

“ANALYSIS OF THE PHYSICO-CHEMICAL PROPERTIES OF RED SOIL LOCATED IN KORANGA MAL VILLAGE OF JASHPUR DISTRICT, SURGUJA DIVISION OF CHHATTISGARH, INDIA”

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Abstract: Red soil is often used for agriculture because it is fertile and well drained. This is especially beneficial for crops that require a lot of nutrients, such as bananas and sugarcane. Red soil can also be used to grow other types of crops, such as vegetables and fruits. It is necessary for us to know the properties of soil. We will study the Physico-Chemical properties of Red soil in our research, the red soil on which we are doing research is found in area of Koranga mal village, block Farsababar of Jashpur district of Chhattisgarh. We will study the Physico-chemical properties of this red soil in our research, which element is found in it, what is its physical properties. During this we will study the physical properties like that Conductivity, pH-value, percentage of Carbon etc. We will study the chemical properties like presence and quantity of Fe, Cu, Zn, Ca, Mg, S, N etc. And try to reach some conclusion.

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

I. INTRODUCTION

Red soil is the soil which generally develops in warm temperature and moist climate. They grow in deciduous conditions and are generally found in mixed forests. They have thin organic and mineral layers. Research Area Koranga mal Village, where we will study the Physico-chemical properties of the Red soil found, this place is located at a distance of 2 km from center of Koranga mal village of Jashpur district. This red soil is used for making bricks and for painting houses. Rice and maize crops are good in this soil. Research area Koranga mal village is 150 Km away from Ambikapur, the headquarter of Surguja division and the distance of this place is 496 Km from Raipur, the capital of Chhattisgarh. and geographical location position of the this research area is at 22°46'21.623"N latitude and 84°0'9.761"E longitude and no research has been done here.

Electrical Conductivity:

Soil electrical conductivity, referred to as EC, is the ability of soil to conduct (transmit) or attenuate electrical current. EC is expressed in milli-Siemens per meter (mS/m) or at times is reported in deci-Siemens per meter (dS/m). Over the years, soil scientists have used EC to measure soil salinity. However, soil EC measurements also have the potential for estimating variations in soil physical properties where soil salinity is not a problem, including texture, moisture, depth of top soil plus others. The important aspect to remember is that anything that affects conductivity in the soil will influence measurements, so it is important to ground reference to understand the driving variable(s) for soil EC measurements [1],[2].

pH-value:

Soil pH is a measure of the acidity or alkalinity of the soil. A pH value is a measure of hydrogen ion concentration. Because hydrogen ion concentration varies over a wide range, a logarithmic scale (pH) is used: for a pH decrease of 1, the acidity increases by a factor of 10. It is a 'reverse' scale in that very acid soil has a low pH and a high hydrogen ion concentration. Therefore, at high (alkaline) pH values, the hydrogen ion concentration is low. Most soils have pH

values between 3.5 and 10. In higher rainfall areas the natural pH of soils typically ranges from 5 to 7, while in drier areas the range is 6.5 to 9. Soils can be classified according to their pH value. 6.5 to 7.5—neutral, over 7.5—alkaline, less than 6.5—acidic, and soils with pH less than 5.5 are considered strongly acidic[3]

II. LITERATURE REVIEW

According to EDELBERT VEES and HANS F. WINTERKORN, “Engineering Properties of Several Pure Clays as Functions of Mineral Type, Exchange Ions and Phase Composition” concluded that The different exchange ions favor the formation of different types of structures but the extent to which these are actually formed and influence engineering properties depends on the type of clay mineral and even more on the history and the treatment of the particular sample. This is comparable to the role played by carbon in steel. The primary effect of a particular exchange ion on an individual clay crystallite is a modification of its interaction with water and determines the effective size and properties of the clay micelle. [4].

In 2015, the research paper of SS Kekane, RP Chavan, DN Shinde, CL Patil, SS Sagar “A review on physico-chemical properties of soil” it is concluded that study of soil quality can be carried out by different parameters. Most of the parameters are quite higher or lower than acceptable limits. Therefore, it is very important to put a total ban on the human activities which are responsible for soil quality deterioration[5].

In 2015, the research paper of V.K. PHOGAT, V.S. TOMAR AND RITA DAHIYA” Soil Physical Properties” concluded that Physical properties have significant influence on the behaviour of soil for agricultural and engineering uses. Soil texture and structure determine the total porosity and the size distribution of pores which influence water, heat and air relationships in the soil. Soil texture is a static property but structure may be manipulated through management practices. It is essential to carry out the tillage operations at optimum soil moisture to avoid deterioration in soil structure.

Management of physical, chemical and biological factors can help in maintaining proper soil physical conditions for plant growth. Soil aeration and soil temperature affect the quality of soils for plants and other organisms. Soil water has a major influence on both soil aeration and temperature. It competes with soil air and moderates soil temperature. Soil consistency, plasticity, compaction, strength etc., help in determining the stability of soil against loading forces from traffic, tillage or building foundations.

Looking at the current stress on soil as a natural resource for food security and safety, due emphasis is needed for maintaining soil physical fertility by adding organic materials, introduction of legumes in rotation, adoption of conservation tillage, etc.[6]

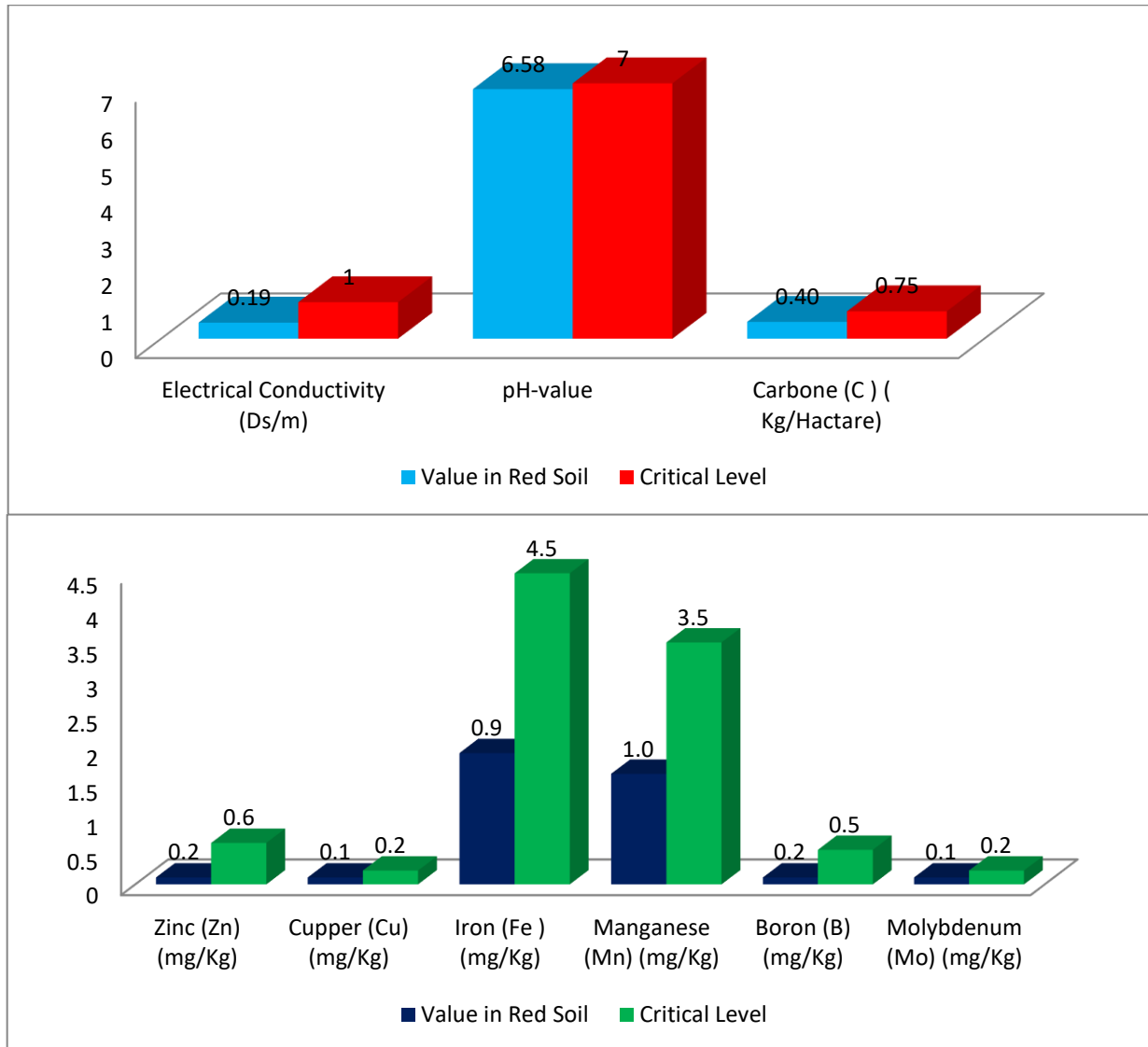
III. MATERIAL & METHODS

We have used experimental Method in our Research as Methodology. During this time we took a Red soil sample 10 cm deep in the research found in the Koranga mal village, Block Farsabahar , district Jashpur. Determined the presence and quantity of Physico-Chemical properties such as Fe, Cu, Zn, Ca, Mg, S, N conductivity, pH-value etc. of the sample taken from research area which are as follows-

| Sl.No. | Physio-chemical properties | Unit | Value in Red Soil | Level | Description/Critical Level |
|--------|----------------------------|------------|-------------------|-------|----------------------------|
| 01 | Electrical Conductivity | Ds/m | 0.19 | | Less than 1.0-Normal |
| 02 | pH-value | pH-Scale | 6.58 | | Neutral 7 |
| 03 | Carbone (C) | Kg/Hactare | 0.40 | | Less than 0.50- Lower |
| 04 | Zinc (Zn) | mg/Kg | 0.2 | | 0.6 |
| 05 | Cupper (Cu) | mg/Kg | 0.1 | | 0.2 |
| 06 | Iron (Fe) | mg/Kg | 0.9 | | 4.5 |
| 07 | Manganese (Mn) | mg/Kg | 1.0 | | 3.5 |
| 08 | Boron (B) | mg/Kg | 0.2 | | 0.5 |
| 09 | Molybdenum (Mo) | mg/Kg | 0.1 | | 0.2 |

IV. RESULT & DISCUSSION

The conductivity of the Red soil found in the Koranga mal village is much lower than normal only 20% of critical level of conductivity, so this soil will not be a saline soil. Obtained a pH-value of 6.58 which means that the red soil found in it is neutral. The amount of organic carbon was obtained in range of the lower value 0.40.



The chemical properties of Red soil found in the Koranga mal village were tested when Zn content was found to be 34% less than the critical level, Cu was obtained only by 50% compared to the critical level, Iron was obtained only 40.22% compared to the critical level Happened, Similarly Mn , B , and Mo obtained only 26% , 42% and 50% as compared to critical level.

The amount of all these chemical elements is very less.

V. CONCLUSION

The nature of the Red soil found in the Koranga mal village, district Jashpur is not saline as well as neutral. The amount of iron and magnesium in the Red soil here is very less. Copper and molybdenum are likely to be found in Red soil. The amount of iron in the red soil found in Koranga mal village is about 40% of the normal.

REFERENCE

- [1] <https://ohioline.osu.edu/factsheet/fabe565#:~:text=Soil%20electrical%20conductivity%2C%20referred%20to,EC%20to%20measure%20soil%20salinity>.
- [2] By Liyan Gong Soil 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 Odotola 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 rftype, 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" Technical Report · February 2017 DOI: 10.13140/RG.2.2.24150.24648
- [8] 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>
- [9] https://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6706e/x6706e06.htm
- [11] <https://www.agriculturewale.com/soil-texture/>
- [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