STABLE ISOTOPE DETERMINATION AND PLASTIC INGESTION IN FARMED SPARUS AURATA AND MYTILUS GALLOPROVINCIALIS IN AN INTEGRATED MULTI-TROPHIC AQUACULTURE SYSTEMS

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Abstract

Plastic debris are ubiquitous and are also found in marine aquaculture. Two key species, *Sparus aurata* (sea bream) and *Mytilus galloprovincialis* (Mediterranean mussel), were tested for four months to assess the effects of plastics derived from a multi-trophic aquaculture system integrated into the natural environment and these impacts on biological parameters (Condition index, Fullness index and size). For this, stable isotope analyses of carbon (δ12C and δ13C) and nitrogen (δ14N and δ15N) was performed. Additionally, gastrointestinal tracts of fish and soft tissues of mussel were digested with potassium hydroxide to analyse and quantify ingestion of plastics. For *S. aurata*, 24.44% individuals had ingested plastics with a total of 145 particles identified using visual sorting. Visually, 79.30% items identified were macrofilaments derived from aquacultures facilities. Sea bream of outdoor cage sites showed an average enrichment of 0.55‰ in δ13C and an average impoverishment of 0.56 ‰ in δ15N compared to indoor treatment. For *M. galloprovincialis,* 89.52% individuals had ingested plastics with a total of 709 particles identified. 98.20% of plastic items identified were fibres. δ13C mean values in mussels' soft tissue were more negative in cages (-21.42 $\pm$ 0.38‰) than in control sites, but differences were not significant. δ15N mean values were significantly higher in cages (6.01 $\pm$ 0.32‰) than in control sites. Despite physical damages, no correlation between plastic ingestion and biological parameters was observed. No relationship was found between plastic ingestion and isotopic values in the two species. Isotopic differences were mainly due to different food sources with control sites and no to the plastic ingestion.

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