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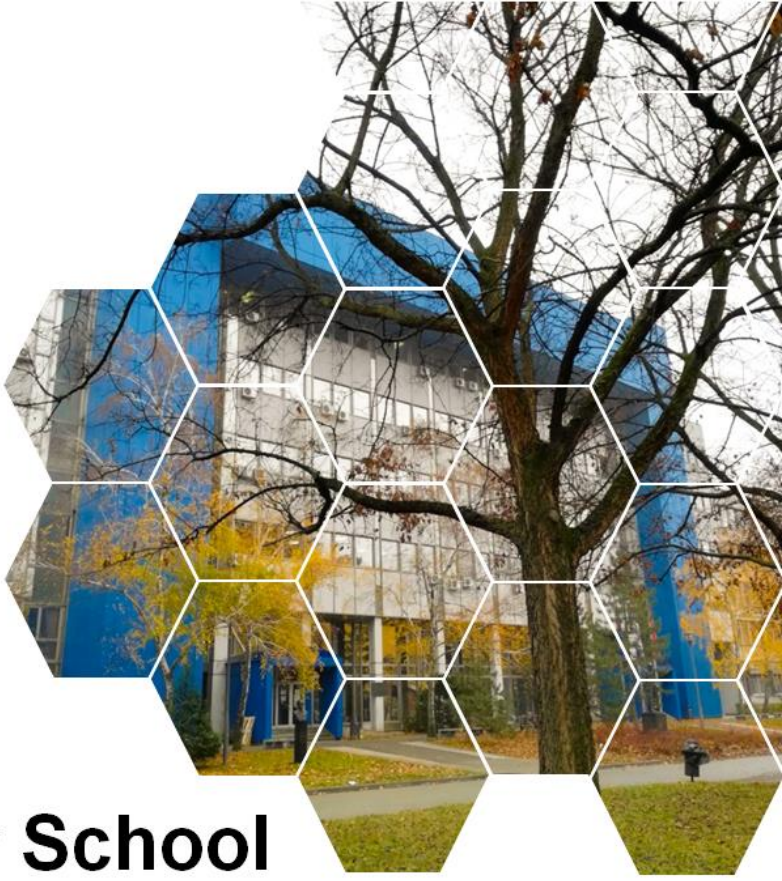

PROCEEDINGS

TwinSubDyn Summer School

on Sustainable organic amendment applications from a soil and ground water management perspective

-learning, training, and knowledge exchange activity-

02-06. June 2025, Novi Sad, Serbia

FACULTY OF SCIENCES NOVI SAD 1969 SERBIA

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BIOCHAR-BASED ELECTROCHEMICAL SENSORS FOR PESTICIDES DETECTION IN AQUATIC ENVIRONMENT

***Jasmina Anojčić*[1]*, Sanja Mutić[1], Nina Đukanović[1], Tamara Apostolović[1], Tajana Simetić[1], Tijana Marjanović Srebro[1], Jelena Beljin[1]**

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As the research and the applications of electrochemical sensors continue to develop, a single-handed pursuit of accuracy and sensitivity cannot meet the demands of the analysis in many *in situ* or *point-of-care* testing circumstances, especially in the fields of food analysis, clinical diagnosis, environmental monitoring, and agricultural detection. More cost-effective, stable, and versatile electrodes, as well as more stable and repeatable sensing strategies, are needed. The peculiar properties of biochar were exploited for the development of electrochemical sensors in view of its lower environmental footprint compared to the widely investigated synthetic carbonaceous nanomaterials (e.g., carbon nanotubes, graphene oxide and carbon dots), reaching analogous or even better analytical performances in the field of electrochemical sensing. With the growth of green chemistry concepts, the preparation and application of biochar have been receiving increased attention. In addition to its advantages (i.e., amorphous characteristics, large specific surface area, surface charge, and good stability etc.), biochar has highly reactive and surface-functionalized spherical and porous structures. Therefore, biochar is a good candidate as a material for electrodes fabrication or modification. The aim of the present work was to develop rapid and highly sensitive voltammetric methods based on the use of biochar-modified carbon paste electrodes for determination of selected dithiocarbamate and carbamate fungicides (maneb, mancozeb and carbendazim). The biochar from different sources (hardwood, wheat, corn) was produced and characterized, afterward it was applied for the preparation of environmentally friendly electrodes with improved electroanalytical performance compared to existing ones. Under optimized conditions of adsorptive stripping voltammetric methods, the obtained limit of detection was 15.0 μg L^{-1} for maneb, 7.5 μg L^{-1} for mancozeb, and 0.38 μg L^{-1} for carbendazim. The developed voltammetric methods were successfully applied to determine selected fungicides in environmental water samples (spiked river water, surface water and wastewater), with good recovery and reproducibility.

Keywords: Biochar, Carbon paste electrode, Voltammetry, Fungicides, Environmental water samples

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