

Utilization of Apple and Beetroot Pomace Flour as Functional Ingredients in Jelly Candies

¹Snežana Zlatanović, ²Ferenc Pastor, ³Jovanka Laličić-Petronijević, ¹Darko Micić, ³Milica Stevanović and ¹Stanislava Gorjanović

¹*Institute of General and Physical Chemistry, Studentski trg 12/V, 11158 Belgrade, Serbia*

²*University of Belgrade - Faculty of Chemistry, Studentski trg 16, 11158 Belgrade, Serbia*

³*University of Belgrade - Faculty of Agriculture, Nemanjina 6, 11080 Belgrade, Serbia*

Abstract

The functionalization of food products using agro-waste is of great interest. Stability and storability of apple and beetroot pomace flour (APF and BPF) obtained on an industrial scale level according to recently patented technological process were confirmed (Zlatanovic et al., 2019, 2020). Utilizing APF and BPF directly in jelly candy production enhances scalability, sustainability, and eliminates the need for preservatives, maximizing the utilization of agro-waste while retaining bioactive compounds. The aim of this work is to outline the strategies employed in achieving the development of a low-energy alternative to jelly candies, which include 1) fortification with APF and BPF as rich source of anti-obesity factors (Gorjanovic et al., 2020) 2) sugar replacement with a low-energy natural mixture of erythritol, stevia, inulin, and fructose as sweeteners and 3) using natural thickening and gelling agents. A randomized design was performed with 3 gelling agents, 2 pomace flour and sugar substitute. The ratio of ingredients and production process of jelly candies have been adopted to overcome challenge of replacing sucrose with natural alternatives, associated with significant changes in texture, color, flavor and shelf life, along with influence of pomace flour. To protect the surface without jeopardizing the composition and energetic value, prepared candies were rolled in apple pomace flour instead of crystal sugar. According to our knowledge, this is the first application of pomace flour in development of jelly candies based on various gelling and sweetening agents. The impact of various matrices on bioactive compounds, essential for exhibiting antioxidant (AO) activity, color, and water activity, was assessed during the production and after nine months of storage. It is worth to note that high content of polyphenolics and prominent AO activity of jelly candies with APF and BPF was well maintained during storage. Colour of each sample were measured by CIELab chromatic analysis. The color parameters, L* (lightness), a* (redness), and b* (yellowness) were recorded. A pronounced negative correlation was identified between both the total polyphenol content and antioxidant activity (DPPH, FRAP), and parameters L (indicating lightness) and b (indicating yellowness). The sensory evaluations of the observed properties-appearance (surface appearance, coating, size, shape, color), texture

(hardness, snap, springiness, chewiness, adhesiveness), and flavor (odor and taste)-at the end of the storage period did not exhibit significant changes compared to the evaluations conducted immediately after production. A science underlying developed enjoyable low energetic 'snack' confirms presence of biomolecules with a prominent health effect. The introduction of pomace flour could widen the assortment of currently existing jelly candies and could have a positive impact on public health by compensating for the lack of DF and AOs in modern diet. In addition, waste utilization in wellbeing and health promotion could support sustainable bioeconomy and contribute to environmental protection.

Keywords: pomace, jelly, antioxidant, functional food

References

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Acknowledgments: This research was supported by the Science Fund of the Republic of Serbia, 7439 GRANT No, From Waste to Food and Soil Enrichment - minimizing waste by applying circular economy in fruits/vegetables processing industry - WasteBridge and by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, grant numbers: 451-03-66/2024-03/200051.