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**Evaluation of phytochemical profile and *in-vitro* antioxidant activity *Suaeda maritima***

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*Suaeda maritima*, a halophytic plant species from the family Amaranthaceae, possesses unique adaptations that enable it to thrive in high-salt environments. Halophytes contain various bioactive chemicals, including plant polyphenols, which have garnered interest due to their antioxidant properties. This study aims to investigate how the polyphenolic content and antioxidant activity of extracts change across the polar, mid-polar, and non-polar fractions of crude extracts from *S. maritima*. These extracts are obtained from both the aerial parts and the roots of the plant, which were harvested from Seguwantivu area of Puttalam, Sri Lanka. Each dried and powdered plant part was sequentially extracted into hexane, dichloromethane (DCM), and methanol at ambient temperature using cold maceration. The Antioxidant activity of each concentrated extract was determined by 2,2-diphenyl-1-1-picrylhydrazyl (DPPH) assay, and 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS) assay, phenolic content by (TPC) by Folin-Ciocalteu method, flavonoid content (TFC) by aluminum chloride assay and condense tannin content (CTC) by vanillin/HCl method. Six sequential extracts of *S. maritima* (from aerial parts and roots) showed antioxidant activity. The results indicated that *S. maritima* shoot extracts have significant levels of polyphenolic compounds ( $p=0.05$ ), with methanolic extracts exhibiting the highest TPC ( $31.55 \pm 1.54$  mg GAE/g dw), TFC ( $18.41 \pm 0.91$  mg CE/g dw) and CTC ( $3.66 \pm 0.19$  mg CE/g dw). In contrast, root extracts showed lower polyphenolic content ( $23.69 \pm 5.63$  mg CE/g dw, methanol extract) but still possessed appreciable antioxidant activity ( $IC_{50}$ ,  $0.40 \pm 0.07 \times 10^{-1}$  mg/mL DPPH and  $IC_{50}$ ,  $0.69 \pm 0.02 \times 10^{-1}$  mg/mL ABTS). The ABTS assays revealed the radical scavenging ability of the extracts, with the methanolic aerial parts extract exhibiting the most potent antioxidant activity ( $IC_{50}$ ,  $0.17 \pm 0.01 \times 10^{-1}$  mg/mL) exhibiting it has more water-soluble antioxidants. Overall, Solvent extracts of the *S. maritima* possess antioxidant properties at varying levels. The fraction of polar compounds in the areal parts of *S. maritima* contains a relatively high amount of phenolic compounds and potent antioxidant properties. Moreover, identifying antioxidant properties from halophytes could contribute significantly to developing of natural antioxidants for combating oxidative stress-related diseases.

**Keywords:** Antioxidants, Free radicals, Halophytes, Phytochemical profile, Oxidative Stress

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