

METHODS FOR THE DETECTION OF MICROPLASTICS INGESTED BY FISH

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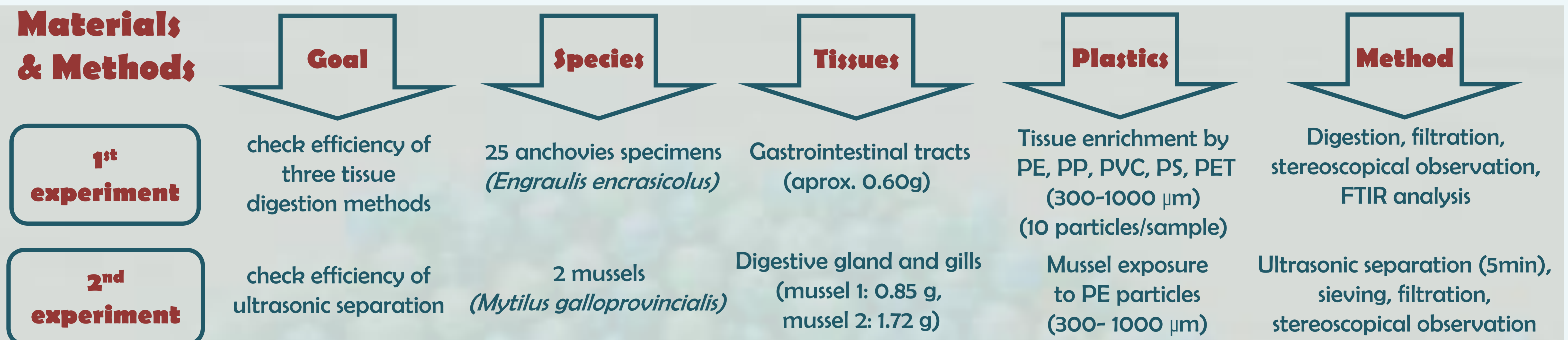
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Introduction

The MedSeaLitter project aims to detect microplastic ingestion by fish inside and outside Mediterranean Marine Protected Areas. Various methods have been suggested in order to detect ingested microplastics (Claessens et al., 2013; Cole et al., 2014; Mathalon and Hill, 2014). In this study, we applied and tested specific methods (digestion using H₂O₂ 15%, H₂O₂ 30%, KOH 10%, ultrasonic separation) proposed for the extraction of ingested microplastic, in order to adopt a common methodology among partners in the Mediterranean. To achieve this, two short experiments for the detection of microplastics enriched in fish or mussel tissues have been designed.

Materials & Methods



Results

Parameters	1 st experiment: Digestion Methods			2 nd experiment: Ultrasonic Separation	
	H ₂ O ₂ 15%	H ₂ O ₂ 30%	KOH 10%	Mussel 1	Mussel 2
Digestion efficiency (% sample weight recovery)	3.365	4.176	2.182	partial separation	partial separation
Time consumed	8-12 hours	8-12 hours	> 7 days	30 min	30 min
Plastic recovery (%)	94	86	92	85	65
Plastic alteration	colour alteration	colour alteration, fragmentation	colour alteration, fragmentation	No alteration	No alteration

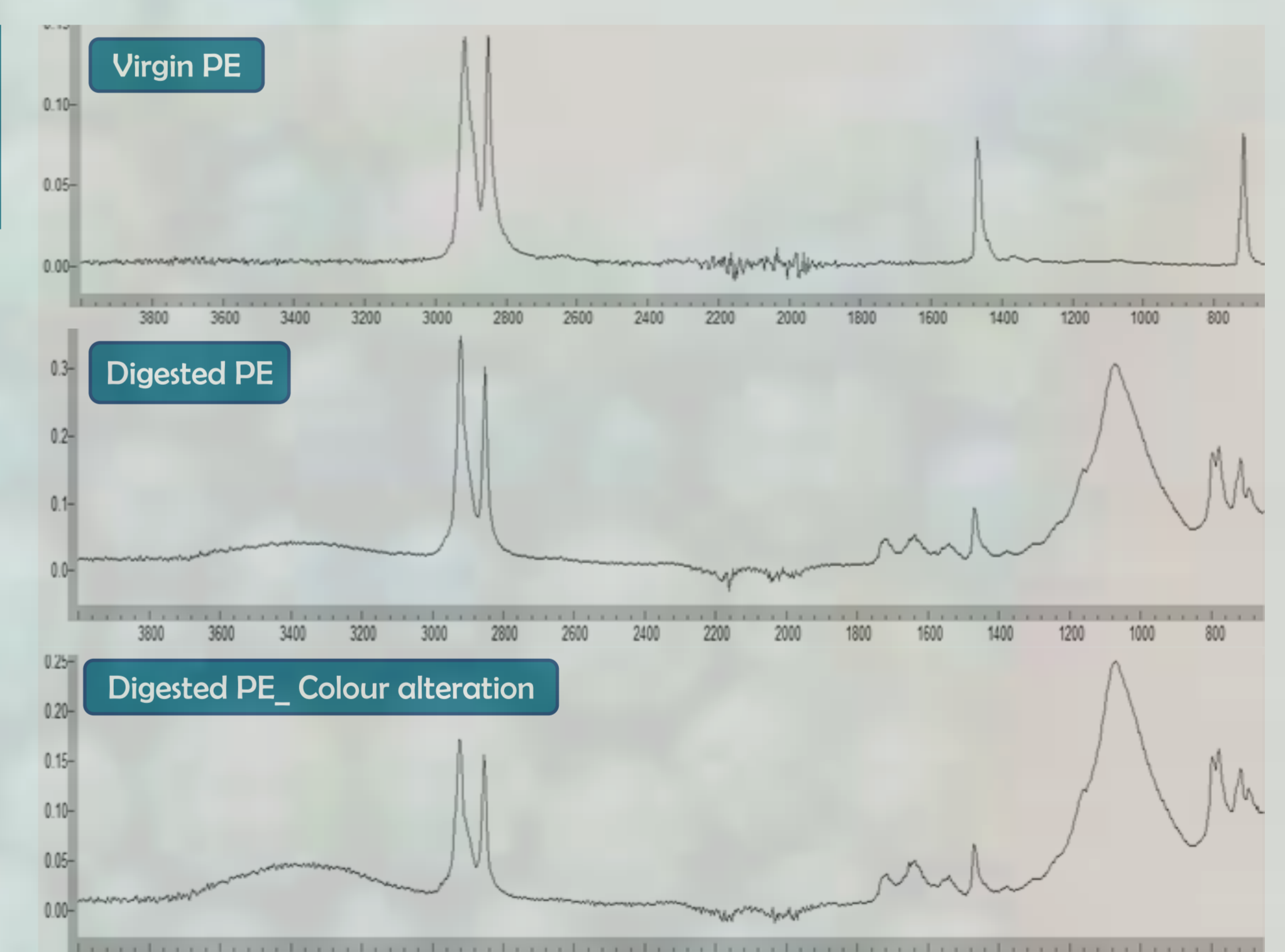


Figure 1. FTIR spectra of PE particles before and after digestion treatment.

Discussion & Conclusions

- Our results suggest digestion using H₂O₂ 15% as the most efficient method to be selected for the extraction of microplastics in fish.
- Among all plastics tested, colour alteration was observed in PE particles (during all digestion methods) and fragmentation in PP particles (during H₂O₂ 30% and KOH).
- Alterations in spectrums of digested PE particles and digested PE particles with colour alteration comparing to virgin PE particles (Fig. 1), imply a possible chemical alteration of PE particles, when treated by H₂O₂ 15%, H₂O₂ 30% and KOH 10%. No other plastic type presented an altered spectrum in FTIR analysis.
- Ultrasonic treatment resulted in partial separation of microplastics from tissue, since few particles remained in the tissues after treatment. However further investigation is needed to validate the efficiency of the method.

References

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