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Abstract

Composition, Antioxidant, and Antifungal Properties of Lavender Floral Waters †

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During essential oil preparation from aromatic plants, floral waters or hydrosols or hydrolates are obtained as by-products presenting inhibitory effects on phytopathogenic fungi growth, while avoiding the main problem of soil accumulation observed for currently used fungicides [1,2]. The *Lamiaceae* family is widely distributed around the world and large fields growing Lavandula sp. can be found in Romania. The aim of this study was to obtain a hydrosol of lavender and to evaluate its composition in correlation with the antioxidant and antifungal properties, in order to develop an alternative natural product to commercial fungicides. Floral water was obtained from aerial parts of *L. Angustifolia* subjected to reflux for 2 h, as by-product of essential oil preparation, and stored in the dark, at 4 °C. Gas chromatography–mass spectrometry (GC–MS) and high performance liquid chromatography (HPLC) analyses were performed to evaluate the composition in bioactive compounds. The antioxidant activity of lavender hydrosol was investigated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) [3] and 2,2′-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS) [4] assays, in comparison to butylated hydroxytoluene (BHT). Different concentrations were added in the culture media of the plant pathogenic fungus Rhizoctonia solani and the fungal growth was monitored at a wavelength of 600 nm, at predetermined periods of time using a SpectroStar Nano microplate reader. The untreated culture served as the negative control, while bifonazole, a known antifungal agent was used as the positive control. The process of lavender hydrosol extraction had a yield of 18% (*w*/*w*). The obtained lavender hydrosol presented quantifiable volatile oils and polyphenolic compounds, as showed by GC–MS and HPLC analyses, respectively. GC–MS showed the prevalence of linalool and small amounts of lavandulol, β-caryophyllene, and trans-ocymene. HPLC showed the presence of caffeic and ferulic acids as the main phenolic acids and astragalin, luteolin, and isoquercetin as the main flavonoids. The antioxidant activity of lavender hydrosol was higher than that of BHT, a known synthetic antioxidant, as shown by DPPH and ABTS assays. In vitro cell culture results showed that the obtained lavender hydrosol had fungistatic effect in the range of tested concentrations. All of these results indicated that this natural by-product could be valorized to develop novel natural formulas with antioxidant and antifungal activity for preventing plant diseases, providing several advantages, such as fast decomposition in the enviroment and no toxicity, thus being optimal for applications in ecologically sustainable agriculture.

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