The Phytoproject: Ex situ Bioremediation of Water From Lagoa da Ervedeira: Use of the Microalgae Chlorella vulgaris Immobilized in Calcium Alginate

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Eutrophication is a degradation process of aquatic ecosystems. As a consequence of the nutrient rise, the environment is disrupted. Thus, it is vital to develop efficient methods that remove nutrient content from the water. Phytoremediation is an effective process where algae are responsible for removing nutrients from aquatic means. The present work studies the possibility of its application in Lagoa da Ervedeira, Portugal, a freshwater body of great ecological and societal importance, famous for its eutrophication state in the summer months. For this purpose, the microalgae Chlorella vulgaris, commonly used in wastewater treatments, was immobilized in a calcium alginate gel matrix, samples of water from the lagoon were collected (04/25/2021) and enriched with culture medium BBM2N, simulating a eutrophic state. The monitorization of the concentration of nitrates, nitrites, phosphates, pH and temperature occurred every two days for 12 days. The apparatus consisted of 3 sets: A (C. vulgaris and enriched water), B (C. vulgaris and water without enrichment) and C (water without enrichment). Furthermore, the cell density was evaluated at the beginning and end of the trial to monitor its growth, verifying if it is suitable for the bioremediation process. In A, there was a 66,67% removal of nitrate, 100% of nitrites and 77.67% of phosphates. The density increased 4.6 times, while in B increased 1.3 times. The laboratory-scale test demonstrated the success of the phytoremediation process by C. vulgaris immobilized in calcium alginate, displayed by the high percentages of removal and the increased density. These results indicate its suitability to be applied to reduce in situ the level of eutrophication of the lagoon and other freshwater masses that exhibit similar conditions.

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