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Eggplant (*Solanum melongena* L.) peel as a potential functional ingredient in pan de sal

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Eggplant (*Solanum melongena* L.) is one of the most frequently consumed vegetables around the world, and it ranks among the vegetables highest in antioxidant activity; however, it has been observed that its peel is usually discarded during food preparations and/or removed before eating. This study aimed, therefore, to characterize and assess the safe use of eggplant peel as a potential functional ingredient in *pan de sal*. It was found that eggplant peel is not a significant source of macro-nutrient (protein, fat and carbohydrate) and can therefore be a low caloric ingredient. Moreover, it contains high amount of dietary fiber (6.90 g/100 g) and phytonutrients (total polyphenol content (TPC)=1230±0.02 mg GAE/100 g DW, total flavonoid content (TFC)=4390±0.28 mg CE/100 g DW, total anthocyanidins (TA)=1420±0.01 mg CE/100 g DW), and exhibits antioxidant capacities (DPPH EC50=114.34 mg/L, FRAP=560±0.01 mg TE/100 g DW). Microbial analysis and test for heavy metals indicated that it is safe for human consumption. Cytotoxicity assay revealed that eggplant peel extract has no/little cytotoxic effect on normal cells (IC50=725) as compared to HepG2 (IC50=179.29 µg/mL) and breast cancer cell lines (IC50=154.67 µg/mL). The sensorial qualities of the developed *pan de sal* (with 0, 4, 8, 12% eggplant peel) were found to be acceptable by the consumers specifically the *pan de sal* with 4% eggplant peel. Furthermore, *pan de sal* with eggplant peel (4%) displayed significantly higher amount of dietary fiber, phytonutrients and antioxidant activities relative to the *pan de sal* without eggplant peel. Therefore, eggplant peel can be utilized as a potential functional ingredient and this may open a new avenue for the food industry.

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Study of membrane separation performance during soy sauce microfiltration

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The cross-flow microfiltration has been widely used in the clarification of soy sauce and traditional condiments at present. However, unavoidably membrane fouling always hinders the membrane performance. In order to clarify the precise fouling mechanism during microfiltration of soy sauce, a spiral polyvinylidene fluoride membrane M3 was used to explore the influences of processing parameters on membrane separation under the total recycle mode; meanwhile, a semi-empirical model was also established. The membrane fouling mechanisms were further investigated. Results showed that soy sauce clarification under the optimal processing parameters (50°C, 0.3 m/s, 1.2 bar) resulted in a steady flux of 27 Lm-2h-1. The permeate soy sauce nearly preserved the whole nutrition and flavor substances and remained the turbidity values below 2 NTU during 3 months' room temperature storage. Resistance-in-series model analysis showed that cake layer resistance (Rc) and concentration polarization resistance (Rcp) were the main components of the fouling resistances, which were affected by crossflow velocity (CFV) significantly. It is noteworthy that when CFV increased from 0.113 m/s to 0.208 m/s, Rcp/Rt decreased from 48.3% to 9.7%, and when CFV increased from 0.208 m/s to 0.301 m/s, Rc/Rt decreased from 43.1% to 35.7%. A mathematical model was established to predict the permeate flux and indicate the influence of operating conditions on the flux. Non-linear fitting method was then used to analyze the fouling mechanisms. Results showed that gel layer formation dominated the membrane fouling. This study provided a theoretical basis for the effective fouling control in soy sauce microfiltration.

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