

Land use conversion from peat swamp forest to oil palm agriculture greatly modifies microclimate and soil conditions

ABSTRACT

Oil palm (*Elaeis guineensis*) agriculture is rapidly expanding and requires large areas of land in the tropics to meet the global demand for palm oil products. Land cover conversion of peat swamp forest to oil palm (large- and small-scale oil palm production) is likely to have negative impacts on microhabitat conditions. This study assessed the impact of peat swamp forest conversion to oil palm plantation on microclimate conditions and soil characteristics. The measurement of microclimate (air temperature, wind speed, light intensity and relative humidity) and soil characteristics (soil surface temperature, soil pH, soil moisture, and ground cover vegetation temperature) were compared at a peat swamp forest, smallholdings and a large-scale plantation. Results showed that the peat swamp forest was 1.5–2.3 °C cooler with significantly greater relative humidity, lower light intensities and wind speed compared to the smallholdings and large-scale plantations. Soil characteristics were also significantly different between the peat swamp forest and both types of oil palm plantations with lower soil pH, soil and ground cover vegetation surface temperatures and greater soil moisture in the peat swamp forest. These results suggest that peat swamp forests have greater ecosystem benefits compared to oil palm plantations with smallholdings agricultural approach as a promising management practice to improve microhabitat conditions. Our findings also justify the conservation of remaining peat swamp forest as it provides a refuge from harsh microclimatic conditions that characterize large plantations and smallholdings.

Keyword: Soil characteristics; Smallholding; Conservation; Plantation; Southeast Asia