INNOVATIVE STRATEGIES FOR GLUTEN-FREE BAKERY PRODUCTS

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Introduction. Celiac disease is one of the most common autoimmune disorders, with an estimated global prevalence of approximately 1% of the population. Strict adherence to a gluten-free diet currently represents the only effective therapeutic strategy. However, the elimination of gluten from bakery products gives rise to technological challenges related to dough structure formation, gas retention, volume, texture, and sensory quality, thereby requiring the use of raw materials and structuring systems capable of compensating for the technological functions of gluten.

Materials and Methods. One strategy involves the use of pseudocereals, which have considerable potential for improving the nutritional profile of gluten-free bakery products. Buckwheat is characterized by its protein content (5.7–16.4 g/100 g), dietary fibre content (10.0–21.5 g/100 g), mineral content (1.8–2.5 g/100 g), and bioactive compounds, whereas amaranth is distinguished by the biological value of its proteins (12–22 g/100 g) and its favourable amino acid profile, particularly its lysine content (≈ 5.7 g/100 g protein), as well as its dietary fibre content (9–14 g/100 g). Soriz complements these pseudocereals by providing an important component of the starch-based matrix (65.2–82.0 g/100 g). The combination of these three flours therefore enables the development of flour blends with complementary nutritional and technological properties.

In the absence of gluten, one of the strategies employed to improve the structure of gluten-free products involves the use of hydrocolloids, owing to their ability to partially compensate for structural deficiencies through water retention, increased viscosity, and matrix stabilization. In this regard, agar-agar, gums, psyllium, and pectin are of particular interest, with their effectiveness being influenced by the type of flour, the concentration used, and the hydration level.

Another strategy with innovative potential is the use of bigels, structured systems resulting from the combination of a hydrogel and an oleogel.

Results and Discussion. Their application in gluten-free products remains insufficiently investigated; however, they are of considerable interest due to their potential to simultaneously structure both the aqueous and lipid phases. In particular, structuring the lipid phase may facilitate the partial replacement of conventional solid fats with vegetable oils while maintaining appropriate textural properties. The combination of bigels with hydrocolloids and gluten-free flour blends thus provides new opportunities for controlling the rheological and structural properties of these products.

Conclusion. Therefore, the combination of buckwheat and amaranth flours with soriz, complemented by the use of hydrocolloids and bigels, enables the simultaneous consideration of the major nutritional, structural, and lipid-related challenges associated with gluten-free products. The integration of these components represents a promising approach for the development of bakery products with improved technological, nutritional, and sensory properties.

Keywords: *amaranth flour, bigels, buckwheat flour, celiac disease, hydrocolloids, soriz flour*

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