

SOIL HEALTH IN DIFFERENT LAND USE SYSTEMS IN COMPARISON TO A VIRGIN FOREST IN A TROPICAL REGION OF KERALA

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The impact of six different land use systems on soil properties were examined in a tropical region. Three systems based on natural rubber (*Hevea brasiliensis*), teak (*Tectona grandis*), cassava (*Manihot esculenta*) and nearby natural forest located between 76° 52' and 77° E longitude and 9° 25' to 9° 30' N latitude, in Kerala, India were investigated. Representative soil samples were collected and analyzed for organic carbon (OC), water soluble organic carbon (WSOC), hot water extractable carbon (HWEC), permanganate oxidizable carbon (POSC), available nutrients (K, Ca, Mg, P, Cu, Zn, Fe, Mn) and pH. *In situ* field soil respiration measurements were also taken from representative sites in the different systems. Carbon management indices (CMI) were worked out in terms of OC, WSOC, HWEC and POSC of different systems with respect to forest system. Soil organic matter quantity and quality were found to be declining in all cultivated systems compared to forest. Nitrogen and available cations such as K, Ca and Mg also had declined in cultivated systems. Microbial activity indicated by soil respiration rate also had declined in all the land use systems compared to forest. The declining trends in soil properties were more in the regularly tilled cassava soil where the crop residue inputs were also negligible. The rubber-*Mucuna* system had conserved more organic matter, quantity wise while teak system had conserved more organic matter, quality wise. The teak system had higher soil respiration rate than all other cultivated systems. The forest and teak systems where multi-species flora existed had less soil acidity than rubber based land use systems. In rubber based systems, av.Cu status was found to be higher, probably due to the regularly applied Cu based fungicides. Soil respiration rate was found to be having significant and positive correlation with soil organic matter quantity and quality and pH while negative correlation with available Cu status.

Keywords: Carbon management index, Forest, Land use systems, Natural rubber (*Hevea brasiliensis*), Soil health, Soil organic matter

INTRODUCTION

The dependence of man on land and soil is ever increasing which has resulted in the indiscriminate use of the natural resources. Small or large, the impact of agriculture on environment is unavoidable;

however, the success of good agricultural practices depends on how best the followed practices make the system resilient to the impacts. Different land use patterns may have varying level of impacts on soil and environment and it is important to assess the same with respect to a natural system