Proceedings of the 9th World Congress on Civil, Structural, and Environmental Engineering (CSEE 2024)
London, United Kingdom – April 14-16, 2024
Paper No. ICEPTP 202
DOI: 10.11159/iceptp24.202

Phytoaccumulation of Polycyclic Aromatic Hydrocarbons (Pahs) In Urban Areas Is Species- And Organ Specific

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Extended Abstract

Urban areas are highly exposed to different environmental pollutants, which negatively affect human health [1] (Boström et al. 2002). Since 20th century, rapid urbanization and industrialization have resulted in a sudden increase in environmental pollution [2] (Li et al. 2020), especially with persistent organic pollutants (POPs), which circulate for a long time in contaminated ecosystems (Farrington and Takada 2014) [3]. According to Kim et al. (2019) [4], one of the main sources of pollution in urban areas is traffic. PAH phytoaccumulation potential of three common tree species in urban areas were tested in this study. In total, 17 PAHs were tracked to define their accumulation potential in different vegetative organs (leaf and wood) that were highly exposed to traffic emissions and compared with paired samples growing in noncontaminated sites.

Platanus x acerifolia, Celtis australis, and *Tilia grandifolia* specimens from highly urbanized, frequent, and highly PAH-contaminated streets were compared with noncontaminated tree specimens from parks in the same urban core with the aim of defining 17 PAH profiles, diagnostic pollution emission sources, and organ- and species-specificity of PAHs uptake potential as a PAHs remediation 'green tool' in urban ecosystems. The obtained results indicated that the leaves accumulated PAH concentrations up to ~20–30% higher than those in the one-year-old branches due to their directly polluted air absorption via stomata. Additionally, following all three species, street trees accumulated more PAHs, while the highest concentrations were observed for heavy-weight PAHs with five and six rings. Generally, *P. acerifolia* and *C. australis* leaf/branch represent a stronger sink for PAHs, than *T. grandifolia* which accumulated up to ~40% less PAHs. The highest foliar Σ17 PAHs concentrations of trees that grew on streets were detected in *C. australis*, slightly less in *P. acerifolia*, while *T. grandifolia* accumulated the least Σ17 PAHs in their leaves (502.68, 488.45, 339.47 ng g^{-1} dry weight (DW), respectively). The same pattern was noted for Σ17 PAHs in branches (414.89, 327.58 and 342.99 ng g^{-1} DW, respectively). Out of the 17 tracked PAHs, benzo[a]anthracene, benzo[a]pyrene, dibenzo[a,h]anthracene, and pyrene accumulated in the highest concentrations in all analyzed species and sites, and they accounted for more than half of the total detected PAHs.

Finally, based on the obtained results, *P. acerifolia* and *C. australis* can be labelled as highly promising species for PAHs removal from urban areas, in contrast to *T. grandifolia*. Decision- and policy-makers may use the acquired species-specific variations to create specific strategies, as well as to determine the species' reliability for PAHs phytoremediation. Although tree drivers and especially their interactions with PAHs uptake limitations are still a 'black box', additional effort will be necessary to increase the predictability and efficacy of PAHs clean-up from the urban environment.

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