106/B

Monitoring soil quality in low country wet zone agricultural lands: identifying soil quality indicators responsive to land management

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Maintaining or improving soil quality in agricultural lands is highly important for sustainable agriculture in Sri Lanka. Soil quality monitoring is required to assess long-term impacts of cultivation and introduce best management practices. Therefore, the objective of this research was to identify indicators to assess soil quality in low country wet zone lands used for agriculture. Soil samples for the study were taken from a Red Yellow Podsoilc Soil (Hapludults) at Kamburupitiya in the Matara district managed under six contrasting land use types viz. planted forest (mahogany woodlot), forage grass, legume, coconut, cinnamon and vegetable. Each selected field was divided into four blocks and composite soil samples were taken from the 0-15 cm depth. Soil samples were analyzed for selected parameters (soil texture, bulk density, organic C, total nitrogen, pH, CEC, extractable P, exchangeable K, water extractable organic C, soil microbial biomass C, potentially mineralizable C and N), which could be used as soil quality indicators.

Results showed that land management had a significant overall effect on the quality of soil. Of the soil properties measured, soil bulk density and organic carbon (content and sequestration in the 0-15cm layer) were the robust indicators sensitive to impact of land management and can be used to assess the degradation of agricultural lands. The highest soil organic carbon content and lowest bulk density were found in the planted forest site while the

lowest organic C and highest bulk density were found in the vegetable field. Plant nutrient levels (N, P, and K) in soil are found to be not ideal indicators of soil quality since the application of fertilizers could mask inferior soil quality and confound the degree of land degradation. Vegetable fieled had considerably higher plant nutrient levels though it recorded poor soil organic matter levels compared to the relatively undisturbed forest soil. This study also revealed that data on soil microbial biomass C and water extractable organic C in soil were highly variable and further research is required to decide the best time of sampling if they are to be used as soil quality indicators. Potentially mineralizable carbon and nitrogen were responsive to land management and cropping, however, they should be tested in different agricultural lands and native forest soil before being adopted as soil quality indicators.