



## Soil physico-chemical and biological properties as affected by vegetation systems and elevation in western Himalayas

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### Abstract

Assessment of various soil properties is vital for understanding and predicting long term effects of changes in land use and climate. A total of 414 composite soil samples (0-30 cm) were collected from different vegetation systems *i.e.* agriculture based agroforestry system (ABAF), chir pine silvipasture (SPCP), mixed-trees silvipasture (SPM), ban oak silvipasture (SPBO) and grassland (Gr) at different elevations (500-1850 m) in Solan district, Himachal Pradesh, India for examining various soil properties. All the tested soil parameters varied significantly ( $P < 0.005$ ) among the vegetation-systems and they increased along the elevation except for pH, EC and bulk density. Maximum organic carbon, moisture content, bacterial, fungal and actinomycetes count (2.10%, 19.43%,  $104.28 \times 10^6$  cfug<sup>-1</sup>,  $63.59 \times 10^3$  cfug<sup>-1</sup> and  $65.07 \times 10^4$  cfug<sup>-1</sup>, respectively) were recorded in SPBO and minimum in grassland (1.68%, 8.03%,  $38.52 \times 10^6$  cfug<sup>-1</sup>,  $24.69 \times 10^3$  cfug<sup>-1</sup>,  $19.51 \times 10^3$  cfug<sup>-1</sup>, respectively). While maximum pH (6.95), EC ( $0.107 \text{ dSm}^{-1}$ ) and bulk density ( $1.37 \text{ gcm}^{-3}$ ) were recorded in ABAF, SPM and grassland system, respectively and their respective lowest values were recorded in SPBO, grassland, ABAF as 6.30,  $0.094 \text{ dSm}^{-1}$  and  $1.14 \text{ gcm}^{-3}$ . Thus the tree-based systems revealed better soil properties compared to grassland in all the elevation zones.

**Keywords:** Agroforestry, Grassland, Microbial count, Silvipasture, Soil properties