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Supplementary Materials

Recovery of Anthocyanins from Passion Fruit Epicarp for Food Colorants: Extraction Process Optimization and Evaluation of Bioactive Properties

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Abstract: The potential of passion fruit (*Passiflora edulis* Sims) epicarp to produce anthocyanin-based colorants with bioactive properties was evaluated. First, a five-level three-factor factorial design coupled with response surface methodology was implemented to optimize the extraction of anthocyanins from dark purple epicarps. The extraction yield and cyanidin-3-*O*-glucoside content were used as response criteria. The constructed models were fitted to the experimental data and used to calculate the optimal processing conditions (t = 38 min, T = 20 °C, S = 0% ethanol/water (v/v) acidified with citric acid to pH 3, and $R_{S/L}$ = 50 g/L) that lead to maximum responses (3.4 mg/g dried epicarp and 9 mg/g extract). Then, the antioxidant, antimicrobial, and cytotoxic activities of anthocyanin extracts obtained using the optimized method and a conventional extraction method were evaluated in vitro. The extract obtained by the optimized method revealed a higher bioactivity, in agreement with the higher cyanidin-3-*O*-glucoside content. This study highlighted the coloring and bioactive potential of a bio-based ingredient recycled from a bio-waste, which promotes a sustainable bioeconomy in the agri-food sector.

Keywords: *Passiflora edulis* Sims; anthocyanins; extraction optimization; natural colorants; antioxidant activity; oxidative hemolysis; antimicrobial activity

Table S1. Anthocyanin identification and content in passion fruit epicarp. It is presented the retention time (Rt), wavelength of maximum absorption in the visible region (λ_{max}), and mass spectral data.

Peak	Rt (min)	λ_{max} (nm)	$[M+H]^+$ (*m*/*z*)	MS^2 (*m*/*z*)	Tentative identification	Content (mg/g E)
1	20.03	520	449	287(100)	Cyanidin-3-*O*-glucoside	8.3 ± 0.1

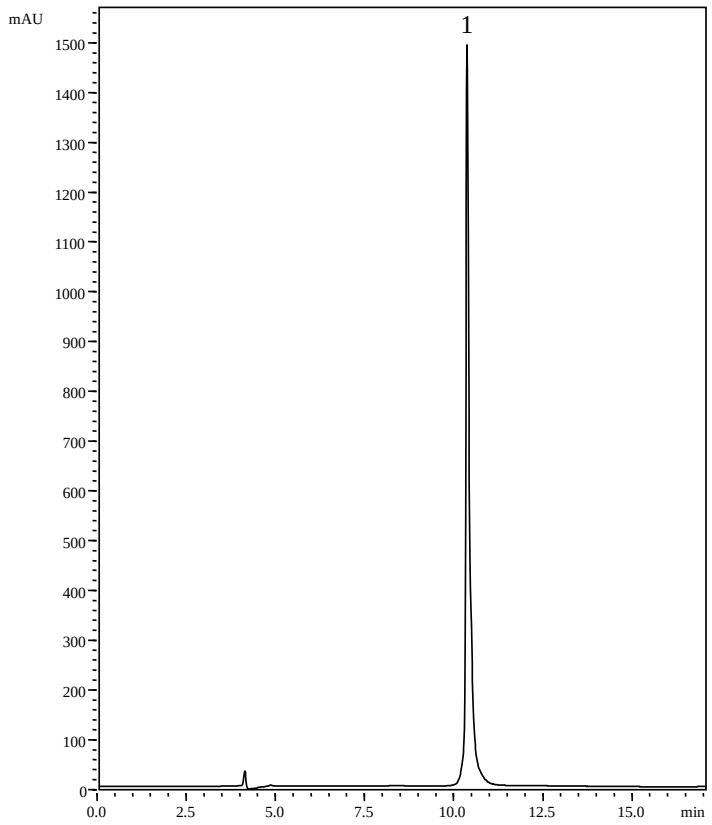

Figure S1. Passion fruit epicarp anthocyanin profile extracted at 520 nm. The identified peak corresponds to cyanidin-3-*O*-glucoside.

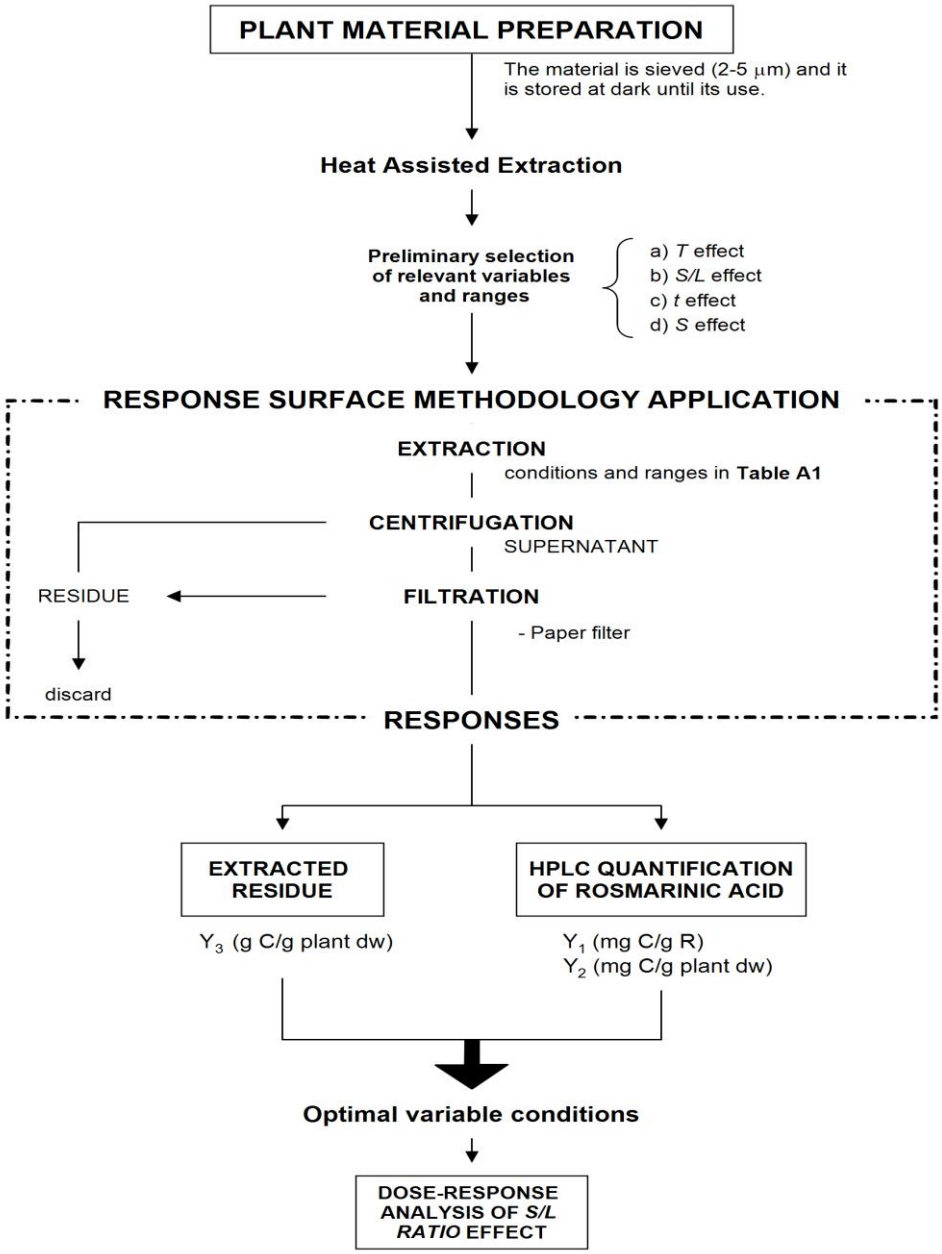

Figure S2. Diagram of the different steps carried out to optimize the extraction conditions for recovery of anthocyanins from passion fruit epicarp.