

TITLE: CHEMICAL AND MICROBIOLOGICAL CHARACTERIZATION OF ESSENTIAL OILS EXTRACTED FROM CITRUS FRUIT OF EXCESSIVE PRODUCTION.

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ABSTRACT:

The accelerated production of organic waste requires measures that aim to maximize the use of food, generating several benefits that go beyond environmental issues. Thus, this work proposes the extraction of essential oils (OEs), an important raw material in the manufacturing of various products from citrus peels, that are production surpluses of concentrated juices. Seven fruits of the genus *Citrus* were obtained from the producer's orchards and their barks. OEs were extracted by hydrodistillation using a Clevenger type apparatus. The characterization of these OEs was performed using refractive indexes, relative density and solubility ethanol 90% methods. For the determination of the chemical composition of the OEs, gas chromatography coupled to mass spectroscopy (GC-MS) was used. The compounds were then grouped by Principal Component Analysis (PCA) and Hierarchical Grouping (HCA). Their antimicrobial activity was evaluated by a diffusion technique using yeasts and bacteria. After analysis, it was verified that the oranges samples showed a superior extraction yield, being the Camper the one that presented the best results. The organoleptic properties of the obtained OEs are similar to each other and data of density showed that orange samples have very close values (0.84 g mL^{-1}), including the acidic ones (0.85 g mL^{-1}). For the refractive index, all samples presented similar values (1.47). The homogeneous behavior was also observed for the solubility in ethanol 90%, ranging from 0.3 mL in the Rio sample to 0.5 mL in oranges. The GC-MS analysis allowed the identification of 61 different compounds in OEs; it was observed that oranges have a higher overall percentage of limonene, the main compound present in citrus OEs (more than 90%), whereas acidic limes presented other major substances: β - Pinene and γ -terpinene. The PCA statistical results were able to describe the data with a 98.3% confidence and showed a sample grouping that is aligned with their classifications (oranges, acid files and gossamer). The statistical treatment by HCA corroborates the results obtained by the PCA method. Considering the antimicrobial analysis of the OEs, all samples presented antimicrobial activity against *Escherichia coli*. Therefore, we were able to conclude that the use of the essential oils generated from the citrus peel excesses is a sustainable option that can generate economical and environmental gains.

Keywords: Essential oil, GC-MS, Citrus, limonene

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