Characterization and Biotechnological Potential of Marine Bacteria from the Sado Estuary, Portugal

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ABSTRACT

Marine environments harbour diverse and rich microbial communities presenting unique adaptations to this stressful habitat. As a result, marine bacteria developed several stress resistance mechanisms, including the ability to synthesize a wide range of bioactive molecules of biotechnological interest.

In this work, the phenotypic and genotypic characterization of fourteen marine bacteria isolated from seawater collected in diverse locations across the Sado estuary in Portugal is presented. In addition, the isolated bacteria were tested for their ability to promote the growth and the accumulation of valuable compounds in the microalgae *Phaeodactylum tricornutum.*

The obtained results revealed that several bacterial isolates were capable of producing diverse functional and stable extracellular lytic enzymes; showed the ability to synthesize phytohormones such as auxins (indole-3-acetic acid) and produced ammonia, PHAs, as well as carotenoids. Comprehensive genomic analysis revealed the presence of gene clusters involved in the biosynthesis of a wide range of secondary metabolites such as extracellular enzymes, carotenoids, polyunsaturated fatty acids, and polyhydroxy acids in the diverse bacterial isolates.

When co-cultivated with *Phaeodactylum tricornutum* all isolates induced a significant increase in microalgae cell count, and fucoxanthin content, while having varying effects in cell size, auto-fluorescence, and indicating their microalgae growth-promoting effects.

Ultimately, these findings bring new insights into the untapped potential of marine bacteria and their use in a vast array of biotechnological applications.

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