

Soil quality under forest compared to other land-uses in acid soil of north western Himalaya, India

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Abstract. Present research was undertaken to examine the impact of land use on soil fertility in an Alfisol, at Dharamshala district of north western Himalayan region, India. Soil samples were collected from 0-15, 15-30, 30-45 and 45-60 cm soil depths of five landuses viz. natural forest of *Pinus roxburghii*, grassland, horticulture, agriculture and wasteland. Soil was examined for pH, organic carbon (OC), electrical conductivity (EC), cation exchange capacity (CEC), available nitrogen (N), phosphorus (P), exchangeable calcium (Ca), magnesium (Mg), potassium (K), aluminium (Al), microbial biomass carbon (MBC), microbial biomass nitrogen (MBN), microbial biomass phosphorus (MBP), acid phosphatase activity (APHA) and dehydrogenase activity (DHA). Soil pH varied from 5.22 in forest and 5.72 in grassland. OC content was higher in forest (3.01%), followed by grassland (2.16%) and was least (0.36%) in deeper layers of agriculture. Highest N content was found under forest (699, 654, 623 and 597 kg/ha, at 0-15, 15-30, 30-45 and 45-60 cm depth, respectively), followed by grassland, horticulture and agriculture and least in wasteland. Maximum exchangeable Ca and Mg were found in grassland (0.801 c mol kg⁻¹ and 0.402 c mol kg⁻¹, respectively). Exchangeable K and Al were higher under forest (0.231 c mol kg⁻¹ and 1.89 c mol kg⁻¹, respectively) least in wasteland. Soil biological properties were highest under surface soil of forest (576 mg kg⁻¹, 31.24 mg kg⁻¹, 6.55 mg kg⁻¹, 29.6 mg PNP g⁻¹h⁻¹ and 35.65 µg TPF 24 h⁻¹ g⁻¹ dry soil, respectively for MBC, MBN, MBP, APHA and DHA) and least in 45-60 cm layer, under wasteland. The forest had a higher fertility index and soil evaluation factor followed by grassland, horticulture, agriculture as compared to wasteland. **Keywords** soil fertility index, soil evaluation factor, available nutrients, exchangeable cations, landuse, microbial activity.