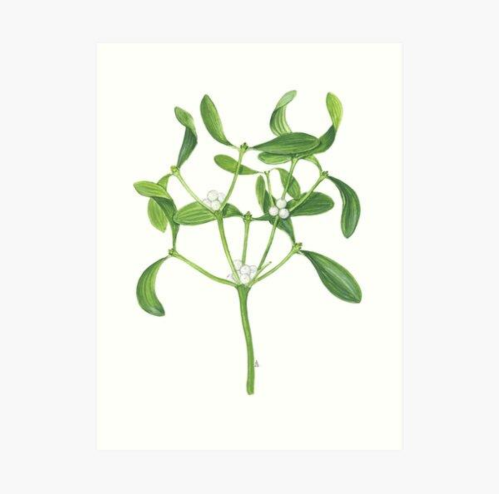
mistletoe

PHYTOCHEMICAL ANALYSIS OF MISTLETOE (*Viscum album L.*) BY FTIR SPECTROSCOPY



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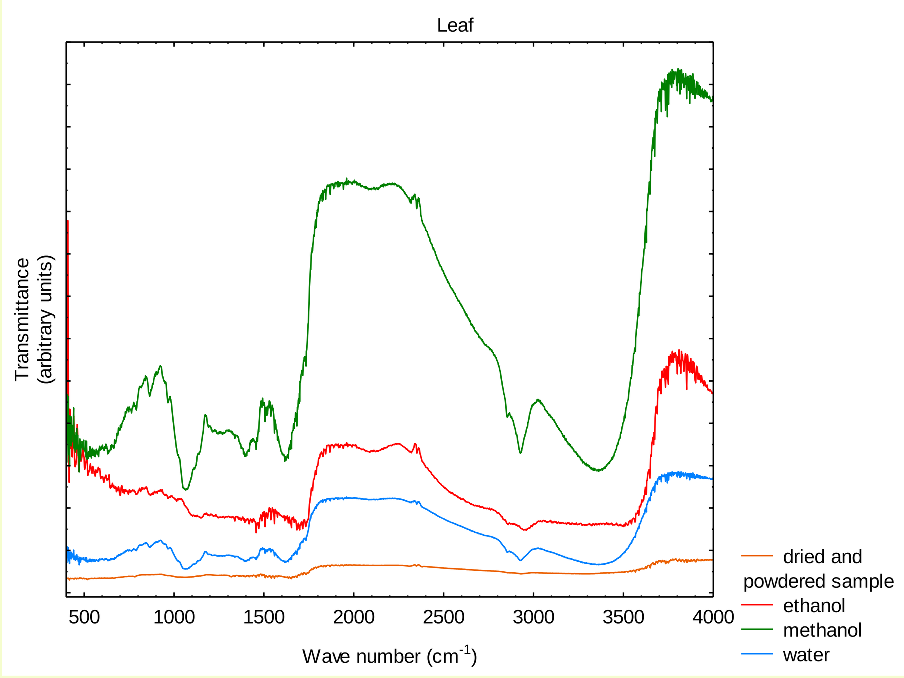
INTRODUCTION

Mistletoe is an evergreen semi parasitic shrub from Santalaceae family which can grow on the branches of different trees like apple, pear, willow, oak, poplar and some other plants. Plant extracts have great potency and can be used for a different purposes. Rudolf Steiner, founder of anthroposophy medicine, introduced mistletoe extract into oncology as an unconventional means of therapy for cancer in 1920. Recent studies showed that *Viscum album* extract had significant effect on the amount of gas production from cottonseed meal and it has also proved to be an important environmentally friendly, and low-cost inhibitor for carbon steel in acid medium [1,2]. The aqueous extract of *Viscum album* fruit demonstrates the strong potential for reducing silver ions and producing silver nanoparticles using clean, non-toxic, eco-friendly method that can be produced on a large scale[3]. Chemical properties of *Viscum album* could be influenced by factors like type of host, geographical locations, mistletoe harvesting season, freshens of plant (fresh mistletoe/commercial tea products). Information regarding the functional group presence in the mistletoe fresh leaves, stems and different commercial products like teas from the continental and coastal part of Croatia is lacking. In this study we used Fourier Transform Infrared (FTIR) Spectroscopy for detection of functional groups in extracts (water, ethanol, methanol) prepared from freshly picked *Viscum album* leaves and stems and extracts prepared from two commercial products (teas). The FTIR spectra, obtained from *Viscum album* samples collected at eight different locations were compared using Principal Component Analysis (PCA).



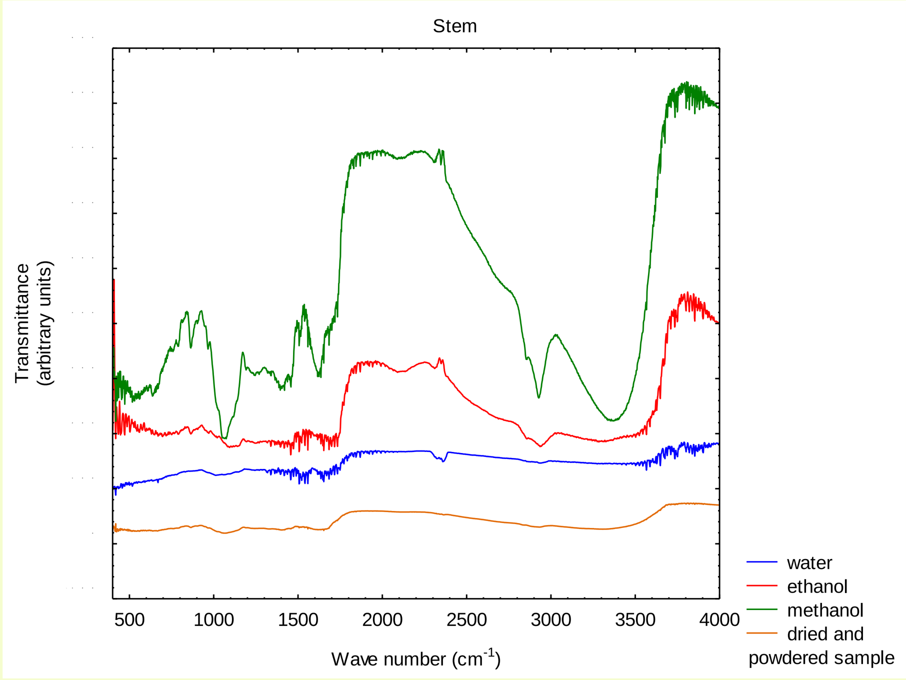


Fig.4. Selected FTIR spectra

METHODS

Sampling included the following locations: Aljmaš, Petrijevci, Voćin, Koprivnica, Bjelovar, Karlovac, Hum and Pazin. The samples were analysed using Fourier Transform Infrared (FTIR) Spectroscopy .

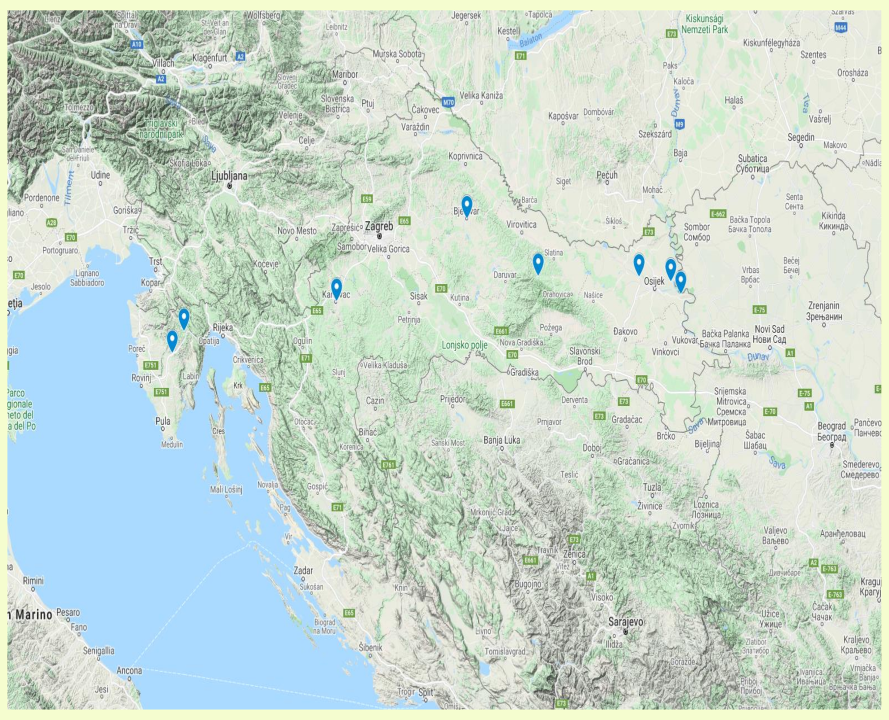


Fig. 1 The map of sampling sites

Fig. 2 Leaf, stem and tea of misteltoe

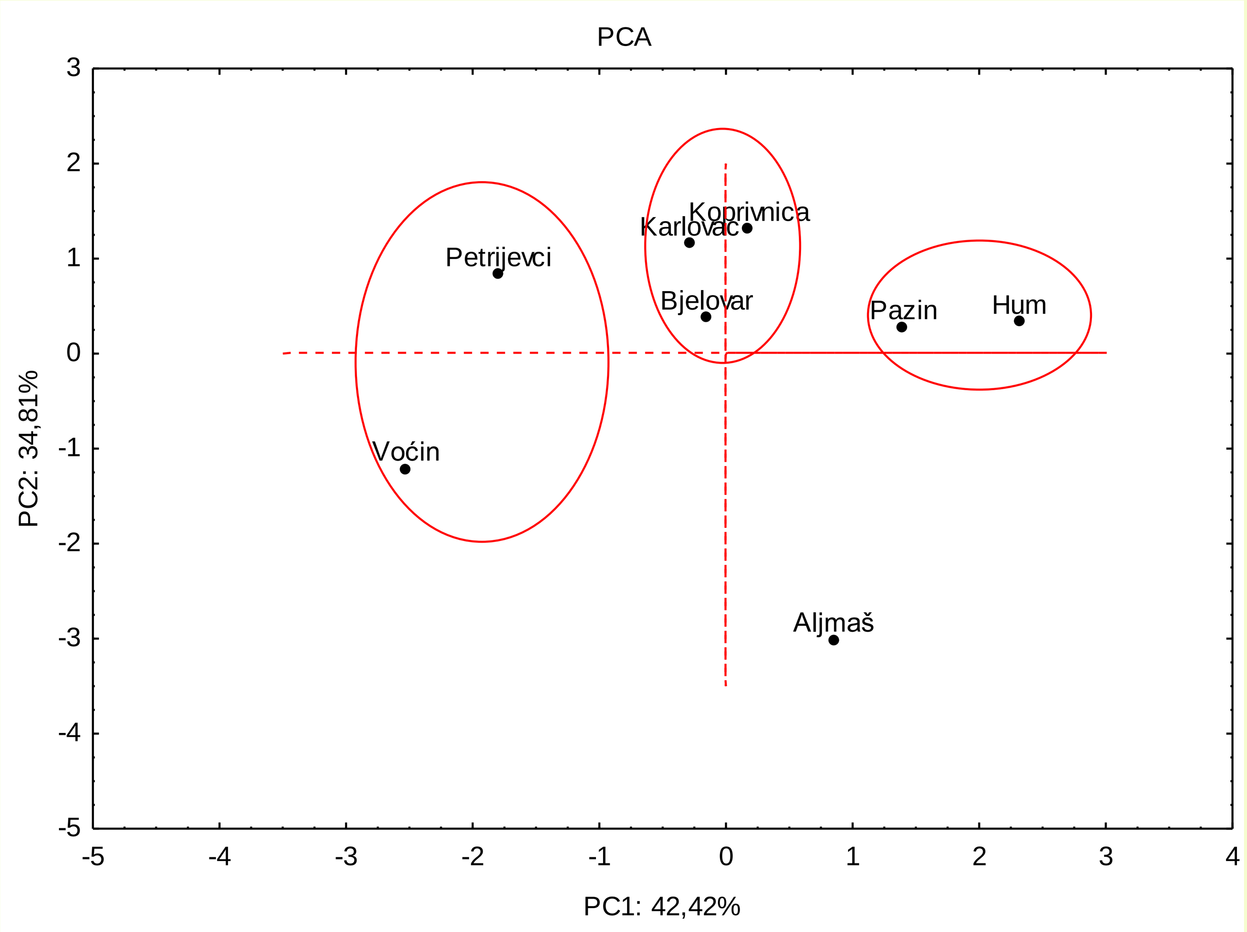


Fig.5. The result of PCA

RESULTS

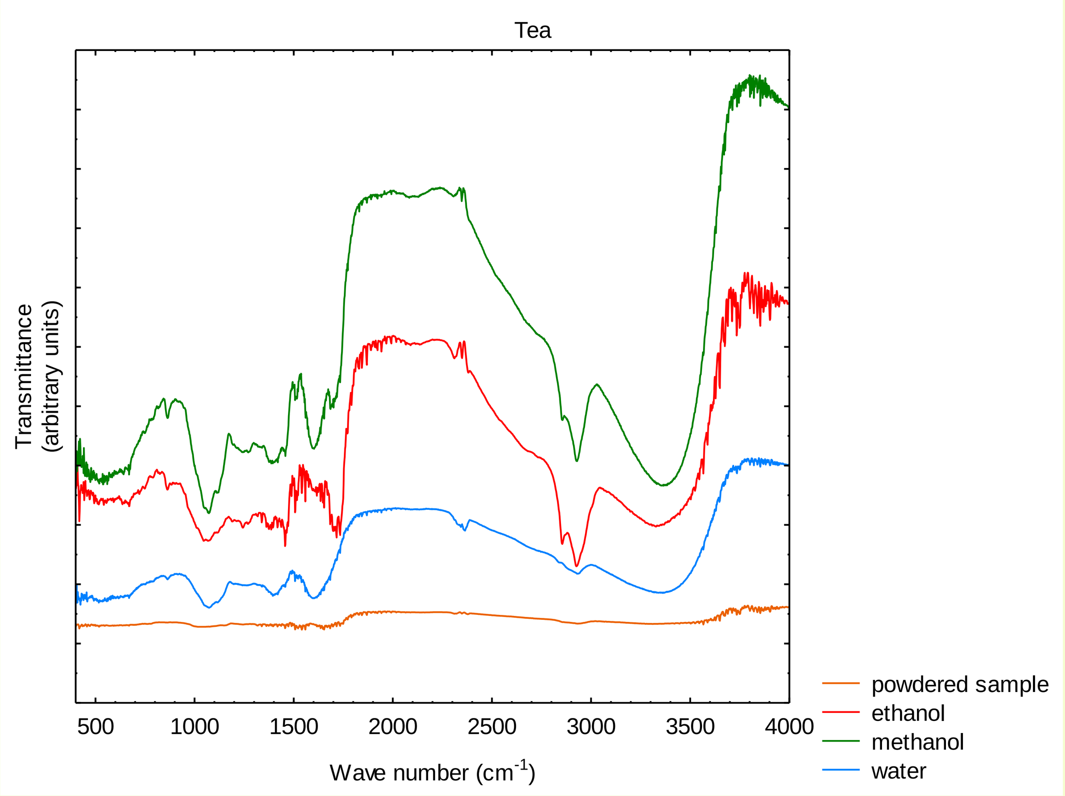


Fig.3. Selected FTIR spectra

CONCLUSION

A large number of peaks appeared in the region from 400 cm^{-1} to 4000 cm^{-1} indicating that mistletoe has a rich chemical composition (proteins, lipids, carbohydrates etc..)

The Principal Component Analysis (PCA) method was applied to the data obtained by FTIR spectroscopy.

The results of the principal components analysis showed that geographical differences had the greatest influence on differences (similarities) among analysed samples.

The extracts of all samples demonstrates the strong potential to reduce metal ions and producing nanoparticles.

[1] Tabrizi et all., *J. Livestock Science* 8(2017) 204-209
[2] Elgyar et all., *Res. Appl. Chem*, 6 (2021) 14344-14358
[3] Damirchi et all., *Nanochem Res*, 1 (2020) 104-110