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Analysis of Soil Samples Collected from Begampura Area of Aurangabad City, Maharashtra (India).

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ABSTRACT: Soil is a vital component of the nature. Production of food basically dependent on the soil and its quality in the form of fertility. Soil analysis is carried out get the information about the productivity and fertility of the soil which can be used for the betterment of Human beings. In this present research work 10 soil samples were collected from 10 different sampling sites of Begampura area of Aurangabad city. In order to analyze the parameters site was visited by definite interval i.e. seasonally like summer, rainy and winter. In this present research work organic carbon of the soil, organic matter of the soil and bulk density of the soil was analyzed for which standard methods were used (Walkley and Black Methods). Average of percentage of soil organic carbon in rainy, winter and summer season of 10 sites is 1.52. Average of percentage of soil organic matter in rainy, winter and summer season of 10 sites is 2.68. Average of Bulk density in rainy, winter and summer season of 10 sites is 1.20. Organic carbon of the soil is very useful in organic farming. To maintain the quality of soil the percentage of organic carbon and organic matter should be maintain in adequate quantity.

KEYWORDS: Soil, Carbon, Organic, Density.

I. INTRODUCTION

Soil is the most crucial natural resource for crop production and it takes almost 1000 years to generate an inch of top soil (Chandra and Singh, 2009). Soil is also referred as the skin of the earth. Soil is defined as a natural body having of layers (soil horizons) that are composed of weathered mineral materials, organic material, water and air. The earthy material in which the plants grow is known as soil, which has been derived from the Latin word “solum”. Soil is also defined as an independent body in ecology having a unique morphology from the surface down to the parent material as expressed by the sample profile (Tan; 1995). Healthy soil provides a vibrant living system which contains many green ecosystems, harvest efficiency, soil recycling, nutrient decomposition and extracting many minerals from the land (Hunter *et al.*, 2019). The soils native potential to supply sufficient nutrients has decreased with higher levels of plant productivity (Havlin *et al.*, 2010). Soil quality is conceptualized as the major linkage between the basic strategies of conservation management practices & achievement of major goals of the sustainable agriculture (Andrews, 2004). It is capable of supporting plant life and it is very crucial to life on earth also. Soil supplies ecosystem services, filters water, provide nutrients to the vegetation’s (crops, plants) which supplies us food, energy and fiber to regulate the human health and habitation (Bhise *et al.*, 2019). High yields of top-quality crops need an abundant supply of sixteen important nutrient elements. Soil is the source for most of the essential nutrients required by the crops. The 13 mineral nutrients, which derived from soils, are dissolved in water and generally absorbed through roots (Wahegaonkar, *et al.*, 2011). Soil organic carbon (SOC) is one part in the much larger global carbon cycle which involves the cycling of carbon through the soil, vegetation, ocean and the atmosphere. The bulk density of soil is regarded as a crucial factor that is correlated with the soil compaction and many physico-chemical, and biological soil properties. It is calculated as the ratio of the dried mass of soil to its total volume (Han *et al.* 2016; Walter *et al.* 2016).

II. MATERIAL AND METHODOLOGY

The soil quality and health definitions both mention the continued potential of a soil to function (FAO, 2008; Bunemann *et al.*, 2018). In the present research work the main components of the soil which were examined in



different seasons like summer, monsoon and winter. In the present research the percentage of organic carbon in soil, percentage of organic matter in soil and bulk density of soil was analyzed, from 10 sites of Begampura area. Aurangabad city is the largest city in Marathwada region. Aurangabad city is also known as historical city or ‘City of Gates’. This city holds UNESCO World Heritage site. This city is situated 568 m above the sea level. The Longitude of the study area is 75.352478° east and Latitude is 19.901054° north. Balanced and integrated utilization of inorganic and organics, management of crop residues, etc. are desirable alternatives for sequestering organic carbon in the soils (Aulakh, 2011).

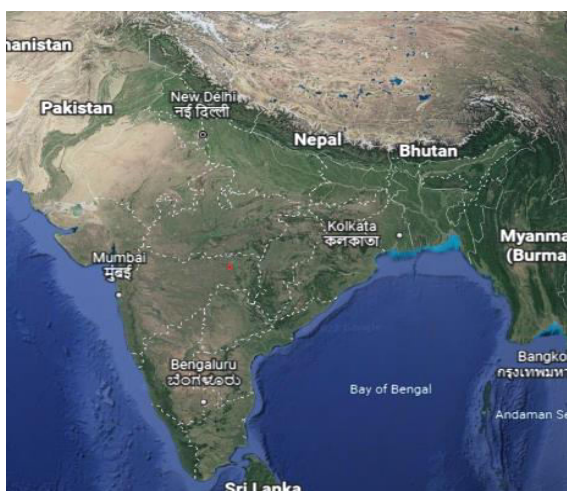


Fig.1. Map of India.

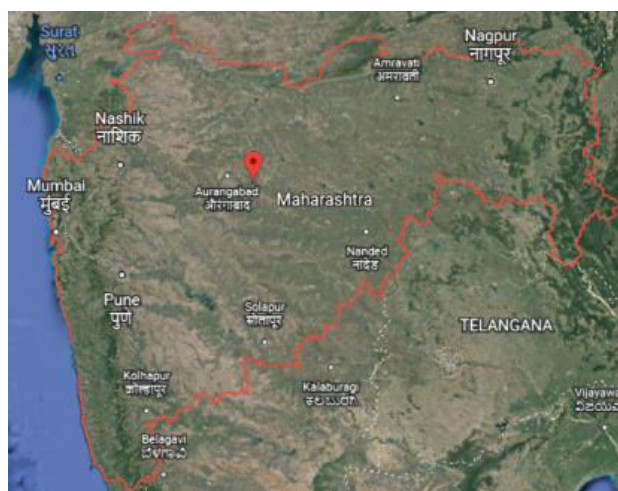


Fig.2. Map of Maharashtra.



Fig.3. Study area map (Aurangabad)

Collected samples were air dried, gently ground and sieved through a 2-3-mm sieve. The bulk density ($Mg\ m^{-3}$) was measured (Black, 1965) with the help of a core sampler and rings (having a fixed volume of $100\ cm^{-3}$; high=6 cm; diameter=5.3 cm) at every soil horizon horizontal stratum (having 1 meter depth). Samples were dried at $105^{\circ}C$ continuously for 24 hours. Soil organic matter was estimated by Fe_2SO_4 titration of an acid-dichromate digestion prescribed by widely accepted method i.e. Walkley and Black, (1934) and soil organic carbon was calculated using

$$SOC=0.58 \times SOM$$

Where, SOC is the concentration of Soil Organic Carbon and SOM is the Soil Organic Matter concentration determined by dry combustion. 0.58 is the Van Bemmelen value generally used for conversion of SOM to SOC.



III. RESULTS AND DISCUSSION

The study was carried out at 10 different sites in Begampura area of Aurangabad city. Percentage of organic carbon in Soil, percentage of organic Matter in Soil and Bulk density in g/cm³ of Soil was analyzed.

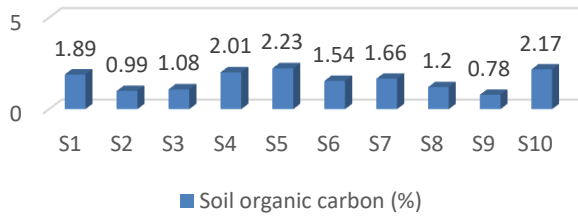
Table 1: Analysis of Soil from (Location code hj.1) of Aurangabad city area

Study areas	Soil organic carbon (%)			Soil organic Matter (%)			Bulk density (g/cm ³)		
	Rainy	Winter	Summer	Rainy	Winter	Summer	Rainy	Winter	Summer
S1	1.89	1.21	1.55	2.99	2.55	3.01	1.70	1.67	0.91
S2	0.99	1.88	1.44	1.87	1.67	1.98	0.99	1.63	1.25
S3	1.08	0.34	0.99	2.10	3.24	2.88	1.55	1.35	1.11
S4	2.01	2.09	2.19	3.19	2.77	3.66	1.67	0.72	1.54
S5	2.23	1.59	1.98	2.45	1.99	2.91	0.83	0.58	1.37
S6	1.54	0.77	2.21	3.19	2.23	2.00	0.89	1.25	0.88
S7	1.66	2.10	1.68	2.99	3.31	3.01	1.73	0.88	1.37
S8	1.20	1.99	0.99	3.01	2.86	2.99	1.55	0.46	0.85
S9	0.78	0.99	0.85	2.65	3.25	1.99	1.25	1.35	0.63
S10	2.17	2.10	1.15	1.98	2.65	2.88	0.91	1.66	1.55
Average	1.555	1.506	1.503	2.642	2.652	2.731	1.307	1.155	1.146
Average of three seasons	1.52			2.675			1.202		
Maximum	2.23	2.1	2.21	3.19	3.31	3.66	1.73	1.67	1.55
Minimum	0.78	0.34	0.85	1.87	1.67	1.98	0.83	0.46	0.63

Values were recorded from the analysis carried out in the present research work and tabulated in the table and interpreted. The maximum percentage of organic carbon in soil in rainy season is 2.23 at site5, minimum 0.78 at site 9 and average is 1.56. The maximum percentage of organic carbon in soil in winter season is 2.10 at site 7 and 10, minimum 0.34 at site 3 and average is1.51.The maximum percentage of organic carbon in soil in summer season is 2.21 at site 6, minimum 0.85 at site 9 and average is1.50.The maximum percentage of organic matter in soil in rainy season is 3.19 at site 4 and 6, minimum 1.87 at site 2 and average is 2.64.The maximum percentage of organic matter in soil in winter season is 3.31 at site 7, minimum 1.67 at site 2 and average is2.65.The maximum percentage of organic matter in soil in summer season is 3.66 at site 4, minimum 1.98 at site 2 and average is 2.73.The maximum Bulk Density in g/cm³ ofsoil in rainy season is 1.73 at site 7, minimum 0.83 at site 5 and average is 1.31.The maximum Bulk Density in g/cm³ ofsoil in winter season is 1.67 at site 1, minimum 0.46 at site 8 and average is 1.16.The maximum Bulk Density in g/cm³ ofsoil in summer season is 1.55 at site 10, minimum 0.63 at site 9 and average is 1.15.

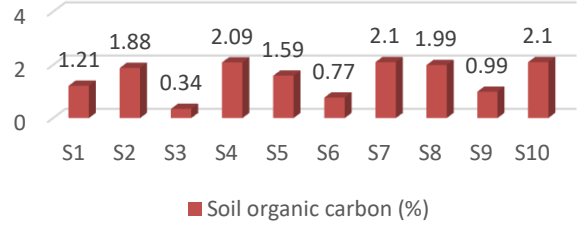


Soil organic carbon (%)



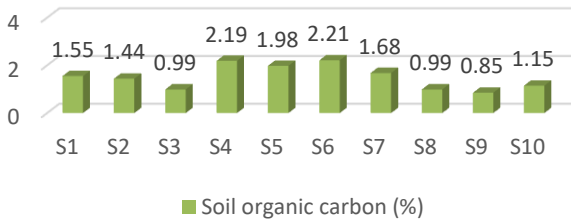
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Soil organic carbon (%)

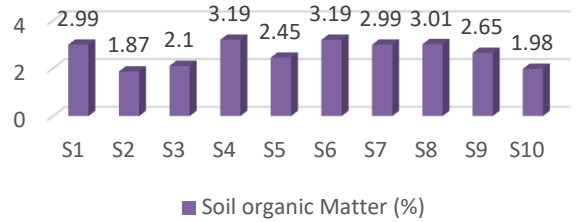


Graph: Percentage of organic carbon in soil in rainy season Graph: Percentage of organic carbon in soil in winter season

Soil organic carbon (%)

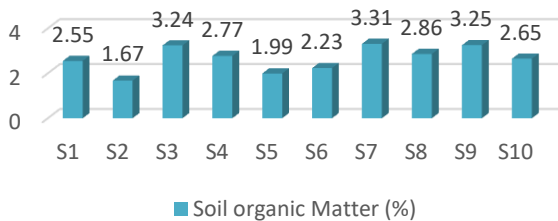


Soil organic Matter (%)

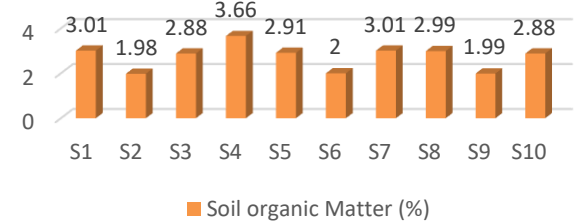


Graph: Percentage of organic carbon in soil in summer season Graph: Percentage of organic matter in soil in winter season

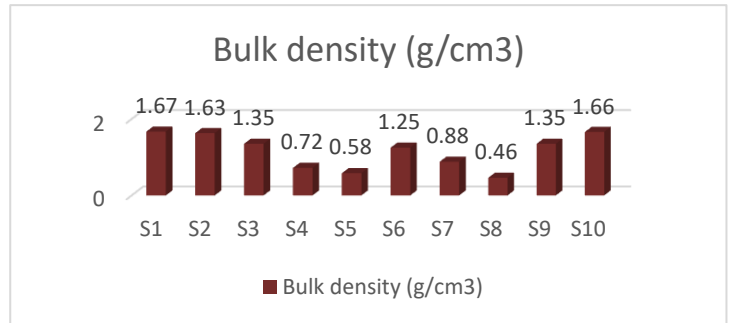
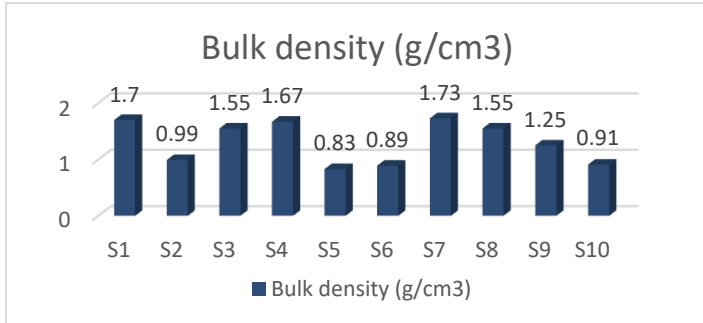
Soil organic Matter (%)



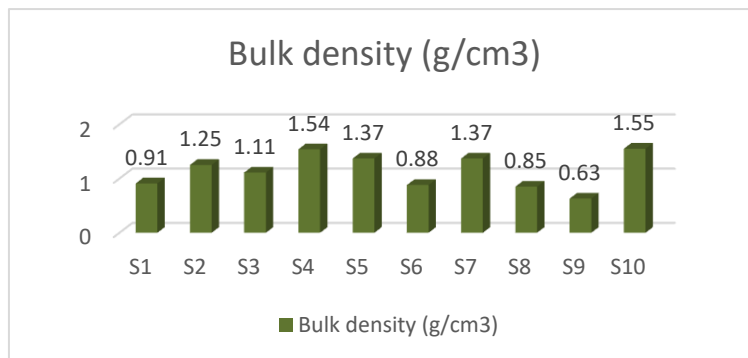
Soil organic Matter (%)



Graph: Percentage of organic matter in soil in winter season Graph: Percentage of organic matter in soil in summer season



Graph: Bulk density (g/cm³) of soil in rainy season Graph: Bulk density (g/cm³) of soil in winter season



Graph: Bulk density (g/cm³) of soil in summer season.

Entire flora and fauna is completely dependent on the quality of soil. The quality and health of soil determine agricultural sustainability and ecological quality, which jointly determine plant, animal and human health (Haberern, 1992, Doran, 2002). Soil quality indices are decision tools that effectively combine a variety of information for multi-objective decision making (Karlen and Stott, 1994). Soil organic carbon (SOC) is one part in the much larger global carbon cycle that involves the cycling of carbon through the soil, vegetation, ocean and the atmosphere. Soil organic matter (SOM) is the organic matter component of soil, consisting of plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by soil organisms. Living organisms (Manson, 2017). Bulk Density is defined as the mass of solids per unit volume of the soil (Dexter, 2004).

IV. CONCLUSION

Soil is the crucial part of the nature. The Organic Carbon of the Soil of site S4 in all three seasons that is summer, monsoon and winter is averagely maximum, that is 2.10. The Organic Carbon of the Soil of site S3 in all three seasons that is summer, monsoon and winter is averagely minimum, that is 0.80. The Organic matter of the Soil of site S4 in all three seasons that is summer, monsoon and winter is averagely maximum, that is 3.21. The Organic matter of the Soil of site S2 in all three seasons that is summer, monsoon and winter is averagely minimum, that is 1.84. The Bulk density of the Soil of site S1 in all three seasons that is summer, monsoon and winter is averagely maximum, that is 1.43. The Bulk density of the Soil of site S5 in all three seasons that is summer, monsoon and winter is averagely minimum, that is 0.93. Another limitation of most of the available studies is that efforts have been made to measure soil characteristics in surface soil and not in the whole profile (Sparling *et al.*, 2004). Maintenance and improvement of soil quality is one of the most important prerequisites to achieve the environmental sustainability (Sojka and Upchurch, 1999).

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