



RESEARCH PAPER

Comprehensive analysis of soil quality in Mungeli district, Chhattisgarh: Environmental and physicochemical perspectives

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Abstract : Soil quality plays a pivotal role in sustaining agricultural productivity and maintaining environmental balance. This study presents a comprehensive analysis of soil quality in Mungeli District, Chhattisgarh, focusing on physicochemical properties and environmental parameters. A total of 15 soil samples were collected from diverse locations across the district to evaluate critical parameters, including pH, electrical conductivity (EC), organic carbon (OC), available nitrogen (N), phosphorus (P), potassium (K), and heavy metal concentrations (e.g., copper, lead, and iron). The levels of macronutrients (N, P, K) were within acceptable ranges but varied significantly between locations, reflecting differing agricultural practices and land-use patterns. However, heavy metal analysis indicated localized contamination, particularly elevated levels of cadmium and lead, which exceed permissible limits set by international standards. This study underscores the need for continuous monitoring and implementation of sustainable agricultural practices to mitigate heavy metal contamination and improve soil health. The findings provide valuable baseline data for policymakers, environmentalists, and farmers to develop region-specific strategies for sustainable land management and environmental conservation in Mungeli district.

Key Words : Physicochemical, Macronutrients, Contamination, Sustainable

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INTRODUCTION

Soil plays a critical role in sustaining agricultural productivity and environmental quality. The Mungeli region, located in the state of Chhattisgarh, India, is predominantly agricultural, with rice and other crops forming the backbone of its economy. The assessment of soil quality and its physicochemical properties is

essential for ensuring sustainable agricultural practices, optimizing crop yields, and preventing land degradation⁽¹⁻³⁾. The soils of the Mungeli region are primarily alluvial and red soils, characterized by variations in texture, nutrient content, and other essential parameters. The region's soil health is influenced by natural factors such as climate and geology, as well as anthropogenic activities