# QUANTIFICATION OF POLYPHENOLS IN SOME AUTOCHTONOUS APPLE CULTIVARS FROM SERBIA

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## INTRODUCTION

Polyphenols are interesting as compounds that add nutritional value to foods, but also as indicators of the environmental stress effects and related to resistance toward diseases in higher plants. Therefore, the chemical examination of polyphenols is useful from the aspect of satisfying consumer needs and consideration of resistance to agroecological conditions. Autochthonous cultivars are characterised by good adaptability to the local environmental conditions and represent a valuable source of genetic variability.

## EXPERIMENTAL

### *Samples*

Samples were collected at the Experimental Station Radmilovac, University of Belgrade - Faculty of Agriculture. The subjects of this study were 17 samples of autochthonous apple varieties collected in 2018 and 2019. For comparison, 5 standard and 5 resistant apple cultivars were also collected (Table 1.).

### *Preparation of samples*

The mesocarp and the peel were separated. About 2.5 g of homogenized sample was measured and extracted with acidified 0.1% hydrochloric acid solution in methanol, assisted by ultrasound for 1 h. The extract was diluted and filtered through a 0.45 µm membrane filter prior to chromatographic analysis.

### *Analysis of polyphenols*

The polyphenols were quantified using ultra-high performance liquid chromatography (UHPLC) on a Dionex Ultimate 3000 UHPLC system equipped with a diode array detector (DAD) connected to TSQ Quantum triple-quadrupole mass spectrometer.

The collected data was furteher used for PCA analysis.

Table 1. Analised apple varieties

| Number | Sort | Sort type | Number | Sort | Sort type | Number | Sort | Sort type |
|---|---|---|---|---|---|---|---|---|
| 1. | Gala Galax | Resistant | 10. | Red Delicious | Conventional | 19. | Mionička belica | Autochthonous |
| 2. | Prima | Resistant | 11. | Demirka | Autochthonous | 20. | Mionička tikvara | Autochthonous |
| 3. | Remura | Resistant | 12. | Hajdučica | Autochthonous | 21. | Pamuklija | Autochthonous |
| 4. | Rewena | Resistant | 13. | Jesenji jablan | Autochthonous | 22. | Šećeruša | Autochthonous |
| 5. | Topaz | Resistant | 14. | Kadumana | Autochthonous | 23. | Šipina | Autochthonous |
| 6. | Golden Delicious | Conventional | 15. | Kopaoničanka | Autochthonous | 24. | Šipura | Autochthonous |
| 7. | Granny Smith | Conventional | 16. | Kožara | Autochthonous | 25. | Zaječarska duguljasta | Autochthonous |
| 8. | Idared | Conventional | 17. | Krtajka | Autochthonous | 26. | Zaječarski delišes | Autochthonous |
| 9. | Jonagold | Conventional | 18. | Loznička tikvara | Autochthonous | 27. | Buzlija | Autochthonous |

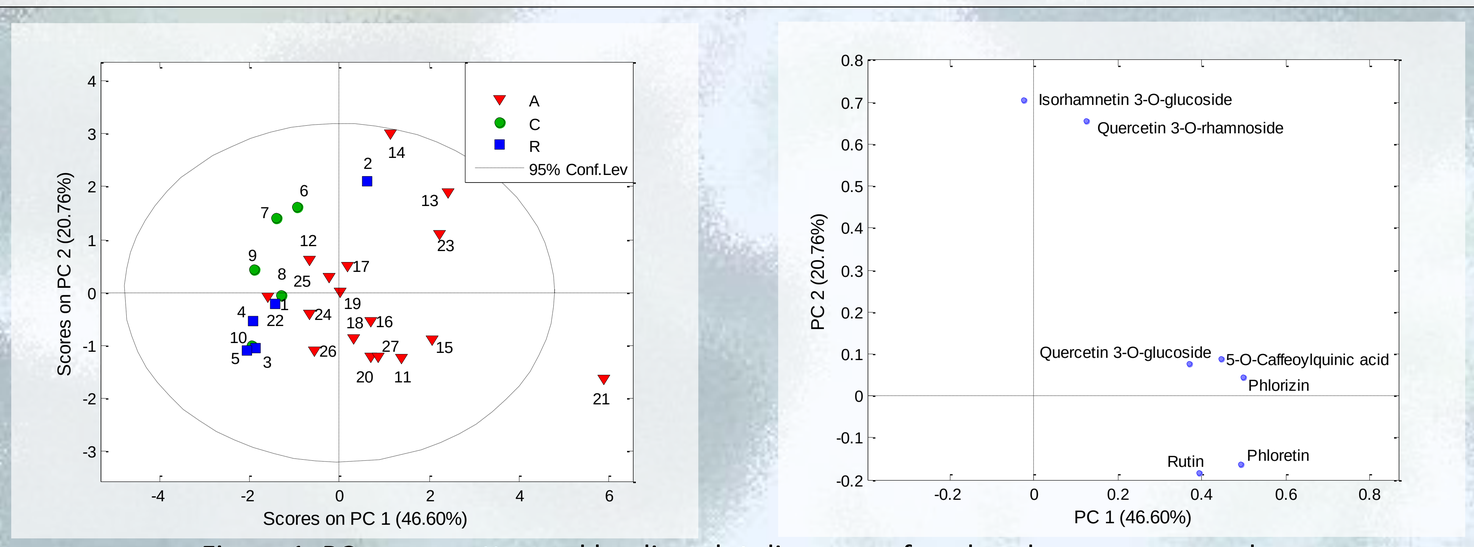


Figure 1. PC score scatter and loading plot diagrams of analysed mesocarp samples (A - autochthonous, C – conventional, R - resistant)

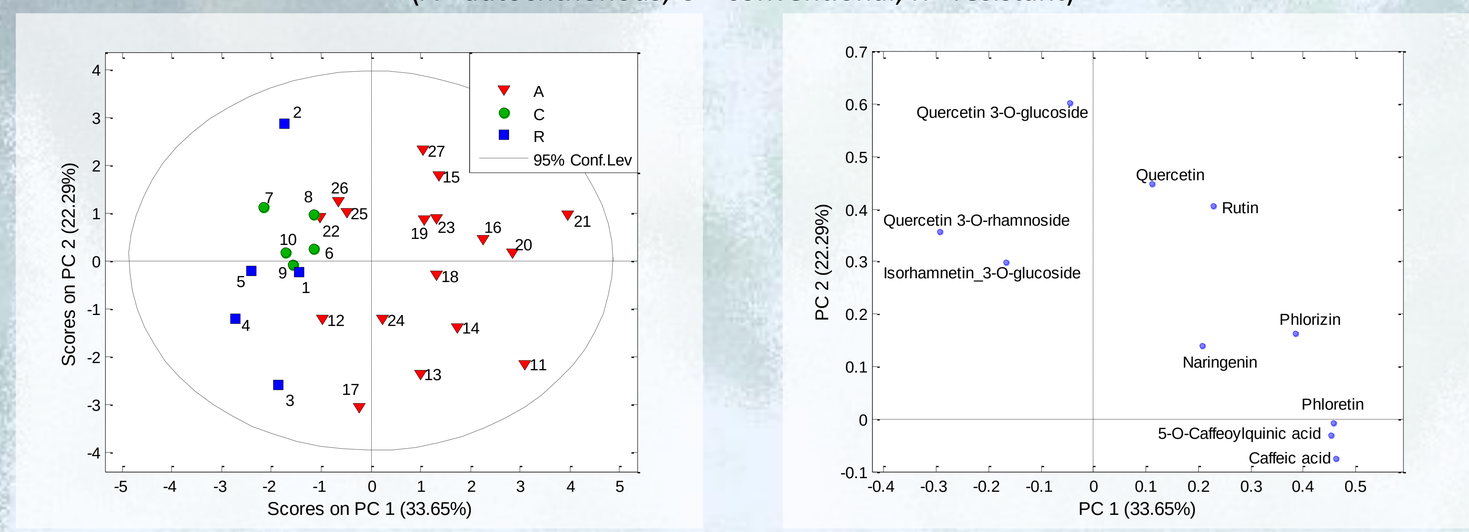


Figure 2. PC score scatter and loading plot diagrams of analysed peel samples (A - autochthonous, C – conventional, R - resistant)

## RESULTS AND DISCUSSION

In total of 7 compounds were quantified in mesocarp, while 11 were quantified in peel. Neochlorogenic acid was detected in the highest amount in mesocarp (503.12 mg/kg FW in autochthonous Šipina cultivar, 134.03 mg/kg in resistant Prima cultivar and 68.37 mg/kg in standard Idared cultivar). In the peel of all analysed cultivars, quercetin-3-*O*-glucoside and quercetin-3-*O*-rhamnoside, along with neochlorogenic acid, were found in higher concentrations compared to other compounds. Phlorizin and quercetin-3-*O*-glucoside were also detected in relatively high amount in the mesocarp of all samples. Higher amount of phlorizin in the mesocarp was generally detected in samples of autochthonous cultivars (1.76 – 55.55 mg/kg FW in autochthonous cultivars, 0.34 – 5.11 mg/kg in resistant cultivars and 0.46 – 8.81 mg/kg in conventional cultivars). Most of analysed polyphenols were detected in higher amount in the samples from 2019 compared to 2018. Autochthonous cultivars are separating from the other two types in both years in the PCA score plot (plots for year 2018 are shown on Fig. 1. and 2.).

## CONCLUSION

The results of PCA analysis pointed out differences between autochthonous apple varieties and commercial ones. Autochthonous apple varieties were generally characterised by higher content of phloridzin, phloretin and 5-*O*-Caffeoylquinic acid.

***Acknowledgements:*** *This work was supported by the Ministry of Education, Science and Technological Development of Republic of Serbia, Contract numbers: 451-03-9/2021-14/200168 and 451-03-9/2021-14/200288*