

Development of fresh pasta with carob-xanthan hydrogel and acorn flour: a promising gluten-free and egg-free alternative

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Pasta is a staple food that is deeply rooted in the Italian gastronomic and cultural traditions, often serving as a symbol of tradition and regional identity. In its fresh form, the dough of some pasta types is enriched with eggs, enhancing nutritional, technological and sensory profiles.

The growing demand for plant-based, allergen-free, and environmentally sustainable products is driving innovation in food formulation. However, such products - particularly gluten-free variants - often present structural and sensory limitations, which are typically overcome through the use of complex mixtures of additives. This practice is in contrast to the trend to reduce ingredient lists.

In this context, the present study aims to develop a gluten-free and egg-free pasta formulation that meets the nutritional, technological and environmental needs. A plant-based hydrogel composed of carob seed flour and xanthan gum was utilised to mimic the viscoelastic properties of gluten and eggs. An alternative gluten-free flour, obtained by milling of acorns, was proposed as a total or partial substitute for rice flour, offering a strategy to valorize this neglected ingredient.

The ratio of gel to flour was optimized through preliminary tests. The rheological, physicochemical and nutritional properties were evaluated.

The incorporation of the hydrogel resulted in improved dough elasticity and texture, while the use of acorn flour contributed to a darker color, enhanced sweetness, higher lipid and fiber content, and a notably higher phenols and antioxidant activity.

In conclusion, the present study highlights two key results: the effectiveness of plant-based hydrogels as structural and functional agents in gluten-free and egg-free fresh pasta, and the nutritional and environmental benefits of using acorn flour as an alternative to conventional gluten-free flours.

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