



Croatian traditional apple varieties as a source of bioactive compounds

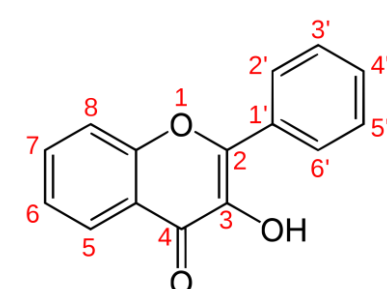
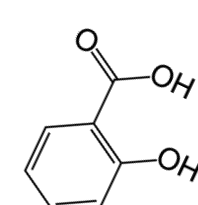
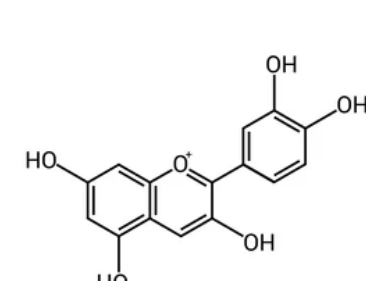


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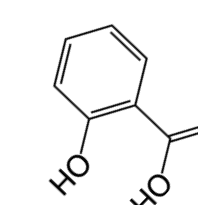
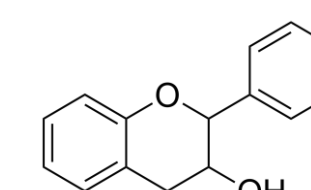
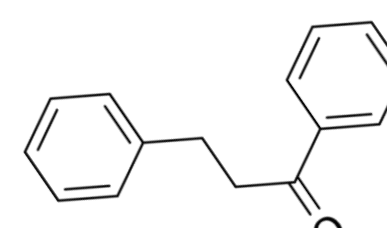
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Introduction



Recent years, traditional apple varieties are in the center of attention due to their rich polyphenolic profile. Traditional and conventional apple varieties have the same groups of polyphenols, being mainly phenolic acids, flavonols, dihydrochalcones, flavan-3-ols and anthocyanins. Despite the similarities, traditional apple cultivars proved to be rich in some individual polyphenolics, such as epicatechin, quercetin-3-rutinoside, chlorogenic acid, procyanidins B1, B2, A2, etc. [1]. Furthermore, traditional apple varieties also have higher antioxidant activity than conventional ones.

Material and methods

Twenty-three Croatian traditional apple varieties examined. Two grams of each variety was extracted using 80% aqueous methanol to achieve a good extract of polyphenols. Extracts were filtered through filter paper and analyzed by HPLC-DAD and LC-MS/MS. The use of chromatography coupled to MS detector working in tandem mode (MS/MS) provides the required analyte sensitivity and selectivity, allowing a deep characterization of twenty-three apple samples, improving the knowledge of bioactive compounds in traditional apple varieties. Total polyphenol content (TPC) was measured with an optimized Folin-Ciocalteu assay and the antioxidant activity was determined by DPPH method.

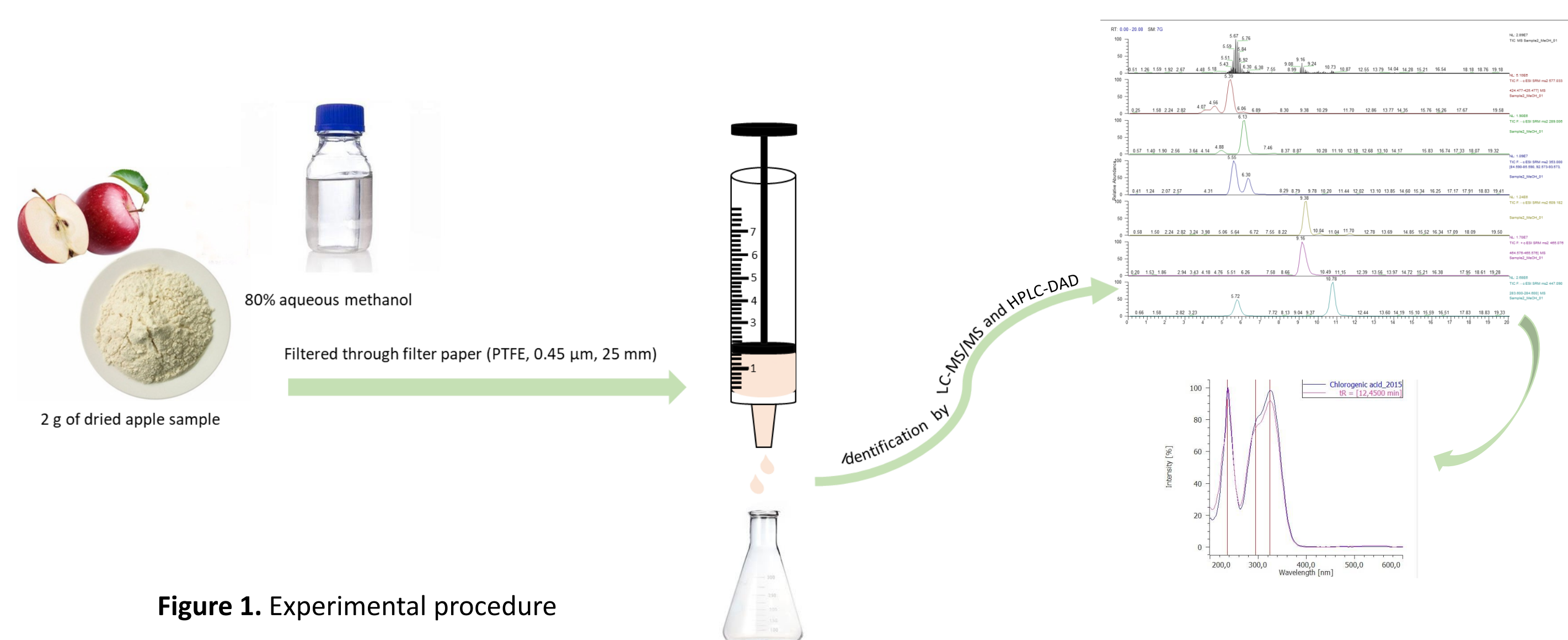


Figure 1. Experimental procedure

Results

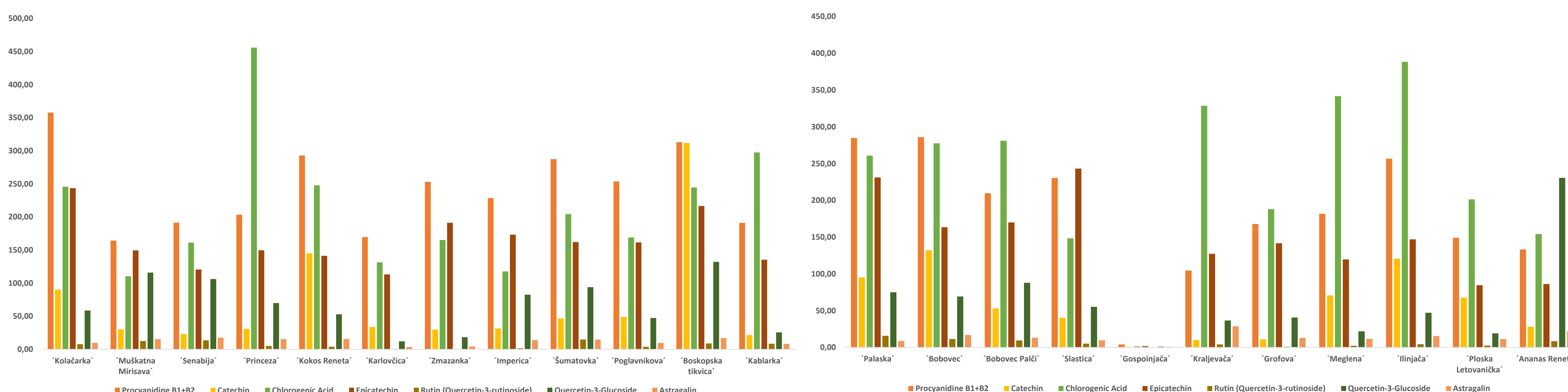


Figure 2. The content of individual polyphenolic compounds in traditional apple varieties [mg/kg dw]

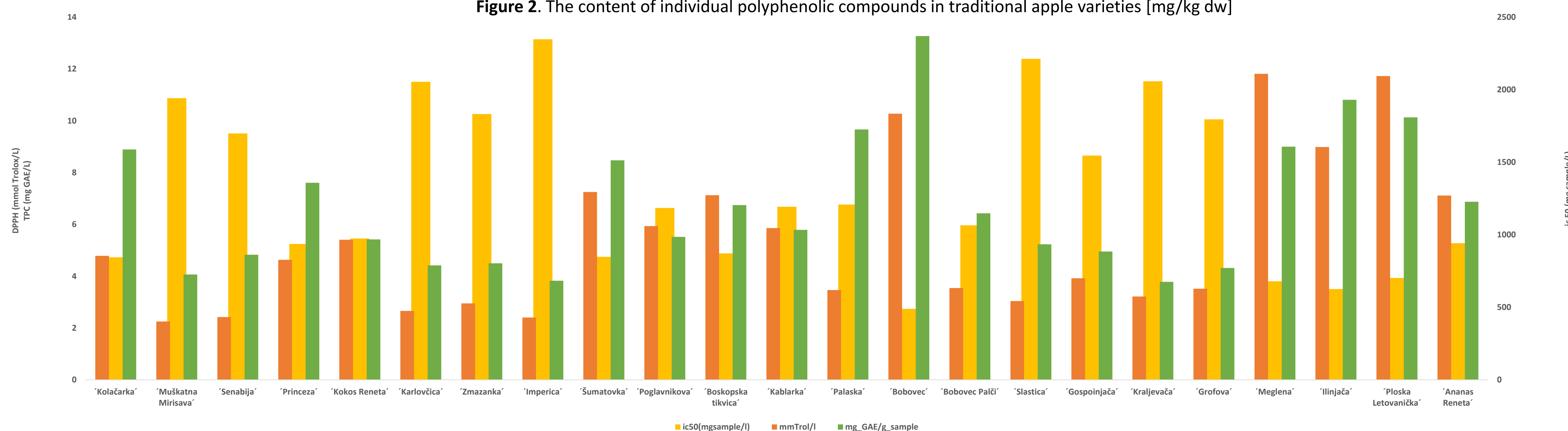


Figure 3. The DPPH, TPC and medium inhibition index (ic50) in traditional apple varieties

Conclusion

LC-MS/MS allowed the identification and quantification of eight compounds, namely procyanidin B1, procyanidin B2, catechin, epicatechin, quercetin-3- β -glucosidse, quercetin-3-rutinoside, astragalgin and chlorogenic acid. The results showed that the main polyphenol in all traditional apple varieties was chlorogenic acid with content ranging from 1.3 mg/kg dw to 455.9 mg/kg dw. The highest content of chlorogenic acid had 'Princeza'. The total polyphenol content varied from 378.15 to 1326.49 mg/100 g dw depending on the varieties. The highest antioxidant activity had 'Meglena' (11.81 mmol Trolox/L). This work was supported by the project UIP-2020-02-8461 (The Croatian Science Foundation).

References:

[1] Lončarić, Ante; Matanović, Katarina; Ferrer, Perla; Kovač, Tihomir; Šarkanj, Bojan; Skendrović Babojelić, Martina; Lores, Marta (2020). *Peel of Traditional Apple Varieties as a Great Source of Bioactive Compounds: Extraction by Micro-Matrix Solid-Phase Dispersion*. *Foods*, 9(1), 80–. doi:10.3390/foods9010080