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EDAPHOLOGICAL STUDY OF BUNDELKHAND (INDIA)

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ABSTRACT

Soil is an ecosystem that can be managed to provide nutrients for plant growth, absorb and hold rain water for use during dryer periods, filter and buffer potential pollutants for leaving our fields, serves as a firm foundation for agricultural activities and provide habitat for soil microbes to flourish and diversity to keep the ecosystem running smoothly. Soil quality is defined as the ability of soil to perform a specific function within a managed ecosystem. Native material soil was evaluated for Physico-Chemical property and for nutrients as an requirement for improvement of soil fertility. Soil sample were randomly collected from four sample sites and brought to laboratory to determine the ph , Ec, Ca contents, Organic Carbons, Total available potassium, Total available Phosphorous, Turbidity, Water holding capacity, Bulk density, Total Dissolve Solid, Specific Gravity, Alkalinity, Moisture contents, Total Fungi Counts, etc. The various results obtained from different studied are suggested that pH is within the range in all sample. Bulk density and Organic Carbon revealed healthy soil, among nutrients parameters Phosphorous and Potassium are medium to low range and total fungi counts also suggested somewhat poor quality of soil.

Keyword: Organic Carbon, Total Available Potassium, Total Available Phosphorous, Turbidity, Water Holding Capacity, Alkalinity, Bulk Density, Specific Gravity

INTRODUCTION

The soil study (Edaphological study) is important in many respects. Soil is considered as a natural resource for plants growth and Animal. Soil is the main source of microorganism provides water and nutrients to the living organisms. Investigation of soil in terms of Physical, Chemical and Biological parameters helpful in agricultural practices such as cultivation, irrigation, artificial drainage and use of

fertilizers. It is also important for Geological, Petrological, Mineralogical and Paleobotanical point of view **[1]**.

Soil is more or less loose friable, unconsolidated earth crust material. Soil is a store house of mineral and reservoir of water. It is infact the very heart of life layer called biosphere **[2]**. It is formed by interaction among livings organism rocks, air water and other materials. The mineral constituents of the soil are derived from the parent rock. The mineral represent about 90% of the total weight of soil. Important element which are found in compound state are Si, Fe, Al, N, P, K, Ca, Mg, Zn, etc. In which N comes from atmosphere in the forms of nitrogen salt.

To meet the challanges of global changes while sustaining the productivity of our natural and managed land, it in necessary to monitor the quality of soil in terms of Physico-chemical parameter.

MATERIAL AND METHOD

Study Area

We selected the 4 land of bundelkhand region located in U.P. Its agro climate zone is located in south west corner of U.P. India. The general slope of the zone is forwards north to east in southern part. Jhansi district is situated 24’11’N to 25’57’ N latitude and 78’23’E longitude in the semi arid region of the country at a height of about 250 meter above mean sea level.

Sampling Sites

The soil samples were collected for analysis in month of march 2013 for edaphological study. Four samples are collected from different land of different places in triplicate shown in **Figure 1**, these are -

S_1- Sample site 1 - Jhansi

S_2- Sample site 2 - Mahoba

S_3-Sample site 3 - Lalitpur

S_4-Sample site 4 - Jaloun

Experimental

The physico-chemical characters of soil were analysed by using the standard method of **[3]**. Whereas Nutrients status as Organic Carbon, N, P, C, etc are analysed by the standard method as prescribed by **[4, 5]**.

RESULS AND DISCUSSION

Soil sample from each sampling site, were collected randomly and analyzed in the laboratory in respect of Physico-chemical and Biological Characteristics. Data are presented in **Table 1**.

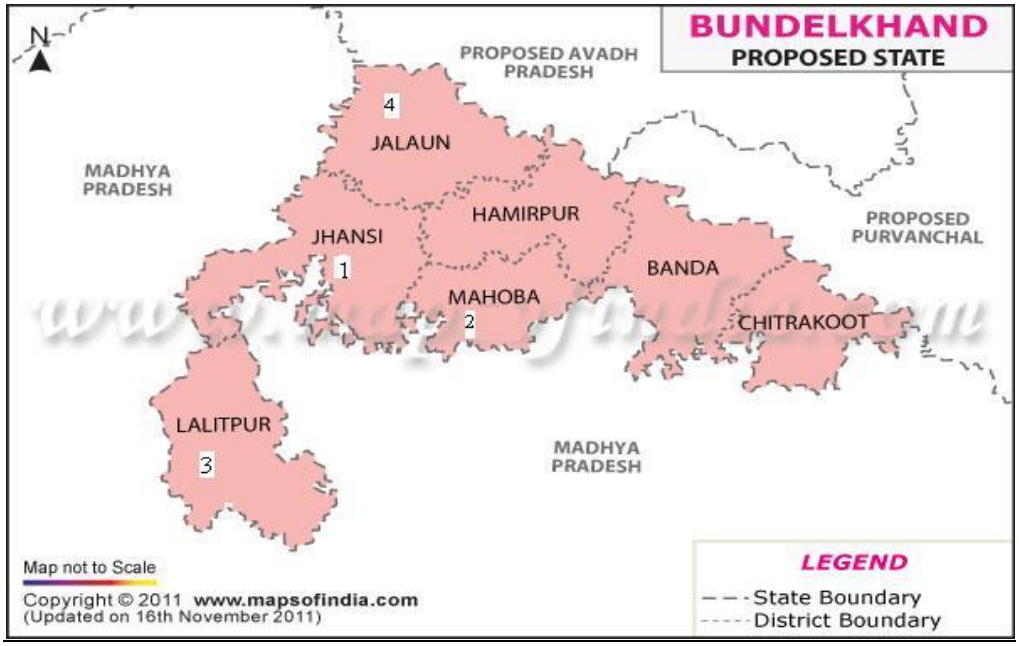

Figure 1

Table 1

PARAMETER	SAMPLE-1	SAMPLE-2	SAMPLE-3	SAMPLE-4
Colour	Dark brown	Reddish	Yellowish	Brownish Black
Odour	Earthy	Less Earthy	Earthy Peaty	Sedimentary
Ph	7.3	6.36	8.92	7.10
Electrical Conductivity(dS/m)	1.29	3.2	1.34	1.34
Total Dissolve solid (ppm)	16.2	56.7	38.7	29.7
Water holding capacity	33%	25%	50%	33%
Moisture Contents	25%	15%	20%	22%
Ca Contents(ppm)	8.00	320.0	42.0	07.28
Bulk Density	.32	.42	.28	.36
Alkalinity (ppm)	1400	240	1600	1100
Organic Carbon	.75% M	.87% H	.12% VL	.30% L
Total available Potassium(kg/hac)	260	112	128	237
Total available Phosphorous(kg/hac)	45.0	13.5	31.5	13.5
Total Fungi Counts	(No/g)21X10^3	8X10^3	3X10^3	7X10^3

Dark Brown and Brownish Black Soil of sample 1 and 4 suggested high water holding capacity. Reddish Soil of sample 2 indicates Presence of Hydrated Fe, Al oxide and its acidic nature which is corroborated by its low pH **[6]**. Water retentive property is found same in sample-1 and 3. The very low range of water retentive (Moisture content and water holding capacity) found in sample-2. Measurement of pH is one of the most important and frequently used tests in soil chemistry. pH of all samples determined are under the range of (6.36 to 8.90). The pH is intensely measurement of

acidity or alkalinity. In the present study the sample-3 found alkaline nature (8.92). The sample-1 and 4 have neutral range (7.10-7.30). Whereas the sample-2 found slightly acidic in nature (6.36). For crop growth pH 6 to 7.5 is suitable. Although a few crops prefer acid or alkaline soils **[1, 7]**. pH is correlate with alkalinity measurement. pH and alkalinity was estimated highest in sample-3 and low range in sample-2.

Specific gravity of a soil which is the average density of mineral particle composing the soil mass vary from 9.73-9.81 and very high from the average value of 2.65 gm/cm^3 **[8]**. The bulk density of soil depends upon the volume of soil. The bulk density varied from 0.28 to 0.42 g/cm^3 in our investigation. The range of bulk density is good for plants growth because nutrients can move smoothly which was restricted in higher bulk density **[9, 10]**. Bulk density is an indicator of soil porosity and soil compaction. In the present investigation the sample-2 have higher bulk density followed by sample-4, sample-1 and sample-3. The lower bulk density of sample-3 suggested its higher porosity. Which again correlate with water holding capacity.

In our result the maximum WHC is found in sample-3 and within range, followed by sample 1 and sample-4. It's very low range found in sample-2.The electrical conductance has been reported from (1.29-3.81) and indicate measurement of water capacity to convey electric current it's similar value found in sample-3 and sample-4 and partially variant range found in sample-1 and sample-2.and are suitable for crop growth **[11]**.

The Highest total dissolve solid found in sample-2 followed by sample-3, 4 and 1.The TDS and moisture content of soil are correlate with each other. Both are inversely proportional to Each other and depend upon the water holding capacity.

In the present paper the moisture contents found higher in sample-1 than 4 and 3. It's very poor range found in sample-2 and affect directly or indirectly the nutrient cycling of plants **[12]**.

The calcium content is one of the important inorganic components of soil. Its value varied from (7.28 to 42.20mg/l) in our study the range of Ca contents reported in high range in sample-3 than sample-2. Almost same range found in sample-1 and sample-4. The deficiency of Ca cause reduced normal growth of plants and roots become short stubby and brown and the leaves becomes wrinkled and blue die.

The total available phosphate estimated by using colorimeter method Es221 suggested poor quality of phosphate in all sample. The highest value of 45 in sample-1 followed by sample-2 and sample-3 with same value and very low value in sample-4. For fertile soil

more than 57kg/hact phosphate in necessary **[13]**.

The total available potassium evaluated in range form (260 to 112 kg/Hac) Using flamephotometer which is found in higher range in sample-1 and slightly low range in sample-4 followed by sample-2 and sample-3. Organic carbon is one of the important soil property and is one of the chief element of organic matter. Organic carbon is necessary for all growth about 80% of bacterial drymass. Its standard range is calculated in fertile soil in 7560ks/Hac. The date indicated that the higher range of organic carbon found in sample-1 and sample-4 and its very low range found in sample-3. Organic carbon is in agreement with the findings of several works **[14, 15]**.

Most process in soil are driven by microorganism. The microbial parameter have been evaluated in terms of total fungi counts **[16]**. TFC indicates the soil fertility. In our study the sample-1 shows the most abundant being the bacteria and fungi by its different growth colony in potato dextrose ager medium. sample-1 found in high range with well developed colony followed by sample-2 and sample-4. TFC found with slightly variation in sample-2 and sample-4 poor range of total fungi count in sample-3 **[17]**. Somewhat low value of fungi count might be high Ec as micro organism are sensitive for electrical conductivity **[11]**.

CONCLUSION

Thus the present work concluded that pH, Bulk density, Water holding capacity, of all the samples suggested healthy nature of soil. The nutrients status of Organic Carbon was found in range of 3 samples but the soil of Lalitpur (sample-3) indicates poor quality of Potassium as well as Organic carbon to improve status there is a need to add some organic manure.

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