

ID229: Characterization of Biochars from Fruit Stones According to IBI Standard: Toxicant Assessment and Safety for Soil Application

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Abstract

The increasing global population, coupled with the reduction of arable land, poses significant challenges for agricultural production. The use of commercial fertilizers enhances productivity, but their widespread application can lead to both economic and environmental issues. Biochar, carbon-rich material, is gaining increasing attention as a soil amendment, particularly due to its potential to function as a slow-release fertilizer. The International Biochar Initiative (IBI) emphasizes the importance of thorough biochar characterization prior to its use as a soil amendment, aiming to improve soil fertility and contribute to climate change mitigation. In this study, four types of biochars were produced via slow pyrolysis from fruit processing waste: sour cherry, apricot, plum, and peach stones and were characterized according to the Test Category B of the IBI standard. Test Category B (Toxicant Assessment) includes the germination inhibition test (GIT), and covers two categories of toxicants: (i) those that may be present in the feedstock (metals and polychlorinated biphenyls—PCBs), and (ii) those generated during the thermochemical conversion process (polycyclic aromatic hydrocarbons—PAHs, and dioxins/furans). All biochars passed the GIT, indicating no phytotoxic effects. Furthermore, none of the samples exceeded the IBI limits for PAHs, PCBs, and dioxins/furans. However, biochars derived from sour cherry and apricot stones had elevated levels of lead, 321 and 420 mg/kg, respectively, surpassing the IBI threshold of 121–300 mg/kg. Elevated lead content in these samples may pose environmental and agronomic risks, affecting soil microbial communities and nutrient availability, and potentially entering the food chain. Although the tested biochars pass IGT, the presence of elevated lead concentrations in some samples, emphasizing the importance of thorough testing of biochar prior to their application in soil. Biochar produced from plum and peach stones was found to be non-toxic, making it suitable and safe for application in soil.



Recent Publications

1. Antanasković A., Lopičić Z., Dimitrijević-Branković S., Ilić N., Adamović V., Šošćarić T., Milivojević M., *Processes*. 12 (2024), 2418.
2. Lopičić Z., Šošćarić T., Milojković J., Antanasković A., Milić J., Spasić S., Avdalović J., *Processes*. 12 (2024) 964.
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4. Antanasković A., Lopičić Z., Šošćarić T., Adamović V., Cvetković S., Perendija J., Milivojević M., *Hem. Ind.* 78 (2024) 241–252.
5. Lopičić Z., Antanasković A., Šošćarić T., Adamović V., Orlić M., Milojković J., Milivojević M., *Hem. Ind.* 77. (2023) 147–153.

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Biography

Anja Antanasković is a PhD student at the Faculty of Technology and Metallurgy, University of Belgrade, Serbia. She works at the Institute for Technology of Nuclear and Other Mineral Raw Materials (ITNMS) in the Centre for Environmental Protection. Her research focuses on the production and characterization of biochar, its applications in environmental protection, the development of pollutant removal techniques, and the synthesis of novel materials. She published more than 9 papers. Her H-index is 4 on Scopus. Email: a.antanaskovic@itnms.ac.rs