.23163	4.239676	Rice	550	Dry	4.48	203	0.203	0.11	3.24	0.17	12.81	1.83	3.17	2.75	0.8	0.18	26.4	40	33.6	Clay Loam
TKN 11	21.04976	92.23618	3.313046	Potato	400	Dry	4.88	45.2	0.045	0.13	4.93	0.12	7.81	0.49	0.85	3.93	0.18	0.33	20.4	56	23.6	Silt Loam
TKN 12	21.05731	92.2467	1.815589	Rice	10	Dry	4.39	2940	2.940	0.08	3.7	0.5	20.16	0.77	1.33	7.18	0.93	0.18	18.4	58	23.6	Silt Loam
TKN 13	21.06101	92.25	1.572051	Salt	500	Dry	4.45	4130	4.130	0.12	5.08	0.73	18.44	0.94	1.63	7.52	2.58	0.15	20.4	52	27.6	Clay Loam
TKN 14	21.04497	92.24175	2.322363	Rice	50	Dry	4.57	782	0.782	0.13	4.31	0.25	91.88	0.94	1.63	6.72	0.82	0.03	18.4	56	25.6	Silt Loam
TKN 15	21.04856	92.24526	1.255624	Rice	500	Dry	4.46	971	0.971	0.07	3.24	0.2	14.22	0.73	1.26	5.44	1	0.06	12.4	60	27.6	Silty Clay Loam
TKN 16	21.04082	92.24559	-2.03165	Rice	200	Dry	4.39	546	0.546	0.12	9.55	0.15	23.44	0.175	0.30	2.58	0.28	0.82	34.4	42	23.6	Loam
TKN 17	21.04076	92.23596	1.506289	Rice	180	Dry	4.63	406	0.406	0.1	4.16	0.4	43.13	0.69	1.19	6.82	1.54	0.15	22.4	38	39.6	Clay Loam

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TKN18	21.03728	92.23358	23.63891	Rice	250	Dry	4.4	754	0.754	0.12	4.78	0.25	11.09	1.02	1.76	2.54	0.85	0.18	18.4	48	33.6	Silty Clay Loam
TKN19	21.036	92.32262	21.19793	Rice	400	Dry	4.71	78.7	0.079	0.07	11.56	0.32	12.81	0.61	1.06	3.04	0.51	0.24	30.4	50	19.6	Loam
TKN20	21.0409	92.22652	21.99108	Maize+ Felon	25	Dry	4.58	72.2	0.072	0.08	13.25	0.16	10.63	0.69	1.19	1.73	0.42	0.21	16.4	64	19.6	Silt Loam
TKN21	21.03899	92.21922	25.23974	Rice	300	Dry	5.01	60.9	0.061	0.08	6.47	0.09	10.63	0.9	1.56	1.73	0.31	0.12	18.4	66	15.6	Silt Loam
Max							5.74	4500.00	4.500	0.41	68.02	0.75	98.89	1.83	3.17	8.02	5.47	1.18	90.40	70.00	39.60	
Min							3.36	3.35	0.003	0.02	1.53	0.02	1.11	0.16	0.28	0.17	0.11	0.03	12.40	2.00	3.60	
Average							4.73	602.74	0.603	0.10	10.95	0.19	23.12	0.83	1.44	2.44	0.97	0.24	42.62	39.15	18.23	

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Dr. Md. Anwarul Abedin has been working as Professor in the Department of Soil Science, Bangladesh Agricultural University, Mymensingh, Bangladesh. He is also leader of Laboratory of Environment and Sustainable Development. Dr. Abedin did his PhD from Kyoto University in 2011 in environmental studies. Subsequently, he did JSPS postdoctoral research during 2011- and 2013 in the same university on international environment and disaster management. Dr. Abedin also worked as a visiting scholar of Northumbria University, UK under the theme of disaster management. He was a PAAR fellow in collaboration with Kyoto University, Japan and START Secretariat, USA. He is conducting fundamental and applied research on soil fertility and plant nutrition, water quality, climate change adaptation and disaster risk reduction issues and also heavy metal pollution especially arsenic pollution. He has published quite a good number of original research articles in peer reviewed journals, books, book chapters and proceedings of international societies and serving as an editorial member of several journals. Dr. Abedin is collaborating in a

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