



Antioxidant and UV-Protective Potential of Pigmented *Brevibacterium* sp. Isolated from *Padina* sp. Collected in Hikkaduwa, Sri Lanka

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Marine-derived bacterial pigments serve as sustainable sources of bioactive compounds with potential applications in food, pharmaceutical, textile, and cosmetic industries due to their diverse biological properties, including anticancer, antimicrobial, antioxidant, and cytotoxic activities. Due to their biodegradability and greater environmental compatibility, marine bio-pigments have recently been highlighted as preferable alternatives to synthetic pigments. Despite the challenges in isolating marine pigmented bacteria, their biotechnological potential remains significant. The primary goal of this study was to investigate pigmented marine phycoplane bacteria associated with *Padina* sp. for their antioxidant and UV-protective properties. These microorganisms colonize the surface of brown seaweed thalli and form a complex, highly dynamic microbial ecosystem. Seaweed samples of *Padina* sp. were collected from Hikkaduwa Reef (southwestern Sri Lanka), serially diluted and cultured on marine agar with the purpose of isolation and screening for pigmented colonies of bacteria. A yellow-pigmented bacterium was isolated and identified as *Brevibacterium* sp. based on morphological, biochemical, and molecular characterization using genomic DNA extraction, 16S rRNA gene PCR amplification, and Sanger sequencing. Pigment extract was evaluated for antioxidant activity using 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) radical scavenging, and for UV-protective potential using Sun Protection Factor (SPF) analysis. The extract exhibited moderate DPPH radical scavenging activity with an IC₅₀ of 1.12 mg/ml measured at 517 nm after 30 min incubation, comparable to the standard reference (ascorbic acid - IC₅₀ of 0.57 mg/ml). All experiments were conducted in triplicate, and results were statistically analyzed using SPSS (version 26.0), and expressed mean ± SD. The extract achieved a SPF value of 3.5 ± 1.2 (determined using the Mansur method at 290–320 nm), indicating low UV protection. Overall, the findings suggest that compounds derived from *Brevibacterium* sp. can be utilized as natural bioactive agents with both antioxidant and UV-protective properties.

Keywords: Antioxidant activity, Bacterial pigment, *Brevibacterium* sp., *Padina* sp., UV protection