



Research projects of counterparts funded at UNJA

Name

Counterpart Title

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B10

The Distribution of soil organic carbon and its relevance for soil water content in oil palm plantations

Expansion of oil palm plantations is assumed to be responsible for degradation of hydrological functions, but there is not enough comprehensive data to verify this. The objectives of this research were to identify the distribution of soil organic carbon (SOC) and water content, and to evaluate their relationship at several soil depths across an age gradient of oil palm plantations. A field survey was carried out for the identification of the oil palm age gradient and soil samplings. The research was conducted in smallholder oil palm plantations at Bungku Village, Batanghari District, Jambi Province between February and June 2014. Soil samples were collected from several ages of oil palm plantations (0, 1, 5, 7, 10, and 16 years) from 0–30, 31–60, and 61–90 cm of soil depth, with three replicates, respectively. Laboratory analysis was conducted to determine soil texture, bulk density, organic carbon and water content. The smallholder oil palm farmers at Bungku Village managed their plantations with outdated technology, and oil palms were grown mostly unweeded. Results indicated that soil in different ages of oil palm plantations was differently compacted. Soil bulk density (SBD) was 1.12–1.59 g cm⁻³ and soil organic carbon (SOC) was very low-low (0.29–1.60%), with a negative linear relationship between soil depth and SOC (Table 1). Low SOC was responsible for low soil water availability in oil palm plantations. The relationship between SOC and soil water content (field capacity, permanent wilting point, and available water) in oil palm plantations of different ages was not always linear. We need more comprehensive research on hydrological functions of soil in oil palm plantations of different ages, on determining factors, and on the autocorrelation of determining factors.

Table 1: Distribution of bulk density (SBD) and soil organic carbon (SOC) from several ages of oil palm plantations (0, 1, 5, 7, 10, and 16 years) from 0–30, 31–60, and 61–90 cm of soil depth, Bungku Village, Batanghari District, Jambi Province, Indonesia.

Age-Gradient of Oil Palm	0–30 cm		31–60 cm		61–90 cm	
	SBD (g cm ⁻³)	SOC (%)	SBD (g cm ⁻³)	SOC (%)	SBD (g cm ⁻³)	SOC (%)
0 Year	1.43	1.60	1.45	0.90	1.51	0.67
1 Year	1.22	1.40	1.31	0.93	1.37	0.61
5 Year	1.12	0.88	1.19	0.59	1.39	0.29
7 Year	1.44	1.17	1.49	0.64	1.42	0.54
10 Year	1.27	0.90	1.31	0.56	1.43	0.45
16 Year	1.22	1.32	1.28	0.85	1.59	0.66