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Chayote peel extracts: exploring bioactive compounds and cosmeceutical uses

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INTRODUCTION & AIM

Innovative technologies for chayote (*Sechium edule* (Jacq.) Swartz) peels nutritional and economical valorization is required [1].

This study aimed to extract bioactive compounds from chayote peels comparing four sustainable extraction techniques: subcritical water extraction (SWE), microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE), and maceration (ME). The best extract was used in the preparation of an ethosomal gel.

METHODS

EXTRACT PREPARATION

solid to sample ratio of 1:30 g/mL
SWE: 100% water, 110°C, 30 min, 200 rpm
MAE: 37% ethanol, 55°C, 300 W, 200 psi, 30 min
UAE: 37% ethanol, 55°C, 224 W, 30 min
ME: 37% ethanol, 55°C, 30 min, 200 rpm

Freeze drying

Powder extract

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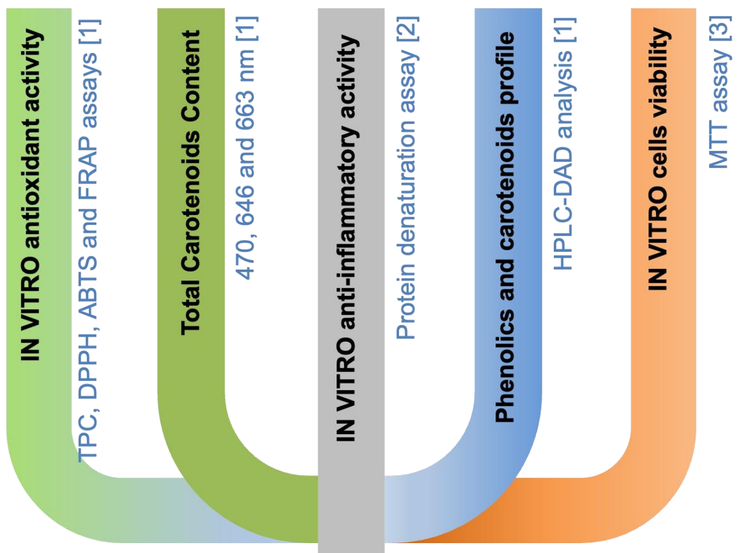
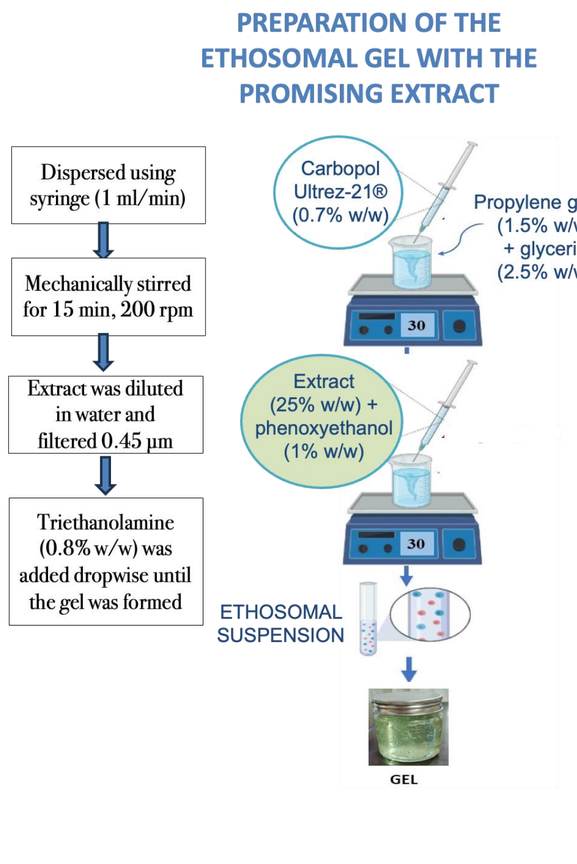
Random sampling of 10 fruits
Dried for 18 h at 52°C, grounded and sieved through 0.75 mm



PREPARATION OF THE ETHOSOMAL GEL WITH THE PROMISING EXTRACT



ETHOSOMAL GEL CHARACTERIZATION

RESULTS & DISCUSSION

Table 1. Extraction yields, Total Phenolics Content (TFC), Total Carotenoids Content (TCC), DPPH radical scavenging activity ABTS radical scavenging activity and Ferric Reducing Antioxidant Power (FRAP) of chayote peel extracts prepared by different technologies.

	SWE	MAE	UAE	ME
Extraction yield (%)	11.67 ± 0.64 [a]	6.56 ± 1.45 [c]	9.34 ± 1.22 [b]	6.88 ± 0.64 [c]
TPC (mg GAE/ 100 g dw	389.89 ± 19.84 [a]	307.11 ± 6.45 [c]	406.89 ± 10.64 [a]	347.88 ± 10.64 [a]
TCC (mg/ 100 g dw)	9.67 ± 0.24 [a]	9.67 ± 0.84 [a]	10.14 ± 0.87 [a]	6.67 ± 0.64 [b]
DPPH (mg TE/ 100 g dw)	234.45 ± 13.04 [a]	203.56 ± 22.84 [b]	209.34 ± 12.07 [b]	200.55 ± 9.64 [b]
ABTS (mg AAE/ 100 g dw)	406.07 ± 10.64 [a]	306.59 ± 7.36 [b]	420.87 ± 23.64 [a]	346.09 ± 31.65 [b]
FRAP (mg AAE/ 100 g dw)	88.9 ± 8.64 [a]	77.89 ± 10.64 [b]	85.78 ± 7.68 [a]	76.89 ± 10.64 [b]

Values are expressed as means ± standard deviation (n=6).
Different letters (a-c) in the same line indicate significant differences between extracts (Two-way ANOVA, $p < 0.05$).

Abbreviations: GAE, gallic acid equivalents; TE, trolox equivalents; AEE, ascorbc acid equivalents; subcritical water extraction (SWE), microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE); maceration (ME).

UAE approach was more effective in extracting phenolics and carotenoids from chayote peels. HPLC analysis of the UAE extract identified tocopherol esters as the main class of carotenoids, and phenolics such as 4-hydroxyphenylacetic acid, gallic acid, protocatechuic acid, ferulic acid, *p*-coumaric acid, myricetin, and quercetin. A concentration of 1000 µg/mL, the UAE extract showed a slight but significant decrease in cell metabolic activity, reducing MTT to 91.6-91.5%.

Table 2. Characterization of the ethosomal loaded gel of chayote peel UAE extract at variable storage conditions.

	Time (days)	4 °C ± 1	25 °C ± 1
Color	DAY 0	Gr	Gr
	DAY 10	Gr	Gr
	DAY 20	Gr	DGr
	DAY 30	Gr	DGr
pH	DAY 0	5.61 ± 0.32 [a]	
	DAY 10	5.61 ± 0.24 [a]	5.59 ± 0.44 [a]
	DAY 20	5.56 ± 0.45 [a]	5.57 ± 0.33 [a]
	DAY 30	5.55 ± 0.33 [a]	5.55 ± 0.21 [a]
Odor, Look, Microbial growth	DAY 0	(-), T, NA	(-), T, NA
	DAY 10	(-), T, NA	(-), T, NA
	DAY 20	(-), T, NA	(-), T, NA
	DAY 30	(-), T, NA	(-), Tr, NA
Spreadability (g.cm/sec)	DAY 0	4.01 ± 0.51 [c]	
	DAY 10	4.61 ± 0.24 [c]	5.09 ± 0.44 [c]
	DAY 20	5.56 ± 0.80 [b]	5.85 ± 0.33 [b]
	DAY 30	6.03 ± 0.53 [b]	7.12 ± 0.34 [a]

Values are expressed as means ± standard deviation (n=3).
Different letters (a-c) in the same line indicate significant differences between extracts (Two-way ANOVA, $p < 0.05$).

Abbreviations: Gr (green); DGr (dark green); T (transparent); Tr (translucent); (-) absent; NA (not applicable).

CONCLUSION

A stable ethosomal gel containing the UAE chayote peel extract was successfully developed and characterized for its cosmeceutical potential. The gel demonstrated good physical stability after one month of storage at both 4 °C and 25 °C.

ACKOWNLEGMENTS

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