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Characterization of Soil Quality from some Farms of Ghatanji Taluka Region, Dist.Yavatmal (M.S.)

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ABSTRACT

The quality of soil and availability of water are essential factors for the good yield of the crop. Hence it is necessary to analyze some quality parameters of the soil to determine the quality of soil. So in the present study is undertaken to determine the physico-chemical characteristics of some samples of soil from some farms of nearby villages of Ghatanji taluka region, Dist. Yavatmal.The soil characterization was carried out with respect to particle size distribution, bulk density, maximum water holding capacity, available water capacity, hydraulic conductivity, soil pH, electrical conductivity, cation exchange capacity, free calcium carbonate and organic carbon. The important observation during the study was that the parameters were varying for farm to farm of nearby villages. The overall quality of the soil in the study area is good and soil is not getting polluted as there is no industrial waste problem in the region.

Key Words: Soil, Bulk Density, Electrical 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 is 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 Ghatanji taluka region the main crops are cotton, soyabean, jawari, bajari, toor etc. Essential nutrients required for proper growth of plants is supplied by soil. Hence the yield and quality of crop depends on the quality of soil. Various nutrients are supplied to soil from fertilizers. Productivity of crop is increased by use of various chemical fertilizers on large scale, but it is decreasing the quality of soil. So it is essential to carry out the physico-chemical analysis of soil.

Materials and methods

Total eight villages of Ghatanji taluka were selected for for the present study. The section was on the basis of over all good annual crop yields, Three farms of each village were selected for analysis of quality physico-chemical parameters of soil. Average value of parameter of three selected farms of a village was reported. Soil samples were collected in the depth of 5-20 cm from the surface of soil and were taken in polythene bags. The soil samples were collected in the month of January-February 2015 from different sampling stations. Sample stations used from 'Ghatanji taluka region' are given in following table-1 and named as G_1,G_2, G_3, G_4, G_5, G_6, G_7 and G_8.

Table-1

Sample site	Name of Village
G_1	Shiroli
G_2	Murli
G_3	Aakpuri
G_4	Inzala
G_5	Manoli
G_6	Sakhara
G_7	Amadi
G_8	Pandhurna

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

Result and discussion

Particle Size Distribution (Soil Texture): Out of three categories of particle size of soil; sand particles are largest, slits are 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-2. The range of sand content in soil under study was 14.7% to 39.4%, slit content was in the range of19.2% to 30.4% and clay content was from 32.5% to 66.1%, 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 And Porosity: 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 1.14 to 1.22mg/m^3.Porosity of soil sample ranged from 48.9 to 55.2%.

Maximum Water Holding Capacity and available Water Capacity: Water holding capacity and physical condition of soil are interrelated. The maximum water holding capacity was observed from 52.4 to 69.2%.The available water capacity of soil sample ranged from 10.7to 16.5%.

Hydraulic Conductivity: Clay content and pore size of soil determines Hydraulic conductivity. This value for samples under study ranged from 0.28 to 0.92$cmhr^{-1}$.

Table -2: Physico-chemical parameters of different soil samples

S.No.	Parameter	G_1	G_2	G_3	G_4	G_5	G_6	G_7	G_8
01	Sand (%)	15.2	15.3	14.7	35.6	39.4	37.2	38.7	24.6
02	Slit (%)	27.4	20.4	19.2	19.9	23.1	30.3	28.6	30.4
03	Clay (%)	63.4	64.3	66.1	44.5	37.5	32.5	32.7	45.0
04	Textural Class	C	C	C	C	CL	CL	CL	C
05	Bulk density (mgm^{-3})	1.14	1.14	1.17	1.17	1.22	1.19	1.18	1.20
06	Porosity (%)	53.2	53.4	55.2	50.1	49.8	49.7	48.9	50.6
07	Maximum Water Holding Capacity (%)	70.2	64.8	65.9	53.8	59.5	64.5	69.2	52.4
08	Available Water Capacity (%)	14.4	16.5	16.5	15.7	11.4	13.4	11.8	10.7
09	Hydraulic Conductivity ($cmhr^{-1}$)	0.76	0.84	0.92	0.43	0.36	0.28	0.32	0.55

10	pH	7.25	7.85	6.79	7.48	7.91	8.04	7.93	8.11
11	Electrical Conductivity (dSm^{-1})	0.23	0.28	0.21	0.27	0.38	0.36	0.35	0.28
12	Organic Carbon (gKg^{-1})	6.9	8.7	5.8	7.6	8.1	8.4	7.4	7.9
13	Calcium Carbonate (%)	13.32	10.4	15.32	9.7	5.14	7.14	11.2	8.6
14	Cation Exchange Capacity (cmol(p+)Kg ha^{-1})	49.2	61.6	42.2	58.3	62.8	63.1	57.4	68.3

pH and Electrical conductivity: Nutrients like Fe, Mn, Zn and Cu are more available in acidic soil than alkaline soil. HencepH of soil is an important parameter to measure availability of these nutrients. Soil with pH 6.85 to 7.5 is considered to have most of the nutrients available for plants. The pH value of analyzed soil samples ranged from 6.79 to 8.11. Only sample $G_3$is acidic.

The amount of salts soluble in soil can be studied with the measurement of its electrical conductivity.EC values ranged from 0.21 to 0.38dSm^{-1}. Higher EC values were found for samplesG_5, G_6, G_7.

Organic Carbon: In the soil main sources of organic carbon are crop residue, animal manure, cover crops, green manure, organic fertilizers etc. In this sense it is an index of nitrogen. Organic carbon in soil samples studied was found in the range of 5.4 to 8.7gKg^{-1}.The lowest value was for $G_6$and highest value was for G_2.

Calcium Carbonateand Cation Exchange Capacity: In the irrigation soils calcium carbonate occurs in natural state. Soil fertility is not uniformly affected by the presence of carbonates. Calcium carbonate values ranged from 5.14 to 15.32%. Lowest calcium carbonate value was recorded for $G_5$and highest value was for G_3.

The ability of soil to hold nutrient cations in readily available forms can be measured by Cation exchange capacity (CEC). 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 affects the physical properties of soil. The CEC values were found between 42.2 to 68.3cmol(p+)$Kgha^{-1}$. Lowest CEC was observed for G_3 and highest value was observed for G_8.

Conclusion:

Physico-chemical analysis of soil under study show different values for various sites. Most of the soil samples are alkaline in character. The texture of soil raged 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.

References:

1. A.N.kulkarni, J.B.Balkhande, B.D.Waghamare, P.U.Ratnakar and V.S.Kanwate, Studies of some physico-chemical factors of teak forest from Kinwat area, Nanded (Maharashtra). International journal of life science(2011) page437-438.
2. A.Nagamani, I. K. Kunwar, C. Maroharachary,"Hand Book of Soil Fungi", I.K.Internationals.
3. Ajay Kumar Bhagi, G.R.Chatwal,"Environmental Chemistry", Himalaya Publication.
4. C.A.Black, Method of Soil analysis, part-I, Amar Soc.Agron. Inc. Argon No.9; Madison, USA, 1965.
5. Jagdish Prasad, Nagraju,Raveev Shrivastava, S.K.Ray and P.Chandran, Characteristic and classification of some soil in Nagpur district. I.India Soc. Soil sci. 49(4), 2001,page 735-739.
6. Wankhade, R. R. (2015). Physico-Chemical Analysis of Soil from some Farms of Digras Region of District Yavatmal in Maharashtra, India. Scholedge International Journal of Multidisciplinary & Allied Studies ISSN 2394-336X, 2(10), 1-4.