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Organic matter sequestration and the particulate fraction at three different types of land use in Bukik Pinang-Pinang, under wet tropical area West Sumatra, Indonesia

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Organic matter sequestration in soil profiles of tropical rain forest area was very important to reduce C concentration in the atmosphere and also to improve soil and environmental quality as OM can form and stabilize soil aggregates, increase infiltration reduce runoff, and finally control erosion. Study on SOM sequestration was conducted under three types of land use in Bukik Pinang-Pinang, the upper foot slope of Mt. Gadut in West Sumatra. The area is located on 390-640 m asl and geographically is between 100°29'40" and 100°30'20 E" as well as between 0°54'55" and 0°55'45" S. The objective of this research was to measure soil organic matter sequestration within soil profile at three land use types: forest, bush, and mixed garden under extremely high (up to 6500 mm) annual rainfall. Forest ecosystem was on the top (>640 m asl) and on the middle slope (480-495 m asl), bush was on the middle slope, and mixed garden on the foot slope (390-480 m asl). Basedon Wakatsuki et al. (1986) thesoil ordo belonged to Inceptisols with three sub group Typic Dystropept, Lithic Dystropept, dan Lithic Eutropept.Soil was sampled from top to 40 cm depth with 20 cm increment. Organic C content in the soil was determined with wet oxidation method, and the particulate fraction was mechanically separated as suggested by Cambardella and Elliott (1992). The results showed that, within the profile (0-40 cm depth), soil organic matter content decreased by depth. Land use change from forest into mixed garden could recover SOM content on the top 40 cm soil profile after approximately 50 years, and after 20 years under bush land as long as the soil surface was covered by vegetation and not cultivated. About 62-85% of the OM sequestered was in form of particulate organic matter (POM) at the 0-20 cm, and 6 - 57% at the 20-40 cm soil depth. Based on sequential topography, amount of SOM stock within soil profile (0-40 cm depth) tended to increase by decreasing altitude. Total SOM increased by 62%, 63%, and 74% as the location of the land moves downward from top into middle forest, bush land, and into mixed garden (foot slope).

Biography

Yulnafatmawita has completed her PhD from the University of Queensland Australia in 2005. During her PhD program, she joined CRC in Greenhouse Gas Accounting of Australia (1999-2005). She measured CO2 emission from soil after cultivation as her Doctoral research project. Upon graduation, she went back to Indonesia and continues her job as a lecturer at University of Andalas in West Sumatra, Indonesia up to now.

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