



Comparative Study on Antioxidants, Bioactive Compounds and Nutritional Profiles of Cold-Pressed Oils in Three Distinct Almond (*Prunus dulcis*) Cultivars

Alya J. A. Absad

Department of Food Sciences, College of Agriculture, University of Basrah, Iraq

Corresponding author email: alya.ala@uobasrah.edu.iq

Received 14th September 2025; Accepted 30th March 2026; Available online 29th June 2026

Abstract: Given the increasing health concerns associated with refined industrial vegetable oils, there is a burgeoning demand for high-quality natural alternatives that play a vital role in supporting the heart health and improving overall nutrition. Our research study the active compounds of extracted oil from three almond varieties (Brazilian BAO, Moroccan MAO, and Iranian IAO) including yield, total phenols content, DPPH activity, tocopherol, and fatty acids content. BAO recorded the highest value of oil yield 43.02±0.32%, there are significant differences ($p < 0.05$) in the phenols content between varieties, the highest value was recorded 86.61±0.01 mg GAE g⁻¹ for BAO. The scavenging DPPH radicals was between 73.32±1.01% by MAO and 89.23±0.12% by BAO, α-tocopherol recorded the highest concentration across all varieties, reaching 484.45 mg kg⁻¹ in BAO. Unsaturated fatty acids USFA was (51.11, 50.28, 48.95) % for BAO, IAO, and MAO, respectively. In light of the increasing global demand for high-quality functional lipids, this study was designed to provide comparative analysis of three commercially prominent almond (*Prunus dulcis*) varieties (Brazilian, Moroccan, and Iranian). The objectives of this research were to: (i) Comparative the bioactive compounds (ii) Evaluate the efficiency of cold-pressing extraction on oil yield across the selected cultivars; (iii) Quantify the total phenolic content and assess the radical scavenging potential using the DPPH assay; (iv) Establish a comprehensive profile of tocopherol isomers (alpha, beta, and gamma) and fatty acid compositions using GC-MS techniques. By correlating these bioactive profiles, the study identifies BAO the most nutritionally superior variety for industrial and pharmacological applications.

Keywords: *Prunus dulcis*, Cold-pressing, Bioactive compounds, Alpha-tocopherol, Antioxidant activity, GC-MS profiling

Introduction

Almond *Prunus dulcis* is a deciduous tree belonging to the *Prunus* genus and the Rosaceae family, which also includes pears, raspberries, and prunes. The almond tree is one of the widely favored tree nuts worldwide and is classified as number one in tree nut

production (Schincaglia et al., 2020). Almond trees are the major nut tree in the Mediterranean region. It is widely cultivated in the western part of Asia, particularly in Iran, and in its surrounding areas. However, geographical variation and climatic conditions

