

## **Cu AND Zn BIOACUMULATION IN CERTAIN ACQUATIC MACROPHITES IN THE AREA OF FISH POND BARDAČA**

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### **BIOAKUMULACIJA Cu I Zn U NEKIM AKVATIČNIM MAKROFITAMA NA PODRUČJU RIBNJAKA BARDAČA**

#### *Apstrakt*

Rad se bavi analizom sadržaja Cu i Zn u vodi, sedimentu i tkivu *Phragmites communis* Trin., *Salvinia natans* L. All. i *Utricularia vulgaris* L. na području ribnjaka Bardača (Necik i Sinjak-aktivni ribnjački bazeni). Na osnovu izmjerenih vrijednost Cu u vodi, a prema Uredbi o klasifikaciji voda i kategorizaciji vodotoka, istraživani lokaliteti pripadaju vodama II kategorije, a na osnovu sadržaja Zn vodama III/IV kategorije. Sadržaj bakra i cinka u sedimentu nije prelazio vrijednosti maksimalno dozvoljene koncentracije prema Službenom glasniku RS (23/1994). Dobijeni rezultati ukazuju da sadržaj Cu i Zn u biljnom tkivu znatno varira u odnosu na vrstu, lokalitet i period uzimanja uzoraka. U tkivu *Salvinia natans* tokom istraživanog perioda najniža koncentracija Zn izmjerena je tokom septembra na oba lokaliteta (32 mg/kg), dok je najveća koncentracija prelazila maksimalno dozvoljene vrijednosti (163,55 mg/kg) što ukazuje na izvjestan stepen zagađenosti istraživanog lokaliteta. Koncentracija Zn u tkivu *Utricularia vulgaris* na oba lokaliteta bila je u opsegu 39,14-55,20 mg/kg, pri čemu su dobijene vrijednosti za 35 % bile niže u odnosu na *Salvinia natans* na lokalitetu Necik, dok su na lokalitetu Sinjak koncentracije Zn kod obje vrste bile slične (44,55 mg/kg). Najznačajnija razlika u akumulaciji Zn utvrđena je za *Phragmites communis* kod koje je dobijen 3-6 puta niži sadržaj Zn u odnosu na *Salvinia natans* i *Utricularia vulgaris*. Sadržaj Cu u tkivu *Utricularia vulgaris* tokom perioda istraživanja je bio u opsegu 1,7-10,18 mg/kg, dok su u tkivu *Salvinia natans* izmjerene neznatno niže vrijednosti u odnosu na *Utricularia vulgaris*. Koncentracija Cu u tkivu *Phragmites communis* tokom istraživanog perioda na oba lokaliteta bila je ispod detekcionog limita (<0,023 mg/kg). Kao najbolji biokumulator Zn pokazala se vrsta *Salvinia natans* dok je *Utricularia vulgaris* bolje akumulirala bakar, što ukazuje na postojanje različitog trenda u pogledu akumulacije određenih teških metala tokom sezone u različitim organima i tkivima. U ovom radu je

naglašena uloga različitih tipova vodenih makrofita u akumulaciji teških metala tokom sezone i njihov potencijal primjene u tehnici fitoremedijacije.

*Ključne riječi: Cu, Zn, akvatične makrofite, bioakumulacija*

#### *Abstract*

The paper deals with Cu and Zn content analysis in water, sediment and tissue of *Phragmites communis* Trin., *Salvinia natans* L. and *Utricularia vulgaris* L. in the area of Barđača fish pond (Necik and Sinjak- active fish ponds). Based on the measured value of Cu in water, and according to the Regulation on Classification of Water and Water Streams, the researched localities belong to category II waters, and based on the Zn content they belong to category III/ IV waters. The content of copper and zinc in sediments did not exceed the maximum permitted concentration values according to the RS Official Gazette (23/1994). The obtained results indicate that Cu and Zn content in plant tissue significantly varied in relation to species, locality and sampling period. In the tissue of *Salvinia natans* during the researched period, the lowest Zn concentration was measured in September on both localities (32 mg/kg), while the biggest concentration exceeded the maximum permitted values (163,55 mg/kg) which indicates a certain degree of contamination of researched localities. Zn concentration in the tissue of *Utricularia vulgaris* on both localities ranged from 39,14 to 55,20 mg/kg, whereby the obtained values were by 35 % lower in relation to *Salvinia natans* on Necik locality, while on Sinjak locality the Zn concentration at both species was similar (44,55 mg/kg). The most significant difference in Zn accumulation was determined for *Phragmites communis* where 3-6 times lower Zn content was obtained in relation to *Salvinia natans* and *Utricularia vulgaris*. The Cu content in tissue of *Utricularia vulgaris* during the research period was in the range from 1,7-10,18 mg/kg, while in the tissue of *Salvinia natans* insignificantly lower values were measured as compared to *Utricularia vulgaris*. The Cu concentration in the tissue of *Phragmites communis* during the researched period on both localities was below the detection limit (<0,023 mg/kg). Species *Salvinia natans* has shown to be the best Zn bioaccumulator, while *Utricularia vulgaris* accumulated copper the best, which indicates the existence of different trend in terms of accumulation of certain heavy metals during the season in different organs and tissues. The role of different types of aquatic macrophytes in heavy metal accumulation during the season was emphasized here and their potential of application in phytoremediation technique.

*Keywords: Cu, Zn, aquatic macrophytes, bioaccumulation*