

VALORISATION OF MELON PEEL AND SEED FLOURS IN BAKERY PRODUCTS: A SUSTAINABLE APPROACH TO FOOD WASTE REDUCTION

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Food waste is widely recognised as a **major global problem** with direct consequences for the **economy, society and environment**.

The **valorisation of fruit by-products** offers a promising strategy to face the **growing challenge of food waste**, which can compromise the implementation of the concept of **food sustainability**.

Additionally, this approach allows for the **development of new food products with potential health benefits for consumers** [1].

This study aimed to **develop two innovative food products based on melon by-products** and to evaluate their nutritional composition, total phenolic content, and antioxidant potential.

In 2022, melon producers and distributors provided the samples used in this study.

The peels were dehydrated, and the seeds were oven-dried. Both were then ground into flour and roasted.

Table 1. Cakes formulations.

Ingredients (%)	Control cake	Cake A	Cake B
Wheat flour	18.6	9.3	9.3
Roasted melon peel flour	-	4.7	4.7
Roasted melon seed flour	-	4.7	4.7
Butter	16.7	16.7	16.7
Egg yolk	7.4	7.4	7.4
Egg	9.3	9.3	9.3
Sugar	18.6	18.6	18.6
Fresh cheese	16.7	16.7	16.7
Dough powder	1.4	1.4	1.4
Salt	0.5	0.5	0.5
Cinnamon	0.5	0.5	0.5
Lemon peel	0.9	0.9	0.9
Yellow tomato jam (sugar-free)	9.3	9.3	9.3

The acceptability of the developed food products was assessed using a seven-point hedonic scale, ranging from 1 (disliked very much) to 7 (liked very much).

The evaluation was carried out based on appearance, colour, odour, texture, taste, and overall appreciation (an assessment that considers all the analysed parameters).

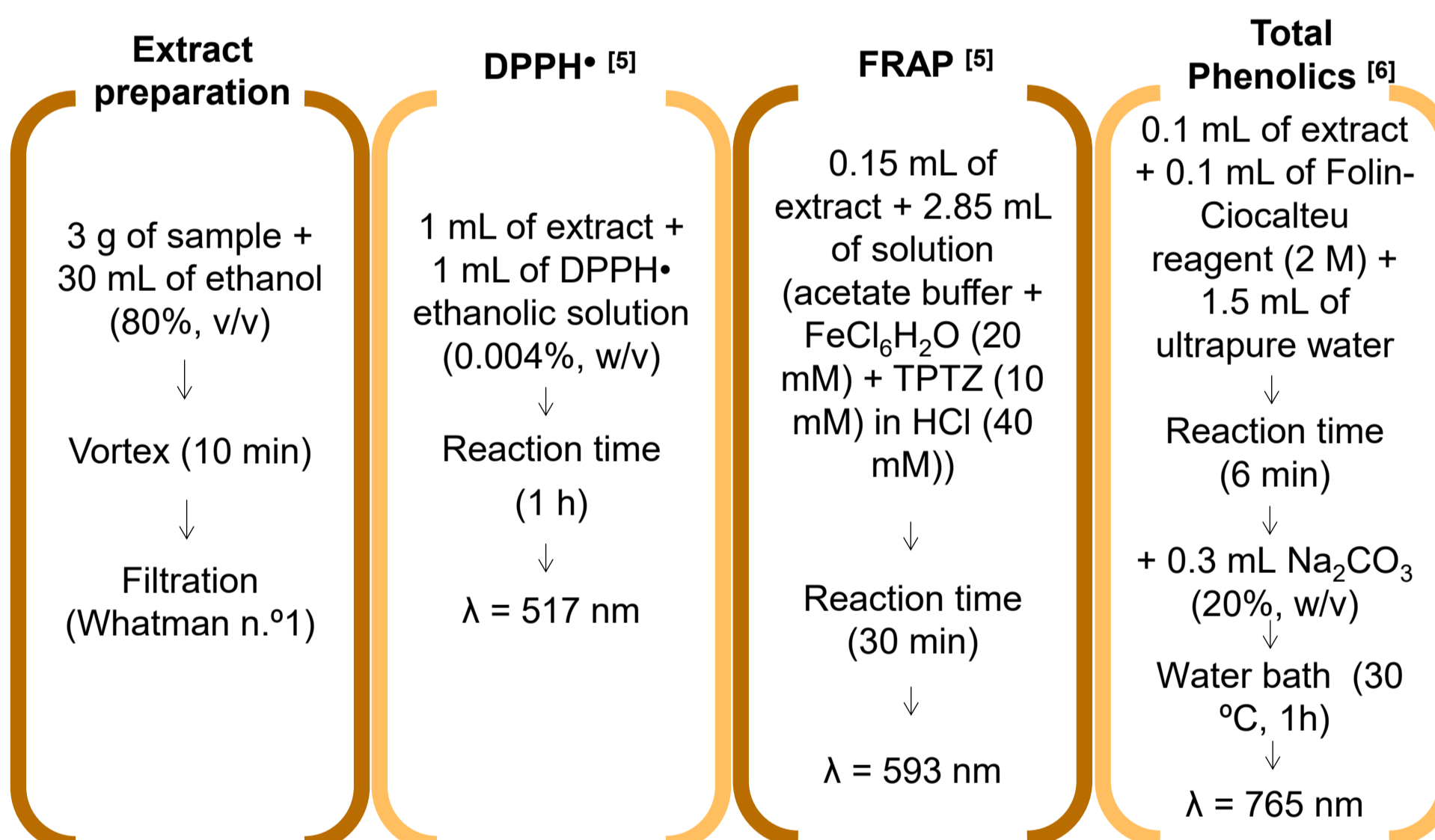


Using these flours, two cakes were developed: one topped with peel flour (cake A) and the other topped with seed flour (cake B). A control cake was also developed (Table 1).

Cake A – Cake topped with peel flour; Cake B – Cake topped with seed flour

Methodology

Moisture	• Gravimetric method, using a dry air oven [2].
Ash	• Process of incineration at 525 °C [2].
Total protein	• Kjeldahl method [2,3].
Total fat	• Acid hydrolysis followed by extraction with petroleum ether using a Soxhlet apparatus [2].
Dietary fibre	• Enzymatic-gravimetric method [2].
Available carbohydrates and energy value	• Obtained by calculation [3,4].



RESULTS

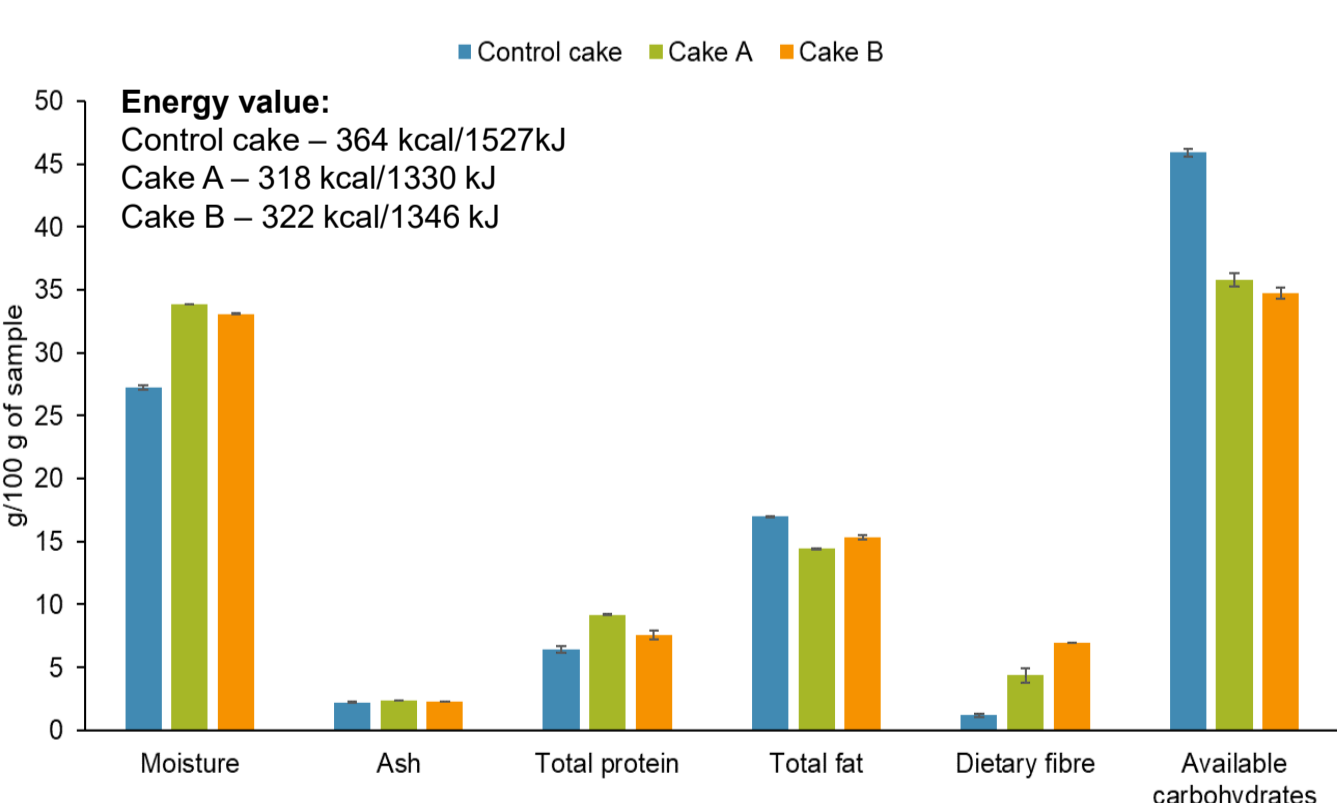


Figure 1. Nutritional composition (g/100 g of sample) of the control and the cakes with melon peel and seeds flour.

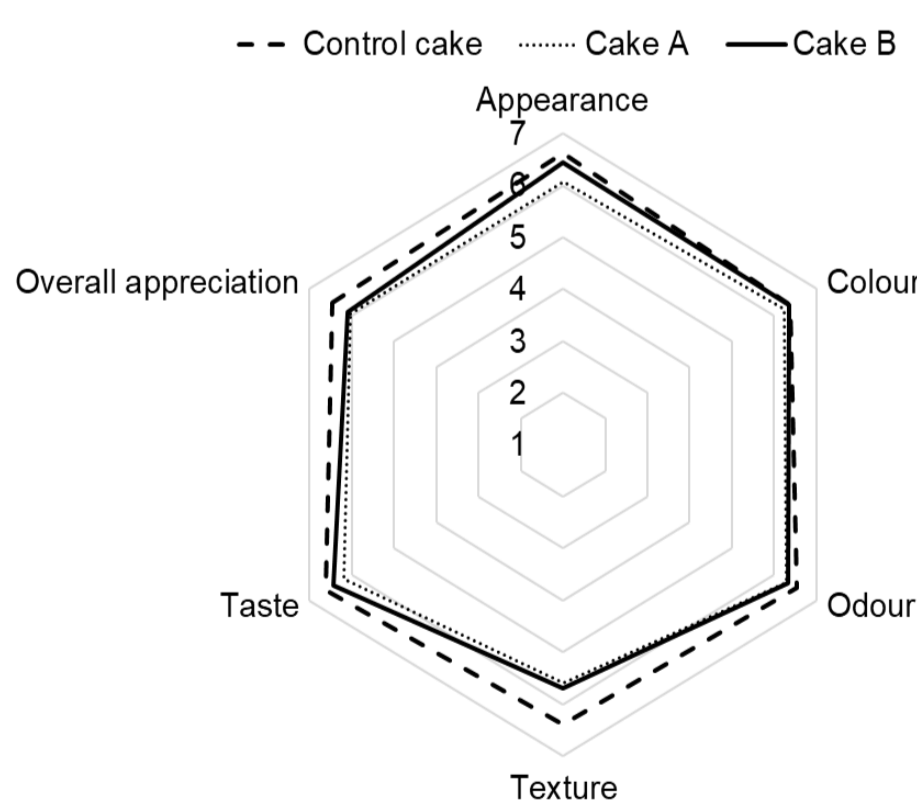


Figure 2. Acceptability evaluation of innovative cakes formulated with melon by-product flours.

Table 2 – Antioxidant capacity and total phenolic content of the control and the cakes with melon peel and seeds flour (GAE – Gallic acid equivalents).

Parameters	Control cake	Cake A	Cake B
DPPH (mg Trolox eq./100 g of sample)	21.2 ± 1.1	42.0 ± 2.5	45.3 ± 2.1
FRAP (mg Trolox eq./100 g of sample)	117 ± 5	803 ± 68	948 ± 112
Total phenolic compounds (mg GAE/100 g of sample)	1003 ± 57	1220 ± 53	1151 ± 52

Cake A – Cake topped with peel flour; Cake B – Cake topped with seed flour; GAE – Gallic acid equivalents

- ✓ The cakes produced contained levels of 6.42 ± 0.2 (control cake), 7.58 ± 0.3 (cake B) and 9.20 ± 0.0 g/100 g (cake A) of total protein (Figure 1).
- ✓ Dietary fibre levels ranged from 1.19 ± 0.1 g/100 g (control cake) to 6.94 ± 0.0 g/100 g (cake B).
- ✓ According to Regulation (EC) No. 1924/2006 on nutrition claims, cake A can be considered a source of fibre (≥ 3 g/100 g) and cake B can be considered rich in fibre (> 6 g/100 g) [7].
- ✓ The incorporation of melon by-products also enhanced both the antioxidant activity and phenolic content of the cakes (Table 2).
- ✓ Both products presented satisfactory results in terms of consumer acceptability (Figure 2).

Overall, these findings highlight the potential of incorporating melon by-products into nutritionally improved and appealing foods. Simultaneously, by-products are valued, reducing their environmental impact while increasing their economic and social impacts, aligned with the principles of sustainable production and consumption.

References

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