Anthocyanins obtained from fruit residues as a natural colorant in a bakery product

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Introduction

The food industry uses artificial colorants to enhance processed foods' sensory quality and diversity. However, health concerns and a preference for healthier eating drive consumers to seek natural alternatives [1].

Fruit residues from processing contain valuable pigments like anthocyanins, carotenoids, and betalains, which can be extracted and used as natural colorants. Various extraction methods are available to obtain these colorants [2].

Objectives

This study aims to explore the potential of diverse fruit residues as natural colorants based on anthocyanins, including:

Sicana odorifera (Vell.) Naudin

SIC

Eugenia brasiliensis L.

EB

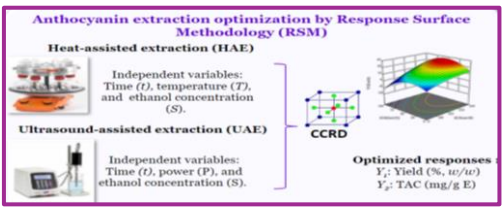
Eugenia involucrata L.

EI

Nephelium lappaceum L.

NL

Methodology



Anthocyanin-rich extracts

SIC EB EI NL

Incorporation into a bakery product (*Sequilhos*)

Base dough

- ❑48.7% starch
- ❑24.4% butter
- ❑24.4% sugar
- ❑2.4% egg york
- ❑0.05 citric acid

Colorant addition

Control (CT): without colorant
EXB: 0.1% commercial natural colorant
SIC: 0.1% SIC extract
EB: 0.1% EB extract
EI: 0.8% EI extract
NL: 0.8% NL extract

Baked at 180ºC/15 min

Shelf-life control

The color and antioxidant activity of *sequilhos* were evaluated over 15 days at three distinct times: T0 (0 days), T1 (7 days), and T2 (15 days).

Color: measured in CIE Lab* space using a colorimeter.

Antioxidant activity: determined by DPPH and Reducing power assay.

Results

Anthocyanin extraction

For all samples, the MAE method yielded extracts with a higher anthocyanin content (Fig. 1).

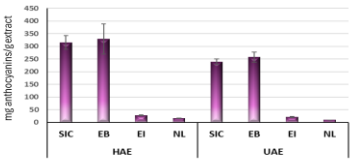


Fig 1.Total anthocyanins obtained under the optimal conditions for each extraction method.

Anthocyanin-rich extracts as food colorant

The samples remained relatively stable during storage, with minimal color variation over the evaluated period (Table1).

Table1. Color parameters and visual appearance of the doughs and *sequilhos* during the storage time.

Time	Color parameters	Samples					
		CT	EXB	SIC	EB	EI	NL
Dough	L^*	77.5 ± 0.4^{Ca}	62.4 ± 0.7^{Cc}	65.4 ± 0.9^{Bb}	63.9 ± 8.5^{Ac}	64 ± 1^{Cb}	59 ± 2^{Bd}
	a^*	-4.5 ± 0.1^{Ce}	11.5 ± 0.6^{Ca}	5.9 ± 0.4^{Bd}	8.5 ± 0.6^{Bb}	5.5 ± 0.3^{Cd}	6.8 ± 0.3^{Bc}
	b^*	22.5 ± 0.3^{Cb}	6.3 ± 0.2^{Cf}	11.2 ± 0.6^{Ad}	8.9 ± 0.5^{Ae}	13 ± 1^{Ac}	24 ± 1^{Ba}
T0	L^*	84 ± 1^{Ba}	67 ± 1^{Bc}	70 ± 2^{Ab}	66 ± 1^{Bc}	70 ± 1^{Bb}	64 ± 2^{Ad}
	a^*	-3.5 ± 0.2^{Ae}	14.0 ± 0.7^{Aa}	8.6 ± 0.3^{Ac}	10.3 ± 0.2^{Ab}	7.2 ± 0.2^{Ad}	7.6 ± 0.2^{Ad}
	b^*	25.1 ± 0.5^{Ab}	4.2 ± 0.2^{Af}	11.6 ± 0.6^{Ad}	9.2 ± 0.5^{Ae}	13.3 ± 0.3^{Ac}	27.1 ± 0.6^{Aa}
T1	L^*	87.5 ± 0.9^{Aa}	68 ± 2^{Bc}	71 ± 3^{Ab}	69.1 ± 0.8^{Ac}	70 ± 2^{Bc}	62 ± 1^{Bd}
	a^*	-3.3 ± 0.2^{Af}	13.1 ± 0.5^{Ba}	8.2 ± 0.4^{Ac}	10.1 ± 0.4^{ABb}	6.5 ± 0.3^{Be}	7.3 ± 0.3^{Ad}
	b^*	24.4 ± 0.4^{Ba}	4.1 ± 0.2^{Ae}	11.5 ± 0.6^{Ac}	8.2 ± 0.5^{Bd}	12.9 ± 0.5^{Ba}	25 ± 1^{Ba}
T2	L^*	87 ± 2^{Aa}	70 ± 1^{Ab}	72 ± 2^{Ab}	70 ± 1^{Ab}	72 ± 2^{Ab}	63 ± 3^{Ac}
	a^*	-3.3 ± 0.2^{Ag}	13.2 ± 0.5^{Ba}	8.2 ± 0.2^{Ac}	9.9 ± 0.5^{Ab}	6.7 ± 0.3^{Bf}	7.3 ± 0.3^{Ad}
	b^*	23.9 ± 0.7^{Bb}	4.1 ± 0.2^{Af}	11.3 ± 0.7^{Ad}	8.1 ± 0.3^{Be}	13.1 ± 0.3^{Ac}	25.6 ± 0.9^{Ba}

The addition of natural colorants improved the products' antioxidant potential (Fig 2).

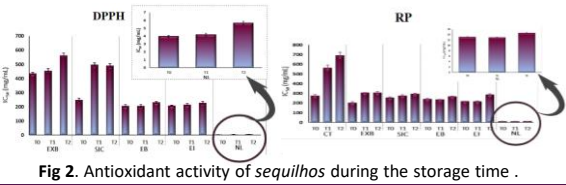


Fig 2. Antioxidant activity of *sequilhos* during the storage time .

Conclusion

These findings suggest that fruit bioresidues can be a valuable and sustainable source of natural colorants for the food industry

This research aligns with the Sustainable Development Goal 12, reducing the food waste generation.

References

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