MICRO 2024 PLASTIC POLLUTION FROM MACRO TO NANO

A PRELIMINARY COMPARISON OF MICROPLASTIC TYPE, SIZE, AND COMPOSITION IN ATMOSPHERIC AND FOLIAGE SAMPLES IN AN URBAN SCENARIO

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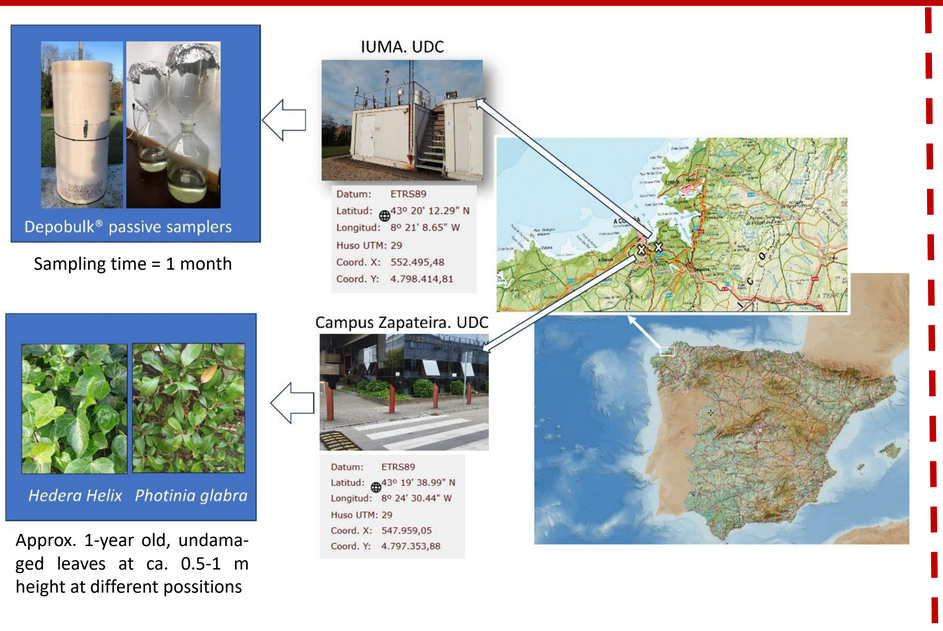
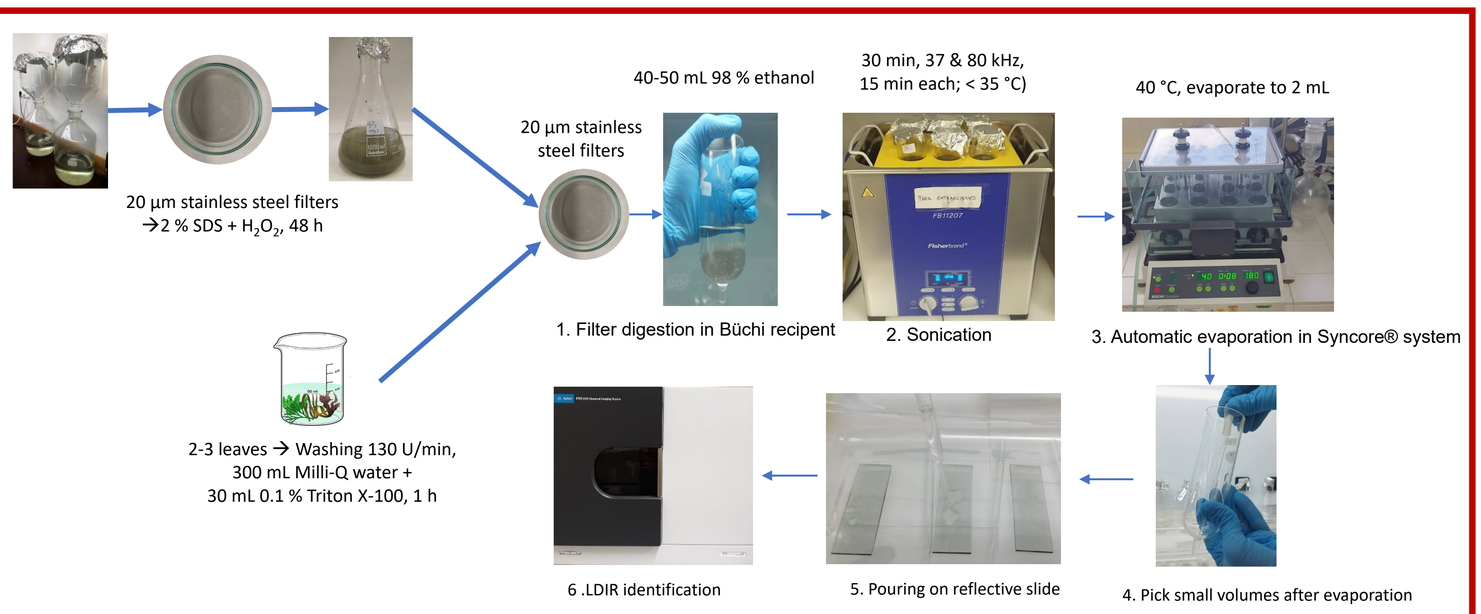
1. INTRODUCTION AND OBJECTIVES

The rising trend of plastic production in last years and the inadequate disposal of related waste has raised concerns regarding microplastic-related environmental issues. Microplastic particles (MPs) disperse by means of transport and deposition processes to different ecosystems and enter food chains. The aim of this work is to evaluate the quantity and identity of MPs in atmospheric deposition and foliage samples of two common vegetation species (i.e., *Hedera helix* and *Photinia glabra*). Then, a comparison will be made to ascertain whether these vegetable species can be used as passive samplers for atmospheric MPs (AMPs) monitoring.

2. SAMPLES AND THEIR TREATMENT

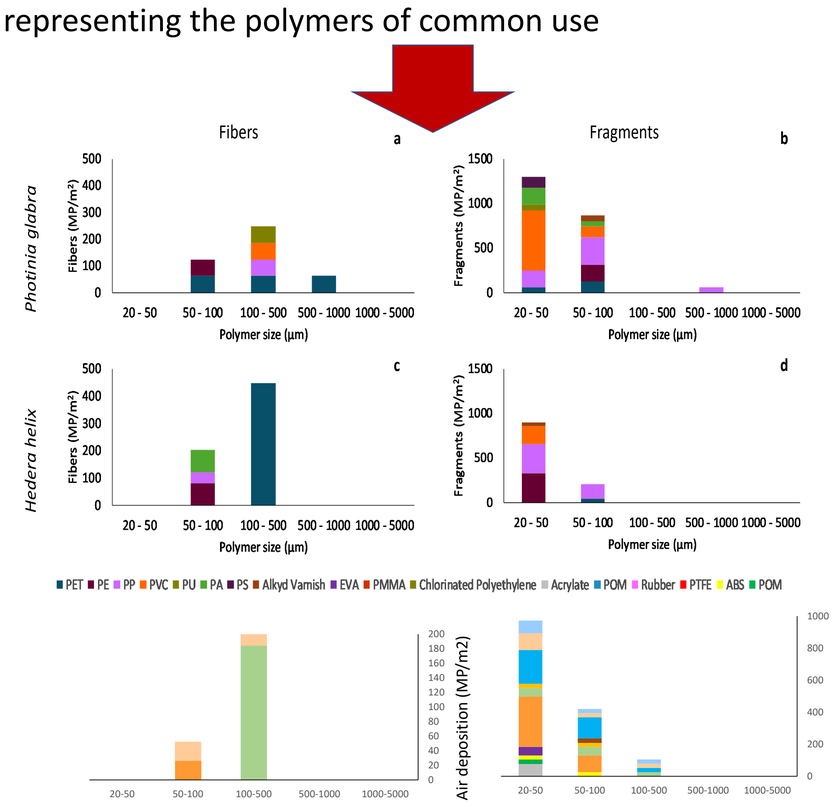




3. COMPARISON OF AMPs IN AIR AND FOLIAGE

Total AMPs in air, HH, and PG samples amounted to 73, 67 and 101 items, respectively (bulk depositions, subtracting blanks, unnormalized); 2735 MPs·m^{-2} and 6235 MPs·m^{-2} for HH and PG. The MPs size distribution is the same for the air and leaves (both species). Fragments represent 73-92 % of particles in air and leaves.

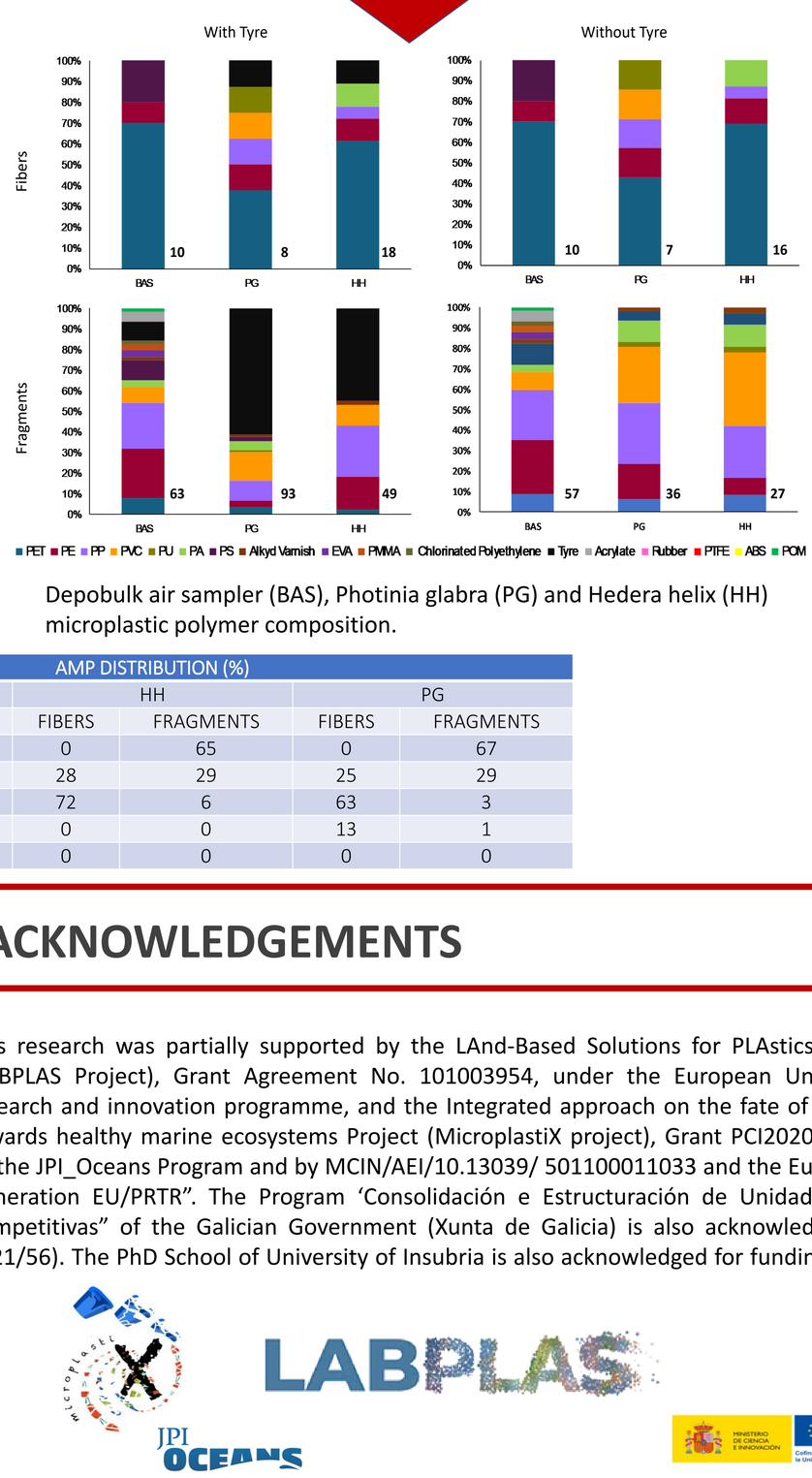
PET, PP, PE, PVC, PS and PA were the most frequently detected polymers (excluding tyres), representing the polymers of common use



Direct numerical comparison between the bulk air sampler and the leaves is not possible (not even normalizing by their surface) given the different accumulation time (1 month for BAS, several months for leaves).

Hence, the MPs fingerprint and percentual composition by polymer type will be considered (% of a polymer considering the total amount of identified particles).

The profiles for air and leaves are the same, but for PG which seemed to accumulate more tyre fragments.



Depobulk air sampler (BAS), Photinia glabra (PG) and Hedera helix (HH) microplastic polymer composition.

Resume of the distribution of fibers and fragments by size and matrix (values are given as percentages of their corresponding class, i.e., columns). The distribution is essentially the same

	AMP DISTRIBUTION (%)					
	Depobulk air sampler		HH		PG	
µm	FIBERS	FRAGMENTS	FIBERS	FRAGMENTS	FIBERS	FRAGMENTS
20 - 50	0	65	0	65	0	67
50 - 100	20	27	28	29	25	29
100 - 500	80	8	72	6	63	3
500 - 1000	0	0	0	0	13	1
1000 - 5000	0	0	0	0	0	0

4. CONCLUSIONS

- A similar fingerprint for MPs was identified in leaves and in the atmospheric deposition. In particular, the percentage distribution of fibres and fragments as a function of size.
- Fragments represented >80 % of total MPs.
- The chemical composition of the MPs for each size fraction revealed that PET, PP, PE, PVC, PS and PA were the most frequently detected polymers (excluding tyres), representing the polymers of common use. The compositional distribution is highly similar in leaves and air (but for tyre fragments, which seemed to get accumulated in leaves, likely due to their proximity to a road.
- Future challenges: how to reasonably evaluate the analytical recoveries on leaves; how to match the periods of atmospheric collection and the accumulation time of the leaves; or how to normalize them; to understand interactions between MPs and vegetation (e.g., uptake, release, degradation, food web accumulation, etc.)..

5. ACKNOWLEDGEMENTS

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