

Soil morphological and chemical properties in homegardens on sandy beach ridges along the east coast of Peninsular Malaysia

ABSTRACT

The morphological and chemical properties of homegardens in the beach ridges with interspersed swales (BRIS) soils were evaluated in order to find a clue for developing sustainable agricultural management. Field survey and soil sampling were conducted at the homegardens and secondary forests in Sungai Ular Village and in the experimental farm of Malaysian Agriculture Research Institute (MARDI), Cherating Station. Chemical fertilizers including ash, charcoal waste and plant litter were applied to the homegardens in both the inland-ward area (HG-I) and in the shoreline area (HG-S). Manure was applied in HG-I and seafood waste from fish processing was buried in the soils in HG-S. High correlation was found between total carbon (T-C) and cation exchange capacity (CEC), indicating soil organic matter was the determinant factor for CEC in the very sandy BRIS soils. The levels of T-C, total nitrogen (T-N), and CEC at 0–10 cm in HG-I in parallel with increasing ages of homegardens. The soils in 0–10 cm and 20–30 cm showed higher levels of T-C and T-N with higher C/N ratios in HG-I than in HG-S and the MARDI farm. The high levels of exchangeable Ca, Mg, and K in HG-I compared with the MARDI farm, suggesting that improved CEC with increasing soil organic matter in HG-I heighten the retention of basic cations supplied as chemical fertilizer, ash, and manure. The level of available P was higher in HG-S than HG-I, attributed by the seafood waste application in the shoreline area. Thus, on the BRIS, the levels of soil organic matter and nutrients can be sustained by the homegarden management although it cannot be regarded as a closed system compared with those in the other tropical regions because chemical fertilizer was used and a certain amounts of nutrients seemed to leach down beyond plant rooting depth.

Keyword: Entisols; Homegarden; Sandy beach ridges; Soil fertility; Soil morphology; Spodosols

