

Carbon content and structural characteristics of organic matter in soils of a climo-biosequences in the main range of Peninsular Malaysia

ABSTRACT

Climate and vegetation are known to be the most important soil forming factors in determining carbon (C) contents and structural characteristics of organic matter (OM) in soils. Four representative soil profiles along a climo-biosequence in the Main Range of Peninsular Malaysia were investigated to determine the impacts of climate and vegetation on C contents and structural characteristics of OM. Soil samples from all genetic horizons were subjected to physical and chemical analyses. Structural characteristics of soil samples from selected horizons were analyzed by Fourier-transform infrared (FTIR) spectroscopy. Soil organic carbon content to 1 m depth increased along the studied climo-biosequence, from 5.7 kg m⁻² in Udult under hill dipterocarp forest to 8.9 kg m⁻² in Humult under upper dipterocarp forest to 15.8 kg m⁻² in Orthod under myrtaceous forest, reaching a maximum value of 49.6 kg m⁻² in Saprist under ericaceous forest. FTIR spectra for the surface organic horizons showed an increase of aliphatic band (2920 cm⁻¹) with increasing elevation from upper dipterocarp forest to ericaceous forest. The increase in aliphatic band with increasing elevation likely resulted from a selective preservation of aliphatic structures derived from original plants with high content of waxes. This study demonstrates that differences in C contents along the studied climo-biosequence are related to co-variation of climate and vegetation; however, vegetation, not climate, is the major driver of differences in structural characteristics of OM.

Keyword: Climate; Climo-biosequence; FTIR spectroscopy; Organic matter; Vegetation