biology and life sciences forum

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Abstract

Alternative Methods of Treatment of Cyanobacterial Biomasses to Reduce Toxin Content †

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† Presented at the 7th Iberian Congress on Cyanotoxins/3rd Iberoamerican Congress on Cyanotoxins, Ponta Delgada, Portugal, 18–20 July 2022.
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Abstract: Microalgae blooms are natural processes that occur in eutrophic aquatic ecosystems. Microalgae blooms, namely those constituted by cyanobacteria, are undergoing a significant expansion as a result of anthropogenic pollution and climate change. Many of these blooms cause environmental and public health concerns due to the production and accumulation of toxic substances by some cyanobacterial species. Despite the burdens that cyanobacteria may cause in the environment and human health, cyanobacterial biomasses are interesting sources of compounds in biotechnology. Cyanobacteria also have interesting plant growth properties, and their biomass is an excellent soil amendment. In order to promote safe use of this type of material in biotechnology and agriculture, a research work was outlined, which consisted in seeking inexpensive and environmentally sustainable methods of treatment of *Microcystis aeruginosa* biomass and to reduce the content of the toxin microcystin (MC) in the biomass. Lyophilized or hydrated biomass from laboratory cultures of *M. aeruginosa* were subjected to treatments by heat (50 °C), ultraviolet radiation, ozone, and solar radiation for periods ranging from 2 to 12 h. The results demonstrate a significant reduction in the amount of MC in the biomass exposed to natural radiation for 12 h, from 0.0042 to 0.0028 mg of MC-LR/mg of dry biomass, equivalent to a reduction of about 33% of the total toxin. Efforts are currently being made to characterize the chemical transformation of the toxin catalyzed by natural radiation. No other treatment allowed us to reduce the amount of toxin present in the biomass, which suggests a strong chemical resistance of MC. This method of treatment of cyanobacterial biomass is quite interesting, and its use on a large scale depends on a confirmation of the preservation of the biotechnological properties of biomass after the applied treatment.

Keywords: cyanobacteria; cyanotoxins; biotechnology; bio-fertilizer; sustainable agriculture

Citation: Loss, L.; Azevedo, J.; Vasconcelos, V.; Campos, A. Alternative Methods of Treatment of Cyanobacterial Biomasses to Reduce Toxin Content. *Biol. Life Sci. Forum* **2022**, *14*, 24. https://doi.org/10.3390/blsf2022014024

Academic Editor: Vitor Gonçalves

Published: 21 July 2022

Author Contributions: Conceptualization, L.L., A.C. and V.V.; methodology, L.L., J.A. and A.C.; formal analysis, L.L., J.A. and A.C.; investigation, L.L., J.A. and A.C.; writing—original draft preparation, L.L. and A.C.; writing—review and editing, L.L., A.C., J.A. and V.V.; supervision, A.C. and V.V.; funding acquisition, A.C. and V.V. All authors have read and agreed to the published version of the manuscript.

Funding: This work received funding from the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement No. 823860.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.