A year-long monitorization of microplastic pollution in a bivalve aquaculture located at a coastal lagoon from Portugal

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Abstract

Marine bivalves, organisms with a worldwide distribution, have an essential role in ecosystem structure and functioning. Some species consumed by humans are considered economically valuable. Nowadays, in order to meet the worldwide demand for seafood resources without putting the natural stocks at risk of overharvesting, marine bivalves are primarily obtained from aquaculture production. Marine bivalves are often produced in aquacultures located in transitional waters systems, which are considered ideal sites for their optimal development. However, these systems are impacted by a substantial number of pollutants, including microplastics, that may cause adverse effects in the marine bivalves produced for human consumption.

In this study, a year-long monitorization was conducted in a bivalve aquaculture located in the Ria de Aveiro coastal lagoon, Portugal, to understand the occurrence of microplastic pollution in different environmental matrices: marine bivalves, water and sediment. *Crassostrea gigas* (diploids and triploids) and *Ruditapes philippinarum* were the bivalve species studied and were sampled once every three months, from September 2019 to July 2020. The occurrence of microplastics in these species was examined at the tissue level, with observation of separate tissues (muscle, digestive gland, gills, remaining visceral mass). Water and sediments were collected once a month from September 2019 to September 2020.

Microplastics were found in every environmental matrix. Microplastics were detected in higher quantities in sediments, followed by water surface and marine bivalve species. Fragments, fibers and films were common types of microplastics found and their colours included blue, pink, white, and others. FTIR analysis revealed that the most prevalent polymers found in the aquaculture were polyethylene, polypropylene, and polystyrene. Further investigation will be conducted to assess the possible effects of the presence of these common microplastic polymers in the marine bivalves produced for human consumption.

Keywords: Crassostrea gigas, Ruditapes philippinarum, water, sediment, microplastics, bivalves, aquaculture, human consumption

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