



Comparative Analysis of Antioxidant Capacity and Phytochemical Profiles of *Ulva fasciata* and *Padina antillarum* from Jaffna, Sri Lanka

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This study investigated and compared the phytochemical composition and antioxidant capacity of two marine macroalgae, the green alga *Ulva fasciata* and the brown alga *Padina antillarum*, collected from the coastal waters of Jaffna, Sri Lanka. The aim of the present study was to investigate and compare the phytochemical profiles and antioxidant capacities of the samples. Crude extracts were prepared using methanol, ethanol, and butanol following standardized maceration protocols, with rotary evaporator used for solvent removal. Qualitative phytochemical screening was used to identify major bioactive compound classes through colorimetric tests, while quantitative analysis determined total phenolic content (TPC) using Folin-Ciocalteu reagent, total flavonoid content (TFC) using aluminum chloride colometry and antioxidant capacity *via* DPPH radical scavenging assay. Phytochemical screening revealed 80% positive detection with saponins, terpenoids, steroidal nucleus and cardiac glycosides present in both species while tannins were absent. *P. antillarum* demonstrated significantly higher antioxidant activity across all parameters compared to *U. fasciata*. The highest TPC was observed in *P. antillarum* ethanol extract (64.61 ± 8.00 mg GAEg⁻¹), while the highest TFC was found in *P. antillarum* butanol extract (50.20 ± 0.28 mg REg⁻¹). DPPH radical scavenging assay revealed that *P. antillarum* butanol extract exhibits the strongest antioxidant activity (36% at 200 µg/mL) with the IC₅₀ value (331.48 µg/mL) while, ethanol extract of *U. fasciata* showed antioxidant activity (27.34% at 200 µg/mL; IC₅₀ = 596.40 µg/mL). General Linear Model analysis confirmed that both solvent type and concentration significantly influenced antioxidant activity ($p < 0.05$). Overall, the findings indicate that both species possess bioactive compounds with moderate antioxidant potential, while highlighting the importance of solvent selection in optimizing extraction efficiency and recovery of antioxidant constituents.

Keywords: Antioxidant activity, DPPH, Phytochemical profile, *P. antillarum*, *Ulva fasciata*