Effect of Lemna minor on Caffeine Levels in Freshwater Ecosystems

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Pollution in freshwater ecosystems from chemicals, personal care products, and pharmaceutical products due to ineffective wastewater treatment poses a significant threat to both water quality and human health. The goal of this research is to ascertain whether the aquatic plant Lemna minor, commonly referred to as duckweed, can reduce caffeine levels in freshwater ecosystems. We hypothesize that if Lemna minor is grown with enough density of specimens, then the amount of caffeine present in the ecosystem will decrease. In each test group, different amounts of Lemna minor were grown in 200mL of well water, caffeine, and fertilizer solution in order to determine the minimum amount needed to see a change in the caffeine levels. The amount of Lemna minor in each test group was 20 sprigs, 40 sprigs, and 80 sprigs. The Lemna minor grew for three weeks and then the remaining caffeine in the solution was extracted using dichloromethane as a solvent. The major findings for this research were, across all test groups, there was loss in caffeine compared to the control. The percent loss of caffeine from the control group to the test group with 80, 40, and 20 Lemna minor sprigs was 6.78%, 7.91%, and 11.5% respectively. These results lead to the conclusion that Lemna minor has the potential to be used in the phytoremediation of caffeine in freshwater ecosystems, and further research should explore Lemna minor’s effect on other pollutants.

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