MICROPLASTIC FIBRE PRESENCE IN THE FOOD CHAIN OF *SPHYRAENA VIRIDENSIS* IN THE EASTERN AEGEAN SEA, GREECE

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Abstract
Microplastics are considered as a major threat not only for the wildlife but also for the human health as they accumulate within the food chain. This study evaluates the persistence of microplastic fibres in marine ecosystems around Samos Island in the eastern Aegean Sea, Greece and aims to correlate the density of microfibers to each trophic level which was represented by selected species, of the food chain. Irrespective that the results confirmed the correlation between trophic level and the mass of fibres, the smaller fish in lower trophic levels still pose a great threat due to higher concentration of microplastics.

Keywords: Plastics, Pollution, Food webs, Aegean Sea, Trophic relations

The research was carried out to assess the presence of microplastic fibres in the marine food chain and identify the potential threat to humans and the ecosystem itself. When ingested, microplastic fibres can cause cloggage in the digestive tract, become translocated to different tissues within the organism, and bioaccumulate [1]. Bioaccumulation at lower trophic levels endangers all subsequent trophic levels and high concentrations in the upper levels are partly a result of the transfer throughout the food chain [2]. To assess the presence and concentration of microplastics in the food chain of *Sphyraena viridensis*, the amount of microfibers of various species was compared, each one representing a different trophic level: *Boops boops*, *Trachurus mediterraneus* and zooplankton-surface water.

Surface water samples were collected by towing a net with 333 μm mesh and a 0.6 x 0.2 m^2 mouth. The samples were then sieved, treated with a saline solution and the supernatant processed using Whatman^{TM} GF/F filters. Finally microplastic fibres were identified using a microscope X10. Individuals of each fish species were identified to the lowest taxonomic level and dissected. The stomach was placed in a saline solution, shaken and let to settle. After repetition of this process, supernatant was removed, filtered and the fibres were counted.

All samples were contaminated with microplastic fibres. The most contaminated species was *Sphyraena viridensis* with an average of 42 ± 20.5 (SD) fibres per individual. *Trachurus mediterraneus* and *Boops boops* had an average of 28 ± 19.5 (SD) and 15.4 ± 3.2 (SD) respectively. Surface water was contaminated with 9.6 ± 4.36 (SD) fibres per sample and an average of 568 ± 264 (SD) per m^3. These values of microplastics in the surface water attest their availability for all marine species. The results show that *Boops boops* at the lowest trophic level of the examined specimens had the lowest number of fibres and *Sphyraena viridensis*, at the highest level had the greatest values.

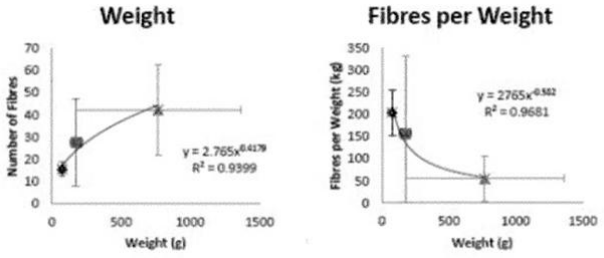

Fig. 1. Correlation Weight and Number of Fibres and correlation between Weight and Fibres per Weight

This observed accumulation in larger fish agrees with previous research dealing with heavy metal, mercury and pesticide accumulation. Previous studies have found that contaminants accumulate within the food chain and are more highly concentrated in high trophic levels than lower ones [3]. Even though the fibres bioaccumulate and are greater in number further up the food chain, it is important to underline that lower trophic levels showed a higher amount of fibres per weight. *Boops boops* showed an average of 204 ± 49,9 (SD) fibres per kg^{-1} representing the species with more fibres per weight (Fig 1). *Trachurus mediterraneus* had an average of 157 ± 173.1 (SD) fibres per kg^{-1} while *Sphyraena viridensis* obtained 55 ± 46.9 (SD) fibres per kg^{-1} implying that consumption of lower trophic level fish is more harmful than of higher levels. Further research should be conducted, in order to provide a better understandig of the real extent of the threat that microplastic pollution poses to marine biota.

References

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