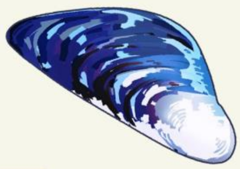
An investigation into marine bioindicators (*Mytilus spp.*) for an overview of micro-plastic pollution.



A snapshot of microplastic accumulation in *Mytilus edulis* along the Fylde Coast United Kingdom, in comparison to mussel species commercially available originating from worldwide shellfish farms. Mussels were chosen due to being easily collected and containing enough tissue material to be removed and chemically analysed in laboratory settings.

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INTRODUCTION

Marine plastic pollution has been an ever-growing issue since their first production in the 1970s, since then it has been on a constant increase. With the correct biotic and abiotic factors, they are prone to degradation which leads to the introduction of microplastics. These fragments are the correct size for consumption by filter feeders (Khan et al., 2022). They can then be passed through the food chain which leads to bio-magnification causing toxicity. In addition plastics can adsorb toxic components which can also be ingested and bio-magnified. It is estimated 10 particles of microplastics per every litre of seawater, (Walkinshaw, 2023) suggesting they are abundant throughout the marine environment.

Marine species commonly used in pollution monitoring are from the genus *Mytilus* due to their sedentary lifestyle and filter feeding of the surrounding water body.

OBJECTIVE

To highlight the variation and abundace of microplastic pollution along the Fylde Coast UK.

METHODOLOGY

Fresh mussels, and commercially available mussels were added to a potassium hydroxide solution to degrade all organic matter. Water and sediment samples were also obtained to identify the microplastic content within the fresh mussels natural environment. All samples were coarsley then finely filtered to be analysed later using a microscope and infrared spectrometer.

RESULTS

A total of **545** microplastic particles were removed, with a larger amount found in the fresh mussels compared to those that are commercially available. There was also a larger variation of microplastic content within the fresh mussels which showed microbeads, microfibres, and microfragments.

Statistical results showed a value greater than F which indicated a large variation between the tested groups, those being commercially bought and fresh mussels.

ANALYSIS

The commercially available mussels showed a larger amount of microfibres than any other type of microplastic, however there was still a few fragmented particles also.
The chemical compositions showed a variety of possible initial plastic products ranging from:
plastic bags
food packaging
organic polymers such as chitin
synthetic plastic substitutes
plastic bottles

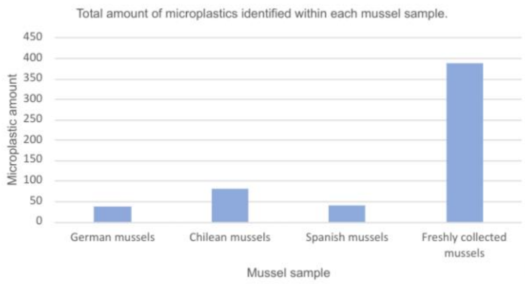


Figure 1: The total amount of microplastics retrieved and counted from filter papers.

Figure 2: Red microfibre found

Figure 4: Microfragmented plastic

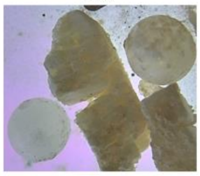


Figure 3: Microbeads

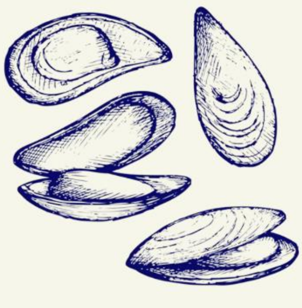
Figure 5: Blue microfibre found

CONCLUSION

Commercially available mussels were noticeably lower in microplastic content compared to those that were collected fresh, this could be due to post-harvesting processes prior to being made commercially available.

There needs to be more research conducted into the effects of microplastics and prevention against them entering the natural environment. As it is evident that mussels that are residing in the marine environment are suffering from microplastic contamination, as there was a huge difference between the samples.

Preliminary studies in medical science have shown there to be health impacts towards humans consuming these microplastics such as, disruption to the gut microbiome, and inflammatory response. This however is still fairly un-researched and dependant on the size and toxicity of the microplastic consumed.



REFERENCES

Walkinshaw, C., (2023), 'Plastic fibres stunt growth in mussels by more than a third – here's why this is a concern', available at: https://theconversation.com/plastic-fibres-stunt-growth-in-mussels-by-more-than-a-third-heres-why-this-is-a-concern-201985
Khan, F, R., Catarino, A, I., and Clark, N, J., (2022), 'The ecotoxicological consequences of microplastics and contaminants in aquatic organisms: a mini review', Emerging Top Life Science, 6(4), pp. 339-348. Available at: https://portlandpress.com/emergtoplifesci/article/6/4/339/231667/The-ecotoxicological-consequences-of-microplastics

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