Land Use Effects on Soil Quality in Humid Sub-tropical Region of India

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Understanding the effects of land use and management practices on soil quality and its indicators has been identified as one of the most important goals of sustainable agricultural land management. In this paper a minimum data set and interpretation were applied to five land use systems around Doon Valley of India to determine the long-term influence of land use on soil quality. Land uses included arable cropland (maize-wheat rotation), sal forest (Shorea robusta), eucalyptus plantation (Eucalyptus spp.), Guinea grass (Panicum maximum) and Golda grass (Chrysopogon fulvus). At each site, the topsoil (0-15 cm depth) was sampled. A minimum data set of 12 indicators including soil depth, texture, slope, soil organic carbon, total and available N, P and K, cation exchange capacity (CEC) and pH were selected to compute soil quality index (SQI). The data indicates that physicochemical properties such as pH, cation exchange capacity (CEC), and organic carbon (OC) were significantly influenced by the land-use systems. Among the land-use systems, sal forest and eucalyptus plantation resulted in significantly higher OC, CEC and total N, P and K. Except for the available N, P and K nearly all of the chemical soil quality indicators had lower values under the arable condition than under the reference forest land use system. The sal forest had SQI: 358 out of 400 score a highest quality, followed by the eucalyptus plantation (SQI: 353), arable cropland (SQI:316) and pasture lands (SQI:228). The soil quality index for arable land that was in continuous agricultural production was 12% lower than the reference sal forest.