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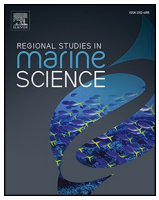

First evidence of microplastic ingestion by crescent perch (*Terapon jarbua*) in Malaysia

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ABSTRACT

Microplastics are plastic debris smaller than 5 mm in size. In recent decades, the issue of microplastics contamination in marine organisms from the marine environment has gained more attention. This study focuses on the occurrence of microplastics in the gastrointestinal tract (GIT) of the crescent perch (*Terapon jarbua*). Sixty-two crescent perch were collected from four locations in Malaysia: Sungai Besar and Kuala Selangor on the west coast of Peninsular Malaysia, Kuantan on the east coast of Peninsular Malaysia, and Mukah in East Malaysia. Microplastics were found in the GIT in 82% of the samples with a mean value ranging from 1.46 ± 0.60 to 2.25 ± 1.26 particles/ind. Microplastics contamination in samples from Mukah was significantly higher than in samples from Kuala Selangor. The increased number of ingested microplastics could be attributed to the higher levels of microplastics contamination present in the coastal waters of Mukah due to the anthropogenic activities taking place there. The extracted particles were predominantly fibres, followed by fragment, and film. The microplastics ingested by crescent perch were primarily blue and black. μ-FTIR tests showed that the most common polymers found in crescent perch were rayon, polyethylene terephthalate, and polyethylene. The findings from this study provide initial evidence that microplastic contamination is emerging as a threat to crescent perch and the Malaysian water ecosystem. Further investigations into microplastics contamination in fish in Malaysia are required, as microplastics exposure to fish can induce adverse effects on the species and the food web.

1. Introduction

Plastics are widely used globally due to their cost-effectiveness, ease of production, and lightweight nature. The annual plastic production rate has gradually increased from approximately 1.5 million tonnes in 1950 to 367 million tonnes in 2020 (PlasticEurope, 2006, 2022). The substantial plastic production volume and its durability properties result in long term environmental accumulation. As of 2015, approximately 6300 million tonnes of plastic waste had been generated, with 79% accumulating in landfills or the natural environment, 12% being incinerated, and around 9% being recycled (Geyer et al., 2017). It was estimated that 1.15 to 2.41 million tonnes of plastic debris enter the ocean annually through rivers (Lebreton et al., 2017). Larger plastic waste accumulated in marine environment has been identified as being ingested by organisms such as the blue shark (Fernandez and Anastasopoulou, 2019). Ingestion of plastic debris by marine turtles was found to obstruct the gastrointestinal tract (GIT) and lead to fatalities (Santos et al., 2015). Moreover, plastic waste in marine environment breaks down into smaller pieces (Veerasingam et al., 2020; Vaid et al., 2021; Mohan et al., 2022). Plastic particles with sizes below 5 mm are commonly referred to as microplastics (Thompson et al., 2004; Arthur et al., 2009; GESAMP, 2019). The investigation of microplastics contamination in marine environments dates back to the early 1970s and is a growing global concern (Carpenter et al., 1972). Among the plastics present in oceans, microplastics dominate, constituting 92.5% of the total plastic count, followed by mesoplastic and macroplastic (Eriksen et al., 2014).

The prevalence of microplastics in marine environments has led to

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