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Evaluation of the similarity/dissimilarity of some autochthonous fruit extracts rich in anthocyanins and the main antioxidant compound classes by FTIR-PCA

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Abstract: The goal of this study was the evaluation of the similarity/dissimilarity of some autochthonous fruit extracts (*Prunus*, *Vitis* and *Ribes* species) that are rich in anthocyanins with the main natural antioxidant classes (anthocyanins, anthocyanidins, flavonoid glycosides and aglycones, and chlorogenic acids), using the combined Fourier-transform infrared spectroscopy – principal component analysis (FTIR-PCA) technique.

• Introduction

Antioxidants are important natural compounds found in many fruits and vegetables, which are involved in the scavenging of free radicals in humans. Antioxidants have biological activities such as anti-inflammatory, anti-atherosclerotic, or anti-aging activities, but also they prevent some cardiovascular diseases, diabetes, cancer, or neurodegenerative disorders. However, the beneficial effect to the human health is controversial and depends on the antioxidant type, daily intake and the patient conditions.

• Materials and Method

Both anthocyanin based fruits ethanolic extracts (plums – *P. domestica* L., red grape – *Vitis vinifera* L. and blackcurrant – *Ribes nigrum* L.) and standard natural antioxidant compounds (cyanidin, cyanidin 3-*O*-glucoside, quercetin, rutin and chlorogenic acid) were analyzed by FTIR (Bruker Vertex 70, range 4000-400 cm⁻¹, resolution 4 cm⁻¹) and the main band characteristics were processed by PCA.

• Results and Conclusion

The extracts (all coded as "E") were more similar with "CG" and "A" antioxidant classes and were dissimilar with "F" classes.

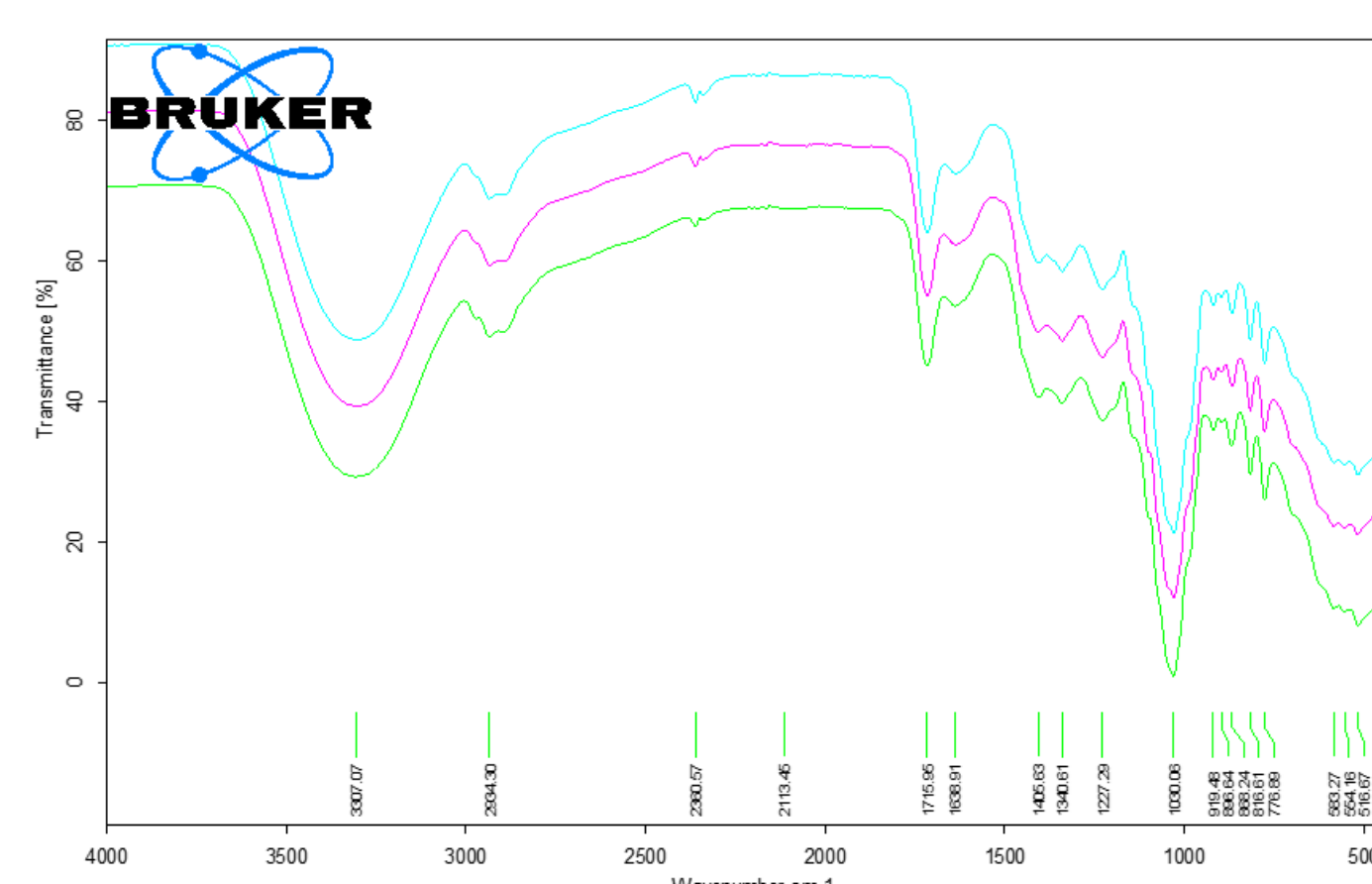


Figure 1. Representative FTIR spectra for *R. nigrum* L. extracts

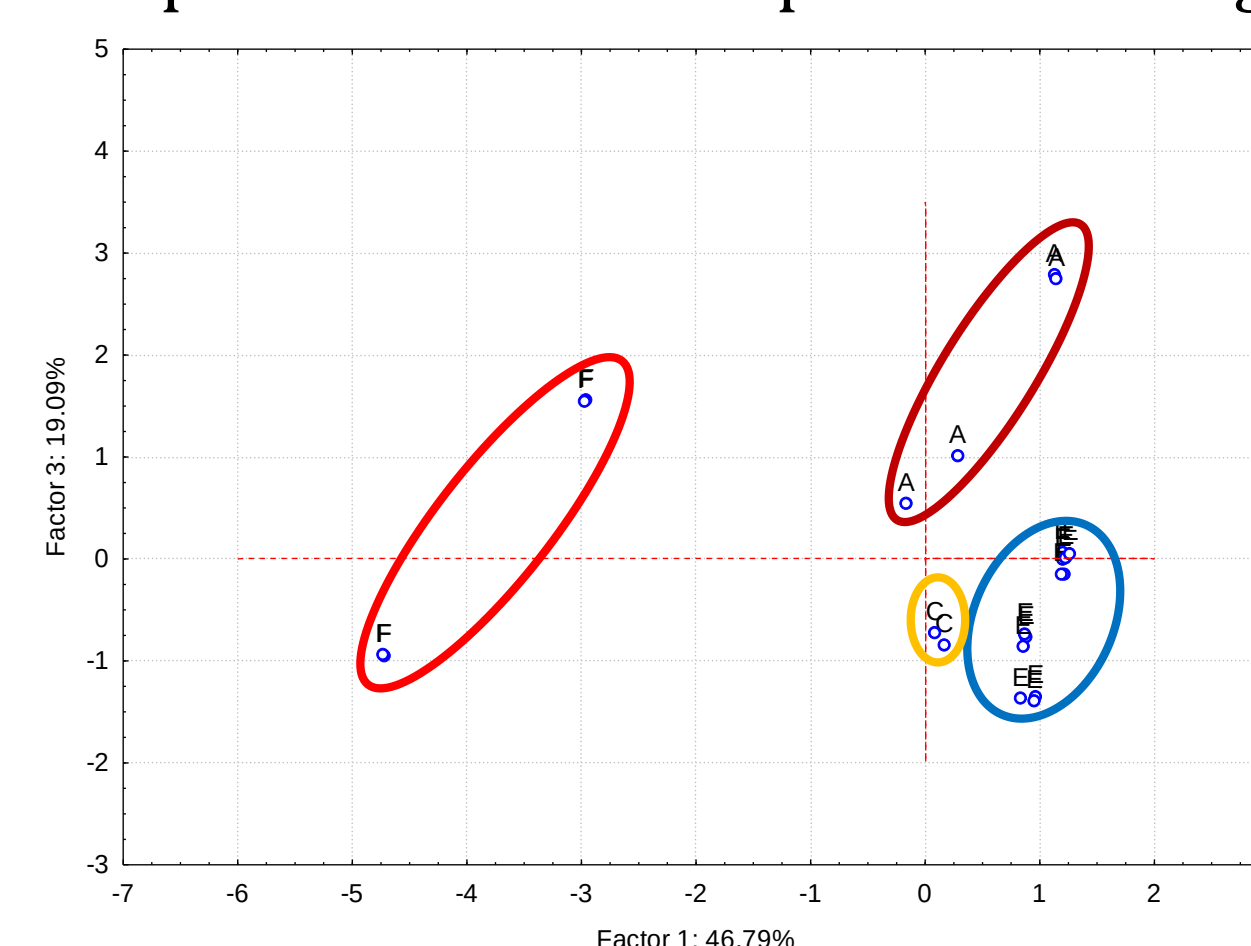


Figure 2. PC3 vs. PC1 scores plot for the fruit extracts (E), and standard antioxidant compounds (F – flavonoids, A – anthocyanidins/anthocyanins, CG – chlorogenic acids)

This very fast and non-destructive FTIR-PCA method allows the overall evaluating the fruit extracts from the main antioxidant classes point of view, which can be useful for classification of fruit extracts and their application in foods.

- **References:** [1] Żyżelewicz *et al.*, *Antioxidants* **2022**, *11*, 2336; [2] Hădărugă *et al.*, Flavones, In: *Handbook of Food Bioactive Ingredients*, Jafari *et al.* (eds.), Springer Nature, Cham, **2023**; [3] Cozzolino *et al.*, *Food Research International* **2011**, *44*, 1888.