



## **STUDY THE PHYSIO-CHEMICAL PROPERTIES OF CLAY SOIL OF KANDORA VILLAGE OF JASHPUR DISTRICT, SURGUJA DIVISION OF CHHATTISGARH, INDIA**

**Shailesh Kumar Dewangan<sup>1</sup> Reshma Yadav<sup>2</sup>, Rekha Haldar<sup>3</sup>**

<sup>1</sup>Asst. Professor & HOD Department of Physics, Shri Sai Baba Aadarsh Mahavidyalaya Ambikapur(C.G.)

<sup>2</sup>M.Sc.-I Semester Physics, Shri Sai Baba Aadarsh Mahavidyalaya Ambikapur(C.G.)

<sup>3</sup>Asst. Professor Department of Chemistry, Shri Sai Baba Aadarsh Mahavidyalaya Ambikapur(C.G.)

### **ABSTRACT**

Soil is one of the major foundations of life on Earth, Serving as a reservoir of water and nutrients, as a medium for filtering and breaking down harmful wastes, and as a means of transporting carbon and other elements through the global ecosystem. It is necessary for us to know the properties of soil. We will study the Physo-chemical properties of clay soil in our research, the black soil on which we are doing research is found in Kandora village, Kunkuri clay of Jashpur district of Chhattisgarh. We will study the Physio-chemical properties of this 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:** Clay soil, Conductivity, Resistive, pH-value, Physical properties, Chemical properties etc.

### **INTRODUCTION**

Research Area Kandora Village, where we will study the physico-chemical properties of the clay soil found, this place is located at a distance of 6 km from Kunkuri block of Jashpur district. This clay is used for making status and toys. Rice and maize crops are good in this soil. Research area Kandora village is 120 Km away from Ambikapur, the headquarter of Surguja division and the distance of this place is 447 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°0'25.761"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 milliSiemens 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]

### LITERATURE REVIEW

According to EDELBERT VEES and HANS F. WINTERKORN, “Engineering Properties of Several Pure Clays as Functions of Mineral rftype, 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. Among the properties affected is the elasticity or springiness of the crystallities, which is especially important if they are fibrous or needle-shaped. This effect may counteract or even exceed that on the size and turgidity of the 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]

In 2017, the research paper of Prof. A. Balasubramanian Centre for Advanced Studies in Earth Science, University of Mysore, Physical Properties of Soils concluded that Soils contain a lot of mineral and organic constituents. Soil types are described according to these main constituents. A soil with a lot of sand is called as a sandy soil; soil with a lot of clay is called as a clay soil; and soil with a lot of organic material is called as an organic soil. Along with soil structure, the texture of soil is also important to determine the water-holding capacity, water movement, and the amount and movement of soil air in a given soil. All of these physical properties are very important to the health and type of plants and other organisms that can exist in a particular soil. The physical properties of soils is a major aspect of study in soil science, civil engineering and agricultural engineering.[7]



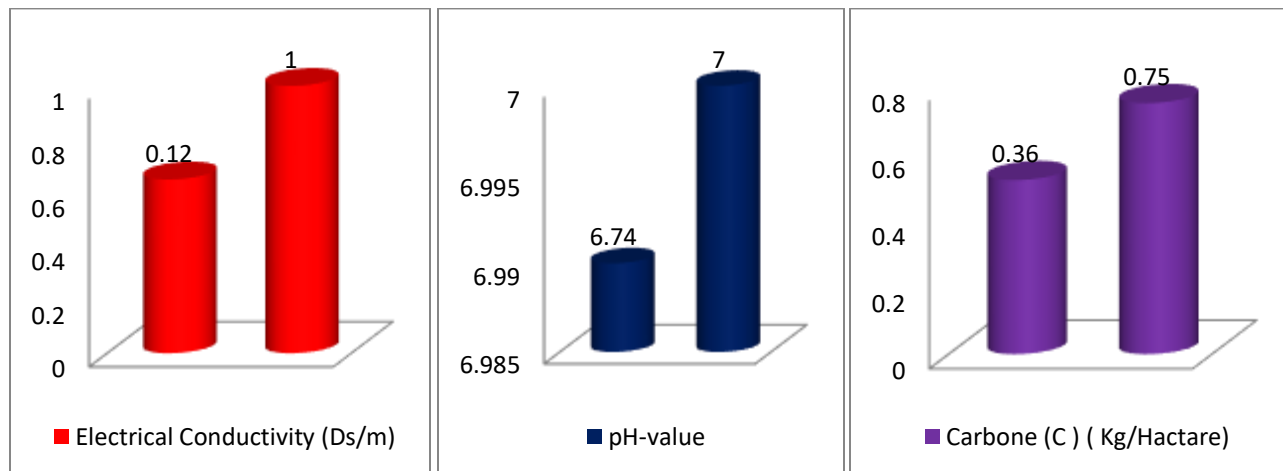
## MATERIAL & METHODS

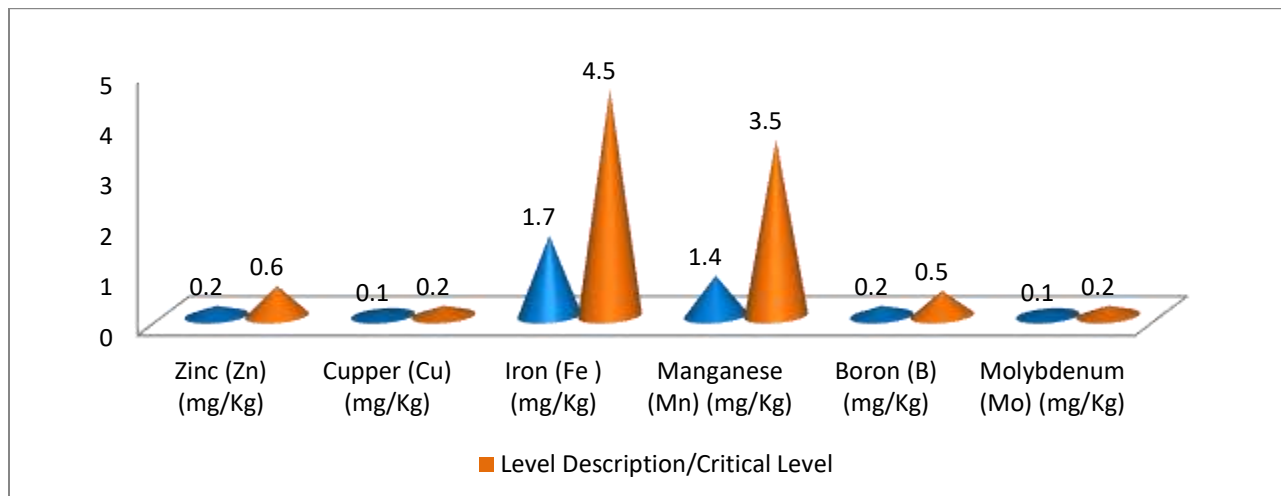
We have used experimental Method in our Research as Methodology. During this time we took a Clay soil sample 6 cm deep in the research found in the Kandora village, Block Kunkuri, district Jashpur. Determined the presence and quantity of Physio-Chemical properties such as Fe, Cu, Zn, Ca, Mg, S, N conductivity, pH-alue, etc. of the sample taken which are as follows-

Sl.No.	Physio-chemical properties	Unit	Value in salt Soil	Level Description/Critical Level
01	Electrical Conductivity	Ds/m	0.12	Less than 1.0-Normal
02	pH-value	pH-Scale	6.74	Neutral 7
03	Carbone (C )	Kg/Hactare	0.36	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	1.7	4.5
07	Manganese (Mn)	mg/Kg	1.4	3.5
08	Boron (B)	mg/Kg	0.2	0.5
09	Molybdenum (Mo)	mg/Kg	0.1	0.2

## RESULT & DISCUSSION

The conductivity of the Hair wash soil found in the Kardana village is much lower than normal only 22% of critical level of conductivity, so this soil will not be a saline soil. Obtained a pH-value of 6.37 which means that the Hair wash soil found in it is neutral. The amount of organic carbon was obtained in range of the lower value 0.50.





The chemical properties of Hair wash soil found in the Kandora village were tested when Zn content was found to be 50% less than the critical level, Cu was obtained only by 50% compared to the critical level, Iron was obtained only 37.7% compared to the critical level. Similarly Mn, B, and Mo obtained only 22.8%, 40% and 50% as compared to critical level. The amount of all these chemical elements is very less.

## CONCLUSION

The nature of the Clay soil found in the Kandora village, district Jashpur is not saline as well as neutral. The amount of iron and magnesium in the clay soil here is very less. Copper and molybdenum are likely to be found in Hair wash soil.

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