

IMPACT OF CONVERSION OF GRASSLAND TO PLANTATION FORESTS ON SOIL MICROORGANISMS AND SOIL ORGANIC CARBON

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ABSTRACT

Changes in land use is a key factor that affects climate change. Nevertheless, the influence of some land-use changes on climate change is yet to be understood. In the present study we investigated the effect of conversion of Patana grassland to plantation forest on soil fertility and accretion of carbon in soil which strongly associates with climate change. The study was carried out in four *Eucalyptus grandis* plantation forests (stand ages of 4, 10, 19, 27 years) and in an adjacent Patana grassland (previous land-use before afforestation), belonging to same agro ecological zone in Passara, Sri Lanka. Six subplots (20 m × 20 m) were established within site and after which soil was sampled at depths of 0–15 cm (top soil) and 15–30 cm (sub soil). Soil Microbial Biomass Carbon (MBC) and Microbial Biomass Nitrogen (MBN) was measured using chloroform fumigation method. Walkley-Black method was used to quantify the Soil Organic Carbon (SOC). The results revealed that MBC: MBN ratios in top soil showed a substantial positive correlation with stand age (Pearson correlation, 0.680; $p = 0.000$). The MBC: MBN in top soil for Patana grassland was 1.8 and after 27 years of afforestation it has increased up to 27.8. The SOC has also increased significantly with the stand age (top soil: Pearson correlation, 0.738; $p = 0.000$; sub soil: Pearson correlation, 0.531; $p = 0.003$) which increased from 3.9 kg ha⁻¹ to 15.7 kg ha⁻¹ after 27 years. In conclusion soil microbiological properties and fertility has improved after the afforestation and the land-use change from Patana grassland to afforestation affects negatively on climate change in the long term.

Keywords: Afforestation, Microbial Biomass Carbon, Microbial Biomass Nitrogen, Soil Organic Carbon, Patana Grassland