12th ESBP 2025

European Symposium on Biopolymers

1st - 3rd October
Lisbon, Portugal

Book of Abstracts

1st – 3rd October 2025

Rectorate of Universidade NOVA de Lisboa

Lisbon, Portugal

NOVA SCHOOL OF SCIENCE & TECHNOLOGY

P73. Improvise. Adapt. Overcome – Baltic Sea Bacteria and Their Polymer Degrading Ability

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As plastics production and consumption today continue to contribute to petrochemical plastic pollution, greener packaging alternatives such as biopolymers and biobased compostable materials are becoming a major focus of research. However, these materials can also pose environmental problems in areas lacking the appropriate degradation conditions. Despite global recycling efforts, plastics frequently end up in landfills and in natural environments such as seas and oceans. Several studies have reported significant microplastic pollution in the Baltic Sea; therefore, the diversity of microorganisms present in these waters may indicate the existence of enzymatic systems capable of degrading polymeric packaging materials.

In this study, several tests were conducted to evaluate the degradation capabilities of bacteria isolated from the Baltic Sea on different types and forms of biobased polymers. The formation of halozones was observed and confirmed using agar plate assays with emulsified polymers – poly(3-hydroxybutyrate), poly(butylene succinate) and poly(lactic acid). Selected polymers in granule or film form (prepared via hot pressing or solvent casting methods) were exposed to the bacterial consortium, and material property changes were monitored. Major structural changes were observed using scanning electron microscopy (SEM), while physicochemical property changes were analyzed using differential scanning calorimetry (DSC) and gel permeation chromatography (GPC-SEC/MALS). Additionally, biochemical activity was assessed by measuring biological oxygen demand (BOD) and the optical density (OD) of microbial cultures. Microbial consortium was separated and analysed on MALDI-TOF and sequenced.

The results indicate that certain bacteria exhibit potential to for the biodegradation of various polymers. Further research will examine these microorganisms in more detail in future studies.

Acknowledgements
This study was financed by GACR project GA25-18143S.