

**Assessment of Soil Health on Agriculture in Kathor Area,
Karachi, Sindh, Pakistan**

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This study examines the intricate relationship between soil quality and agricultural productivity within the context of Kathor Village, Sindh. Recognizing the pivotal role of soil in influencing plant development, nutrient availability, and overall ecosystem health, our research aims to provide comprehensive insights into the multifaceted connections between soil properties and crop performance. Conducted in August 2023, the study focuses on a plain area southeast of Karachi City, characterized by sparse vegetative cover and exposed siliciclastic rocks. A total of 10 soil samples were collected from various agricultural fields, representing diverse vegetable crops. The physical and chemical properties of the soil were analyzed, including pH (as low as 3.5), Total Dissolved Solids (TDS), Total Organic Carbon (TOC) at 6.15%, major elements (H, Na, K, Ca, Mg, Cl, HCO₃, NO₃, SO₄), and trace elements (Cu, Fe, Ni, Pb, Co, Cr, Zn). These elements play crucial roles in maintaining soil moisture and structure, and supporting plant growth, while trace elements such as copper, iron, nickel, lead, cobalt, chromium, and zinc demonstrate their influence on plant functions and potential environmental consequences. Grain analysis revealed a medium-to-fine particle size, indicating potential nutrient-holding capacities in the soil. Furthermore, the study explores the impact of agricultural practices on soil health, considering factors such as fertilizers, manures, and pesticides used by farmers in the region. This detailed analysis of soil properties and their implications for crop research provides valuable insights into the complex interplay between soil characteristics and agricultural outcomes. The outcomes of this study can guide farmers and researchers in developing strategies for sustainable and resilient agriculture, ensuring the long-term productivity of agricultural systems in the Kathor area.