

DISSOLVED ORGANIC CARBON CONCENTRATIONS IN AN OIL PALM PLANTATION AT SOUTH SELANGOR PEAT SWAMP AREA, MALAYSIA



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Dissolved organic carbon (DOC) is a complex collection of organic carbon molecules produced as a result of plant or animal materials decay and dissolved in water. The DOC concentrations were monitored from May 2013 until October 2014 at an oil palm plantation on peat swamp area in South Selangor, Malaysia. Bimonthly samplings were made on groundwater (GW) in piezometers installed at different ages of oil palm blocks (1- to 14-year old) and their respective nearby drains (DW), collection drains (CD) and main drains (MD). Based on the 13 months sampling, the overall average DOC was 89.44mg L⁻¹ which were higher by 85.1% and 31.5% respectively than those in severely drained disturbed peat swamp forest and intact peat swamp forest in Sebangau river basin, Central Kalimantan. Average DOC in GW at the 14-year-olds was the highest with 113.50mg L⁻¹ while the lowest at the 4-year-olds with 18.41mg L⁻¹. For the DW, average DOC was the highest at the 8-year-olds (107.15mg L⁻¹) and lowest at the one-year-olds (24.12mg L⁻¹). Overall average DOC in both GW and DW from blocks of less than 8-year-old were lower than those at the older blocks which could be due to higher biomass in older palms. Average DOC in DW at the 8-year oil palm area was also negatively correlated with dissolved oxygen (R²=0.85) and surface water temperature (R²=0.67) within the 1-year-olds. The DOC in DW was positively related to that in GW especially at the 8-year-olds (R²= 0.77) while DOC in GW were higher than those from nearby drains, as DOC in the latter were diluted by direct rainfall. Hydrological factors such as precipitation, evaporation and temperature coupled with soil properties especially moisture increase DOC in peat. The above show that DOC follow seasonal pattern and storm events, and groundwater depth which determines soil moisture and fluctuations of GW affects DOC concentrations. The above trends of DOC seem to agree with studies in temperate and tropical areas.

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Measurement of dissolved organic carbon in groundwater from (a) piezometer and (b) drainage channels in an oil palm plantation in the study area