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Effect of multipurpose tree species on soil fertility and CO_2 efflux under hilly ecosystems of Northeast India

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Abstract A 26 years old agroforestry plantation consisting of four multipurpose tree species (MPTs) (*Michelia oblonga* Wall, *Parkia roxburghii* G. Don, *Alnus nepalensis* D. Don, and *Pinus kesiya* Royle ex-Gordon) maintained at ICAR Research Complex, Umiam, Meghalaya, India were compared with a control plot (without tree plantation) for soil fertility status and CO_2 efflux. The presence of trees improved all the physico-chemical and microbial biomass parameters studied in this experiment. Relative to control, soils under MPTs showed significant increases of 17 % soil organic carbon, 26 % available nitrogen (AN), 28 % phosphorus (AP), 50 % potassium (AK), 65 % mean weight diameter (MWD) of aggregates, 21 % moisture and 34 % soil microbial biomass carbon (MBC) while reducing the mean bulk density (7 %). However, these parameters significantly differed among the tree species i.e., soils under *A. nepalensis* and *M. oblonga* had higher values of these attributes except bulk density, than under other species. Irrespective of treatments, the values of all these attributes were higher in surface soils while bulk density was highest in subsurface (60–75 cm). Cumulative CO_2 efflux under MPTs was significantly higher