

Ecotoxicity of a biobased mulch film on the dipteran *Chironomus riparius* larvae

Bruna Pinho¹, Diogo Ferreira-Filipe², Sara Silva³, Armando Duarte², Teresa Rocha-Santos², Ana Patrício Silva³

¹Department of Chemistry, University of Aveiro, 3810-193 Aveiro, Portugal

²CESAM (Centre for Environmental and Marine Studies) and Department of Chemistry, University of Aveiro, 3810-193 Aveiro, Portugal

³CESAM (Centre for Environmental and Marine Studies) and Department of Biology, University of Aveiro, 3810-193 Aveiro, Portugal

*mail to: ana.luisa.silva@ua.pt

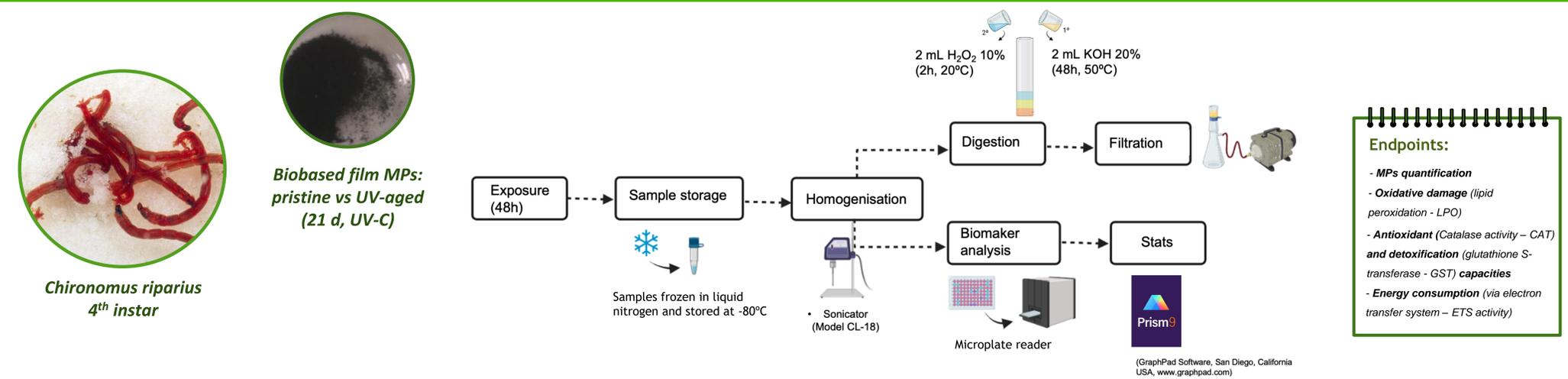


Introduction

- Freshwater environments are major sinks of microplastics from inland anthropogenic activities → threatening their biota that underpin several ecosystem services.
- New biobased biodegradable plastics, categorized as environmentally friendly options, are being introduced in the market every year → but little is known considering their potential threats to numerous environments, including freshwaters where they seem to persist longer.

Aim: Evaluate physiological and biochemical responses on *Chironomus riparius* 4th instar larvae after 48h exposure to microplastics obtained from an agricultural biobased film, in their pristine and UV-aged form.

Material and Methods



Results

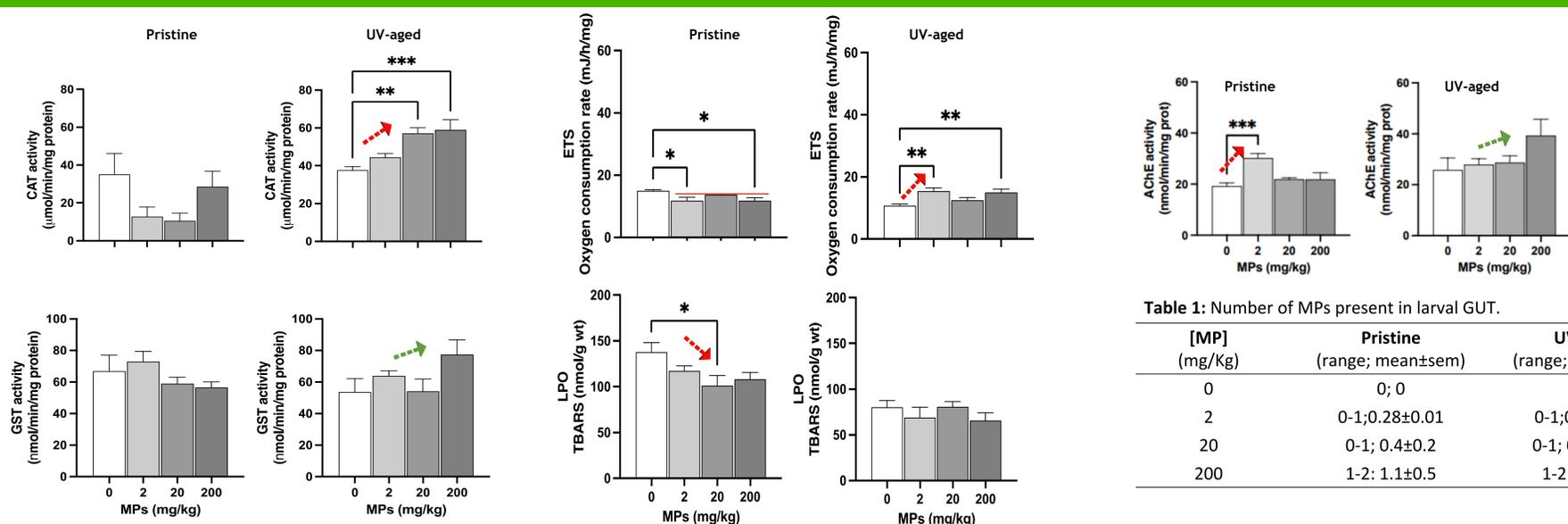


Figure 1: Effect of short-term exposure (48h) to 2, 20, 200 mg kg⁻¹ of biobased film microplastics (MPs), aged or not under UV-C, in glutathione-S-transferase levels (GST), catalase activity (CAT), energy consumption (via electron-transfer-system, ETS), lipid peroxidation (LPO), and acetylcholinesterase (AChE) of *Chironomus riparius* 4th instar larvae. Data expressed as mean ± SEM.

Conclusions

C. riparius larvae 4th instar larvae proved to ingest bio-MPs after 48 h exposure, which potentially triggered alterations in aerobic metabolism, antioxidant defenses, and neurotransmission. Such alterations did not result in oxidative damage, indicating that this biobased biodegradable polymer (as pristine or UV-aged) might not impose a serious threat to this organism.

For a better and in-depth understanding of the potential physiological and biochemical effects of bio-MPs on *C. riparius*, energy reserves (lipids, carbohydrates, proteins) should be assessed, along with other antioxidant defenses (such as the pool of glutathione). These responses should also be linked with the potential effects at higher levels of biological organization (such as larval growth, and imagoes emergence). Therefore, a life-cycle assessment should also be considered in future studies.

Acknowledgments

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