Physio-Chemical Analysis of Soil from Various Talukas Farms of Selected District Yavatmal in Maharashtra, India

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Abstract: **The yield quality of the crop is dependent of the type of the soil ,water,some essential factor and proper cultivation. Hence it is necessary to study to anlyse some quality parameters of the soil. So in the present study is undertaken to determine the physic-chemical characteristics of some samples of soil from some farms of nearby talukas villages of selected District yavatmal in Maharashtra. The soil characterization was carried out with respect to particle size distribution, bult density, maximum water holding capacity, available water capacity, hydraulic conductivity, soil pH, electricl conductivity, cation exchange capacity, free calcium carbonate and organic carbon. The important observation during the study is that the parameters were fluctuating for farm to farm of selected district Yavatmal nearby talukas and villages.**

Key Words: Soil, Bulk Density, Electricl Conductivity, Organic Carbon, Available water capacity, Cation Exchange Capacity.

INTRODUCTION

The soil word is derived from Latin word, 'Solum' meaning the earthy material in which plant growth occurs. Soil is the natural material spread in different layers. It differs in physical, chemical and mineralogical characteristics. Soil is result of rocks due to environmental processes: weathering and erosion. Soil ius dynamic material of minerals, organic matter, water, air, bacteria etc. Soil quality varies due to farming, parent material and environmental changes.

Yavatmal district is the region of Western Vidarbha: the part of Maharashtra. In this district and hence in various Taluka region the main crops are cotton, soyabean, jawari, bajari, chana, toor etc. Essential njutrients required for proper growth of plants is supplied by soil. Hence the yield and quality of crop depends on the qulity of soil. Various nutrients are supplied to soil from fertilizers. Productivity of crop is increased by use of various chemic al fertilizers on large scale, but it is decreasing the qulity of soil. So it is essential to c arry out the physic- chemical analysis of soil.

MATERIALS AND METHODS

Six farms of each village were selected for phusico-chemical analysis of soil. Total six talukas situated in Yavatmal district were selected for study. Average value of parameter of six selected farms of a talukas was reported. Soil smaples were collected in the depth of 5-20cm from the surface of soil and were taken in polyhthene bags. The oil samples were collected in the month of June 2022 from different sampling stations. Sample stations used from selected 'Yavatmal district selected region' are given in following table-1 and named as S1,S2,#,S4,S5 and S6.

Sample Site	Name of Selected region of Yavatmal
S1	Arni
S2	Borgaon
S3	Chkhalgaon
S4	Dhanora
S5	Dhanki
S6	Kalamb
S7	Korta
S8	Loni
S9	Maregaon
S10	Nagdhari
S11	Pandharkawada
S12	Ralegaon
S13	Saykheda
S14	Waghari
S15	Wani

The soil samples were collected and brought to the laboratory for the study of physic-chemical parameters. The standard methods of soil analysis Black(1965P) and Richard(1945) for particle size distribution,bulk density, maximum water holding capacity, abvilable water capacity, hydraulic conductivity and Piper (1966) for soil pH, electrical conductivity, cation exchange capacity, free calcium carbonate and organic carbon were adopted.

Soil series	Particle size distribution (<2mm)			BD (Mgm-3)	PAWC (%)	ASW (cm/m)	COLE	pH	OC (g/kg)	CaC O3	CEC (cmol/ kg)
	Sand	Silt	clay								
1.Arni(Ar)	13	49.8	37.2	1.79	20.4	34.5	0.22	8.7	3.9	-	51.4
2.Borgaon(Bo)	12	39.4	48.6	1.62	10.3	11.2	0.19	8.4	5.1	69.4	54.4
3.Chikhalgaon(Ci)	24.8	39.0	36.2	1.61	12.6	23.7	0.15	8.4	3.2	65.0	40.1
4.Dhanora(Dh)	6.1	41.3	52.6	1.69	10.16	5.1	0.19	8.1	6.5	64.5	70.0
5.Dhanki(Dk)	1.3	34.3	64.4	1.72	11.9	34.7	0.23	8.1	4.6	7.1	70.1
6.Kalamb(Km)	3.2	41.2	55.6	1.64	14.8	38.6	0.18	8.1	2.7	-	59.5
7.Korta(Ko)	23.1	24.0	52.9	1.79	10.1	8.9	0.24	8.0	2.8	38.1	62.5
8.Loni(Lo)	12.7	49.0	32.3	1.57	16.2	40.9	0.18	7.9	1.0	8.4	46.0
9.Maregaon(Ma)	7.5	33.2	59.3	1.71	16.1	11.6	0.19	8.1	6.6	21.9	63.4
10.Nagdhari(Ng)	10.7	40.0	49.3	1.69	9.4	27.9	0.11	8.3	0.8	-	46.8
11.Pandharkawada(Pk)	29.4	18.2	52.4	1.52	11.7	1.9	0.15	7.5	3.6	4.1	62.6
12.Ralegaon(Ra)	9.9	44.6	45.5	1.70	12.6	18.3	0.17	8.2	4.8	-	54.4
13.Saykheda(Sy)	28.0	42.7	29.3	1.58	8.6	20.5	0.15	8.4	4.5	112.5	49.5
14.Waghari(Wg)	27.6	36.4	36.0	1.61	8.6	6.7	0.20	8.3	6.9	94.6	67.1
15.Wani(Wn)	18.8	33.6	48.4	1.70	15.5	36.7	0.21	8.3	2.9	75.5	56.7

RESULT AND DISCUSSION

Practicle size Distribution (Soil Texture): Out of three categories of particle size of soil; sand particles are largest, slitsare intermediate and clay particles are very fine. On the basis of relative proportion of these particles, soil texture is determined. Particle size distribution is given in table-1. The range of sand content in soil under study was 1.3% to 29.4%, slit content was in the range of 18.2% to 49.8% and clay content was from 29.3% to 64.4%. hence the soil texture varied from clay-to-clay loam with predominance of clay texture. The soil texture influence water availability. The sandy soil quickly be recharged with soil moisture but is unable to hold much water as like soil with heavier texture.

Bulk Density: Bulk density of soil is the mass per unit volume. Thus it measures space occupied by solids pore space i.e., degree of compactness of soil. It decreases with increase in organic matter. In this study, Bulk Density varied from 1.52 to 1.79mg/m3.

Plant Available Water Capacity: Plant available water capacity of soil is the mass per unit volume; thus it measures space occupied by solids pore space. degree of compactness of soil. It decreases with increase in organic matter. in this study plant available water capacity 8.6 to 20.4%.

Maximum Water Holding Capacity and Available Soil Water: Good water holding capacity indicates the good physical condition of soil. The maximum water holding capacity was observed and available soil water of soil sample ranged from 1.9 to 40. 9 cm. m-

PH and COLE : PH is an important parameter as it measures availability of nutrients availability of nutrients like Fe,Mn,Zn, and Cu which are more available in acidic soil than alkaline soil. Soil with PH 7.5 to 8 is considered to have most of the nutrients available for plants, the PH value of analysed soil samples ranged from 8 to 8.7. The measurement of COLE is to determine amount of salts soluble in soil. COLE values ranged from 0.11 – 0.24. Higher COLE values were values were found for samples S1,S5,S7,S15.

Organic Carbon: In the soil crop residue animal manure, cover crops, green manure, organic fertilizers etc. are main sources of organic carbon. In this sense it an index of nitrogen. Organic carbon in soil samples studied was found in the range of 0.8 – 6.9. The lowest value was for S10 and highest value was for S14.

Calcium Carbonate and Cation Exchange Capacity: In the soils calcium carbonate occurs in natural state. Soil fertility is not uniformly affected by the presence of carbonatges. Calcium carbonate values ranged from 4.1 – 113%. Lower calcium carbonate value was recorded for S11 and S13.

Cation exchange capacity(CEC) denotes the ability of soil to hold nutrient cations in readily available forms. It is the quantity of nutrient cations present in exchangeable form. CEC influence PH of soil and its salt composition. It is the direct source of mineral nutrients to plants. It affect the physical properties of soil. The CEC values were found between 40.1 – 70.1cmol Kgha-1. Lower CEC was observed for S3 and higher value was observed for S5.

CONCLUSION

Physic-chemical analysis of soil under study show different values for various for various site of selected district Yavatmal. Most of the soil samples are alkaline in character. The texture of soil ranged from clay to loam clay. Physico-chemical parameter values suggest no any pollution effect. The fertilizers used by farmers of this region use well combination of chemical and manure fertilizers.

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