Região Autónoma da Madeira
Governo Regional

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Young Scientists Contest 2022

Summary

Study area: Environmental Sciences

Project Title: Use of banana pulp to remove microplastics from contaminated water

Keyword: microplastics; contaminated water; banana tree; biofilter; eco-technology, circular economy

Objectives:

- Produce unmodified and nanomodified biofilters from agricultural residues;

- Apply the scientific method in the construction of an effective experimental protocol that allows testing the efficiency of simple and nanomodified biofilters in removing microplastics (MPs) from contaminated water;

- Raise awareness of the educational community, and the population in general, to the problem of pollution by microplastics and to the importance of adopting sustainable living habits that minimize their release to the environment, as well as to the importance of using waste as materials for added value.

Methodology: In this project, biofilters were produced from the cellulosic pulp of the banana pseudo-stem with different masses and nanomodified biofilters with solutions of cyanobacteria, microalgal and bacterial exopolymers. The efficiency of different biofilters for the removal of MPs was studied, using a binocular magnifying glass with LED and UV light, a fluorescence microscope and flow cytometry.

Observations: Biofilters obtained from banana pulp showed high efficiency in removing microplastics, and their retention capacity increases with increasing thickness of the biofilter. It was found that after several uses the biofilters maintain their integrity and effectiveness. The nanomodified biofilters are equally effective in retaining microplastics, and those obtained by immersion in exopolymeric substances from the cyanobacteria *Cyanocohniella calida*, showed a greater capacity to retain pollutants.

Conclusion: Biofilters based on banana pulp are a viable eco-technology for the decontamination of wastewater contaminated by microplastics. The recovery of this waste contributes to the development of the circular economy on the island of Madeira and to the 2030 Agenda for Sustainable Development Goal 6 (Clean Water), 11 (Sustainable Cities) and 14 (Life Below Water).