Evaluating the Safety and Microbiome Impact of Antifouling Compounds in the clam Venerupis corrugata

Ana Sara Gomes[1], Tiago Ribeiro[1], Helena Barbosa[1], Inês Basílio[2], Andreia Cruz[2], Marta Correia-Da-Silva[1,3], Sérgio Boo[1], and Joana R. Almeida[*†1]

[1]Centro Interdisciplinar de Investigação Marinha e Ambiental = Interdisciplinary Centre of Marine and Environmental Research [Matosinhos, Portugal] – Portugal

[2]Oceano Fresco, Lda. – Portugal

[3]Laboratory of Organic and Pharmaceutical Chemistry, Faculty of Pharmacy, University of Porto – Portugal

Résumé

Open sea farming of clams is an innovative strategy to expand bivalve cultivation beyond traditional sheltered coastal zones. This approach offers several advantages, including reduced environmental pressure on coastal ecosystems and access to cleaner, nutrient-rich waters that provide optimal conditions for clam growth (1). Nevertheless, one of the major operational constraints in offshore bivalve aquaculture is biofouling of submerged cages and other farming structures (2).

Our group previously reported natural and nature-inspired antifouling compounds (3,4). In this study, we evaluated the effects of portoamides (3), one polyphenol (4) and two nucleosides (unpublished data) on mortality and oxidative stress in *Venerupis corrugata*, a commercially relevant clam species. Additionally, we investigated potential impacts on the clam-associated microbiome. No mortality or oxidative stress was observed at the tested concentrations, suggesting potential application of these compounds without compromising clam health. However, some compounds induced microbiome imbalances in juvenile clams. Particularly, one nucleoside reduced the microbiome diversity and increased the abundance of opportunistic pathogens *Vibrio* spp. and *Psychrobium* spp., whereas portoamides increased the abundance of commensal *Poseidonibacter* spp. and *Colwellia* spp., and the opportunistic pathogen *Psychrobium* spp.

Future work will assess the implications of antifouling compound-induced dysbiosis on juvenile clam survival and growth under aquaculture conditions.

Acknowledgments:

This research was supported by UIDB/04423/2020 and UIDP/04423/2020, and by the Innovation Pact, Project No. C644915664-00000026 (WP2 Bivalves)–"Blue Bioeconomy Pact"–submission Notice No.02/C05-i01/2022, within the scope of the Recovery and Resilience Plan (PRR) and the project PTDC/CTA-AMB/0853/2021.

[*]Intervenant

[†]Auteur correspondant: jalmeida@ciimar.up.pt

1.Buck,B.H.,et al.(2017).DOI:10.1007/978-3-319-51159-7.

2.Bannister,J.,et al.(2019).DOI:10.1080/08927014.2019.1640214.

3.Antunes,J.,et al.(2019).DOI:10.3390/md17020111.

4.Neves,R.,et al.(2022).DOI:10.1016/j.bioorg.2022.105911.

Mots-Clés: Biofouling, antifouling, nature, inspired compounds, sustainable aquaculture, bivalve cultivation