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Development of muffins with Tannat grape pomace as potential functional foods

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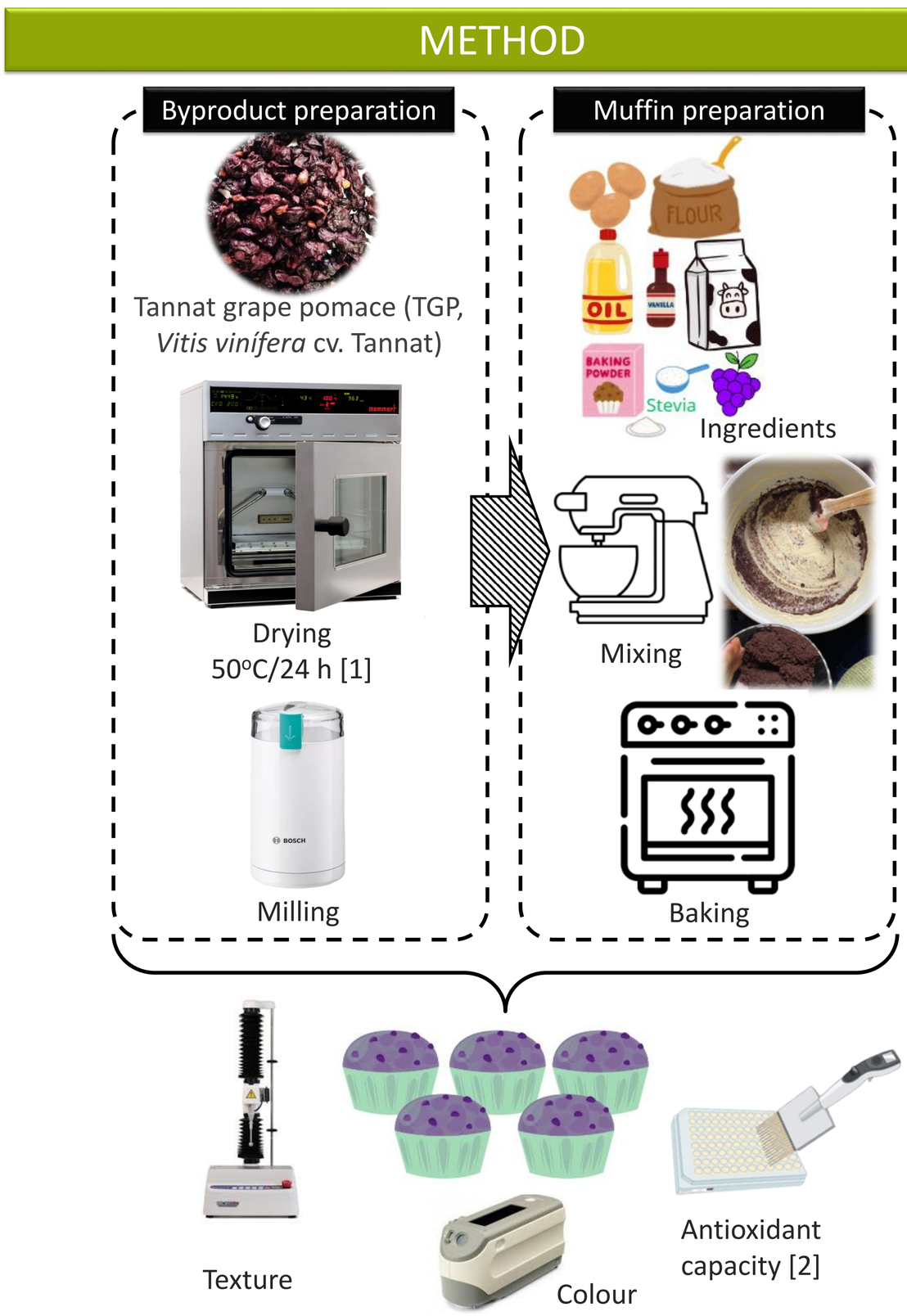
INTRODUCTION & AIM

Food industry is evolving and must keep evolving in order to carry out the Sustainable Development Goals proposed by the United Nations and to apply circular economy strategies to food chain for a sustainable and healthy nutrition. One strategy could be the use of agri-food industry byproducts as ingredients in the formulation of foods. In this sense, Tannat grape (*Vitis vinifera* cv Tannat) is the emblematic Uruguayan grape generating great amounts of waste every year by winemaking industry. Tannat grape pomace is the most abundant byproduct in Uruguay which has a unique polyphenolic profile and dietary fibre that may confer health-promoting properties when used as an ingredient [1].

The objective of the present work was to develop potential functional muffins with the nutritional claims of "source of/high in fibre" and "no added sugars", by incorporating Tannat grape pomace (TGP) as a source of fibre and bioactive compounds, and stevia as sweetener.

METHOD



RESULTS & DISCUSSION

Five formulations of muffins with TGP were obtained, as well as their control muffins (without TGP)

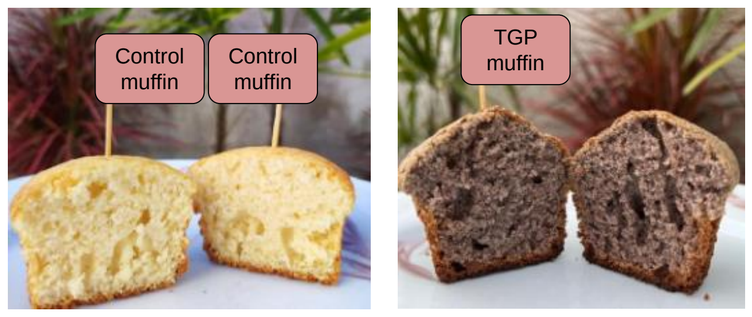


Figure 1. Muffins without (**left**) and with TGP (**right**).

Table 1. Colour results of the muffins with and without TGP.

Muffins	L	a*	b*
CM 0.65	62.5 ± 3.0 ^{d}	17.5 ± 0.7 ^{e}	41.6 ± 1.3 ^{f}
CM 0.75	71.4 ± 0.5 ^{e}	3.8 ± 0.2 ^{a}	28.9 ± 1.7 ^{d}
CM 0.85	71.8 ± 1.1 ^{e}	7.9 ± 0.6 ^{d}	35.9 ± 1.7 ^{e}
TGPM 7% 0.65	44.3 ± 0.3 ^{c}	6.8 ± 0.4 ^{c}	17.9 ± 0.4 ^{c}
TGPM 7% 0.85	44.6 ± 1.3 ^{c}	5.5 ± 0.1 ^{b}	12.9 ± 1.2 ^{b}
TGPM 11% 0.75	40.5 ± 3.2 ^{bc}	3.7 ± 0.4 ^{a}	7.6 ± 0.7 ^{a}
TGPM 15% 0.65	35.9 ± 1.6 ^{ab}	6.1 ± 0.6 ^{bc}	12.9 ± 1.8 ^{b}
TGPM 15% 0.85	34.4 ± 0.5 ^{a}	4.1 ± 0.3 ^{a}	6.9 ± 0.5 ^{a}

CM: control muffin; TGPM: Tannat grape pomace muffin. ANOVA analysis was performed per row using Tukey test. Different letters in the same row indicate significant differences ($p < 0.05$).

Lower L values were shown for the muffins with higher TGP content

Table 2. Texture results of the muffins with TGP.

Muffins	Hardness	Elasticity	Cohesiveness	Gumminess	Chewiness
TGPM 7% 0.65	6135 ± 623 ^{b}	0.873 ± 0.010 ^{b}	0.345 ± 0.025 ^{ab}	2246 ± 424 ^{c}	1961 ± 379 ^{c}
TGPM 7% 0.85	5341 ± 466 ^{b}	0.840 ± 0.014 ^{b}	0.293 ± 0.022 ^{ab}	1571 ± 179 ^{b}	1383 ± 158 ^{bc}
TGPM 11% 0.75	3223 ± 296 ^{a}	0.860 ± 0.024 ^{b}	0.374 ± 0.021 ^{c}	1282 ± 223 ^{ab}	1106 ± 217 ^{ab}
TGPM 15% 0.65	3655 ± 223 ^{a}	0.855 ± 0.013 ^{b}	0.325 ± 0.013 ^{ab}	1373 ± 395 ^{b}	1174 ± 348 ^{bc}
TGPM 15% 0.85	3170 ± 497 ^{a}	0.773 ± 0.056 ^{a}	0.210 ± 0.025 ^{a}	694 ± 202 ^{a}	538 ± 182 ^{a}

TGPM: Tannat grape pomace muffin. ANOVA analysis was performed per row using Tukey test. Different letters in the same row indicate significant differences ($p < 0.05$)

Lower hardness, gumminess and chewiness values were shown for the muffins with higher TGP content

Increased TPC, ABTS and ORAC-FL values were shown compared to the control muffin (without TGP) and were higher for muffins with higher TGP content

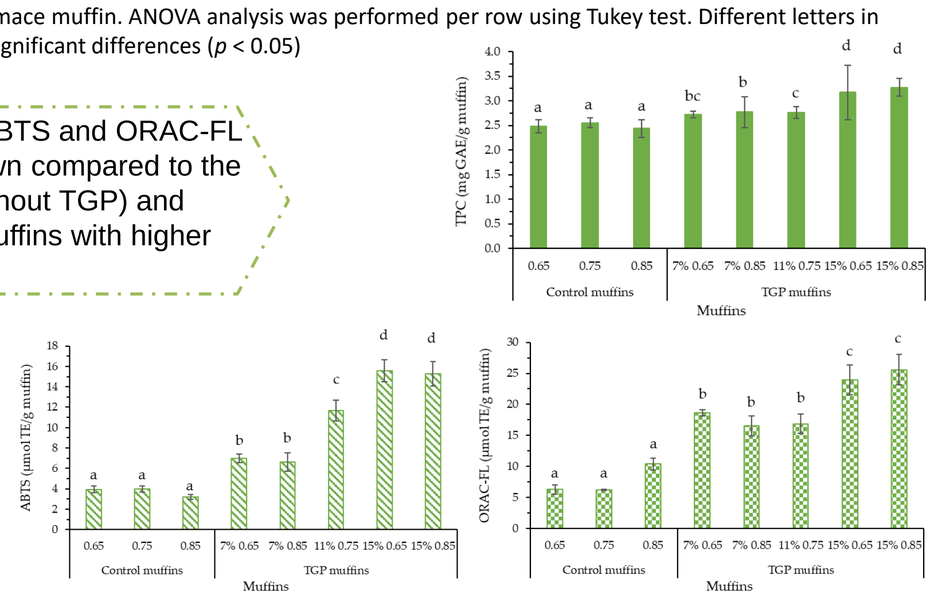


Figure 2. Antioxidant capacity of the muffins assessed by total phenol content (a), ABTS (b) and ORAC-FL (c). Different letters indicate significant differences between samples in the same assay by Tukey test ($p<0.05$). CM: control muffin; TGPM: Tannat grape pomace muffin.

CONCLUSION

In the present work TGP represented a feasible ingredient for the formulation of muffins presenting characteristic colour and textural parameters. Moreover, TGP addition to muffins showed increased nutritional quality by the augmented antioxidant capacity and dietary fiber. In conclusion, the incorporation of TGP in muffin formulations contributes to the application of circular economy concept and represents a sustainable food with the potential to promote health.

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