

Farmers' Perspective on Soil Health in the Indian Punjab: A Quantitative Analysis of Major Soil Parameters

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Abstract : Although soil health, which is recognized as one of the key determinants of sustainable agricultural development, can be measured by a range of physical, chemical and biological parameters, the widely used parameters include pH, electrical conductivity (EC), organic carbon (OC), plant available phosphorus (P) and potassium (K). Soil health is largely affected by the occurrence of natural events or human activities and can be improved by various land management practices. A database of 120 soil samples collected from farmers' fields spread across three major agro-climatic zones of Punjab suggested that the average pH, EC, OC, P and K was 8.2 (SD = 0.75, Min = 5.5, Max = 9.1), 0.27 dS/m (SD = 0.17, Min = 0.072 dS/m, Max = 1.22 dS/m), 0.49% (SD = 0.20, Min = 0.06%, Max = 1.2%), 19 mg/kg soil (SD = 22.07, Min = 3 mg/kg soil, Max = 207 mg/kg soil) and 171 mg/kg soil (SD = 47.57, Min = 54 mg/kg soil, Max = 288 mg/kg soil), respectively. Region-wise, pH, EC and K were the highest in south-western district of Ferozpur whereas farmers in north-eastern district of Gurdaspur had the best soils in terms of OC and P. The soils in the central district of Barnala had lower OC, P and K than the respective overall averages while its soils were normal but skewed towards alkalinity. Besides agro-climatic conditions, the size of landholding and farmer education showed a significant association with Soil Fertility Index (SFI), a composite index calculated using the aforementioned parameters' normalized weightage. All the four stakeholder groups cited the current cropping patterns, burning of rice crop residue, and imbalanced use of chemical fertilizers for change in soil health. However, the current state of soil health in Punjab is unclear, which needs further investigation based on temporal data collected from the same field to see the short and long-term impacts of various crop combinations and varied cropping intensity levels on soil health.

Keywords : soil health, punjab agriculture, sustainability, soil fertility index

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