Study the Physio-Chemical Properties of Red Soil of Bhiwandi (East) District Thane, Maharashtra, India

Shaikh Arif M. Salim

Department of chemistry B.N.N. College. Dhamankar naka bhiwandi-421302 , District Thane Maharashtra, India.

Abstract: Is one of the main pillars of life on Earth. Due to its fertility anAd good drainage, red soil is frequently utilized in agriculture. This is especially advantageous for crops like sugarcane and bananas that need a lot of nutrients. Vegetables and fruits are among the various crops that can be grown on red soil. We must be aware of the characteristics of soil. In our research, we will examine the physco-chemical characteristics of the red soil that we are working with. Bhiwandi (East) Dongari pada, Thane district, Maharashtra is the location of the research. In our investigation, we'll examine the physical and chemical characteristics of this red soil, including the elements that are present in it.what physical characteristics it possesses. We will examine physical characteristics such as conductivity, pH, percentage of carbon, etc. During this time. Chemical characteristics such as the presence and amount of Fe, Cu, Zn, Ca, Mg, Sulphur, and Nitrogen will be studied.

Keywords: Red soil, Conductivity, Resistive, pH-value, Physical properties, Chemical properties etc.

I.   INTRODUCTION

The majority of the land in Tamil Nadu, Bombay, Chhattisgarh, Andhra Pradesh, and Karnataka is covered in red soil; these states comprise almost all of these regions. The Thane district of Maharashtra, India's Bhiwandi, Dongari pada village is home to the red soil that we are studying. The inhabitants use this soil for plantation flower growth and small-scale agriculture. This soil is located near mountains, and there are a few tiny rice and wheat farms here. There is very little of this dirt in this location. The distance between Dongari Pada village and Bhiwandi is 6.1 km. The geographic coordinates of this research area are 19.299429° latitude and 73.087464° longitude. Also , no research has been done in this area.
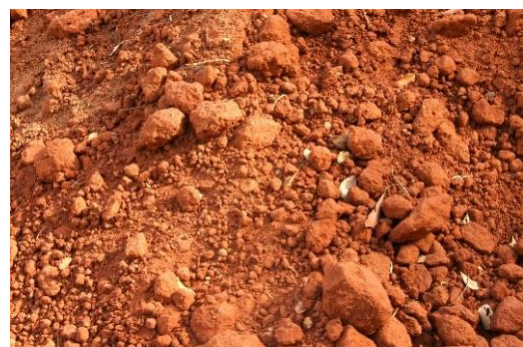
***Electrical Conductivity*:**
This property of soil tells us how much of the soluble (salt) ions are present. By measuring the electrical resistance of a 1:5 soil:water suspension, a conductivity cell is used to determine electrical conductivity (EC).

The term electrical conductivity (EC) refers to the soil's capacity to either conduct or attenuate electrical current. Deci-Siemens per meter (dS/m) is sometimes used to report EC, which is stated in milli-Siemens per meter (mS/m). Soil scientists have been measuring soil salinity with EC for many years. However, in situations when soil salinity is not an issue, soil EC measurements may also be used to estimate differences in other physical attributes of the soil, such as texture, moisture content, and topsoil depth.

It's crucial to keep in mind that anything that modifies soil conductivity will alter measurements, thus it's critical to establish a baseline of knowledge in order to identify the driving variable or variables for soil EC measurements [1], [2].

PH-Value :

The concentration of hydrogen ions in the soil solution is gauged by a soil's pH. The negative logarithm of the H+ concentration in moles per liter is known as pH. Since pH is a solution measurement that solely takes into account the presence of acid cations adsorbed on soil colloids, it is equal to -log [H+].

The acidity or alkalinity of the soil is determined by the pH of the soil. The concentration of hydrogen ions is expressed as a pH value. Since there is a large variation in hydrogen ion concentration, a logarithmic scale (pH) is utilized: The Acidity increases by a factor of ten for a pH drop of 1. Because very acidic soil has a low pH and a high hydrogen ion concentration, it is a "reverse" scale. Therefore, the concentration of hydrogen ions is low at high (alkaline) pH levels. The pH range of most soils is between 3.5 and 10. Natural soil pH normally ranges from 5 to 7 in areas with higher rainfall, and from 6.5 to 9 in dry areas. Soils can be categorized based on their pH level. pH values of 6.5 to 7.5 are neutral, over 7.5 are alkaline, less than 6.5 are acidic, and less than 5.5 are extremely acidic soils.

Literature Review :-

The research paper by SS Kekane, RP Chavan, DN Shinde, CL Patil, and SS Sagar was published in 2015. It is concluded in "A review on physico-chemical properties of soil" that several metrics can be used to study the quality of soil. The majority of the parameters are either significantly over or below allowable bounds. As such, it is critical to completely outlaw any human activity that contributes to the degradation of soil quality.

The study conducted in 2015 by V.K. Phogat, V.S. Tomar, and Rita Dahiya"Soil Physical Properties" came to the conclusion that physical characteristics greatly affect how soil behaves for engineering and agricultural purposes. Total porosity and the size distribution of pores that affect water are determined by the texture and structure of the soil.and air Associations in the ground. Although the texture of the soil is static, management techniques can change its structure. To prevent soil structure degradation, tillage operations must be performed while soil moisture levels are at their ideal. Maintaining the ideal soil physical conditions for plant growth can be aided by the management of physical, chemical, and biological components. The quality of soil for plants and other organisms is influenced by soil temperature and soil aeration. The temperature and aeration of the soil are significantly influenced by soil water. It balances the temperature of the soil and competes with soil air. The properties of soil, such as strength, consistency, plasticity, and compaction, are useful in assessing how stable the soil is under loading forces from tillage, traffic, and building foundations. Considering the current soil stress as a natural appropriate attention is required to maintain the physical fertility of the soil by adding organic materials, rotating legumes, using conservation tillage, etc., in order to ensure food security and safety.

II.   MATERIAL & METHODS

In our research, we employed an experimental methodology. In the course of our investigation, we collected a red soil sample from 10 centimeters below the surface in Dongari pada village, Bhiwandi district Thane. Identified the existence and amount of several physical and chemical parameters, including pH value, nitrogen conductivity, sulphur, Fe, Cu, Zn, Ca, Mg, and so forth. Of the research area sample, which are as follows

Tables:

S.No.	Physio-chemical Properties	Unit	Value in Red soil	Level Description/Critical Level
01	Electrical Conductivity	Ds/m	0.28	Less than 1.0 Normal
02	PH-Value	PH-scale	6.84	Neutral 7
03	Zinc (Zn)	mg/kg	0.4	0.6
04	Cupper (Cu)	mg/Kg	0.1	0.2
05	Carbon (C)	Kg/Hactare	0.47	Less than 0.50- Lower
06	Iron (Fe)	mg/kg	1.6	4.5
07	Manganese	mg/Kg	1.5	3.8

III.   RESULT & DISCUSSION

The red soil in Dongari pada Village has conductivity that is only 28% of the threshold level, which is significantly lower than typical and indicates that the soil would   be saline. Acquired a pH of 6.84, indicating that the red soil present there is neutral. The obtained amount of organic carbon fell within the lower range of 0.47.

	1	2	3	4	5	6	7
Series1	0.28	6.84	0.4	0.1	0.47	1.6	1.5
Series2	1	7	0.6	0.2	0.5	4.5	3.8
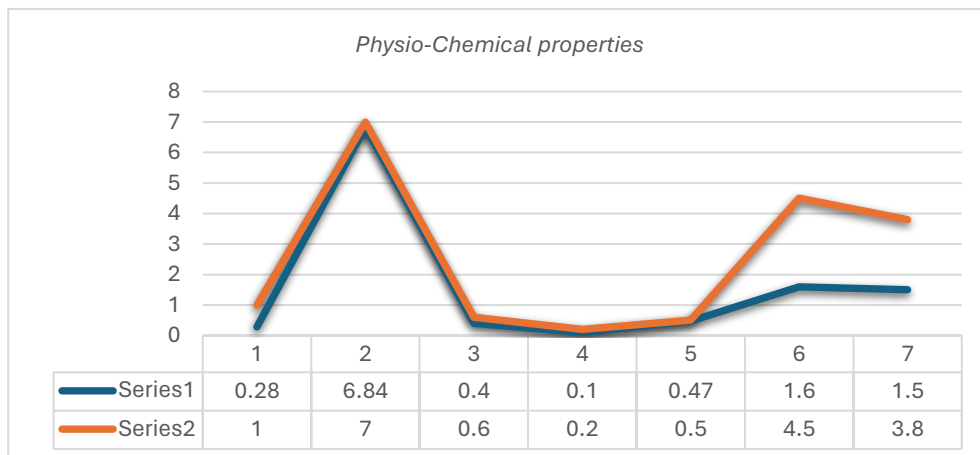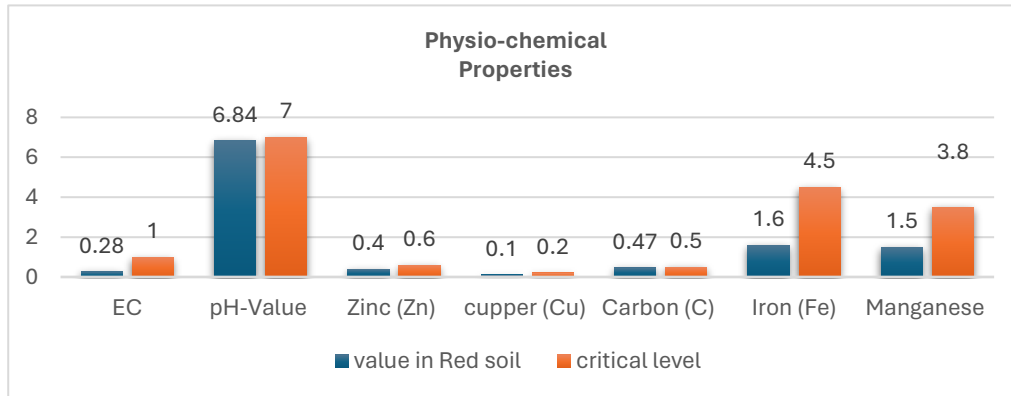
Zn concentration was discovered to be 50% when the chemical characteristics of the red soil in Dongari pada village were examined. Cu was obtained less than the essential level by only 50%, and Iron was obtained less than the crucial level by only 40%. Likewise, Mn only achieved 42% in comparison to the critical amount that transpired. All of these chemical elements are extremely rare.

REFERENCES

[1]. https://ohioline.osu.edu/factsheet/fabe565#:~:text=Soil%20electrical%20conductivity%2C%20referred%20to,EC%20to%20measure%20soil%20salinity.

[2]. By Liyan GongSoil Electrical Conductivity(EC): What's It, Why Important, How to Measure & More, https://www.seeedstudio.com/blog/2022/07/15/soil-electrical-conductivity/

[3]. Suarau Odutola Oshunsanya, "Introductory Chapter: Relevance of Soil pH to Agriculture" https://www.researchgate.net/publication/330729435

[4]. EDELBERT VEES and HANS F. WINTERKORN, "Engineering Properties of Several Pure Clays as Functions of Mineral rfype, Exchange Ions and Phase Composition"

[5]. SS Kekane, RP Chavan, DN Shinde, CL Patil, SS Sagar "A review on physico-chemical properties of soil" P-ISSN 2349–8528,E-ISSN 2321–4902,IJCS 2015; 3(4): 29-32,© 2015 JEZS,Received: 10-10-2015,Accepted: 30-11-2015

[6]. SS Kekane, RP Chavan, DN Shinde, CL Patil, SS Sagar "A review on physico-chemical properties of soil" https://www.researchgate.net/publication/297737054

[7]. Prof. A. Balasubramanian Centre for Advanced Studies in Earth Science, University of Mysore, Physical Properties of Soils" TechnicalReport · February 2017 DOI: 10.13140/RG.2.2.24150.24648

[8]. Report · February 2017 DOI: 10.13140/RG.2.2.24150.246488. Courtney Mobilian, Christopher B. Craft, "Wetland Soils: Physical and Chemical Properties and Biogeochemical Processes" Elsevier Volume 3, 2022, Pages 157-168

[9]. Zou Jiea , Chen Liyia* , Wang Shenga , Zhang Chuana "Analysis on Rock Properties Based on Exploration of Hole Wall's Stability" Geological Engineering Drilling Technology Conference (IGEDTC), New International Convention Exposition Center Chengdu Century City on 23rd-25th May 2014

[10].   https://wsdot.wa.gov/publications/manuals/fulltext/M46-03/Chapter5.pdf.

[11].   https://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6706e/x6706e06.htm.

[12].   Xudong Zhang, V.Vijayaraj, N.H.Younan, "Hyperspectral Soil Texture classification", IEEE, Workshop on Advances in Techniques for Analysis of Remotely Sensed Data, pp. 182186, 2003.

[13].   Du Jin-long, Jin Meng-gui, Hao Han-Zhou, Ouyang Zheng-ping, Liu Yan-feng, "Regionalization for soil texture in Yangi Basin of Xinjiang, China", IEEE, International Conference on Consumer Electronics,10.1109/CECNET.2011.5769413, 2011.

[14].   1Pratiksha P. Shete, 2Ratnadeep R. Deshmukh, 3Jaypalsing N. Kayte "Determination of Soil Texture Distribution (Clay, Sand and Silt) By using Spectral Measurement: A Review" © 2019 JETIR February 2019, Volume 6, Issue 2

[15].   Rai, Radha Umashankar. "MICROWAVE ASSISTED MULTI-COMPONENT SYNTHESIS OF 3, 4-DIHYDROPYRIMIDIN-2-(1H)-ONES BY USING MANDELIC ACID AS CATALYST UNDER SOLVENT FREE CONDITIONS."

[16].   Salim, S. A. M. GREENER AND EFFICIENT SYNTHESIS OF 2, 4, 5-TRISUBSTITUTED IMIDAZOLE BY USING SODIUM OXALATE IN AQUEOUS MEDIUM.

[17].   Salim, Shaikh Arif M. "STUDY THE SIGNIFICANT ROLE OF MICROBES FOR IMPROVING NUTRIENT QUALITY OF FOOD MATERIAL."

BIOGRAPHY

Shaikh Arif M. Salim is Department of chemistry. He has a B.Sc. degree in Organic chemistry (2021) and an M.Sc. degree in Organic chemistry (2024). His research involves the challenges and solution of cloud Drugs synthetic, Microorganisms,. He currently works as a FTIR-SPECTROSCOPY 6 month handle in the molecule analysis , India.