

## 등근금감 (칼라몬딘 오렌지)의 이네푸 추출공정의 최적화를 통한 화장품 기능성 활성 증가 연구

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### Improved cosmetic activity by optimizing the *Citrus madurensis* (*Citrofortunella microcarpa*) INEFU extraction process.

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#### ABSTRACT

This study was expand the use of *Citrus madurensis* (*Citrofortunella microcarpa*), which is a good source of skin whitening and antioxidants activation cosmetics. The goal was to provide cosmeceutical activity data about the extraction yield and total phenol of this calamondin orange by optimizing the focused high ultrasound(INEFU) and ultrasound extraction(UE) conditions. Under optimal extraction conditions, which consisted of 1800W for 45min and 500W for 45 min, 21.55 and 13.27 % (w/w) of the highest extractions yield and polyphenol contents were obtained. For the skin whitening activity, tyrosinase inhibitory activity was observed at 69.24 % in the INEFU extracts, which was ca. 18 % higher than that of the UE extracts (58.82 %). To reduce melanin production in Clone M-3 cells, 86.9 % melanin production was observed following the addition of control, WE(water extraction) relative to the control without a sample, and 81.2 and 78.9 % were found in the UE and INEFU conditions. The highest total phenol secretion was conclusively obtained under the optimal conditions and resulted in a significant improvement of the cosmetic activities of *Citrus madurensis*(*Citrofortunella microcarpa*) extracts

Keywords: INEFU, tyrosinase, melanin, *Citrus madurensis*, *Citrofortunella microcarpa*

Comparison of cosmetic activities of the *C. madurensis* in relation to the different extraction processes

	Extraction Methods		
	WE	INEFU	UE
Tyrosinase inhibitory activity (%)	61.38 ± 0.95%	58.82 ± 1.13%	69.24 ± 0.88%
Melanin production (%)	86.92 ± 0.78%	81.20 ± 0.45%	78.92 ± 0.36%

<sup>a</sup> WE water extraction at 40°C, control. <sup>b</sup> INEFU focus high ultrasonication extraction for 45 min at the 1800 watts at 40 °C with water <sup>c</sup> UE ultrasonication extraction for 45 min at the 40 °C with water.

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\*\* (Acknowledgement) 본 연구는 고부가가치화장품신소재개발사업(사업번호: 18062853) 지원에 의해 이루어진 결과로 이에 감사드립니다.