

20th World Congress of Soil Science 2014

Jeju, Korea
8 - 13 June 2014

Volume 1 of 5

ISBN: 978-1-5108-3668-6

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Red Hook, NY 12571



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[C4.2-1] Linking forest Management and Soil Processes to Ecosystem Productivity and Functions

Soil Surface Assessment under Plantation Forest in South Sumatra using Landscape Function Analysis Procedure

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Land use change from secondary forest into plantation forest industry often creates environmental dilemma. Soil quality mostly declines in the early forest clearance and utilization. However, after several cycles of planting-harvesting, people believe soil conditions would improve substantially. This study particularly evaluates soil surface changes following the practice of plantation forest with special reference to procedure of Landscape Function Analysis (LFA). Soil survey and field observations were undertaken in the plantation forest of PT Musi Hutan Persada in Suban Jeriji district (Muara Enim Regency, South Sumatra) in August 2008, which focused on the stands aged 1 to 4 years old. The main plant species is *Acacia mangium*. Fertilization is given one month after planting as much as 10 g of urea, 10 g TSP and 10 g KCl. The 1 year old plant height has reached nearly 5 m with a diameter of about 6.2 cm which increased to 11 cm at the age of 2 years. Organic carbon increased rapidly with age (4.37 to 5.37 % at 0-2 cm depth). Biomass build-up occurs in every plant-harvest cycle. Plants are already entering the third cycle (more than 12 years of cultivation land). Total biomass production at the age of 14 months can reach 17.67 ton/ ha and increased markedly to 46.13 tons / ha at the age of 24 months. Contribution of nutrients from litter decomposition can reach 146 kg N/ ha, 7 kg P/ha and 95 kg K/ha at age 1 year stands although the rate of decomposition of biomass of *Acacia mangium* usually slow. Marked difference in the condition and abundance of litter is reflected in the diversity index of LFA at four selected sites. At the age of 2 years general conditions of ecological stability of the land surface has been similar to the value at the age of 3-4 years (stability index around 73%). The difference in the infiltration index may be partly due to local variation (depression, plant and bark residues) with the index values ranging from 31 to 57%. Nutrient cycling index increased consistently with increasing plant age (24 to 51%), along with increasing rate of soil respiration. These overall findings reveal the beneficial practice of plantation forest to improve soil functionality.

Keywords : plantation forest, landscape function analysis, tropical soils, plant-harvest cycle