Study on the Authenticity of Copaiba Oils by HATR-FTIR Spectroscopy and Multivariate Analysis.

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Introduction

The oleoresin obtained by tapping the trunk of the *Copaifera* (Leguminosae – Caesalpinoideae) trees is widely used in Brazilian popular medicine, mainly in healing as antiseptic and anti-inflammatory agent.[1,2] Exported to Perfumery industry act as a fragrance component in perfumes and cosmetic preparations. Nevertheless, the presence of adulterants and contaminants in Copaifera oils common. To outline these problems analysis of multivariate methodology associated to Infrared Spectroscopy provides highly useful information about structure and proportion of analites and therefore can be used for both qualitative and quantitative analysis.[3,4,5]

Results and Discussion

In the present communication we develop a methodology to identify the presence of common adulterants and contaminants in *Copaifera* oils sampling in different Amazonian region using the attenuated total reflectance Fourier transform infrared (FTIR-ATR) spectroscopy associated with multivariate analysis based on the Principal Component Analysis (PCA) and Hierarchical Cluster Analysis (HCA). The spectra has been performed on a Model 520 Nicolet FT-IR spectrometer and a triplicate spectra were recorded by applying *Copaifera spp* and standard oil sample on the surface of a HATR sample-handling accessory with ZnSe crystal of the Pike. The HATR-FTIR method was useful also to detect the presence copaiba oil adulteration with vegetable oil (triglycerides from soyabean oil) and/or ethanol and it's will be applied also for quantitative determination of these contaminants. The HCA/FTIR was used to group oils with similar characteristics and shown resulted similar those presented by TLC and GC-MS. This approach simplifies many of the sample handling problems and can answer to routine quality control since is fast, economic and requires no weighing or qualitative dilution of test materials in any solvent, and requires little or no preparation of the test sample. In the oils sampled (from Rondônia, state of Pará) we didn't found adulterations with vegetable oils, diesel or ethanol, the most common in commercial oils. The results for FTIR/HATR associated with method PCA is showed in **Fig. 1** Oleoresin sample was doped with different soyabean oil concentrations (5, 10, 15, 20 and 25%) and ethanol (10, 15 and 20%) and then correlated with eight pure samples of oleoresin (samples 31-54). The results of the application of the methods to oils samples from different regions can discriminate four main groups: (1) soybean oil, (2) five doped samples with soy oil, (3) ethanol and respective doped samples and (4) copaiba oil. The dendogram obtained with HCA/FTIR showed group oils with similar characteristics and resulted similar those presented by TLC and GC-MS.

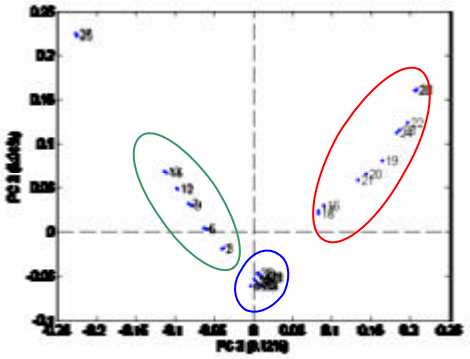

Fig. 1. 2D plot of the scores for PCA: 1 – 15 (*C. multijuga* oilresin + soyabean 5,10,15 and 20%); 16-24 (*C. multijuga* oilresin + etanol 5,10,15 and 20%); 25-27 (soy bean oil pure); 28-30 (ethanol PA); 31-54 (*C. multijuga* and *Copaifera spp.* oleoresin).

Conclusions

The results of the application of the methods FTIR / PCA and HCA to Copaiba oils samples were coherent with preliminary analysis obtained by CCD and sophisticated instrumental methods such as GC, GC-MS, showing adequate for detection and calculates approach of adulterants such as ethanol and soyabean oil in of *Copaifera* oleoresin samples.

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