

Urban trees as bioindicators and mitigators of PTEs: the case of *Acer platanoides* L.

*Urbano drveće kao indikatori i faktori za smanjenje PTEs: slučaj *Acer platanoides* L.*

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Abstract

Trees in urban ecosystems not only improve the microclimatic conditions and aesthetic value of urban spaces, but also contribute to the accumulation and redistribution of potentially toxic elements (PTEs), thereby mitigating ecological risks and supporting urban sustainability. In this study, the phytoremediation potential of *Acer platanoides* L. was assessed by analysing B, Cu, Sr and Zn in soil, roots and leaves from three urban parks in Belgrade. The element concentrations were determined by ICP-OES after microwave digestion (CEM Mars 6). The measured concentrations of B and Sr in leaves reached toxic levels, indicating a potential risk of phytotoxicity of *A. platanoides*. Bioconcentration and translocation factors confirmed an efficient uptake and transfer of B, but a limited uptake of Cu, Sr and Zn from the soil. The results show that the species is very good at accumulating and translocating B, while it has limited uptake and redistribution of other elements into plant tissue. Due to its relatively rapid growth, stress tolerance and ability to accumulate certain PTEs (especially B), *A. platanoides* can be considered as an efficient and cost-effective species to improve the resilience and ecological functions of urban green spaces.

Keywords: Urban ecosystems; *Acer platanoides* L.; phytoremediation; potentially toxic elements (PTEs); biological factors

Izvod

Drveće u urbanim ekosistemima ne samo da poboljšava mikroklimatske uslove i estetsku vrednost urbanih prostora, već i doprinosi akumulaciji i redistribuciji potencijalno toksičnih elemenata (PTEs), čime smanjuju ekološke rizike i podržava urbanu održivost. U ovoj studiji procenjivan je fitoremedijacioni potencijal vrste *Acer platanoides* L. analizom sadržaja B, Cu, Sr i Zn u zemljištu, korenu i listovima iz tri gradska parka u Beogradu. Koncentracije elemenata određene su ICP-OES metodom nakon mikrotalasne digestije (CEM Mars 6). Izmerene koncentracije B i Sr u listovima dostizale su toksične nivoe, što ukazuje na potencijalni rizik od fitotoksičnosti kod *A. platanoides*. Vrednosti biokoncentracionog i translokacionog faktora su potvrdile efikasno usvajanje i transport B, ali ograničeno usvajanje Cu, Sr i Zn iz zemljišta. Rezultati pokazuju da je ova vrsta veoma dobra u akumulaciji i translokaciji B, dok za ostale elemente ima ograničeno usvajanje i redistribuciju u biljnom tkivu. Zbog relativno brzog rasta, otpornosti na stres i sposobnosti akumulacije određenih PTEs (posebno B), *A. platanoides* se može smatrati efikasnom i ekonomičnom vrstom za unapređenje otpornosti i ekoloških funkcija urbanih zelenih površina.

Ključne reči: Urbani ekosistemi; *Acer platanoides* L.; fitoremedijacija; potencijalno toksični elementi (PTEs); biološki faktori

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