



PHYSICO-CHEMICAL ANALYSIS OF SOIL COLLECTED FROM MAHISHI, DIST. SAHARSA (BIHAR)

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ABSTRACT

The present work has been undertaken to evaluate seasonal variation in physico-chemical parameters of soil samples collected from 'MAHISHI', Thana-Mahishi, Dist. Saharsa (Bihar). The soil characterization was carried out for parameters like pH, electrical conductivity, total chloride, total alkalinity, sulphate, bulk density, moisture, content, organic matter, calcium, magnesium, sodium and potassium. During the course of study period, fluctuation in the various parameters were recorded. The variety of values was observed in the different parameters due to the soil quality in different places.

Key words: Soil, Total chloride, Bulk density, Moisture content.

INTRODUCTION

Soil formation is a continuous process i.e. it is a constructive processes well as destructive. The destructive process means there is physical and chemical breaking down of material, plants and animal structure, which results in the partial loss of more soluble and volatile compounds; both minerals and organic and provides it new distribution or association characteristics, structural properties as well as chemical compositions. These factors influence the plant growth in soil. Saharsa district is famous in world for fishes and Makhana. So, it is an important district of Bihar to earn foreign currency for Bihar and India. The main crops cultivated in this district are maize rice, wheat, bajra, javari, sugarcane, cotton banana etc. The yield and quality of crops depends upon the fertilizers and presence of micronutrients such as Na, K etc. The soil condition is of great importance because it is a universal medium for plant growth, which supplies essential nutrients to the plants. These are supplied to the soil by giving the different fertilizers such as urea, sulphate, phosphate etc. by the external addition to the crop.

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In this district, season wise crop are taken i.e. in rainy season rice in winter season there is wheat and in summer season there is maize, bazra, So, it is essential to analyse the soil quality.

In India, now a days' large number of chemical fertilizers are used. Due to this the crops increased rapidly but the quality of crop decreases. Due to the large use of chemical fertilizers in the region soil quality decreases. Due to this the small crops is burned largely. Therefore, it becomes essential to analysis the soil with different parameters. It is real time to carry out the physico-chemical analysis of soil because with increasing use of chemical fertilizers to the soil and it is difficult to control the side effects of the chemical to the soil, plants, animals and human beings.

EXPERIMENTAL

The study area in Mahishi, Dist. Saharsa was marked for the characterization of soil samples. From the selective sites samples were collected in the depth of 15 cm from the surface of land, which were taken in polythene bags. The soil samples were collected in the month of December 2011 from the various sampling stations. The eight sample stations were used name S1, S2, S3, S4, S5, S6, S7 and S8. These samples were brought to the laboratory of R. M. College, Saharsa for the study of properties of soil. In this process laboratories & library of different departments i.e. chemistry, botany, zoology, physics of different colleges and P.G. department were used.

Chemicals and reagents of standard quality were used. Most of these were A. R. Grade (E. Merck), Glass wares of Borosil and Pyrex were utilized throughout the testing.

The physico-chemical analysis of soil samples were carried out by the standard procedure recommended by Trivedi and Goel.

The soil samples were dried in oven to 105°C about 24 hrs and grinded more finely. This powder was passed thorough 2 mm sieve and stored in polythene bag.

The pH of soil was measured using Equip-tonics meter Type No. 630. pH was standardized by KH-Phthalate. The electrical conductivity (EC) of soil was measured using conductivity meter Model No. 660.

Total chloride was determined by titrating it with AgNO₃. Total alkalinity was determined by titrating it with N/50 HCl using phenolphthalein and methyl orange as indicator. Sulphate was determined by gravimetric method. Bulk density was determined by laboratory method for distributed soil. Soil moisture was determined by gravimetric method.

Organic matter was determined by titrating with ferrous ammonium sulphate. Na and K in the soil samples were determined by using the digital flame photometer Elico Model CL22D.

RESULTS AND DISCUSSION

Result of physico-chemical characteristics are given in Table 1.

Table 1: Physico-chemical parameters of different soil samples

Samples	S1	S2	S3	S4	S5	S6	S7	S8
pH	7.93	6.58	7.81	7.34	6.87	6.95	7.52	6.84
EC (mScm ⁻¹)	0.236	0.176	0.183	0.336	0.212	0.356	0.413	0.314
Total alkalinity (mg/L)	235	265	210	220	255	230	215	245
Total chloride (mg/L)	71.80	61.80	54.10	81.00	66.10	68.30	59.70	57.00
Sulphate (mg/L)	29.60	31.30	25.10	28.00	33.30	23.90	27.60	34.60
Bulk density (g/mL)	1.37	1.43	1.68	1.56	1.70	1.48	1.31	1.62
Moisture content (%)	2.40	2.76	3.41	3.78	2.16	3.38	4.08	4.16
Organic matter (%)	0.954	0.734	1.144	0.845	1.00	0.627	0.790	1.089
Na (mg/L)	263	178	118	145	167	108	136	194
K (mg/L)	192	173	107	161	143	198	185	209

pH

The pH value of soil samples ranged from 6.58 to 7.93. For the samples lower pH observed was 6.58 in the sample site S1 and higher value observed was 7.93 in sample S2.

Electrical conductivity (EC)

The EC values varies from 0.176 to 0.413 (mScm⁻¹). Lower EC value was observed 0.176 for sample S2 and highest EC 0.413 for S7.

Total alkalinity

Total alkalinity was observed in range between 210 to 265 mg/L. Lowest value 210 mg/L for S3 & highest value 265 mg/L for S2, which clearly indicates that different types of salt contents in the soil samples.

Chloride

Chloride was observed in range between 57 to 81 mg/L. Lowest value 57 for S8 and highest 265 for S4, which clearly indicates this is because of agricultural run off due to the rain in the post winter season.

Sulphate

The sulphate values were observed from 23.9 to 34.6 mg/L. Lowest for S6 and highest for S8. It may be due to the addition fertilizers during the plantation of crop and sowing of seeds.

Bulk density

Bulk density values were observed from 1.31 to 1.70 g/L. Lowest for S7 and highest fro S5.

Moisture content

Moisture content values were observed from 2.16 to 4.16%. Lowest for S5 and highest for S8.

Organic matter

Organic matter values was recorded in between 0.627 to 1.114%. Lowest for S6 and higher for S3. The highest organic matter content may be due to decaying of plant.

Na: Sodium content value ranged from 108 to 263 mg/L. Lowest for value of Na was found for S6 and highest for S1.

K: Potassium content ranged from 107 to 209 mg/L. Lowest for value of K was found for S3 and highest for S8.

CONCLUSION

It is concluded that the physico-chemical analysis of soil samples under study shows different concentrations of various parameters at different sites. Undecomposed residue of plants affects on the organic matter content in soil samples. Irregular distribution of metals was recorded during present investigation, which may be attributed to added chemical fertilizers during crop formation. So, there is need to add actual amount of essential fertilizers to such a soil samples. The high variation in concentrations of SO_4^{2-} , Na, K etc.

shows that there is a much large use of chemical fertilizers in soil. To avoid this, there is a need for use of natural fertilizers to improve the quality of the soil. As soil sample quality is improved the production of plants will also increase and amount of chemical will decrease in the soil. So, the crop will be much healthy for animal and human beings.

ACKNOWLEDGEMENT

We are thankful to our Principal Dr. Renu Singh and Head of the department of Chemistry of R. M. College, Saharsa for permission to carry this investigation with laboratory and library facilities and for their useful suggestion. We are thankful to all those persons specially my wife who helped me in this investigation.

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Revised : 02.04.2015

Accepted : 06.04.2015