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From Celery Pomace to Functional Snack: Development of Corn Tortilla Chips with Celery Pomace

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Abstract

Celery juice has become increasingly popular due to its health benefits, resulting in growing amount of celery pomace as a by-product. In this study, a dehydration procedure previously developed for apple pomace stabilization was applied to celery stalk pomace from the domestic company Cold Pressok, yielding stable celery pomace flour (CPF). CPF contained approximately 50% dietary fiber and exhibited high antioxidant, anti-diabetic, and anti-inflammatory activity. In addition, it demonstrated favorable techno-functional properties, including high water- and oil-binding capacity, indicating potential for incorporation into food systems. Its application was evaluated in the industrial production of corn tortilla chips. The maximum proportion of CPF that could be successfully incorporated into corn-based dough under industrial processing conditions was 5%, while higher levels affected dough handling and processing properties. The optimal incorporation level was determined based on the ability to uniformly incorporate CPF into dough produced from soaked and ground whole corn kernels. Control and CPF-enriched tortilla chips were produced under identical industrial conditions, lightly salted, and packaged in standard commercial packaging without additional seasonings. Product stability was evaluated through artificial ageing under conditions corresponding to the declared shelf life of six months. Compared to apple pomace flour (APF), whose optimized incorporation level in previous studies reached 10%, CPF showed lower incorporation potential. Unlike APF, which has a neutral, mildly sweet taste, CPF possesses a more pronounced sensory profile and stronger inherent flavor, limiting its addition level. Proximate composition and dietary fiber fractions, including soluble fiber, insoluble fiber, and resistant starch, were determined. CPF enrichment significantly increased total dietary fiber content (from 2.9 ± 0.2 to 6.1 ± 0.4). Insoluble fiber, soluble fiber, and resistant starch increased from 3.7 ± 0.3, 0.8 ± 0.2, and 1.38 ± 0.10 to 4.7 ± 0.3, 1.4 ± 0.2, and 1.53 ± 0.10, respectively. Instrumental texture analysis and descriptive sensory evaluation were performed to assess the effects of CPF addition on product quality, acceptability, and storage stability. Hardness and fracturability were measured instrumentally, while sensory profiling provided insight into attributes relevant to consumer perception. The incorporation of 5% CPF resulted in a slight decrease in hardness compared to the control sample; however, during storage, hardness increased more than in the control sample. Overall, the results demonstrated the potential for diversification of a highly popular snack category through by-product valorization, although further optimization of processing conditions and sensory properties, particularly

through seasoning application, is still needed.

Keywords: corn tortilla chips, celary stalk pomace, dietary fiber, texture, sensory evaluation

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