

## DETERMINATION OF THE HEAVY METALS' PRESENCE IN THE WATER AND GRAYLING MUSCLE TISSUE (*THYMALLUS THYMALLUS*) OF THE RIVER UNA

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### ODREĐIVANJE PRISUSTVA TEŠKIH METALA U VODI I MIŠIĆNOM TKIVU LIPLJENA (*THYMALLUS THYMALLUS*) RIJEKE UNE

#### Apstrakt

Cilj ovog rada bio je da se prikažu uporedni rezultati hemijskih analiza vode i ribe rijeke Une na različitim lokacijama. Za ispitvanje je uzeta riba lipljen (*Thymallus thymallus*) iz porodice Thymallidae. Lipljen je riba koja preferira hladne vode bogate kisikom, što upravo Una i jeste. Uzorci vode i ribe su uzeti sa tri lokacije. Hemijska ispitivanja su obuhvatila analizu vode rijeke Une i to slijedeće parametre: temperatura, pH, elektrovodljivost, otopljeni kisik, suspendirane materije, BPK<sub>5</sub>, KPK - Cr, ukupni dušik - N, ukupni fosfor - P, sulfati - SO<sub>4</sub>, hloridi, nitriti - NO<sub>2</sub>, nitrati - NO<sub>3</sub>, fluoridi i teški metali (Cu, Cd i Pb). U fileu lipljena određeni su: proteini, masti, voda, ugljikohidrati i mineralne materije. Rezultati su pokazali dobar kvalitet vode rijeke Une sa različitim koncentracijama na pojedinim lokalitetima kao i na dobar kvalitet mesa ribe.

Sadržaj Pb, Cu i Cd je određen na atomskom apsorpcionom spektrofotometru „Perkin Elmer“ AAnalyst - 800, plamenom tehnikom. Količine teških metala (Pb, Cu i Cd) bile su ispod maksimalno dozvoljenih količina (MDK). Sadržaj teških metala u mišićnom tkivu riba u direktnoj vezi je sa zagađenjem rijeka. Sadržaj olova u mišićnom tkivu lipljena izlovljenog u rijeci Uni bio je najveći u uzorcima koji su izlovljeni na drugom lokalitetu i najveći sadržaj bakra identifikovan je na istom lokalitetu. Vrijednosti kadmija u uzorcima mišićnog tkiva ribe na svim lokalitetima iznosio je ispod 0,1 mg/kg.

Sadržaji teških metala u ispitanim uzorcima vode i ribe lipljena rijeke Une, imali su vrijednosti ispod dozvoljenih granica. Takvi rezultati ukazuju da još uvijek nije došlo do značajnijeg zagađenja vodotoka rijeke Une.

*Ključne riječi: teški metali, voda, riba, hemijske analize.*

### *Abstract*

The aim of this paper is to present comparative results of the chemical analysis of water and fish of the river Una in different locations. Grayling fish (*Thymallus thymallus*) from the family Thymallidae was sampled for analysis. Grayling is the fish that prefers cold water, rich in oxygen, just as it is a case with river Una. Water and fish samples were taken from three locations. Chemical testing included water analysis of the river Una paying attention to the following parameters: temperature, pH, conductivity, dissolved oxygen, suspended matter, BOD<sub>5</sub>, COD - Cr, total nitrogen - N, total phosphorus - P, sulfates - SO<sub>4</sub>, chlorides, nitrites - NO<sub>2</sub>, nitrates - NO<sub>3</sub>, fluorides and heavy metals (Cu, Cd and Pb). Protein, fat, water, carbohydrates and minerals were determined in the fillet of grayling. The results showed not only good water quality of the river Una with different concentrations in certain locations, but also good quality of fish meat.

Atomic absorption spectrometer "Perkin Elmer" AAnalyst – 800 was used to determine the content of Pb, Cu and Cd through flame technique. Amounts of heavy metals (Pb, Cu and Cd) were below maximum allowable concentration (MAC). The content of heavy metals in fish muscle tissue is directly related to the pollution of rivers. The lead content in the muscle tissue of grayling being overfished in the river Una was the highest in the samples from site number two and the largest copper content was identified at the same site. Cadmium values in the fish muscle tissue samples were less than 0.1 mg / kg at all sites.

The heavy metal content, in the tested samples of water and grayling fish of the river Una, had values below the acceptable limit. These results indicate that the watercourse of river Una is still not significantly polluted.

*Keywords: heavy metals, water, fish, chemical analysis.*