

PHENOLIC CONTENT AND ANTIOXIDANT PROPERTIES OF FUNCTIONAL COOKIES WITH GRAPE POMACE

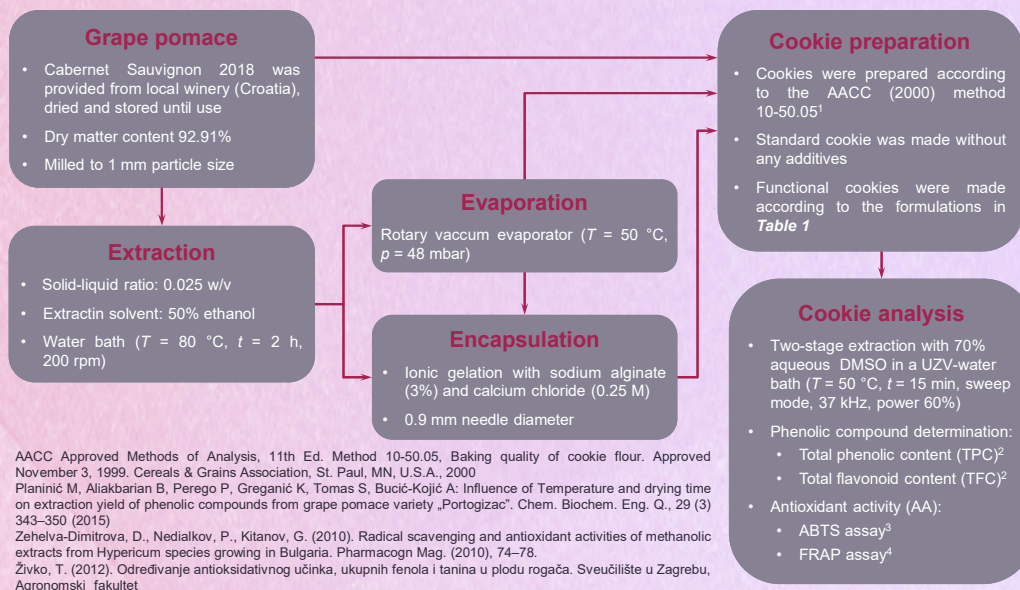
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Aim

The aim of this study was to make functional cookies with three different forms of grape pomace (milled grape pomace (GP), encapsulated (EN) and powdered (PE) extract), in order to examine the possibility of using wine industry byproducts in the production of functional cookies.

For each obtained functional cookie were determined: total phenolic content (TPC), total flavonoid content (TFC) and antioxidant activity (AA) with ABTS and FRAP assay.

Materials and methods



Results

Table 1. Cookie formulations and abbreviations

ABBREVIATION	FORMULATION
S	standard mixture
GP-1	standard cookie mixture in which 10% of the wheat flour was replaced with a grape pomace
GP-2	standard cookie mixture in which 20% of the wheat flour was replaced with a grape pomace
GP-3	standard cookie mixture in which 30% of the wheat flour was replaced with a grape pomace
PE-1	standard mixture + amount of powdered extract having the same polyphenol content as grape pomace in GP-1
PE-2	standard mixture + amount of powdered extract having the same polyphenol content as grape pomace in GP-2
PE-3	standard mixture + amount of powdered extract having the same polyphenol content as grape pomace in GP-3
EN-1	standard mixture + amount of encapsulated extract having the same polyphenol content as grape pomace in GP-1
EN-2	standard mixture + amount of encapsulated extract having the same polyphenol content as grape pomace in GP-2
EN-3	standard mixture + amount of encapsulated extract having the same polyphenol content as grape pomace in GP-3

Data in figures are expressed as mean value \pm standard deviation (SD).

The same letter indicates no significant differences (Duncan test, $p < 0.05$).

On Figure 3, uppercase letters correspond to the ABTS assay, and lowercase letters correspond to the FRAP assay.

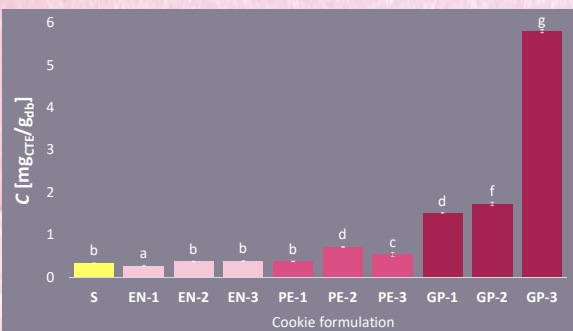


Figure 2. Total flavonoid content (expressed as a catechin equivalent, CTE) of various cookie formulations (abbreviations in Table 1)

Table 2. Correlation coefficient (R) between antioxidant activity (ABTS assay and FRAP assay) and with phenolic compounds

	ABTS	FRAP
TOTAL PHENOLIC CONTENT	0.9194	0.9393
TOTAL FLAVONOID CONTENT	0.8698	0.8959

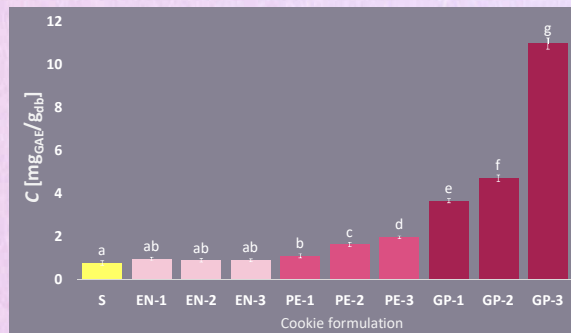


Figure 1. Total phenolic content (expressed as a galic acid equivalent, GAE) of various cookie formulations (abbreviations in Table 1)

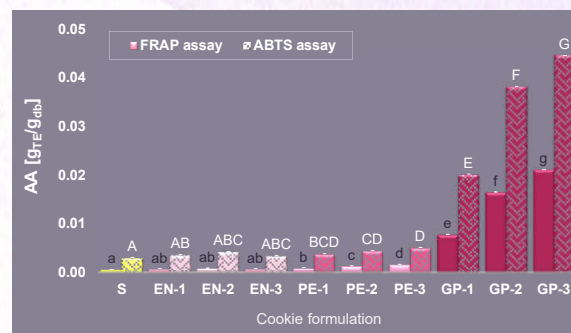


Figure 3. Antioxidant activity (expressed as a trolox equivalent, TE) of various cookie formulations (abbreviations in Table 1)

Conclusion

- The addition of grape pomace to the standard cookie formulation had a positive effect on antioxidant activity, total phenolic content and total flavonoid content.
- The total phenolic content of functional cookies ranged from 0.9 to 10.96 $\text{mg}_{\text{GAE}}/\text{g}_{\text{db}}$, while the total flavonoid content reached values between 0.27 and 5.70 $\text{mg}_{\text{CTE}}/\text{g}_{\text{db}}$.
- Functional cookies in which part of the wheat flour was replaced by milled grape pomace showed the highest content of bioactive compounds as well as antioxidant activity. Functional cookies enriched with powdered grape pomace extract also significantly contributed to the increase in antioxidant activity and bioactive compound content.
- The content of bioactive compounds shows a high correlation with antioxidant activity.