Chemical characterization, antioxidant and antimicrobial activities of essential oil from *Melaleuca quinquenervia* leaves

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Received 20 August 2016; revised 18 May 2018

Niaouli oil is an essential oil known for its applications in aromatherapy and pharmaceutical preparations for coughs, colds, rheumatism and neuralgia. It also serves as a sedative, possesses antifungal activity, and used in perfume industry. *Melaleuca quinquenervia* (Cav.) S.T. Blake, commonly called, paper bark tea tree or punk tree, is a potential source of niaouli oil. Here, we analyzed the chemical composition of essential oil from *M. quinquenervia* leaves and evaluated its antioxidant and antimicrobial potential. Chemical analysis of the oil by GC-FID and GC-MS revealed 1,8-cineole (31.0%) as a major component followed by *p*-cymen-8-ol (19.7%), *p*-cymene (16.5%), α-terpineol (9.9%), limonene (6.8%), α-pinene (4.2%) and terpinolene (4.2%). *M. quinquenervia* essential oil demonstrated good antioxidant activity by inhibiting 84.3 % of 2,2'-diphenyl-1-picrylhydrazyl radical and ferric reducing power (1.94±0.007) at 100 µg/mL. Further, it was highly effective against tested food borne bacterial as well as fungal pathogens inducing 11.0-46.0 mm and 11.8-46.0 mm zones of inhibition, respectively at concentration of 8-250 µg/mL. The high degrees of antibacterial and antifungal activities were further confirmed at 8 µg/mL minimum bactericidal concentrations and minimum fungicidal concentrations, respectively. Time kill assay showed significant bactericidal and fungicidal effects of essential oil for four weeks. The high antimicrobial and antioxidant activities of *M. quinquenervia* essential oil substantiate its potential use as alternative to chemical preservatives in food industry.

Keywords: 1,8-Cineole, 2'-Diphenyl-1-picrylhydrazyl radical, Food borne pathogens, Limonene, Minimum fungicidal concentration, Niaouli oil, 2Paper bark tea tree. Preservatives, Punk tree, Time kill assay