



Runoff-erosion characteristics of soils along volcanic slopes in the Ecuadorian Andes

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Soil erosion is a widespread phenomenon in Andean South America, where many regions are covered with soils derived from volcanic parent materials. Climate-induced differences in the genesis of these soils have been demonstrated along toposequences on volcanic slopes. This research was conducted to study the impact of such differential pedogenesis on erodibility and runoff – infiltration characteristics along an altitudinal Entisols – Inceptisols – Andisols sequence in the Andes of northern Ecuador. Surface soils were packed into small pans and placed on a 9 % slope, and a simulated rainstorm with varying intensities was applied for a duration of 30 minutes.

The runoff – erosion behaviour of the studied volcanic ash soils is strongly affected by their pedological development. Accumulation of organic matter and precipitation of active amorphous materials at high elevations have led to the formation of well-developed Andisols with very stable aggregate structure. These soils remain wettable when air-dried, show very high infiltration capacity and consequently low potential for runoff generation and soil erosion. Low organic matter contents and absence of active amorphous materials at low elevations have led to the formation of weakly aggregated Entisols and Inceptisols. These soils are susceptible to surface crusting, which lowers their infiltration capacity and increases their erodibility. However, in comparison with other soils of different origin and composition, the interrill erodibilities determined for these more erodible low-elevation soils are classified as low. The findings of this study suggest that upland soil erosion is not a major threat to sustainability in the studied volcanic landscape, which is generally confirmed by field observations.