ABSTRACT

Coconut (Cocos nucifera L.) phospholipids hold significant potential as natural emulsifiers and drug delivery system components, yet their commercial utilization remains limited due to the low efficiency of conventional extraction methods. This study investigated the effects of pulser duty cycle and extraction time in ultrasound-assisted extraction (UAE) using ethanol on the phospholipid fraction mass recovered from dried coconut press cake, and evaluated the physicochemical characteristics of the resulting extracts. Extraction followed a 3×2 factorial completely randomized design with pulser levels of 25%, 50%, and 75% and extraction times of 15 and 30 minutes, each in triplicate. Two-Way ANOVA revealed that pulser significantly affected phospholipid mass ($F = 9.5697$; $p = 0.0033$; $\eta^2 = 0.5912$), while extraction time showed no significant effect ($p = 0.6445$). The optimum condition was 50% pulser and 15 minutes extraction time, yielding 6.8572 ± 0.2846 g/100 g far exceeding conventional chloroform–methanol maceration (0.04 g/100 g). FTIR confirmed diagnostic phospholipid bands (P=O ~1211 cm^{-1}, C–O–P ~1045 cm^{-1}, P–O ~923 cm^{-1}) without structural degradation. GC-MS at optimum conditions identified oleic acid (13.907%) and palmitic acid (8.220%) as dominant components, consistent with membrane phospholipid profiles. Ethanol-based UAE at 50% pulser and 15 minutes represents an efficient, rapid, and environmentally friendly strategy for coconut phospholipid isolation.

Keywords: ultrasound-assisted extraction; coconut phospholipids; duty cycle; ethanol; physicochemical characterization