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“Bridging the gap between increasing knowledge and decreasing resources”

The Effects of Management Practices on Soil Organic Carbon Stocks in Oil Palm Plantation

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Abstract

Today about 20–25 % of anthropogenic CO₂ emissions are derived from land use changes and 90 % of these changes are taking place in the tropics, with Indonesia and Malaysia as hotspots. The dominant land use transition in these countries is the transition of different forest types to large scale oil palm plantations. It is hypothesised that soil organic carbon (SOC) stocks are significantly affected by management practices and more intensive oil palm plantation management systems like Best Management Practice (BMP) have faster C accumulation rates than smallholder oil palm production practices because of the faster growth and establishment of the oil palms and applying more organic residues like empty fruit bunches (EFB), decanter cake (DC), palm oil mill effluent (POME) and front stuck back to the fields. Therefore, the aim of this study was to investigate the soil organic carbon in the different management practice (BMP, Commercial practice and Smallholder practice) in palm plantation. Soil samples were collected from 0–5, 5–10 and 10–20 cm layer by 100 cm³ soil core from BMP practice fields, commercial practice fields and small holder practice fields in Central Kalimantan and North Sumatra in Indonesia with three replicate profiles beneath the palm circle, harvesting path and inter-row position (where they apply most of the organic residues). SOC stocks in the soils were calculated according to the fixed-depth approach as well as according to the equivalent soil mass approach. The result showed that soil organic carbon (SOC) stocks are significantly affected by management practices. SOC from BMP fields are significantly higher than commercial practice fields and small holder practice fields. The result also showed that the amount of organic carbon is significantly higher in the inter-row position of the plantation than the palm circle and harvesting path of the plantation.

Keywords: Management practices, oil palm plantation, soil organic carbon