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Atmospheric deposition of polycyclic aromatic hydrocarbons (PAHs) around two metropolitan areas in the western province of Sri Lanka, using moss (*Hyophila involuta*) as a biomonitor

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Atmospheric deposition of 16 selected polycyclic aromatic hydrocarbons (PAHs) which are defined as priority pollutant by the American Environment Protection Agency (EPA) was investigated using moss (*Hyophila involuta*) as a bioindicator. Monthly sampling was conducted from March 2013 to February 2014 at two different metropolitan areas in Sri Lanka (area around Sapugaskanda oil refinery and area around Kelanitissa power plant). The background level was monitored using moss (*Hyophila involuta*) collected from Kalupahana rural area (in Badulla District) where anthropogenic influence is assumed to be very low. PAHs were extracted by ultrasonic extraction and cleaned-up using Silica gel column. Identification and quantification of PAHs in the moss samples were carried out using HPLC system (Agilent 1100 series) and UV-DAD (Agilent 1200 series). A C-18 PAH column (VYDAC PAH column) as the stationary phase, acetonitrile: water as the mobile phase and 16 PAH standards (Supelco) were used as calibration materials. The average concentrations of total detectable PAHs during a year were determined on a dry weight basis. The average concentrations of total detectable PAHs around the Sapugaskanda sampling location were in the range 0.74–3.86 mg kg⁻¹ dry weight of moss (*Hyophila involuta*) with a mean value of 1.43 mg kg⁻¹ dry weight when it ranged 0.91–3.06 mg kg⁻¹ dry weight of moss (*Hyophila involuta*) with a mean value of 1.55 mg kg⁻¹ dry weight around the Kelanitissa sampling location. The total detectable PAHs for selected two metropolitan areas were higher compared with the total PAHs in remote area, Kalupahana which was 0.01 mg kg⁻¹. The percentage of low molecular weight PAHs (Two-ring and Three-ring PAHs) was in the range of 67.0–78.0% around two metropolitan areas. The 2-3 ring/ total PAH ratios showed no statistically significant differences between the area around Sapugaskanda oil refinery (0.71(±0.07)) and the area around Kelanitissa power plant (0.73(±0.07)). The vehicular and industrial emissions of study areas may cause the formation of total detectable PAHs.

Keywords: atmospheric deposition, bioindicator, PAHs, mosses, Sri Lanka

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