

Chemical composition and bioactive properties of *Eucalyptus*

globulus L. essential oil

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Eucalyptus is a large genus of tall evergreen plants belonging to the Myrtaceae family that comprises about 900 species and subspecies^[1]. It is native to Australia but currently is planted all around the world being one of the most important tree for its several uses such as timber, pulp and essential oil^[2]. In recent years, the demand of *Eucalyptus* sp. essential oil has significantly increased as it has been approved as a natural additive. It is widely used in food, flavor, pharmaceutical, and perfumery industries, thanks to its many biological properties, including antibacterial, antifungal, analgesic and anti-inflammatory properties^[3-4]. *Eucalyptus* sp. leaves in particular are rich in essential oil and its chemical composition depends on several factors, both intrinsic and extrinsic ones, such as environment and agronomic practices^[5].

The aim of this work was to characterize the essential oil obtained from *Eucalyptus globulus* L. dry leaves and assessing its antioxidant (DPPH and reducing power), antimicrobial (microdilution method against pathogenic bacteria) and cytotoxic properties. A conventional Clevenger apparatus was used to extract the essential oil by hydrodistillation for 3 h. The essential oil yield was 2.2 ± 0.3 %. The chemical composition of the oil was determined by GC-MS analysis which enabled the identification of 94% of total compounds in common eucalyptus essential oil. The major compounds were eucalyptol, alpha-pinene, globulol, alpha-terpinyl acetate, alpha-terpineol and aromadendrene. From a qualitative point of view, the obtained results are in good agreement with the data available from the literature, considering the genetics and environment variations that may occur^[5]. The antioxidant activity was evaluated by DPPH radical scavenging effect and reducing power. For DPPH assay an EC₅₀ value of 145.5 ± 0.7 mg/mL was obtained, while for reducing power assay an EC₅₀ value of 3.0 ± 0.2 mg/mL was presented. Concerning the cytotoxic activity against four tumor cell lines (AGS - gastric, NI-H460 - lung, CaCo - colon and MCF-7- breast), the best results were revealed on the inhibition of the colon cancer cell line with GI₅₀ value of 73 ± 5 µg/mL. The minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) were tested against a large panel of several common food and clinical bacteria evidencing a wide spectrum antibacterial activity against the selected bacteria. A strong activity in a concentration range between 2.5 and 0.6 % was reported against *Escherichia coli*, *Listeria monocytogenes* (clinical isolate), Methicillin-resistant *Staphylococcus aureus* (MRSA) for clinical bacteria and against *Yersinia enterocolitica*, *Listeria monocytogenes* (ATCC), *Enterobacter Cloacae*, *Staphylococcus aureus* and *Bacillus cereus* for food bacteria. Overall, the results revealed that essential oils from eucalyptus are a potential and natural source of bioactive substances for bio-based industries.

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