

Microplastics in Cultured and Wild Oysters: Comparative Assessment of Accumulation and Depuration Efficiency

R. Mathushan¹, R. Consaha¹, M.G.Y.L. Mahagamage², A.L. Inamul Hassan^{1*}

¹*Department of Aquatic Bioresources, Faculty of Urban and Aquatic Bioresources, University of Sri Jayewardenepura, Gangodawila, Nugegoda 10250, Sri Lanka.*

²*Centre for Environmental Studies & Sustainable Development, The Open University of Sri Lanka, Nawala, Sri Lanka.*

*[*ainamulhassan@sjp.ac.lk](mailto:ainamulhassan@sjp.ac.lk)*

Microplastic contamination in seafood is a rising concern for seafood consumption and human health, especially the consumption of shellfish considering their filter-feeding nature. This study examined microplastic contamination levels in cultured oysters sourced from Kandakuliya lagoon and wild oysters harvested from Negombo lagoon, Sri Lanka, alongside an assessment of how effectively a 24-hour depuration process could reduce microplastic levels. At each sampling site, 30 oysters were collected, with 15 oysters immediately processed for microplastic quantification and the remaining 15 placed in a commercial depuration plant for 24 hours before processing. Both groups were examined in three replicates, each comprising pooled soft tissues from five oysters. Tissue samples underwent hydrogen peroxide digestion at 50 °C for 72 hours, saturated sodium chloride density separation, and Nile Red fluorescent staining, after which microplastics were identified and counted using stereomicroscope. Ambient water samples from both lagoons were simultaneously examined to reflect environmental contamination levels. Although statistically not significant, wild oysters from Negombo Lagoon recorded numerically higher mean microplastic concentrations (1.59 particles/g) than cultured oysters from Kandakuliya Lagoon (0.60 particles/g). Similarly, water sample analysis revealed that there is no significant difference in microplastic counts between Negombo (average = 100 ± 20 particles/m³) and Kandakuliya lagoon (average = 30 ± 10 particles/m³). Fragment constituted the most prevalent microplastic type at both sites, followed by fibers and foams. The commercial depuration process has significantly reduced the microplastics ($p < 0.05$) with a mean overall removal efficiency of 67 %, with the reduction confirmed as statistically significant through paired t-test. Removal rates differed by particle type ($p < 0.05$), with foams eliminated most efficiently (77%), followed by Fragment (73%), whereas fibers proved hardest to remove (48%). Overall, these results indicate that a 24-hour depuration period is effective in reducing microplastic levels in oysters and highlight the need for improved depuration practices, aquaculture management, and plastic waste control in Sri Lanka.

Keywords: *Microplastic, Depuration, Oysters, Negombo lagoon, Kandakuliya lagoon*