COMPARISON OF % COMPOSITION OF ESSENTIAL OILS IN CITRUS PEELS OF ORANGE (*Citrus aurantium*), LEMON (*Citrus limomum*), AND LIME (*Citrus aurantifolia*) BY SOLVENT EXTRACTION USING HEXANE AND ETHYL ACETATE AS THE SOLVENTS.

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ABSTRACT

COMPARISON OF % COMPOSITION OF ESSENTIAL OIL IN CITRUS PEELS OF ORANGE (*Citrus aurantium*), LEMON (*Citrus limomum*), AND LIME (*Citrus aurantifolia*) BY SOLVENT EXTRACTION USING HEXANE AND ETHYL ACETATE AS THE SOLVENTS.

Essential oils from citrus peels of orange, lemon, and lime were extracted by solvent extraction using hexane and ethyl acetate as the solvent. The composition of essential oil was analyzed by gas chromatography mass spectrometry (GCMS). Overall, hexane extracts from all citrus peels showed higher percentage yield. Hexane extraction of orange, lemon, and lime peels provided the yields of 7.21, 6.28, and 8.09%, whereas only 6.09, 4.94 and 7.11% yields, respectively were obtained from ethyl acetate extract. The major constituents of hexane extract from orange (*citrus aurantium*) peel were limonene (73.13%), citral (0.96%), α-pinene (0.60%) and b-pinene (1.28%) whereas limonene (36.66%) and b-pinene (0.12%) are the major components of the ethyl acetate extracts essential oil. The major constituents of hexane extract from lemon (*citrus limomum*) peel were limonene (33.52%), citral (3.15%), and b-pinene (10.14%) whereas limonene (1.18%) are the major component of the ethyl acetate extracts essential oil. The major constituents of hexane extract from lime (*citrus aurantifolia*) peel were limonene (18.79%), citral (6.45%), α-pinene (0.43%) germacrene B (3.29%) and b-pinene (2.45%) whereas limonene (15.67%) citral (5.80%), α-pinene (1.75%), germacrene B (1.75%), and b-pinene (9.25%) are the major components of the ethyl acetate extracts.

CHAPTER 1

INTRODUCTION

1.1 Essential oils

Essential oils (EOs) (also called volatile or ethereal oils; Guenther, 1948) are aromatic oily liquids obtained from plant material (flowers, buds, seeds, leaves, twigs, bark, herbs, wood, fruits and roots). They can be obtained by expression, fermentation, enfleurage or extraction but the method of steam distillation is most commonly used for commercial production of EOs (Van de Braak and Leijten, 1999). The term 'essential oil' is thought to derive from the name coined in the 16th century by the Swiss reformer of medicine, Paracelsus von Hohenheim; he named the effective component of a drug *Quinta essentia* (Guenther, 1948). An estimated 3000 EOs are known, of which about 300 are commercially important destined chiefly for the flavours and fragrances market (Morris, 1979). It has long been recognised that some EOs have antimicrobial properties (Guenther, 1948 and Boyle, 1955) and these have been reviewed in the past as have the antimicrobial properties of spices but the relatively recent enhancement of interest in 'green' consumerism has lead to a renewal of scientific interest in these substances. Besides antibacterial properties, EOs or their components have been shown to exhibit antiviral (Betty, 2002) properties. These characteristics are possibly related to the function of these compounds in plants (Guenther, 1948 and Mahmoud and Croteau, 2002).