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EUTROPHICATION CONTROL TREATMENTS AND SEDIMENT POROSITY

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Different land uses and wastewater discharges from point and diffuse emission sources result in accumulation of nutrients, or eutrophication of lakes and reservoirs, and water quality not meeting standards for different uses. Consequently, 70% of the approximately 300 lentic water bodies monitored in Mexico are in a eutrophic or hypereutrophic state [1]. Different methods have been proposed for the rehabilitation of eutrophic water bodies, where the following stand out (1) hypolimnetic oxygenation systems (HOS), where organic matter is expected to be more readily degraded and iron oxyhydroxides are formed that can immobilize nutrients, and (2) application of a phosphorus selective adsorbent (Phoslock) in water and sediment, that restrains this limiting nutrient [2]. The effectiveness of these treatments depends on the accessibility of these amendments to surfaces inside the porous structure of sediments, and the question arises if there are structural changes due to the application of these methods? We evaluated how these treatments affected mineralization rates of organic matter, immobilization of phosphorus, changes in pore volumes, distribution of pore areas in the sediment. The sediment had a predominant pore size of 5.2 ± 1.5 nm with an initial specific surface area of 46 m²/g, which increased to 58 m²/g with the HOS treatment and decreased to 41 m²/g or less with the Phoslock and combined treatments and without treatment (Control). The pore volume remained at 0.09 ± 0.01 cm³/g with no variation between treatments. It was determined that the mineralization rate of organic matter was higher in the Control reactor (44% of the organic matter in 220d) and lower in the reactors with treatments ($32 \pm 5\%$ of the organic matter). The treatments did therefore not affect the pore volume or diameter. The different mineralization reactions identified through ion release and depletions during the treatments, were related to variations in surface areas of the sediment. The financial supports from IMTA (TH1913.1 and TH2012.1), Conacyt (scholarship- CVU 780094) and the Office of International Affairs and External Cooperation of the University of Costa Rica, are acknowledged.

Time Block Preference

Time Block C (18:00-21:00 CET)

References

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