Profiling Phytochemicals and Bioactivities in Mediterranean Seaweeds

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Abstract

This study aimed to investigate Mediterranean seaweed's phytochemical composition and bioactivities, by identifying bioactive compounds with potential health benefits. Eighteen macroalgae species, including samples from brown, green, and red phyla, were collected from the Mediterranean coast of southern Spain. Samples were analyzed for their fatty acid (FA) profiles using CG-FID, total phenolic content (TPC), total flavonoid content (TFC), carotenoid profiles via LC-MS, antioxidant activity ($ABTS^{\bullet+}$ and DPPH methods), and antitumor activity using the MTT assay. Total FA content ranged from 0.7 to 5.8 g/100 g dry weight (dw), with palmitic acid (PA, 16:0) and oleic acid (OA, 18:1*n*-9 cis) as the most abundant. The brown algae *Dictyota dichotoma* and *Rugulopteryx okamurae* showed the highest FA content at 5.6 and 5.8 g/100 g dw, respectively. Green macroalgae (*Codium bursa*, *Codium tomentosum*, *Flabellia petiolata*, and *Ulva lactuca*) exhibited higher PUFA percentages in winter compared to autumn. Red algae, particularly *Polysiphonia* sp., were rich in *n*-3 PUFAs, such as eicosapentaenoic acid (EPA, 20:5*n*-3) and docosahexaenoic acid (DHA, 22:6*n*-3). Fucoxanthin was the predominant carotenoid in brown and red algae, while siphonaxanthin dominated in green algae. Notably, acetone extracts from brown algae, such as *R. okamurae* and *D. dichotoma*, demonstrated antitumor activity with GI_{50} values comparable to doxorubicin, a commonly used anthracycline chemotherapy drug. This study highlights the potential of Mediterranean seaweeds as a rich source of phytochemicals for applications in the food and pharmaceutical industries.

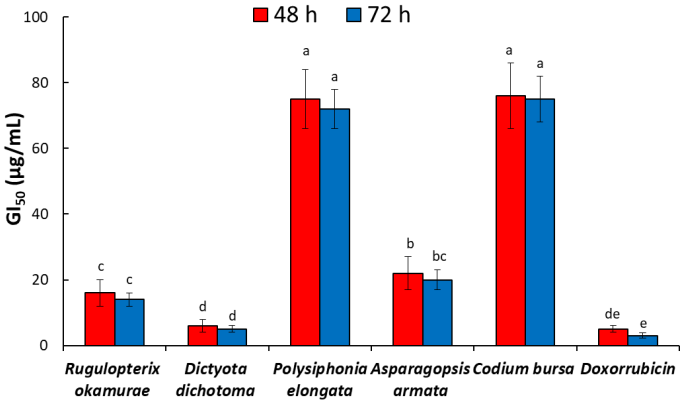

Figure 1. MTT assay. GI_{50} (the concentration that inhibits cell growth by 50%) for HT-29 cancer cells after treatment of cell cultures with either acetone algal extracts or doxorubicin for 48 and 72 h. In a bar, means followed by different letters are significantly different at $p<0.05$.

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3. Chelh, T. C., Lyashenko, S., Lahlou, A., Belarbi, E. H., Rincón-Cervera, M. Á., Rodríguez-García, I., ... & Guil-Guerrero, J. L. *Food Res. Int.* 157 (2022) 111421.
4. González-Fernández, M. J., Manzano-Agugliaro, F., Zapata-Sierra, A., Belarbi, E. H., & Guil-Guerrero, J. L. *J. Clean. Prod.* 276 (2020)123081.
5. Lyashenko, S., González-Fernández, M. J., Borisova, S., Belarbi, E. H., & Guil-Guerrero, J. L. *Food Chem.* 350 (2021) 128635.

Biography

José L. Guil-Guerrero has expertise in enzyme technology, the chemopreventive activity of phytochemicals against colorectal cancer, the distribution of essential fatty acids in nature, and the nutritional/functional value of underutilized foods. His focus is based on using natural products from various sources to have applications in the health field. He published more than 160 JCR papers. His H-index is 37 on Scopus.

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