POTENTIAL TROPHIC TRANSFER OF MICROPLASTICS FROM MARINE TO HUMAN FOOD CHAIN: PRELIMINARY STUDY ON COMMERCIAL SEAFOOD FROM TYRRHENIAN SEA

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Introduction

The occurrence of microplastics is recognized as an emerging threat to aquatic ecosystems. One of the main environmental risks associated with microplastics is their bioavailability to marine organisms. An increasing number of reports documents the ingestion of microplastics by fish species, including those for human consumption, and their occurrence in the gastrointestinal tract (Efsa, 2016).

Although demersal fish are usually eviscerated before the consumption, both fresh and dried small fishes are often consumed as whole (Renzi et al., 2019). This is the case of *Engraulis Encrasicolus*, a commercially important small pelagic fish species, which has been proposed as a small-scale indicator both of microplastic contamination in open waters and human exposure (Compa et al., 2018). The particular feeding strategy, that combines both filter and particulate feeding activities, makes them the link between higher (top predators such as tuna fish) and lower (phyto- and zoo-plankton) trophic levels (Renzi et al., 2019).

This study investigates marine litter and microplastics in the gastrointestinal (GI) content of anchovy (*E. encrasicolus*), sampled from the Tyrrhenian Sea(FAO subarea 37.1, division 37.1.3).

Methodology

The GI tracts of *E. encrasicolus* (n.20) were removed, and the sample processing was performed based on a digestion method, according to Foekema et al. (2013) and Avio et al. (2015) with some modifications.

The GI tracts were filled with a 10% KOH solution, and the jars were stored overnight at 45 °C in an oven until the dissolution of the organic material was observed to be complete.

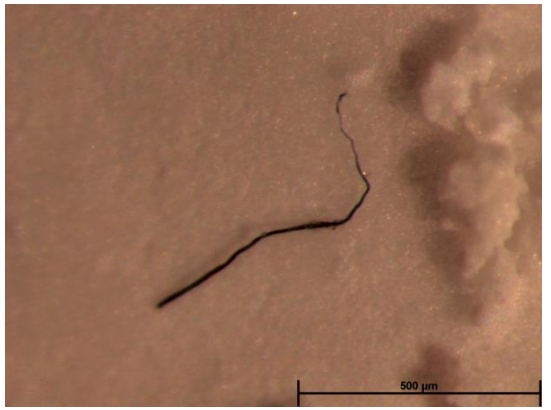
Each sample was added to prefiltered hypersaline solution (1.2 g/cm^3), stirred, and decanted for 10 min. The overlying water was filtered over a cellulose nitrate membrane filter (pore size of 8 µm, 47 mm diameter).

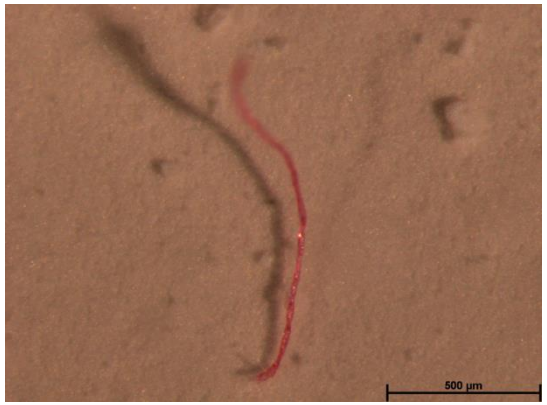
The filters with retained materials were transferred in a Petri dish with a 15% H_2O_2 solution and allowed to dry in oven (45 °C) for the digestion of residual organic matter.

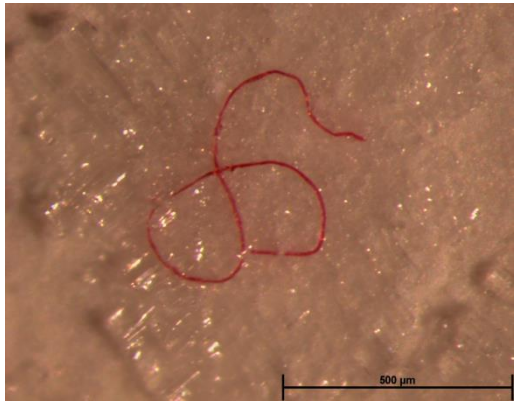
A visual assessment was applied to identify the morphotypes of retained particles. Filters were covered with glass lids during observation under the optical microscope (LEICA M205C, zoom range 0.78x - 16x).

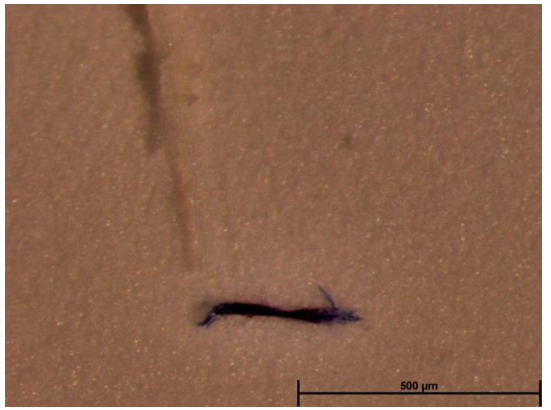
Results

- Anthropogenic debris recovered from anchovy sampled from the Tyrrhenian Sea was primarily fibers.
- The preliminary results showed, on average, a number of 0.88 fibres/g of wet weight of the individual, and 9.15 fibres/individual.
- Fibres were mostly dark, but the presence of other colours was frequent, indicating a general lack of selectivity.









Discussion

Analyses of the GI contents of commercial fish from the Mediterranean sea, including pelagic fish such as anchovy, showed a dominance of fibres (over 90%) among the anthropogenic particles (Rios-Fuster 2019). In the current study, anchovies from the Tyrrhenian Sea showed a number of 9.15 fibres/individual, while lower levels of contamination were detected in anchovies from the Ligurian Sea (1.17 items/individual; Capone et al., 2020). This variability could be explained by the heterogeneous dispersion of the marine debris along the oceans and sea that could affect the microplastic ingestion by marine organisms (Rios-Fuster 2019). Data on the occurrence of microplastic fibers in fish is limited, while many studies investigated the contamination levels of filter-feeding organisms such as bivalve molluscs. However, considering that anchovies composing the main diet for pelagic predators in the Mediterranean Sea, and their relevance for human consumption, further studies targeting levels of litter and microplastics in natural stocks are essential (Renzi et al., 2019).

Traceability of the fate of plastic debris in contaminated seafood is essential to assess their bioaccumulation and biomagnification in the marine habitat and the potential trophic transfer from marine to the human food chain.

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