



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 12, December 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

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Analysis of Soil from Dr. BAM University campus of Aurangabad city, Maharashtra India

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ABSTRACT: Soil is the most diverse, nutrient rich loose surface material which covers most of our land. Soil contains both the organic and inorganic matter. The presence of soil is necessary to prevent direct leaching of the inorganic pollutants in the groundwater. The samples of soil were collected from different areas in Aurangabad district during rainy, winter & summer season and was analysed for different parameters as per the standard procedure. The result obtained from the study indicates the clear differentiation in the values of the parameter in the selected seasons. Also the values at different areas differ from each other due to the various activities carried out around that area. Certain parameters exceeded the desirable limit while some parameters show less content as compared to their desired value range in the soil. It is observed that organic carbon values are ranged from 0.42 to 2.23 in rainy season. while in winter it differs from 0.34 to 2.28, and in summer it differs 0.56 to 2.23 percentages. The organic matter content of soils of different areas in Aurangabad differs from 1.45 to 3.74 in rainy season. in winter it differs from 1.25 to 3.57. while in summer it varies from 1.6 to 2.48 percentages. The Bulk density present in the soils of different areas of Aurangabad differs from 0.56 to 1.62 in rainy season. in winter ranged from 0.48 to 1.64 and in summer and it ranged from 0.49 to 1.65. Soil analysis is a set of various chemical processes that not only determine the amount of available plant nutrients in the soil, but also chemical, physical and biological soil properties important for plant nutrition.

KEYWORDS: soil, carbon, parameter, matter, bulk density.

I. INTRODUCTION

Soil is one of the most important resources and crucial component of earth's critical zone. Soil, water, and air these are the natural resources present on or surrounding of the earth. Human depend on natural vegetation and natural resources like land, soil as well as wildlife resources for our survival. All these form the basic components of our ecosystem (Bhise and Kulkarni, 2019). Soil is a good medium for many reactions in the earth ecosystem (Rajasekhar and Vaidya, 2022). Soil provides life to small microorganism to all living things. It encourages biodiversity on the earth and maintains equilibrium condition between numerous ecosystems on the earth. Quality of earths ecological health mainly based on the soil health. It is a complex mixture of minerals, water, air and organic matter and also it is referred as skin of the earth. Soil is an independent body in the nature with a unique morphological features from the surface down to the parent. Soil is the thin layer which is covering the earth surface and it is formed through weathering of rocks (Ghare and Kumbhar, 2021). Soil is mainly formed of organic materials, mineral and living organism. Almost all the flora get nutrients from the soil which is the main sources of food for all living organism. Soil has the significant potential to remove impurities. Soil basically absorbs the oxygen and methane which release carbon dioxide and nitrous oxide. The world is highly dependent on the food generation and the food production severely depends on the soil quality. Soil analysis may be stated as the potential of a soil to function within ecosystem boundaries to sustain the biological productivity, maintain ecological quality and promote plant and animal health. A productive soil would ensure proper retention and release of the water and nutrients, promote and sustain root growth, regulates soil biotic habitat, respond to management and resist degradation process. Organic carbon, organic matter and microbial biomass are major

indicators of soil biological status of soil health. Soil morphology provides a strong basis on which it groups the results of observation, experiments, and practical experience and to improve integrated principles which predict the behaviour of soils (soil survey manual 2017). Soil analysis is a valuable tool for your farm as it determines the inputs required for efficient and economic production. Soil health can be stated as the capacity of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality and promote plant and animal health. A proper soil test will help ensure the application of enough fertilizer to meet the demands of the crop while taking benefits of the nutrients already present in the soil. These areas include commercial area, industrial area, residential area, roadside area and along the rail tracks from Aurangabad district.

II. MATERIALS AND METHODS

Aurangabad district is located in the north central part of Maharashtra between North Latitude 19°15' and 20°40' and East Longitude 74°37' and 75°52'. Aurangabad district is surrounded by Nashik district in west, Jalgaon district of North, Ahmednagar and Beed district in south and Parbhani and Buldhana district in east. Aurangabad district has been divided in 9 talukas viz. Aurangabad, Khuladabad, Vaijapur, Gangapur, Kannad, Soyagaon, Sillod, Phulambri, and Paithan talukas. The district has geographical area of 10,107 sq. km, out of which 726 sq. km is covered by forest while cultivated area is 8135.57 sq. km and net area sown is 6540 sq. km. The entire area is covered by the Deccan trap, lava flows of upper cretaceous to the lower Eocene age. The lava flows are overlain by thin alluvial sediments along the Kham and Sukhana River.

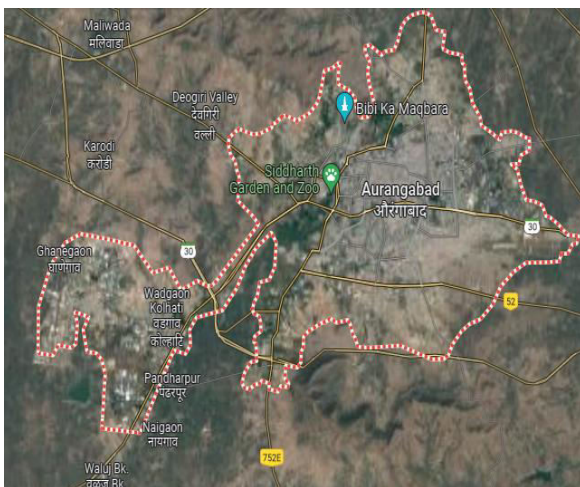


Fig.(1): Map showing location of Aurangabad city

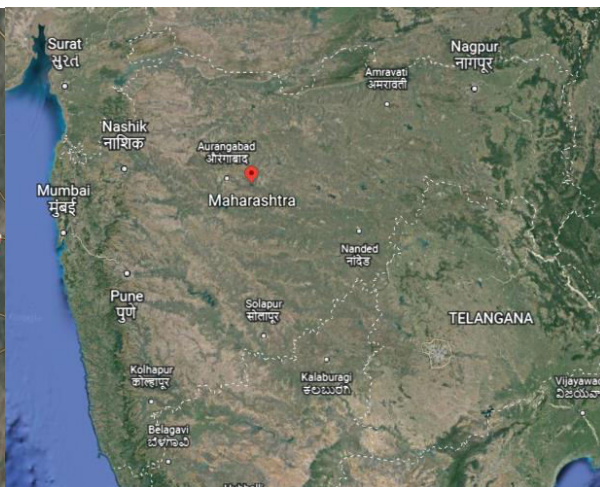


Fig.(2) Map showing Maharashtra State.

The basaltic lava flows belonging to the Deccan Trap is the only major geological formation occurring in Aurangabad. The average annual rainfall of the district 619 mm. The elevation of the district was 500 meters above mean sea level. The bulk density was determined by clod coating method (Piper and Black, 1966). Hydraulic conductivity is one of the crucial parameter of soil which is determined by constant head method as described by Richard (1954). The soil samples collected during present research work was initially air dried in the laboratory at room temperature, grinded by using wooden mortar and pestle. It was screened through 2 mm sieve, properly labelled and stored in polythene bags for laboratory analysis purpose. For certain soil characters like organic carbon, samples were again ground with 80 mm mesh sieve. The above said parameters were determined by adopting the standard procedures. 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 estimated by using following equation

$$\text{SOC} = 0.58 \times \text{SOM}$$

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

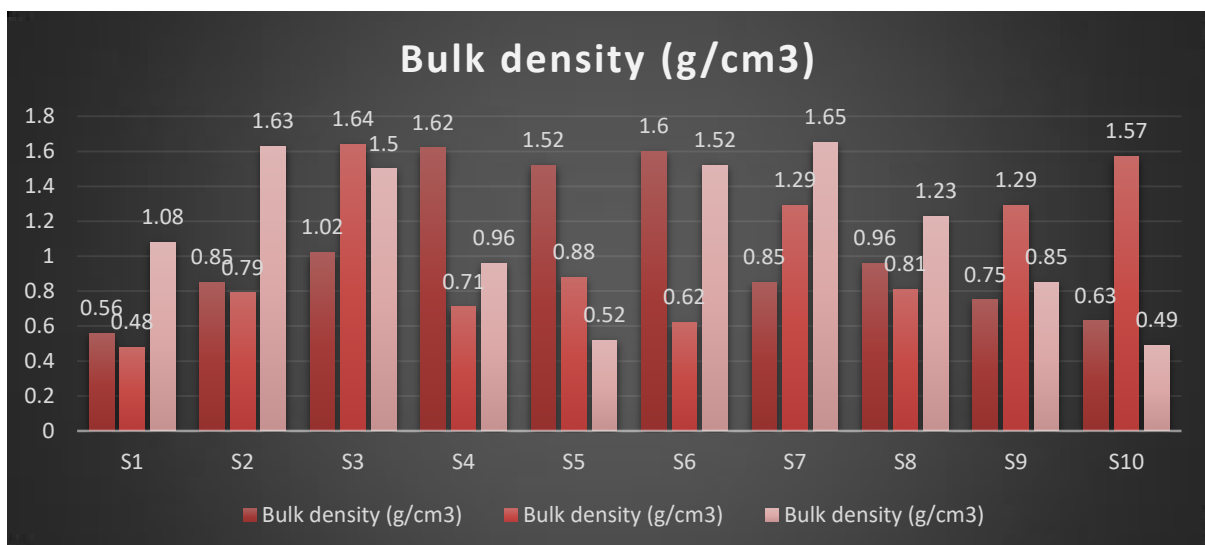
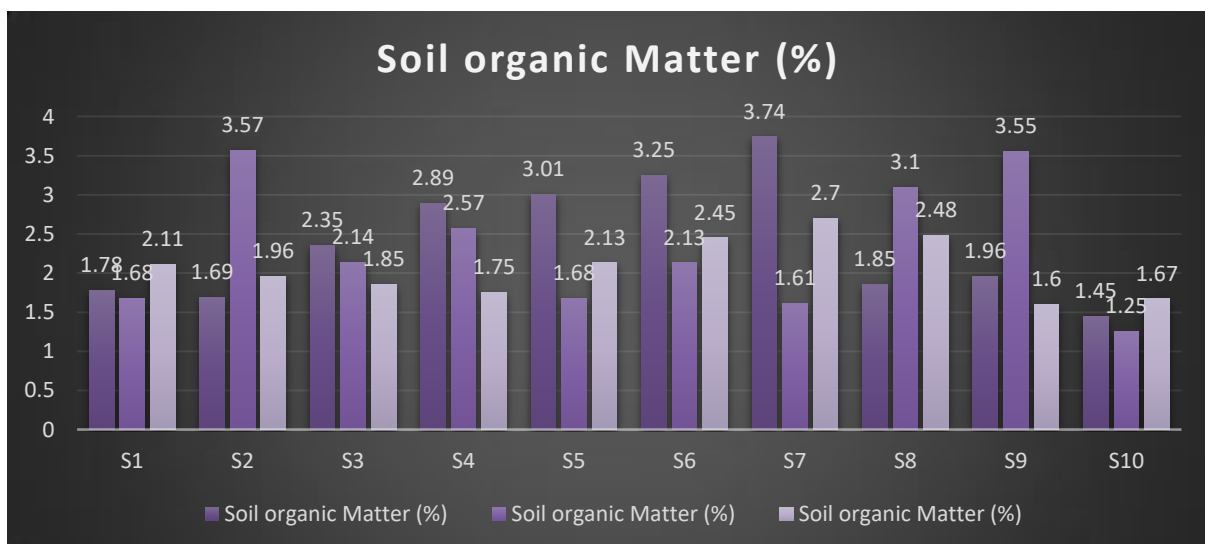
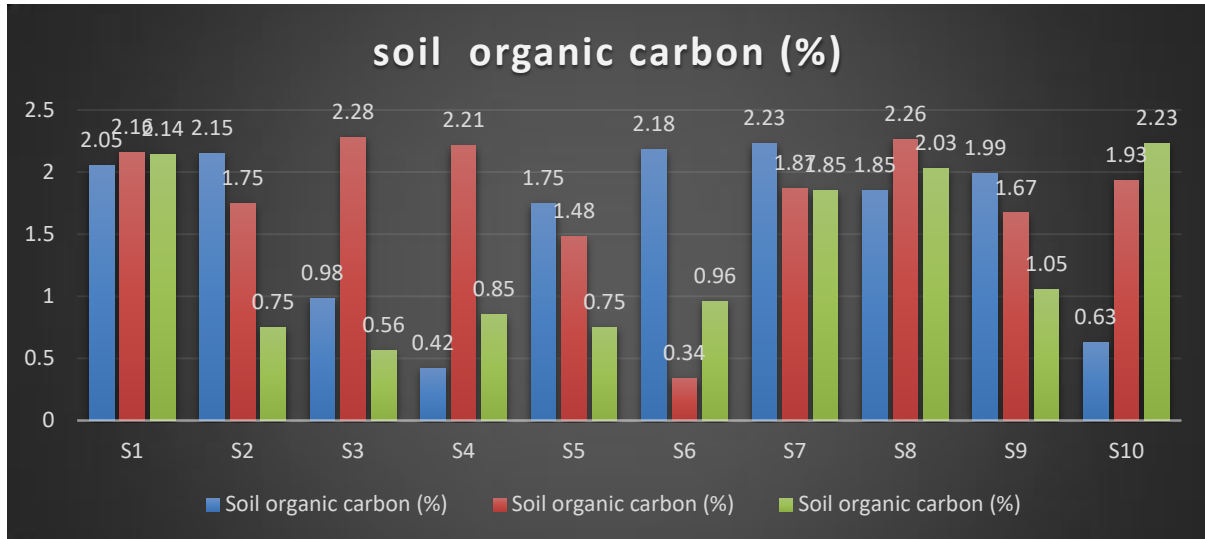
III. RESULTS AND DISCUSSION

The systematic research work was carried out to know the soil organic carbon, soil organic matter and soil bulk density in the study area. Observed values have been tabulated in the table no. 1 and graphically represented with the graphs

Table 1: Soil parameters observed values during the analysis

Study areas	Soil organic carbon (%)			Soil organic Matter (%)			Bulk density (g/cm ³)		
	Rainy	Winter	Summer	Rainy	Winter	Summer	Rainy	Winter	Summer
S1	2.05	2.16	2.14	1.78	1.68	2.11	0.56	0.48	1.08
S2	2.15	1.75	0.75	1.69	3.57	1.96	0.85	0.79	1.63
S3	0.98	2.28	0.56	2.35	2.14	1.85	1.02	1.64	1.5
S4	0.42	2.21	0.85	2.89	2.57	1.75	1.62	0.71	0.96
S5	1.75	1.48	0.75	3.01	1.68	2.13	1.52	0.88	0.52
S6	2.18	0.34	0.96	3.25	2.13	2.45	1.6	0.62	1.52
S7	2.23	1.87	1.85	3.74	1.61	2.7	0.85	1.29	1.65
S8	1.85	2.26	2.03	1.85	3.1	2.48	0.96	0.81	1.23
S9	1.99	1.67	1.05	1.96	3.55	1.6	0.75	1.29	0.85
S10	0.63	1.93	2.23	1.45	1.25	1.67	0.63	1.57	0.49
Average	1.623	1.795	1.317	2.397	2.32	2.07	1.03	1.008	1.14
min.	0.42	0.34	0.56	1.45	1.25	1.6	0.56	0.48	0.49
max.	2.23	2.28	2.23	3.74	3.57	2.7	1.62	1.64	1.65

Organic carbon: - Higher the soil organic carbon promotes soil structure meaning there is greater physical stability. This improves soil aeration (oxygen in the soil) and water drainage and retention, and reduces the risk of erosion and nutrient leaching. In present analysis organic carbon values are ranging from 0.42 to 2.23 in rainy season. while in winter it ranges from 0.34 to 2.28, and in summer it ranges 0.56 to 2.23 percentages. The source of the organic carbon in the cultivated soil included crops residue, animal manure, cover crops, green manure and organic fertilizers etc.



Organic matter improves soil structure, which results in increased water infiltration following rains and increased water-holding capacity of the soil; it also enhances root growth into more permeable soil. This results in better plant health and allows more movement of mobile nutrients (such as nitrates) to the root, organic matter stocks and turnover, the biotic community that regulates soil fertility, and plant demand. The organic matter content of soils of Aurangabad ranges from 1.45 to 3.74 in rainy season, in winter it ranges from 1.25 to 3.57. while in summer it ranges from 1.6 to 2.48 percentages. Soil organic matter is the critical component in the functioning of terrestrial ecosystems, providing substrate and nutrients for biotic reactions. It maintains soil structure and soil permeability and resistance to wind and water erosion. The organic manures contain plant nutrients in small quantities as compared with fertilizer. Besides plant nutrients organic manure also contains growth regulators like enzymes and hormones essential for improvement of soil fertility and productivity (Bhuma, 2001). Less content of organic matter indicates that the soil lacks micro flora and fauna which ultimately results in organic matter. Soil organic matter is essential for carbon and nitrogen turnover and nutrient retention ultimately for soil quality. Intensive cultivation has caused a heavy loss in soil organic matter relative to natural ecosystems (Matson *et al.*, 1997). Integrated approach for nutrient management is suggested by the scientist but it is observed that, most of the farmers are using only chemical fertilizers and they are not using organic inputs because of unavailability at local level. Organic manure includes all nutrients including micro nutrients (Ajgaonkar and Patil (2017). Bulk density is an indicator of soil compaction. It is calculated as the dry weight of soil divided by its volume. This volume includes the volume of soil particles and the volume of pores among soil particles. Bulk density reflects the soil's ability to function for structural support, water and solute movement, and soil aeration. The bulk density present in the soils of Aurangabad ranges from 0.56 to 1.62 in rainy season. in winter it was ranged from 0.48 to 1.64 and In summer it ranges from 0.49 to 1.65.

IV. CONCLUSION

Soil is the most precious natural resource to get fundamental needs of human beings and it takes almost 1000 years to produce an inch of top soil. There are extraordinary pressures on soil due to urbanization, industrialization or from degradation; soils are reducing their quality that are unbalancing the agricultural practices and food production. Consequently, soil quality and its management with planning are essential to preserve the soil with its quality for future generations. This contain the main observation table of the analysis of soil. All parameters with respect to different areas are mention in this part along with the units. This also includes the standard value described by different authorities for different parameters to maintain quality and ultimately to compare the result with standard to draw the conclusion. After the analysis the average organic carbon percentage present in the soils of different areas of Aurangabad are 1.623 % in rainy season. in winter it is 1.795% and in summer it is 1.317%. The average organic matter percentage present in the soils of different areas of Aurangabad are 2.397% in rainy season. in winter it is 2.32 % and in summer it is 2.07%. The average bulk density (g/cm³) present in the soils of different areas of Aurangabad are 1.03(g/cm³) in rainy season. in winter it is 1.008(g/cm³) and in summer it is 1.14(g/cm³). Most living things depends on soil for their existence. It include material and methodology used for the project. Detailed information right from the sampling to the storage and analysis is given in this part. Various instrument have been used during this project.

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