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Analysis of Soil from Nandanvan Colony Area of Aurangabad City, Maharashtra, India

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ABSTRACT: Soil is an essential part of our nature. Various important processes in the nature take place through the medium of soil. Soil being a significant component of the environment, is important for growth of flora and fauna on the earth's surface. The present research paper attempts to analyze the soil quality of Nandanvan colony area of Aurangabad city. Ten samples of soil were collected randomly from area in three seasons, rainy, winter and summer, for soil analysis. Factors like percentage of organic carbon in soil, organic matter and bulk density were taken into consideration for this study. The analysis shows changes in soil properties as per each season. The average soil organic carbon for rainy, winter and summer season was found out to be 1.77%, 1.76% and 1.76% respectively. The average soil organic matter for rainy, winter and summer season was found out to be 2.49%, 2.48% and 2.49% respectively. The average bulk density of soil for rainy, winter and summer season was found out to be 1.03 g/cm³, 1.01 g/cm³ and 1.03 g/cm³ respectively. It was found that the average percentage of organic soil carbon was 1.77%, average percentage of organic soil matter 2.49% and average bulk density of soil was 1.02 g/cm³ of the studied area. Soil health and texture is important to study before performing any agricultural activity or construction. Soil plays an important role in providing nutrients to the plants. It is also important to hold on to the foundation of buildings.

KEYWORDS: Soil, Organic, Environment, Bulk Density, Soil Health.

I. INTRODUCTION:

Soil is the most precious natural resource for agricultural production and it takes almost thousands of years to produce an inch of topsoil (Chandra and Singh, 2009). The availability of nutrients based on types of soils, nature of irrigation facilities, pH and organic matter content (Gupta and Gupta, 1997). The decrease in soil organic carbon concentration and increasing carbon emissions are burning issues globally, because it causes many changes in weather calamities like global warming, greenhouse gas effect and increase in level of sea. (Fortunate and Colin, 2004). Along with edaphic conservation methods like crop cover, mulching, green manuring, ignoring soil health card results and significantly used plenty of or high doses of commercial fertilizer application results decrease in the soil organic carbon and harm to soil health (Lal et al., 2004). The environmental issue of high ozone concentration in the soil atmosphere causes oxidation of soil organic carbon in the surface layer of soil (Taiji and Wang, 2014). Soil is an important interface for infiltration, surface runoff and precipitation events. Likewise soil is a very crucial medium to interflow of leachate/water in the ground reservoirs (Bhagwat, 2018). Aurangabad city is one of the growing industrial hub in Maharashtra (Tejankar & Pathrikar, 2017).

In agriculture, good soil health means potential of soil to possess physical, chemical and biological activities for the consistent productivity of high crop yield. Good quality of soil assures the retention and release of water and nutrients, enhancement with consistent root growth whilst maintaining a biotic environmental conditions, providing the expected result and resist filth. Most of the agricultural soil types in India are deficient in primary nutrients like Nitrogen, Phosphorus and Potassium. The Physio-chemical parameters of soil are very crucial for site suitability, plant growth and soil management practices (Bhagwat, 2018). The ultimate aim of any technology with respect to agriculture is to make food production cheap and at the same time to give farmers many short term, long term and sustainable advantages (Rao, 2013). Land use refers to human-induced land transformation for the specified intentions such as

agriculture, recreation and build-up, etc. In contrast, vegetation patterns, water bodies, soil, and natural land surface are included under land cover (Hua, 2017; Chamling et al., 2020). The three main types of soil properties are physical, chemical and biological. The physical properties of soil includes texture, structure, density, consistency and color. Chemical properties of soil are Cation Exchange Capacity (CEC), soil pH, minerals and organic matter (carbon, nitrogen and phosphorus) (Ramdas et al., 2015). In the Maharashtra state, large areas are under zinc deficiency followed by iron and manganese (Malewar, 2005). Biological properties include soil biota, including flora (plants), fauna (animals) and microorganisms which perform major functions that contribute to the soil’s development, structure and yield. The physical and chemical properties of the soil are essential nutrients which are crucial for crops and basic resources for maintaining the Earth’s all ecosystems (Li et al., 2015).

II. METHODS AND MATERIALS:

Aurangabad is located at latitude 19o 53’47” N and longitude 75o 23’54” E. It has total about 10,107 km² geographical areas, the forest cover in city area is about 120 km² and area covered by open forest area is about 437 km². The total land portion under forest cover is 557 km² which is only 5.51% of total land area of Aurangabad (SFR, 2009). Aurangabad district is located in the north central part of Maharashtra between North Latitude 19015’ and 20040’ and East Longitude 74037’ and 75052’. This district is mainly surrounded by Jalgaon district of North, Nashik district in the west, Ahmednagar and Beed district in south and Parbhani and Buldhana district in eastern side. Aurangabad district has been divided into nine talukas viz. Aurangabad, Phulambri, Khuladabad, Vaijapur, Kannad, Soyagaon, Sillod, Gangapur, 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 is 6540 sq.km (Rajasekhar and Vaidya, 2022).



Fig 1: Map of India

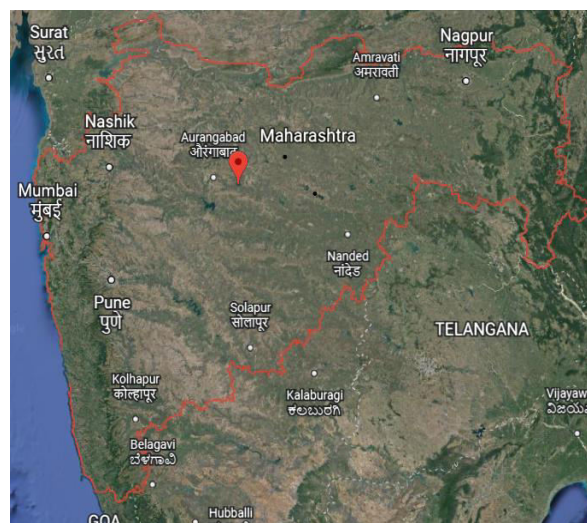


Fig 2: Map of Maharashtra

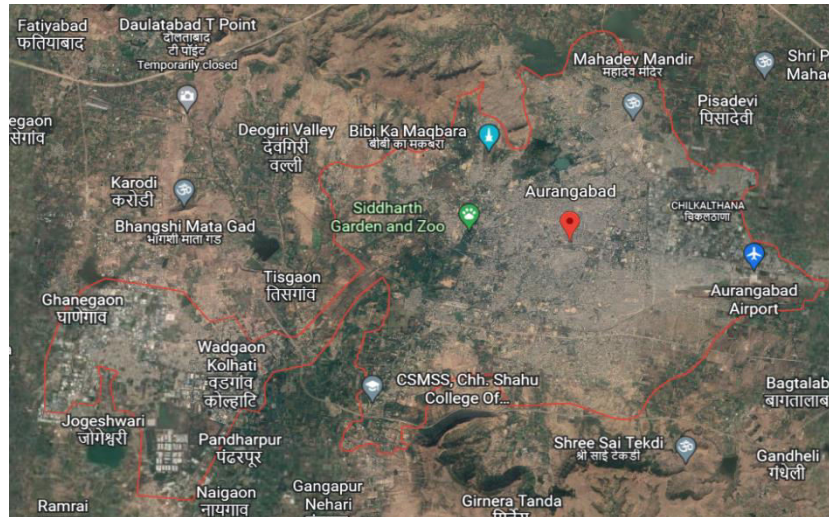


Fig 3: Map of Aurangabad city and study area (Source: Google Earth)

CLIMATE:The climate of the Aurangabad district is mainly characterized by a hot summer and a general dryness throughout the year except during the south west monsoon season, which is from June month to September while October and November constitute the post-monsoon season. Approximately 83% of annual rainfall is received during the month June to September. The variation in rainfall from year to year is very large and the study area falls in vulnerable to droughts hence is characterized by the erratic behavior of the rainfall. (Deshpande and Aher, 2012).

GEOLOGY AND PARENT MATERIAL:The entire area is covered by the Deccan trap lava flows of upper cretaceous to lower Eocene age. The lava flows are overlain by thin alluvial deposits along the Kham and Sukhana River. The basaltic lava flows belonging to the Deccan Trap is the only major geological formation occurring in Aurangabad (Tadi and Vaidya, 2022).

III. RESULTS AND DISCUSSION

The present research work carried out to know the soil quality. The recorded values form the analysis carried out in the present research work and tabulated in the table and interpreted.

Table 1: Analysis Of Soil From (Location Code Lwd.5) 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	2.01	2.04	1.92	1.77	1.75	3.65	0.45	0.66	0.76
S2	2.00	1.52	1.54	2.23	3.62	2.22	1.62	0.93	0.47
S3	2.02	2.27	2.29	3.66	2.26	1.76	0.72	1.46	0.77
S4	2.05	2.22	2.24	1.67	2.96	2.25	0.97	0.61	1.64
S5	1.45	1.58	1.57	2.98	1.65	2.99	0.73	0.88	0.74
S6	1.22	0.33	0.35	1.72	2.28	1.66	0.81	0.62	0.95
S7	2.03	1.86	1.89	2.24	1.70	3.22	1.23	1.37	1.30
S8	1.55	2.27	2.26	3.76	3.19	1.67	1.55	0.81	0.82
S9	1.54	1.66	1.64	3.21	3.78	1.73	1.28	1.24	1.54
S10	1.90	1.91	1.93	1.66	1.68	3.77	0.97	1.54	1.28
Maximum	2.05	2.27	2.29	3.76	3.78	3.77	1.62	1.54	1.64
Minimum	1.22	0.33	0.35	1.66	1.65	1.66	0.45	0.61	0.47
Average	1.77	1.76	1.76	2.49	2.48	2.49	1.03	1.01	1.03



The average soil organic carbon percent in the rainy season was 1.77. The minimum soil organic carbon percent in the rainy season was 1.22 and maximum was 2.05. Average soil organic carbon percent in the winter season was 1.76. The minimum soil organic carbon percent in the winter season was 0.33 and maximum was 2.27. Average soil organic carbon percent in the summer season was 1.76. The minimum soil organic carbon percent in summer season was 0.35 and maximum was 2.29. Average soil organic matter percent in the rainy season was 2.49. The minimum soil organic matter percent in the rainy season was 1.66 and maximum was 3.76. The average soil organic matter percent in the winter season was 2.48. The minimum soil organic matter percent in the winter season was 1.65 and maximum was 3.78. The average soil organic matter percent in the summer season was 2.49. The minimum soil organic matter percent in summer season was 1.66 and maximum was 3.77. The average bulk density in the rainy season was 1.03. The minimum bulk density in the rainy season was 0.45 and maximum was 1.62. The average bulk density in the winter season was 1.01. The minimum bulk density in the winter season was 0.61 and maximum was 1.54. The average bulk density in the summer season was 1.03. The minimum bulk density in the summer season was 0.47 and maximum was 1.64.

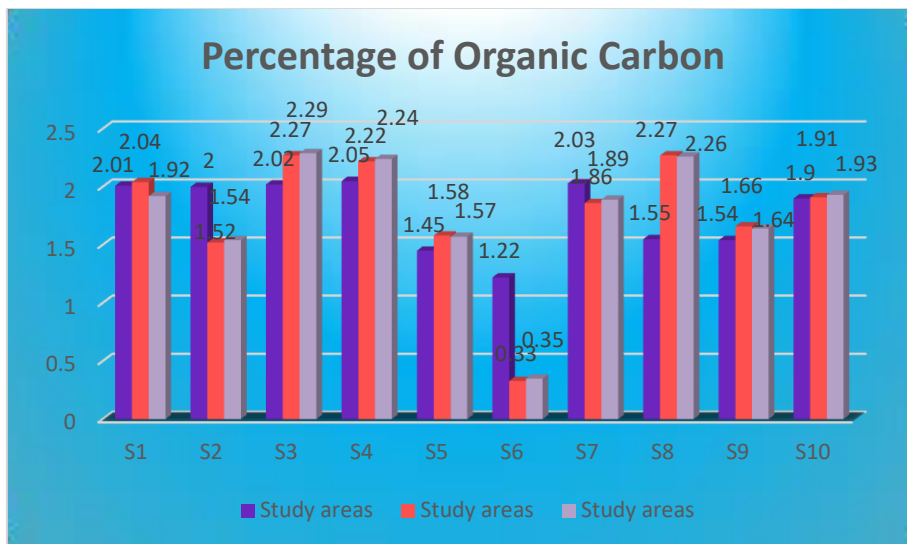


Fig 4: Percentage of organic carbon in soil

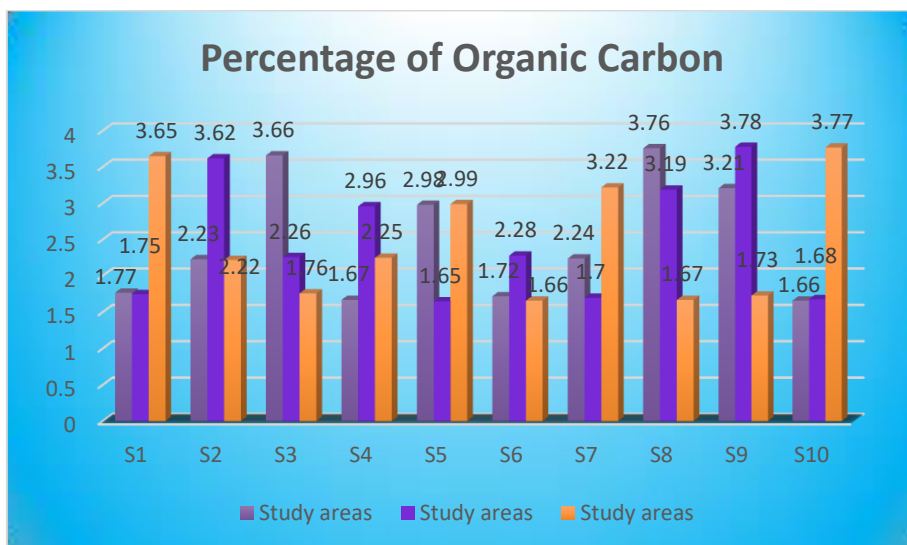


Fig 5: Percentage of organic matter in soil

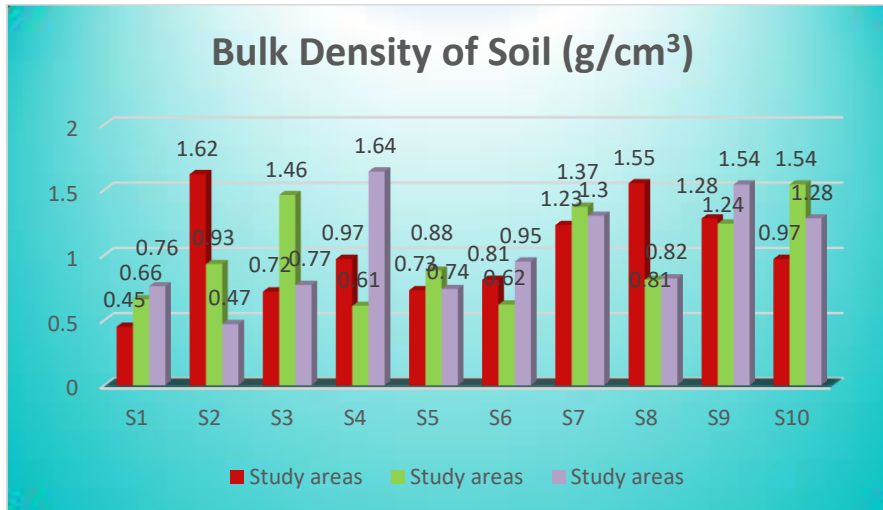


Fig 6: Bulk density of the soil

The organic matter improves soil health by retention of mineral nutrient, developing soil structure and water holding capacity, water infiltration, aeration, drainage and crucial one is root penetration (Havlin et al., 2010). It also aids to maintain large amounts of soil flora and fauna (Jain, 2009).

IV. CONCLUSION

Soil is crucial component of nature which provides food, clothing and shelter to human beings. The present study was conducted in Nandanvan colony area of Aurangabad city in rainy, winter and summer seasons. Soil samples were collected and tested on the basis of numerous parameters like soil organic carbon, soil organic matter and bulk density of soil. These ten samples were collected from the area. The average soil organic carbon for rainy, winter and summer season was found out to be 1.77%, 1.76% and 1.76% respectively. The average soil organic matter for rainy, winter and summer season was found out to be 2.49%, 2.48% and 2.49% respectively. The average bulk density of soil for rainy, winter and summer season was found out to be 1.03 g/cm³, 1.01 g/cm³ and 1.03 g/cm³ respectively. It was found that the yearly average soil organic carbon present was 1.77%. The yearly average soil organic matter percent was found out to be 2.49%. The yearly average bulk density was found to be 1.02 g/cm³ which is considered as low bulk density. The present study is very helpful to analyze the soil data and its comparison to the soils from different areas.

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