Title : Comparative study on the chemical composition and applications of *Citrus-aurantium* and *Citrus hystrix*

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ABSTRACT

Bitter orange (*Citrus aurantium*) and kaffir lime (*Citrus hystrix*) are plants in the *Citrus* genus of the Rutaceae family. The essential oils from the peels of both of these plants are used in cooking. In this study, essential oils were extracted from the peels of bitter orange and kaffir lime using a Clevenger-type distillation apparatus, which is an effective method for extracting high-quality essential oils without the use of chemicals. This method is easy to perform, safe, and environmentally friendly. The extracted essential oils of bitter orange and kaffir lime were clear and colorless, with yields of 4.30% and 1.93%, respectively. Gas chromatography-mass spectrometry (GC-MS) analysis revealed that the essential oil from bitter orange peel contained 16 identified chemical components, with the highest concentration being L-Limonene (89.58%). The essential oil from kaffir lime peel contained 31 identified chemical components, with the most abundant being 1S-α-Pinene (26.89%). Comparing the two essential oils, 8 compounds were found exclusively in bitter orange oil, 23 compounds were unique to kaffir lime oil, and 8 compounds were common to both oils. Functional group analysis was performed using Fourier-transform infrared spectroscopy (FT-IR). The FT-IR spectra of the essential oils from both bitter orange and kaffir lime showed distinct signals at O-H stretch at 3400 cm^{-1}, C-H stretch at 3000-2800 cm^{-1}, C=O stretch at 1715 cm^{-1}, N-H bending at 1650-1550 cm^{-1}, and C-H bending (CH$_3$) at 1450-1375 cm^{-1}. The signal patterns in the IR spectra of both essential oils were similar.

The extracted essential oils were then used to create four perfume scents, all with the same base note and a top note of citrus from the essential oils of bitter orange and kaffir lime. A consumer preference survey was conducted with 10 participants to test the scent of the four perfumes. The results revealed that Formula 3, consisting of 50% Ethanol, 15% Passion fruit, 12.5% *Citrus aurantium*, 5% Rose, 5% Mint, 5% Musk, and 7.5% Herb, was the most satisfied (50%) of the testers favoring it.

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