

Background - Synthetic phenolic antioxidants are the most effective and feasible choice to preserve food system but may increase health risks at high doses. Driven by consumer demand and government policies, natural additives are receiving increasing attention as substitutes for synthetic ingredients. Owing to high bioactive properties and easy cultivation, seaweeds have become an attractive, sustainable source of natural phenolic antioxidants [1]. However, detailed analysis of antioxidant capacity of Australian seaweed phenolics particular in food system is scarce.

Aim - In the present study, Australian seaweed species have been screened based on their extraction yields, total phenolic contents (TPCs) and *in-vitro* antioxidant properties.

Materials & Methodology - Locally grown two brown seaweeds (Ochrophyta) and one green seaweed (Chlorophyta) were freshly collected and processed into dried powders. Conventional solvent extraction was performed using different extraction solvents to obtain crude seaweed extracts. The extraction yields, total phenolic contents (TPCs) and *in-vitro* antioxidant properties of the extracts were determined. Based on the results, *Ecklonia radiata* has been screened and subjected to further analysis. Moreover, major phenolic constituent present in *E. radiata* extract has been tentatively identified via LC-ESI-QTOF-MS/MS characterization.

Results -

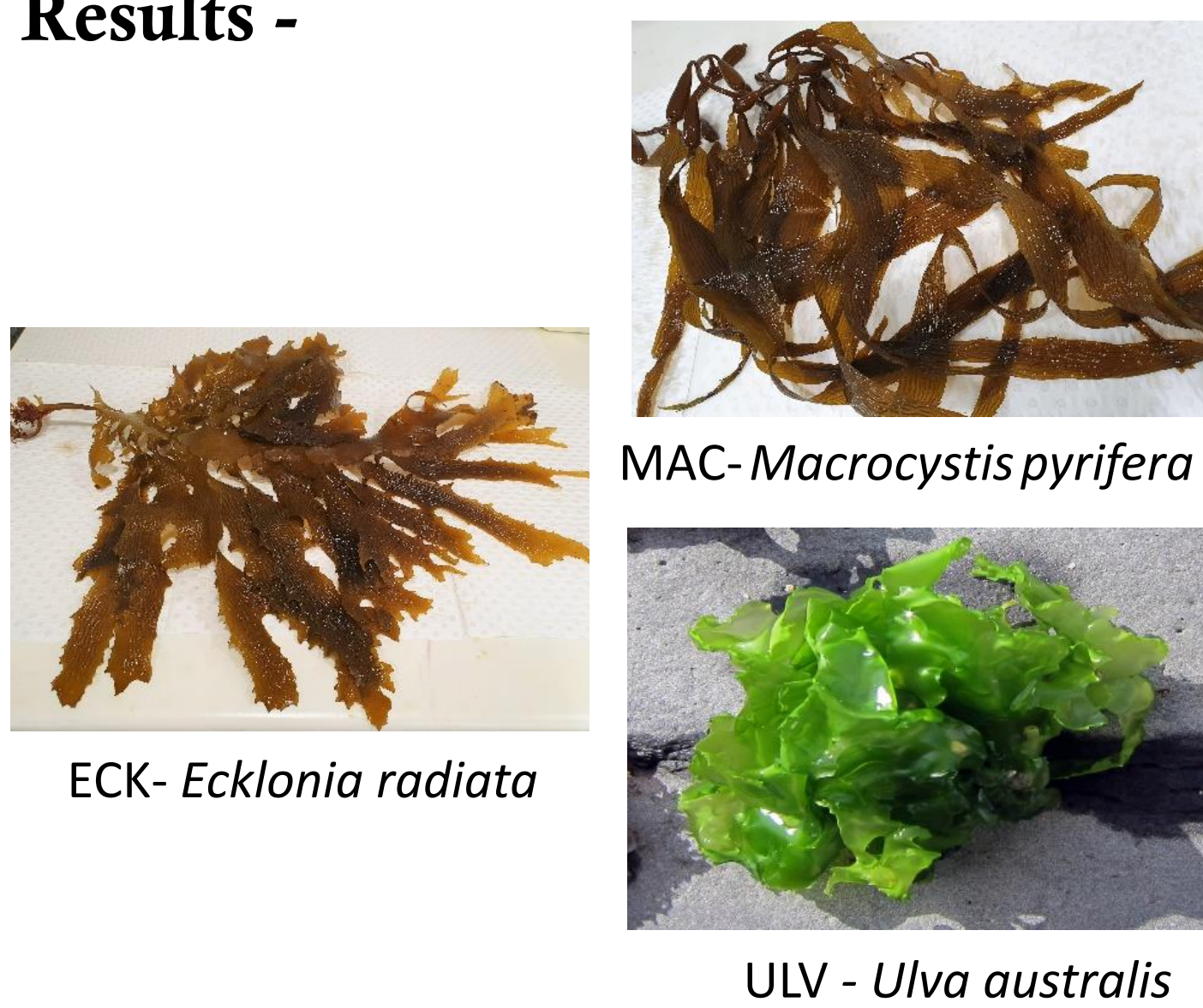


Figure 01 : Visual identification of tested seaweed species.

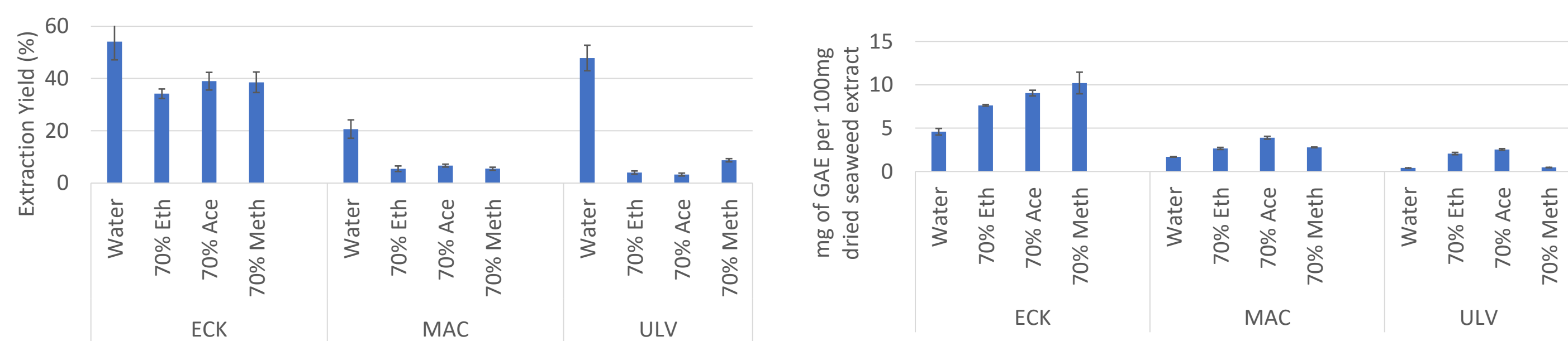


Figure 02 : Extraction yields and Total phenolic contents (TPCs) of seaweed extracts in water, 70% ethanol, 70% acetone and 70% methanol (n=3).

➤ *E. radiata* crude extracts showed the highest extraction yields which is 10 times higher than other species. TPCs showed an opposite trend to extraction yields as aqueous mixtures of organic solvent extracts were more efficient than water in phenolic extraction. Among the tested species, brown seaweeds (*E. radiata* and *M. pyrifera*) showed higher TPCs than green seaweed.

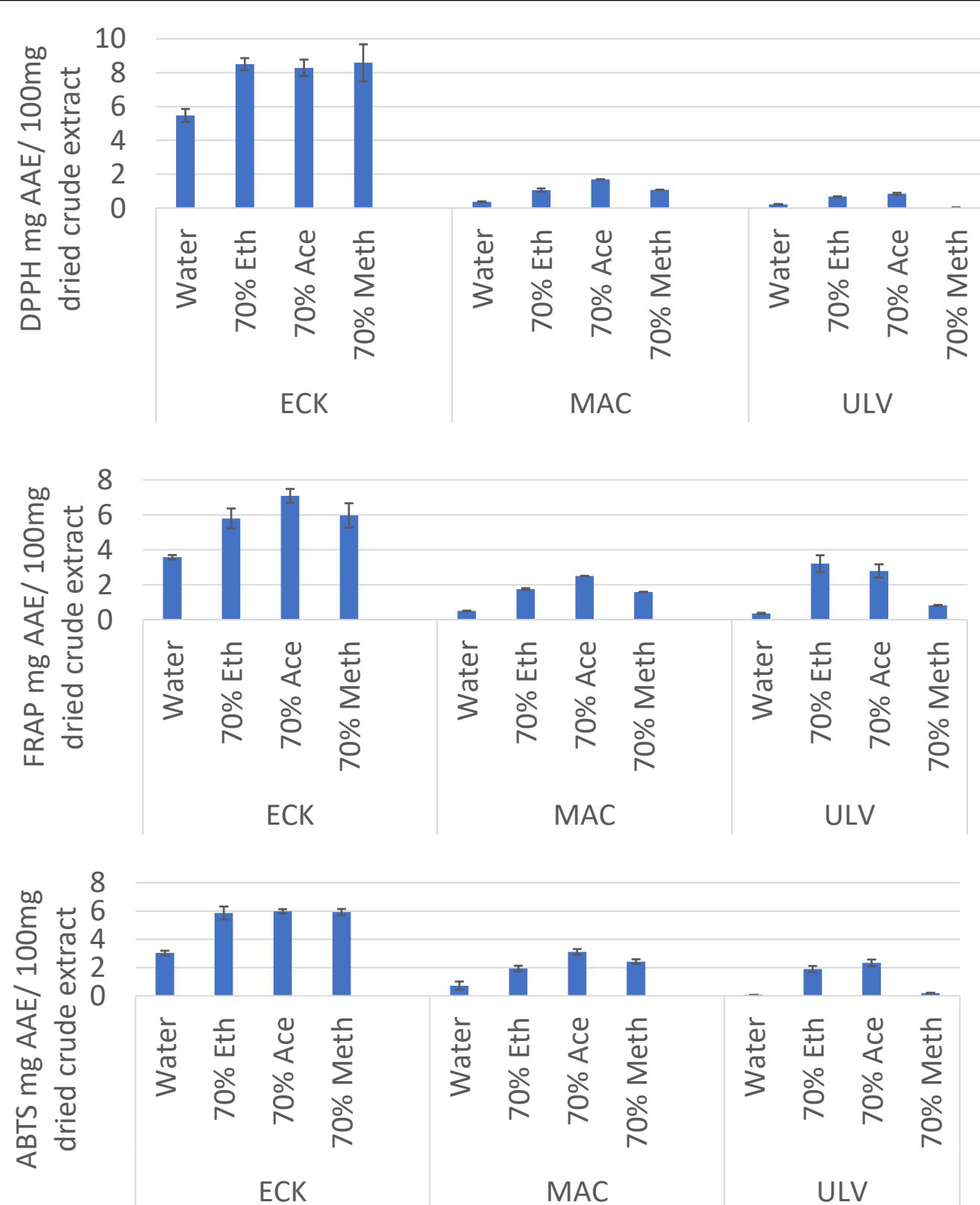


Figure 03 : *in-vitro* antioxidant properties of seaweed extracts in water, 70% ethanol, 70% acetone and 70% methanol (n=3).

➤ *E. radiata* crude extracts exhibited the highest ferric ion reducing power and relatively high radical scavenging abilities against DPPH and ABTS radicals

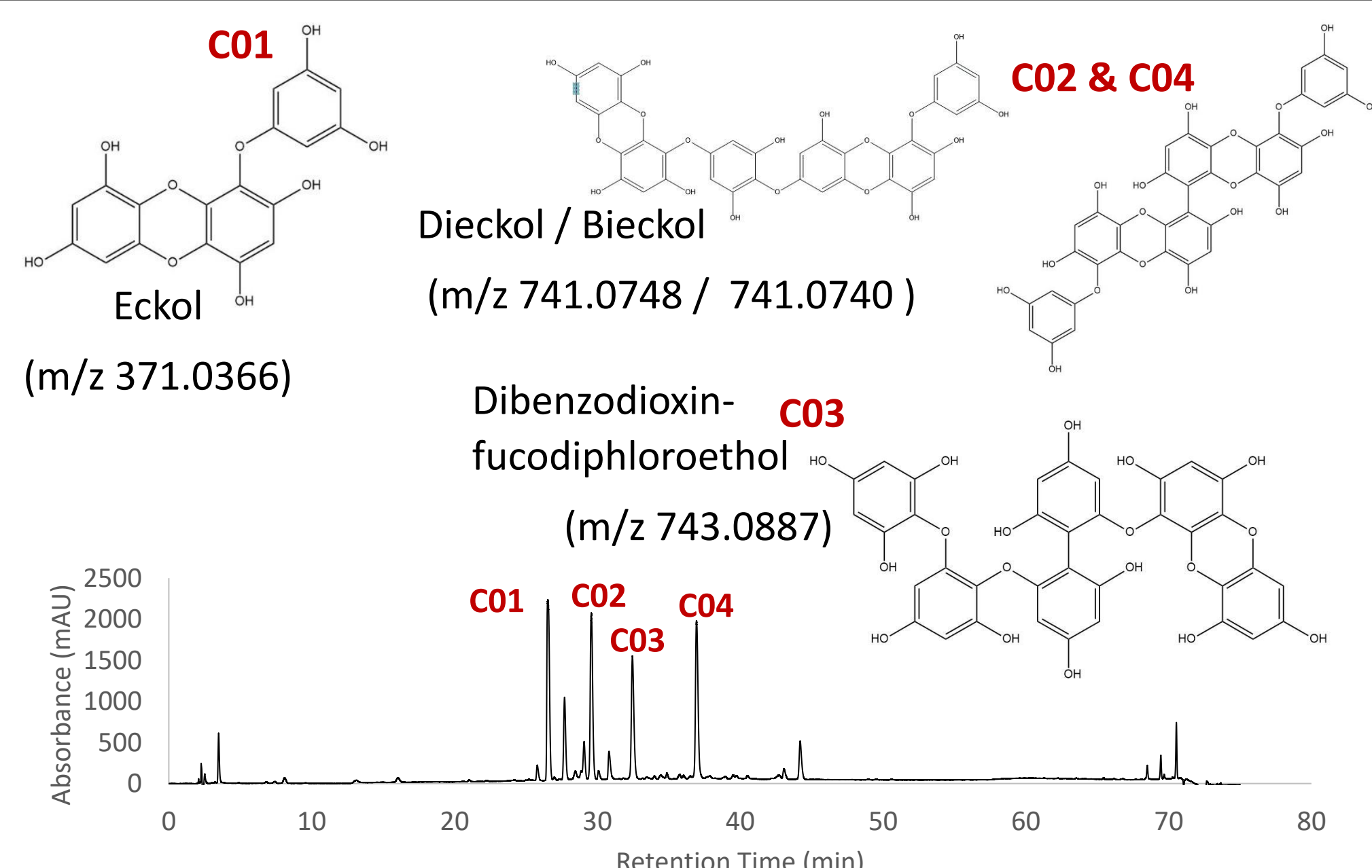


Figure 04 : Tentative identification of major phenolic compounds in *E. radiata* crude extract via LC-ESI-QTOF-MS/MS in negative ionization mode

➤ Eckol type phlorotannins were the most abundant phenolic group detected in *E. radiata* extract [2].

Conclusion - seaweed phenolics are mostly soluble in solvents less polar than water (ethanol, acetone and methanol) giving significantly high TPCs and antioxidant activities. Positive correlation was observed between TPCs and radical scavenging activity indicating the importance of seaweed phenolics as chain breaking antioxidants. The major phenolic constituents (Eckol type phlorotannins) present in *E. radiata* extract may act as natural antioxidants to stabilize a broad range of lipid-based foods including omega-3 enriched food systems.

Reference: [1] Jacobsen, C., Sørensen, A. D. M., Holdt, S. L., Akoh, C. C., & Hermund, D. B. (2019). Source, extraction, characterization, and applications of novel antioxidants from seaweed. Annual Review of Food Science and Technology, 10, 541-568

[2] . Shrestha, S., Zhang, W., Begbie, A. J., Pukala, T. L., & Smid, S. D. (2020). Ecklonia radiata extract containing eckol protects neuronal cells against Aβ 1–42 evoked toxicity and reduces aggregate density. Food & Function, 11(7), 6509-6516.

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