Abstracts

FOR

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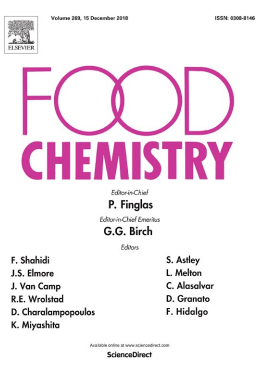

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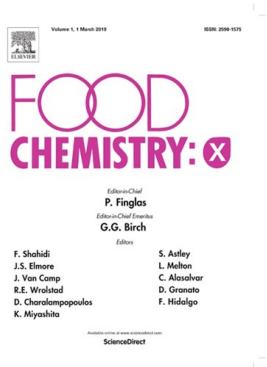

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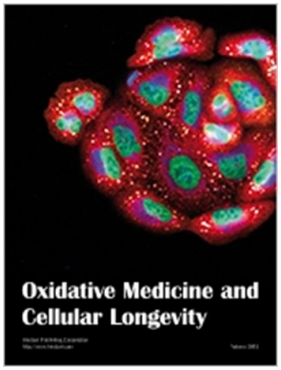

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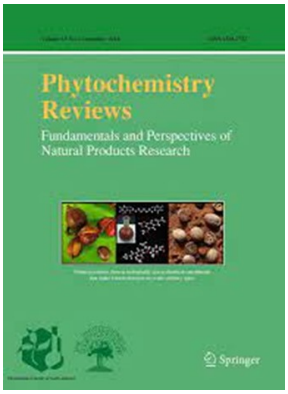

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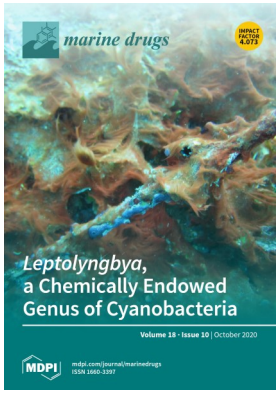

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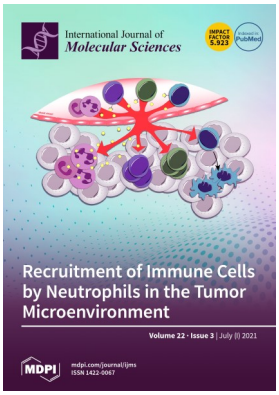

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Chemical and bioactive characterization of *Melissa officinalis* L. subjected to sustainable cultivation: comparison between different extraction methods

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Melissa officinalis L. (lemon balm) is a species of the Lamiaceae family which has been consumed for several decades in the form of decoctions, infusions or directly in food preparations. In addition to its recognized effects in helping digestion problems, rheumatism or headaches, several studies have demonstrated its antioxidant, hypoglycemic, hypolipidemic, antimicrobial, anticancer, antidepressant, anxiolytic, anti-inflammatory, and spasmolytic capacities. In this study it was aimed to compare three different extraction methods: infusion (100% water), maceration (80:20 ethanol: water) and ultrasound assisted extraction (UAE) under previous optimized extraction conditions (33.0 ± 3.2 min, 371.7 ± 19.3 W and 39.9 ± 1.4% ethanol) in plants grown under sustainable cultivation on complete irrigation [1]. The studied parameters included the bioactive evaluation through antimicrobial (microdilution method), antioxidant (thiobarbituric acid reactive substances - TBARS), cytotoxicity (sulforhodamine B) and anti-inflammatory (RAW cells) assays. It was also studied the phenolic compounds and organic acids composition. According to the obtained results, eight phenolic compounds were identified and quantified, being rosmarinic acid the major one (107.1 ± 0.9 mg/g of extract). Except for lithospermic acid A isomer II (2.38 ± 0.03 mg/g of extract) and hydoxysalvioanolic acid E (20.7 ± 0.1 mg/g of extract), the infusion revealed the lowest extraction of individual polyphenols, while the maceration recorded the highest extractability. On the other hand, the content of six out of the eight detected polyphenols for the ultrasound-assisted extraction was between the infusion and maceration methods. In terms of antioxidant activity determined through the TBARS assay, the infusions showed the highest activity (1.47 ± 0.05 µg/mL), followed by UAE (2.14 ± 0.03 µg/mL) and maceration (5.79 ± 0.06 µg/mL). The anti-inflammatory activity showed the opposite trend, with the maceration showing the strongest potential (114 ± 6 µg/mL), followed by infusion (292 ± 6 µg/mL) and UAE (316 ± 8 µg/mL). The antitumor properties were assessed in 5 cell lines, with the best results being recorded for maceration, except in CaCo2 cells, where infusion showed the best results (48 ± 1 µg/mL). All in all, these natural extracts are interesting ingredients, capable of replacing counterparts of synthetic origin, and may find wide applications in the industrial sector (*e.g.*, food, pharmaceutical and cosmetic companies). Besides, a great potential of using the leaves of *M. officinalis* to obtain extracts enriched in rosmarinic acid was presented, which may be included in developmental strategies for increased plant production.

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[1] Caleja, C., Barros, L., Prieto, M. (2017). Extraction of rosmarinic acid from *Melissa officinalis* L. by heat-, microwave- and ultrasound-assisted extraction techniques: A comparative study through response surface analysis. Separation and Purification Technology, 186, 297-308. Doi: http://dx.doi.org/10.1016/j.seppur.2017.06.029.