

Chemical Composition of the Essential Oils of Variegated Pink-Fleshed Lemon (*Citrus x limon* L. Burm. f.) and their Anti-Inflammatory and Antimicrobial Activities

Dalia Hamdan^a, Mohamed L. Ashour^b, Sri Mulyaningsih^c, Assem El-Shazly^a, and Michael Wink^{c,*}

^a Department of Pharmacognosy, Faculty of Pharmacy, Zagazig University, 44519 Zagazig, Egypt

^b Department of Pharmacognosy, Faculty of Pharmacy, Ain Shams University, Abbassia, 11566 Cairo, Egypt

^c Institute of Pharmacy and Molecular Biotechnology, Heidelberg University, Im Neuenheimer Feld 364, D-69120 Heidelberg, Germany. Fax: +49 6221 54 4884. E-mail: wink@uni-hd.de

* Author for correspondence and reprint requests

Z. Naturforsch. **68c**, 275–284 (2013); received December 18, 2012/May 13, 2013

The volatile secondary metabolites of essential oils from fruit peel and leaves of variegated pink-fleshed lemon (*Citrus x limon*) were investigated using GLC and GLC-MS (gas-liquid chromatography-mass spectroscopy). Altogether 141 compounds were identified and quantified, accounting for 99.59% and 96.33% of the total hydrodistilled peel and leaf oil, respectively. Limonene occurred in higher amounts in fruit peel (52.73%) than in leaf oil (29.13%). Neral (12.72%), neryl acetate (8.53%), -menth-1-en-7-al (4.63%), -pinene (6.35%), and nerol (4.42%) were the most abundant constituents in leaf oil, whereas -terpinene (9.88%), -pinene (7.67%), geranial (4.44%), and neral (3.64%) dominated in the fruit peel oil. The antioxidant, anti-inflammatory, antitrypanosomal, and antimicrobial activities of the fruit peel essential oil were evaluated. The oil had a low antioxidant activity with an IC₅₀ value of (26.66 ± 2.07) mg/ml as compared to the efficient antioxidant ascorbic acid [IC₅₀ (16.32 ± 0.16) µg/ml]. The oil moderately inhibited soybean 5-lipoxygenase (5-LOX) with an IC₅₀ value of (32.05 ± 3.91) µg/ml and had moderate antitrypanosomal activity [IC₅₀ (60.90 ± 0.91) µg/ml]. In addition, moderate antimicrobial activities were detected against Gram-positive bacteria (*Bacillus subtilis*, *Staphylococcus capitis*, *Micrococcus luteus*), one Gram-negative bacterium (*Pseudomonas fluorescens*), and yeasts (*Saccharomyces cerevisiae*, *Candida parapsilosis*).

Key words: Pink Lemon, Essential Oil, Bioactivities