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# "PHYSICO-CHEMICAL PROPERTIES OF SOIL FROM SHANTINAGAR JUNADHEE, LAKHANPUR BLOCK, SURGUJA, CHHATTISGARH: A RESEARCH STUDY"

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# ABSTRACT

This research paper investigates the physico-chemical properties of soil samples collected from Shantinagar Junadhee, located in the Lakhanpur block of Surguja, Chhattisgarh. The study aims to analyze key soil characteristics such as pH, electrical conductivity, organic matter content, and nutrient levels to assess the fertility and health of the soil in the region. The findings of this study contribute to a better understanding of the soil quality in Shantinagar Junadhee and provide valuable insights for sustainable agricultural practices and soil management strategies in the area.

Keywords: Soil analysis, physico-chemical properties, Shantinagar Junadhee, Sustainable.

### 1. INTRODUCTION

The soil quality and fertility of a region play a crucial role in determining agricultural productivity and sustainability. Shantinagar Junadhee, situated in the Lakhanpur block of Surguja, Chhattisgarh, is known for its agricultural significance. However, limited research has been conducted on the physico-chemical properties of the soil in this area. This study aims to fill this gap by analyzing the soil characteristics of Shantinagar Junadhee to provide insights that can guide effective soil management practices and sustainable agriculture in the region.

## 2. METHODOLOGY

- Soil samples were collected from various locations in Shantinagar Junadhee, ensuring representative sampling across the area.
- The collected soil samples were analyzed for physico-chemical properties including pH, electrical conductivity, organic matter content, and nutrient levels such as nitrogen, phosphorus, potassium, and micronutrients.
- Standard laboratory methods and equipment were used to conduct the soil analysis, following established protocols for soil testing and characterization.

# 3. DATA COLLECTION & ANALYSIS

 Table 1: Physico-chemical properties of Soil.

S.No.	Physio-chemical	Unit	Value in Soil		Level Description/
	properties		Sample	Sample	Critical Level
			Α	В	
			(6 inch depth)	(8 inch depth)	
01	Electrical Conductivity	Ds/m	0.38	0.37	Less than 1.0-Normal
02	pH-value	pH-Scale	6.72	6.81	Neutral 7
03	Carbone (C) %	Kg/Hactare	0.46	0.45	Less than 0.50- Lower
04	Zinc (Zn)	mg/Kg	0.2	0.2	0.6
05	Cupper (Cu)	mg/Kg	0.1	0.1	0.2
06	Iron (Fe )	mg/Kg	1.4	1.4	4.5
07	Manganese (Mn)	mg/Kg	0.9	0.7	3.5
08	Boron (B)	mg/Kg	0.2	0.2	0.5
09	Molybdenum (Mo)	mg/Kg	0.1	0.1	0.2

Here is a summary of the data analysis for the physico-chemical properties of soil samples from Sample A (6 inch depth) and Sample B (8 inch depth) in Shantinagar Junadhee, Lakhanpur block, Surguja, Chhattisgarh:



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# editor@ijprems.com **1. Electrical Conductivity:**

Both samples show normal levels of electrical conductivity, with values below 1.0 dS/m, indicating favorable soil salinity for plant growth.

### 2. pH-value:

The pH values of both samples are within the neutral range, close to 7.0, which is suitable for most crops.

### 3. Carbon (C):

The carbon content in both samples is below the critical level of 0.50 kg/hectare, indicating lower organic matter content in the soil.

### 4. Zinc (Zn), Copper (Cu), Iron (Fe), Manganese (Mn), Boron (B), Molybdenum (Mo):

Zinc, copper, iron, manganese, boron, and molybdenum levels in both samples are below the critical levels, indicating deficiencies in these essential nutrients in the soil. Overall, the data analysis suggests the need for soil amendments to address deficiencies in zinc, copper, iron, manganese, boron, and molybdenum, as well as to improve organic matter content for enhanced soil fertility and crop productivity in the study area.

#### 4. **RESULTS AND DISCUSSION**

# **Physico-Chemical properties of Soil**



1. Electrical Conductivity: - Sample A (6 inch depth): 0.38 dS/m,- Sample B (8 inch depth): 0.37 dS/m,- Both samples show electrical conductivity levels below 1.0 dS/m, indicating normal salinity levels in the soil.

2. pH-value: Sample A (6 inch depth): 6.72,- Sample B (8 inch depth): 6.81,- The pH values of both samples fall within the neutral range, close to the critical level of 7, which is suitable for most crops.

3. Carbon (C): - Sample A (6 inch depth): 0.46 kg/hectare, Sample B (8 inch depth): 0.45 kg/hectare,- The carbon content in both samples is below the critical level of 0.50 kg/hectare, indicating lower organic matter content in the soil.

4. Zinc (Zn):,- Sample A (6 inch depth): 0.2 mg/kg,- Sample B (8 inch depth): 0.2 mg/kg,,- The zinc levels in both samples are below the critical level of 0.6 mg/kg, suggesting a deficiency of zinc in the soil.

5. Copper (Cu):,- Sample A (6 inch depth): 0.1 mg/kg,,- Sample B (8 inch depth): 0.1 mg/kg The copper levels in both samples are below the critical level of 0.2 mg/kg, indicating a potential copper deficiency in the soil.

6. Iron (Fe): Sample A (6 inch depth): 1.4 mg/kg,- Sample B (8 inch depth): 1.4 mg/kg,,- The iron content in both samples is below the critical level of 4.5 mg/kg, suggesting a lower iron concentration in the soil.

7. Manganese (Mn):,- Sample A (6 inch depth): 0.9 mg/kg,- Sample B (8 inch depth): 0.7 mg/kg The manganese levels in both samples are below the critical level of 3.5 mg/kg, indicating a potential manganese deficiency in the soil.

8. Boron (B):,- Sample A (6 inch depth): 0.2 mg/kg,- Sample B (8 inch depth): 0.2 mg/kg The boron levels in both samples are below the critical level of 0.5 mg/kg, suggesting a deficiency of boron in the soil.

9. Molybdenum (Mo):,- Sample A (6 inch depth): 0.1 mg/kg,- Sample B (8 inch depth): 0.1 mg/kg The molybdenum levels in both samples are below the critical level of 0.2 mg/kg, indicating a potential molybdenum deficiency in the soil. Overall, the results suggest that the soil samples from both depths exhibit normal electrical conductivity and pH levels. However, there are deficiencies in essential nutrients such as zinc, copper, iron, manganese, boron, and molybdenum, indicating a need for soil amendment and nutrient supplementation to improve soil fertility and crop productivity in the study area.



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# 5. CONCLUSION

The soil samples from Sample A (6 inch depth) and Sample B (8 inch depth) in Shantinagar Junadhee, Lakhanpur block, Surguja, Chhattisgarh exhibit the following characteristics:

- Normal electrical conductivity levels below 1.0 dS/m, indicating favorable soil salinity.
- Neutral pH values close to 7.0, suitable for most crops.
- Low carbon content below the critical level of 0.50 kg/hectare, indicating lower organic matter.
- Deficiencies in essential nutrients such as zinc, copper, iron, manganese, boron, and molybdenum below critical levels. Finally the soil in the study area shows potential for improvement in organic matter content and nutrient levels. Soil amendments and nutrient management practices are recommended to address deficiencies and enhance soil fertility for sustainable agriculture and improved crop productivity in Shantinagar Junadhee, Chhattisgarh.

# 6. REFERENCES

- [1] Das, B., Yadav, R. K., & Das, S. (2017). Assessment of heavy metal contamination in soil samples from Chhattisgarh, India. Environmental Monitoring and Assessment, 189(1), 18.
- Dewangan, S. K., Jaiswal, A., Shukla, N., Pandey, U., Kumar, A., & Kumari, N. (2022). Characterization of [2] agriculture Soil of Gangapur area located in Latori, Surguja division of Chhattisgarh. International Journal of Science, Engineering And Technology, 11(1). Web-link. Researchget
- Dewangan, S. K., Kumari, J., Tiwari, V., Kumari, L. (2022). Study the Physico-Chemical Properties of Red Soil [3] of Duldula Area Located in Jashpur District, Surguja Division of Chhattisgarh, India. International Journal of Scientific Research in Engineering and Management (IJSREM), 06(11), 1-5. Web-link, Researchget
- Dewangan, S. K., Kumari, L., Minj, P., Kumari, J., & Sahu, R. (2023). The Effects of Soil pH on Soil Health and [4] Environmental Sustainability: A Review. International Journal of Emerging Technologies and Innovative Research, 10(6), Web-link. Researchget
- Dewangan, S. K., Kumari, L., Tiwari, V., Kumari, J. (2022). Study the Physio-Chemical Properties of Red Soil [5] of Kandora Village of Jashpur District, Surguja Division of Chhattisgarh, India. International Journal of Innovative Research in Engineering (IJIRE), 3(6), 172-175. Web-link, Researchget
- [6] Dewangan, S. K., Minj, A. K., & Yadav, S. (2022). Study the Physico-Chemical Properties of Soil of Bouncing Land Jaljali Mainpat, Surguja Division of Chhattisgarh, India. International Journal of Creative Research Thoughts, 10(10), 312-315. Web-link, Researchget
- [7] Dewangan, S. K., Minj, P., Singh, P., Shivlochani. (2022). Analysis of the Physico-Chemical Properties of Red Soil Located in Koranga Mal Village of Jashpur District, Surguja Division of Chhattisgarh, India. International Advanced Research Journal in Science, Engineering and Technology, 9(11), 116-119. Weblink, Researchget
- [8] Dewangan, S. K., Sahu, K., Tirkey, G., Jaiswal, A., Keshri, A., Kumari, N., Kumar, N., Gautam, S. (2022). Experimental Investigation of Physico-Chemical Properties of Soil taken from Bantidand Area, Balrampur District, Surguja Division of Chhattisgarh, India. International Research Journal of Modernization in Engineering Technology and Science, 04(12), 751-755. Web-link. Researchget
- [9] Dewangan, S. K., Sahu, R., Haldar, R., & Kedia, S. (2022). Study the physico-chemical properties of black soil of girwani village of balrampur district, surguja division of chhattisgarh, india. Epra International Journal of Agriculture and Rural Economic Research (ARER), 10(11), 53-56. Web-link. Researchget
- [10] Dewangan, S. K., Sharma, G. K., & Srivasrava, S. K. (2022). Characterization of agriculture Soil of Gangapur area located in Latori, Surguja division of Chhattisgarh. International Journal of Science, Engineering And Technology, 11(1), 1-3. Web-link Researchget
- [11] Dewangan, S. K., Shrivastava, S. K., Kehri, D., Minj, A., & Yadav, V. (2023). A Review of the Study Impact of Micronutrients on Soil Physicochemical Properties and Environmental Sustainability. International Journal of Agriculture and Rural Economic Research (ARER), 11(6). Web-link. Researchget
- [12] Dewangan, S. K., Shrivastava, S. K., Soni, A. K., Yadav, R., Singh, D., Sharma, G. K., Yadav, M., & Sahu, K. (2023). Using the Soil Texture Triangle to Evaluate the Effect of Soil Texture on Water Flow: A Review. International Journal for Research in Applied Science & Engineering Technology (IJRASET), 11(6), 389-390. Web-link Researchget
- [13] Dewangan, S. K., Shrivastava, S. K., Soni, A. K., Yadav, R., Singh, D., Sharma, G. K., Yadav, M., & Sahu, K. (2023). Using the Soil Texture Triangle to Evaluate the Effect of Soil Texture on Water Flow: A Review.



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www.ijprems.com editor@ijprems.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET), 11(6), 389-390. Web-link. Researchget

- [14] Dewangan, S. K., Singh, D., Haldar, R., & Tirkey, G. (2022). Study the Physio-Chemical Properties of Hair Wash Soil of Kardana Village of Jashpur District, Surguja Division of Chhattisgarh, India. International Journal of Novel Research and Development, 7(11), 13-17. Web-link, Researchget
- [15] Dewangan, S. K., Soni, A. K., & Sahu, K. (2022). Study the Physico-Chemical Properties of Rock Soil of Sangam River, Wadrafnagar, Surguja Division of Chhattisgarh, India. International Journal of Research and Analytical Reviews, 9(4), 119-121. Web-link . Researchget
- [16] Dewangan, S. K., Yadav, M. K., Tirkey, G. (2022). Study the Physico-Chemical Properties of Salt Soil of Talkeshwarpur Area Located in Balrampur District, Surguja Division of Chhattisgarh, India. International Research Journal of Modernization in Engineering Technology and Science, 4(11), 791-797. Web-link Researchget
- [17] Dewangan, S. K., Yadav, R., Haldar, R. (2022). Study the Physio-Chemical Properties of Clay Soil of Kandora Village of Jashpur District, Surguja Division of Chhattisgarh, India. EPRA International Journal of Research and Development (IJRD), 7(11), 87-91. Web-link Researchget
- [18] Dewangan, S. K., Yadav, V., Sahu, K. (2022). Study the Physio-Chemical Properties of Black Soil of Bahora Village of Jashpur District, Surguja Division of Chhattisgarh, India. International Research Journal of Modernization in Engineering Technology and Science, 04(11), 1962-1965. Web-link. Researchget
- [19] Dewangan, S.K., Kehri, D., Preeti & Yadav, A.(2022). Study The Physico-Chemical Properties Of Brown Soil Of Gaura Village Of Surajpur District, Surguja Division Of Chhattisgarh, India. International Journal of Engineering Inventions, 11(11), 80-83. Web-link. Researchget
- [20] Dewangana, S. K., Mahantb, M. (2023). Physical Characterization of Soil from BudhaBagicha Area, Balrampur, Chhattisgarh and its Comparative Study with Soils of Other Areas. International Journal of Science, Engineering and Technology, 11(6). Web-link. Researchget
- [21] Dewangana, S. K., Yadavb, N., & Preetic. (2023). A Study on the Physicochemical Properties of Soil of Butapani Area Located in Self-Flowing Water, Lundra Block, Surguja District, Chhattisgarh, India. EPRA International Journal of Research and Development (IJRD), 8(12). Web-link. Researchget
- [22] Lal, R. (2015). Restoring soil quality to mitigate soil degradation. Sustainability, 7(5), 5875-5895.
- [23] Prajapati, S., Singh, V., & Singh, S. (2019). Assessment of soil physicochemical properties in Korba district, Chhattisgarh. International Journal of Chemical Studies, 7(1), 281-286.
- [24] Singh, R., Kumar, A., & Sharma, S. (2015). Assessment of soil fertility and nutrient content in different locations of Chhattisgarh. Journal of Soil Science and Agricultural Engineering, 2(1), 32-37.
- [25] Verma, S., Tiwari, A., & Sahu, A. (2018). Physicochemical properties of soil in Surguja district, Chhattisgarh. International Journal of Current Microbiology and Applied Sciences, 7(11), 3884-3890.
- [26] Naveed, M., Moldrup, P., Arthur, E., de Jonge, L. W., & Vogel, H. J. (2018). Soil organic carbon content effects on soil water retention on the Loess Plateau, China: A review. Journal of Hydrology, 565, 607-617.
- [27] Qadir, M., Tubeileh, A., Akhtar, J., Larbi, A., & Minhas, P. S. (2008). Productivity enhancement of salt-affected environments through crop diversification. Land Degradation & Development, 19(4), 429-453.
- [28] Rhoades, J. D. (1996). Salinity: Electrical conductivity and total dissolved solids. Methods of Soil Analysis: Part 3 Chemical Methods, 417-435.
- [29] Rhoades, J. D., Chanduvi, F., & Lesch, S. M. (1999). Soil salinity assessment: methods and interpretation of electrical conductivity measurements. Food and Agriculture Organization of the United Nations.
- [30] Rhoades, J. D., Kandiah, A., & Mashali, A. M. (1992). The Use of Saline Waters for Crop Production. Food and Agriculture Organization of the United Nations.
- [31] Rillig, M. C., Aguilar-Trigueros, C. A., Bergmann, J., Verbruggen, E., Veresoglou, S. D., & Lehmann, A. (2015). Plant root and mycorrhizal fungal traits for understanding soil aggregation. New Phytologist, 205(4), 1385-1388.
- [32] Ryals, R., Hartman, M. D., Wooliver, R., Givens, K. P., Norris, C. E., & Paul, E. A. (2019). Long-term climate change mitigation potential with organic matter management on grasslands. Global Change Biology, 25(6), 1879-1892.
- [33] Shainberg, I., Sumner, M. E., & Miller, W. P. (1989). Cation exchange properties of irrigated soils: Weathered micas. Soil Science Society of America Journal, 53(6), 1616-1621.
- [34] Singh, N., Maurya, B. R., & Tripathi, R. (2019). Effect of different levels of soil salinity on growth, yield, and quality of tomato (Solanum lycopersicum L.). Journal of Plant Nutrition, 42(11-12), 1437-1446.