

# Određivanje zaostalog sadržaja bakra u tlu nakon procesa fitoremedijacije rukolom i štitastom ognjicom

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## TEMELJNA DOKUMENTACIJSKA KARTICA

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### ODREĐIVANJE ZAOSTALOG SADRŽAJA BAKRA U TLU NAKON PROCESA FITOREMEDIJACIJE RUKOLOM I ŠTITASTOM OGNJICOM

Tea Guberović, 128

**Sažetak:** Globalni napredak stvorio je mnoge probleme u zaštiti i očuvanju okoliša. Kontaminacija tla otrovnim tvarima se povećala i postala globalni problem. Mnogi od zagađivača su kancerogeni i mutageni te predstavljaju ozbiljan problem za ljudsko zdravlje. Zagađenje tla teškim metalima predstavlja jednu od najvećih briga današnjice. Neke vrste teških metala su otrovne i smrtonosne, čak i u malim koncentracijama, dok druge mogu uzrokovati neurološke poremećaje te druga teška oboljenja. Stoga je sanacija tla zagađenih teškim metalima vrlo važna i u današnje vrijeme naglasak se stavlja na fitoremedijaciju kao ekonomičnu i ekološki prihvatljivu metodu. U ovom diplomskom radu određivana je koncentracija zaostalog bakra, kao teškog metala, u humusu u kojemu su rasle dvije biljke; rukola i štitasta ognjica. Obje biljke su služile kao hiperakumulatori bakra. Određen je sadržaj bakra u šest različito pripremljenih humusa (ukupno 12 za obje biljke): čisti humus bez dodataka, humus s dodatkom letećeg pepela na koji je adsorbiran bakar, humus u koji je dodan humus na koji je adsorbiran bakar, humus s dodatkom ljski jaja na koje je adsorbiran bakar, humus s dodatkom zeolita na koji je adsorbiran bakar te posljednji humus u kojem su biljke bile zalijevane samo s vodenom otopinom bakrovog(II) sulfata. Uočava se povišen sadržaj bakra u svim uzorcima humusa osim u kontrolnim uzorcima. Na temelju izmjerenog sadržaja bakra može se zaključiti kako su biljke ipak, u većoj ili manjoj mjeri, usvojile bakar iz humusa u koji su dodani adsorbensi na koje je prethodno vezan bakar kao teški metal, kao i one koje su zalijevane isključivo vodenom otopinom bakrovog(II) sulfata.

**Ključne riječi:** humus, bakar, fitoremedijacija, rukola, štitasta ognjica

**Rad sadrži:** 42 stranice, 33 slike, 7 tablica, 40 literaturnih referenci

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| 1. Prof. dr. sc. Sandra Svilović    | predsjednica |
| 2. Dr. sc. Jelena Jakić, znan. sur. | član         |
| 3. Doc. dr. sc. Mario Nikola Mužek  | član-mentor  |

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## BASIC DOCUMENTATION CARD

MASTER THESIS

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### DETERMINATION OF RESIDUAL COPPER CONTENT IN SOIL AFTER THE PHYTOREMEDIATION PROCESS WITH THE ROCKET AND THE GARDEN CANDYTUFT

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**Abstract:** Global progress has created many problems in protecting and preserving the environment. Soil contamination with toxic substances has increased and become a global problem. Many of the pollutants are carcinogenic and mutagenic and represent a serious problem to human health. Soil pollution with heavy metals is one of the biggest concerns of today. Some types of heavy metals are toxic and deadly, even in small concentrations, while others can cause neurological disorders and other serious illnesses. Therefore, remediation of soils contaminated with heavy metals is very important and nowadays the emphasis is placed on phytoremediation as an economical and environmentally friendly method. In this diploma thesis, the concentration of residual copper, as a heavy metal, in humus in which two plants grew was determined; rocket and garden candytuft. Both plants served as copper hyperaccumulators. Copper content was determined in six differently prepared humus (a total of 12 for both plants): pure humus without additives, humus with the addition of fly ash on which copper was adsorbed, humus with the addition of humus on which copper was adsorbed, humus with the addition of egg shells on which copper was adsorbed, humus with the addition of zeolite on which copper was adsorbed, and the last, humus in which the plants were watered only with an aqueous solution of copper(II) sulphate. Elevated copper content is observed in all humus samples except in control samples. Based on the measured copper content, it can be concluded that the plants still, to a greater or lesser extent, adopted copper from humus to which adsorbents were added to which copper was previously adsorbed as a heavy metal, as well as those watered exclusively with aqueous copper(II) sulphate.

**Keywords:** humus, copper, phytoremediation, rocket, garden candytuft

**Thesis contains:** 42 pages, 33 pictures, 7 tables, 40 literary references

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|--|--------------|
| 1. Full Professor Sandra Svilović, Ph.D.         | chair person |
| 2. Jelena Jakić, Ph.D., research associate       | member       |
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