

OCCURRENCE OF MICROPLASTICS IN THREE WILD SPECIES OF SEA URCHINS (*PARACENTROTUS LIVIDUS*, *ARBACIA LIXULA* AND *DIADEMA AFRICANUM*) FROM THE COASTAL AREA OF TENERIFE AND LA PALMA (CANARY ISLANDS, SPAIN).

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INTRODUCTION

Sea urchins play a key role in the dynamics of the coastal ecosystems by organizing and structuring rocky macroalgae assemblages (1). These species that populate the marine coastline are susceptible to plastic pollution due to the presence of submarine outfalls and terrestrial runoffs, which represent an important source of these pollutants in the vicinity of the coasts.

This study investigates the occurrence of microplastics in three species of wild sea urchins collected at coastal areas of the islands of Tenerife and La Palma (Canary Islands, Spain) between 2021 and 2022. Sea urchins were collected by scuba divers in different localities of these two islands at a depth between 3 and 11 meters. Once at the laboratory, from each sea urchin, digestive tracts and gonads were removed and digested with H₂O₂ (33%). After filtration of the digests, each filter was visualized under a stereomicroscope (2). Results revealed a similarity in the distribution pattern among the three sea urchin species in terms of size, shape, and colour, finding in all species mainly transparent fibers. Regarding their composition, most of them showed a cellulosic composition (natural and semisynthetic) though an important concentration of synthetic fibers were also found. These results agree with other studies previously carried out in the same biogeographic region (3).

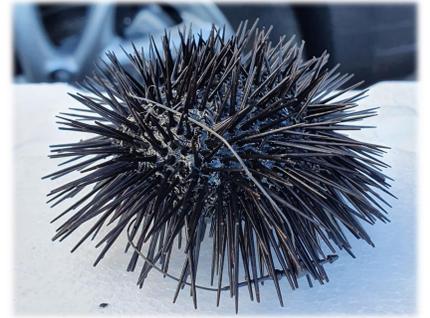


Figure 1. *Arbacia lixula* sea urchin collected in La Palma with a macroplastic.

EXPERIMENTAL

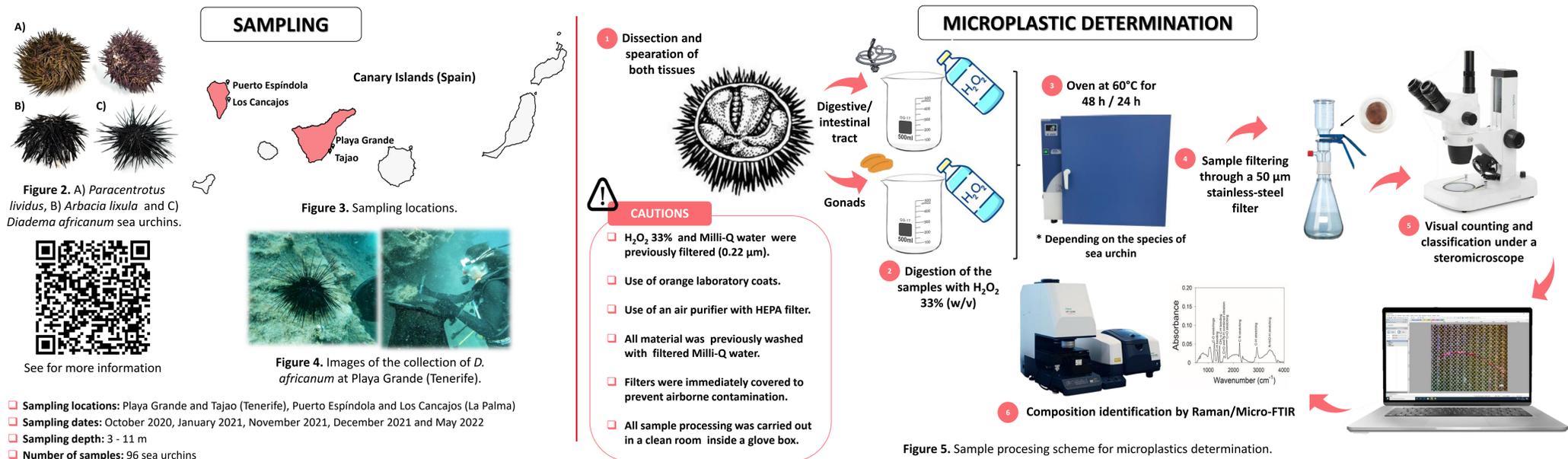


Figure 5. Sample processing scheme for microplastics determination.

RESULTS AND DISCUSSION

Table 1. Summary of the microplastics content in three different species of sea urchins.

Island	Location	Date	Species	N° of individuals	N° of particles	Average items/individ. ± SD	Shape classification
Tenerife	Playa Grande	Jan-21	<i>Diadema africanum</i>	20	200	10.0 ± 4.5	312 microfibrils (97.5%) 2 films (0.6%) 6 fragments (1.9%)
Tenerife	Tajao	Oct-20		13	120	9.2 ± 3.0	
La Palma	Los Cancajos	Dic-21		15	37	2.5 ± 2.0	
La Palma	Puerto Espindola	Dic-21	<i>Arbacia lixula</i>	15	51	3.5 ± 2.5	81 microfibrils (92.0%) 3 tangled mess (3.4%) 4 fragments (4.5%)
Tenerife	Tajao	Nov-21	<i>Paracentrotus lividus</i>	15	86	5.7 ± 2.4	223 microfibrils (98.2%) 3 fragments (1.3%) 1 line (0.4%)
Tenerife	Tajao	May-22		18	141	7.8 ± 3.8	

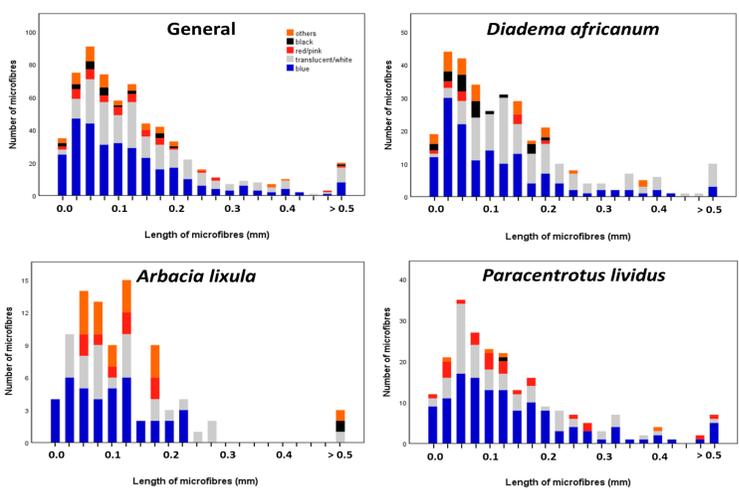


Figure 6. Histograms of the size and color distribution of the microfibrils found in general, and for each sea urchin species.

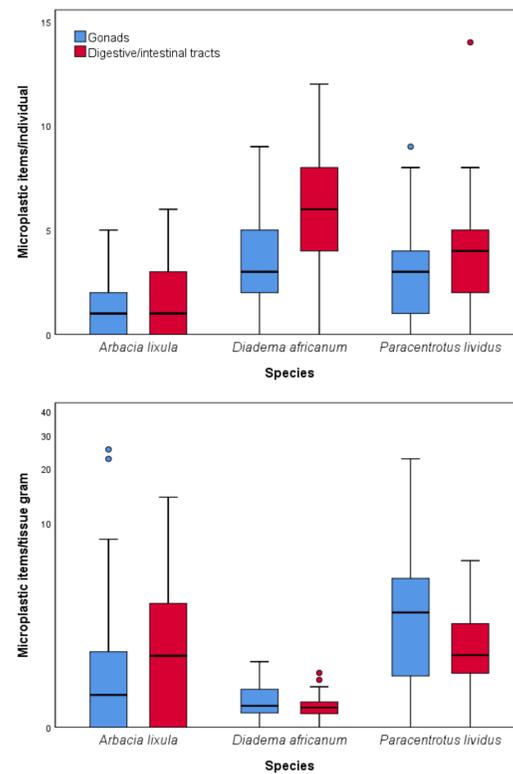


Figure 7. Box and whiskers plots of the number of items per individual and number of items per tissues weight (g) for three different sea urchin species.

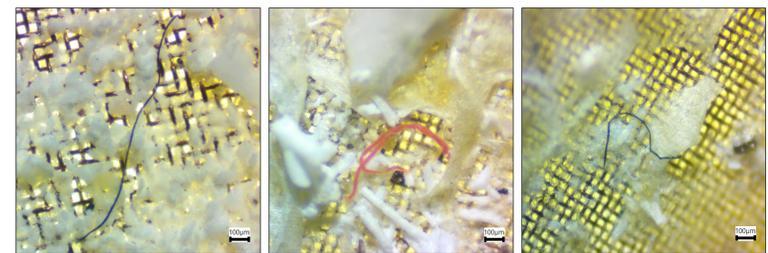


Figure 8. Stereomicroscope photographs of three microfibrils found in sea urchins during this study.

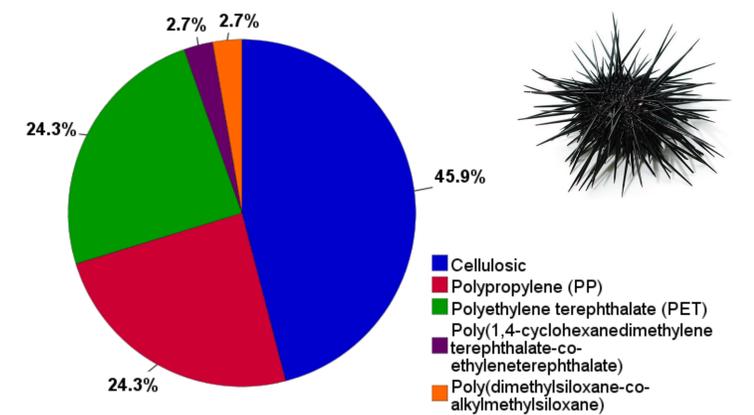


Figure 9. Distribution of the composition of the microfibrils found in *D. africanum* (n=37) by µRaman spectroscopy (Sevillano-González et al., 2022).

CONCLUSIONS

- The presence of microplastics in both digestive/intestinal tracts and gonads of *Diadema africanum*, *Arbacia lixula* and *Paracentrotus lividus* has been confirmed in individuals collected at different locations of Tenerife and La Palma (Canary Islands, Spain). In all three species, fewer plastic particles were found in the gonads than in the digestive/intestinal tracts.
- Regarding items per individual, the species *Diadema africanum* was the one with the highest number of 9.5 ± 4.0 items/individual. However, regarding items per gram of tissue, the same species *Diadema africanum* was the one with the lowest number of 0.7 ± 0.4 items/g tissue.
- The same pattern was found in all three urchin species, mainly blue microfibrils and an average size between 500 - 750 µm, which is similar to what found in other studies conducted in the same biogeographic region.

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