

# Assessing the impacts of sustainable land management practices using soil water hydraulic properties, penetration resistance and organic matter

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## Abstract

Sustainable land management practices (SLMP) initiatives can be evaluated using soil physical characteristics and soil organic matter (SOM). SLMP effects on soil water hydraulic characteristics, penetration resistance (PR), and SOM were examined at Adigudom, northern Ethiopia. With three replications, we evaluated six land management types (exclosure AC, crop rotation CR, conventional tillage CT, grazing land GL, conservation agriculture CA, and fallow land FL) in Vertisols and Leptosols soils. Soil texture, infiltration rate (IR), cumulative infiltration (Ic), field-saturated hydraulic conductivity (Kfs), SOM, and PR were measured. IR and Kfs were higher in AC (17.55 and 30.21 cm hr<sup>-1</sup>, 92.8 and 83.8 cm hr<sup>-1</sup>) on Vertisols and Leptosols, respectively, followed by CA (63.2 and 9.51 cm hr<sup>-1</sup>) on Vertisols, while the lowest IR and Kfs were observed in GL (9.40 and 7.45 cm hr<sup>-1</sup>, 2.43 and 2.37 cm hr<sup>-1</sup>), and CT (23.8 and 21.4 cm hr<sup>-1</sup>, 2.8 and 4.22 cm hr<sup>-1</sup>) on Vertisols and Leptosols, respectively. In AC, CA, and FL, interventions significantly impacted parameters derived water retention curve and PR soil quality indicators. AC, CA, and FL improved soil quality, however, GL and CT dryland farming reduced soil productivity. This shows how important soil parameters are for assessing SLMP programs.

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