

# FROM FASHION TO MARINE ENVIRONMENTS: CYTOGENOTOXIC EVALUATION OF EXPOSURE TO TEXTILE MICROFIBERS IN *Crassostrea gasar*

Laís Adrielle de Oliveira Santos<sup>1</sup>, Letícia Fernanda da Silva<sup>1</sup>, Alexandre Rodrigues Nascimento Gonçalves<sup>1</sup>, Julia Lino Duz<sup>3</sup>, Paloma Kachel Gusso-Choueri<sup>3</sup>, Rodrigo Brasil Choueri<sup>2</sup>, Camilo Dias Seabra Pereira<sup>2</sup>, Caio Rodrigues Nobre<sup>2</sup>, Renata de Britto Mari<sup>1</sup>.

<sup>1</sup> *Department of Biological and Environmental Sciences, São Paulo State University (UnespCLP).*

<sup>2</sup> *Department of Marine Sciences, Federal University of São Paulo (Unifesp-CBS).*

<sup>3</sup> *Department of Ecotoxicology, Santa Cecília University (Unisantia).*

Corresponding author: [lais.adrielle@unesp.br](mailto:lais.adrielle@unesp.br)

## ABSTRACT

**INTRODUCTION:** The contamination by textile microfibers (MFs) has become a growing concern for aquatic ecosystems and human health. The ingestion of these MFs by aquatic organisms can lead to bioaccumulation and biomagnification throughout the food web, representing a potential threat to higher trophic levels, including humans. **OBJECTIVE:** In this context, this study aimed to evaluate the sublethal effects of polyester plastic microfibers, natural cotton microfibers, and a mixture of these microfibers, at two concentrations (environmentally relevant at 0.11 mg/L and higher at 1 mg/L), on the gills and digestive glands of *Crassostrea gasar*. **MATERIALS AND METHODS:** The specimens were exposed to these MFs for 7, 14, and 21 days to investigate the impacts on biotransformation and conjugation enzymes, antioxidant defenses, cytogenotoxicity, and neurotoxicity. The survival rate was monitored daily by recording and removing dead organisms from the aquarium and was analyzed using the Log-rank test. **RESULTS:** The biomarker results revealed biochemical alterations in both analyzed organs, with varying degrees of impact in each organ. The main effects included increased GSH levels, cytogenotoxicity, lipid peroxidation, and DNA damage. The data indicate that exposure to microfibers increases reactive oxygen species (ROS) levels in a time- and concentration-dependent manner. The increase in LPO levels and DNA damage suggests an effect leading to the depletion of antioxidant defenses and increased cellular damage, surpassing the organism's defense capacity. Additionally, there was a reduction in the survival rate of organisms exposed to all three types of microfibers and at both concentrations. Among the evaluated microfiber types, polyester was the most harmful to the studied organism, causing changes at different levels of biological organization (biochemical, cellular, and physiological). **CONCLUSION:** It can be stated that textile-origin microfibers represent a threat to tropical estuarine ecosystems, necessitating legislative implementations to control the release of microfibers into the environment, in order to reduce risks to organisms and ecosystems.

**Keywords:** polyester; cotton; biomarkers; sublethal effects; mortality. Financial support: FAPESP: (n°2023/02394-8); CAPES: (8887.954715/2024-00).