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Valorization of Apple Pomace in Corn Tortilla Chips Produced Under Industrial Conditions

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Abstract

Corn tortilla chips are a widely consumed snack product produced from whole corn kernels. The potential of apple pomace flour (APF) as an ingredient in tortilla chips was evaluated under industrial conditions at a domestic chips manufacturer. The production process included corn soaking, grinding, dough flattening, baking, frying, and seasoning. Prior to dough flattening, 10% APF was incorporated into the ground corn. Both control and APF-enriched tortilla chips were produced under standard industrial conditions, lightly salted, and packaged in standard commercial packaging. Proximate composition, as well as soluble and insoluble dietary fiber content were determined. The addition of 10% APF increased the total dietary fiber content from 2.0 ± 0.2 to 9.3 ± 0.5 g per 100 g of product, thereby enabling the identification of the 'high fiber' claim. Insoluble fibers were doubled, while soluble fibers were tripled. Both samples were subjected to artificial ageing corresponding to the declared shelf life of six months. The influence of APF addition on texture was evaluated using instrumental texture analysis. Fresh and aged samples were mutually compared and evaluated against the control. The addition of APF resulted in an increase in hardness compared to the control, whereas storage conditions did not have a statistically significant impact on textural properties. Sensory analysis involved two types of profiling techniques performed by two different sensory panels. A semi-trained panel consisting of university staff conducted descriptive sensory analysis of fresh and aged tortilla samples, while a consumer panel performed sensory profiling of fresh samples using the ideal profile method, which combines classical profiling with evaluation of the intensity and acceptability of sensory attributes. Optimization pathways for the sensory properties of the tested products were identified in order to improve their potential consumer acceptability. The conducted survey also included an assessment of purchase intention, which provided additional insight into the commercial potential. The obtained results demonstrate the significant potential of APF in the functionalization of snack products and justify further research such as HPLC and GC-MS analyses that will provide an insight in the effects of APF addition on oxidative stability and the retention of phenolic compounds during storage. Considering the potential of APF to contribute to public health and the implementation of circular economy principles, further process optimization will be undertaken. All activities are aimed at increasing the technological and the commercial readiness level of the developed product.

Keywords: corn tortilla chips, apple pomace, dietary fiber, texture, sensory evaluation, functional food

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