



Abstract

# Composition, Physicochemical and Antioxidant Properties of Tropical Almond (*Terminalia catappa* L.) Oil as a Novel Source of Lipids <sup>†</sup>

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**Abstract:** The demand for edible fats and oils has sparked interest in alternative vegetable oil sources with a focus on health benefits and new industrial applications. Therefore, this study aimed to assess the potential of using underutilized tropical almond (TA) (*Terminalia catappa*) nut oil as a source of novel dietary lipids. The fatty acid profile of the screw-pressed TA oil was analyzed by a gas chromatography-flame ionization detector. Physicochemical properties, total phenolics, total flavonoids, and antioxidant properties were evaluated and compared with coconut and almond oils extracted under similar conditions. Thermal behavior and shelf life of TA oil were comparatively analyzed using differential scanning calorimetry and Schaal's oven test respectively. Interestingly the yield of TA oil ( $48.67 \pm 1.76\%$ ) was significantly higher than the almond oil ( $39.0 \pm 0.57\%$ ). The TA oil contained more than 56% of unsaturated fatty acids, particularly 31.3% oleic and 24.9% linoleic being the predominant fatty acids. Palmitic acid was the predominant (38.9%) saturated fatty acid. The melting and the crystallization temperatures of TA oil were  $14.29^\circ\text{C}$  and  $(-0.75^\circ\text{C})$  respectively while the melting points of almond and coconut oil were  $-10.63^\circ\text{C}$  and  $24.8^\circ\text{C}$ . The physicochemical properties including specific gravity, refractive index, peroxide, acid value, and iodine value were comparable with coconut oil, and they were consistent with the CODEX and SLS standards. The estimated shelf life of TA oil was more than nine months. Moreover, TA oil showed significantly higher phenolic content ( $2.26 \pm 0.08$  mg GAE/100 g) and flavonoid content ( $10.46 \pm 1.47$  mg QE/100 g) than almond and coconut oils. Further, TA oil showed antioxidant activity with an  $\text{IC}_{50}$  of  $1574.93 \pm 3.44$  mg/mL for DPPH,  $340.28 \pm 1.23$  mg/mL for ABTS, and a reducing power of  $4.68 \pm 0.33$  mM Trolox eq/100 g in FRAP assays. Hence, TA oil possessed excellent physicochemical and functional properties suitable to be used as a novel, healthy edible oil.

**Keywords:** *Terminalia catappa*; edible oil; fatty acid profile; antioxidant activity; physicochemical properties



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