OPTIMIZE AND COMPARE HEAT, MICROWAVE, AND ULTRASOUND-ASSISTED EXTRACTION TECHNIQUES TO OBTAIN BIOACTIVE COMPOUNDS FROM ANISE (PIMPINELLA ANISUM) SEED USING RESPONSE SURFACE METHODOLOGY (RSM)

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The purpose of this study was to optimize the extraction of phenolic compounds from anise seed using heat-assisted extraction (HAE), microwave-assisted extraction (MAE), and ultrasound-assisted extraction (UAE). Based on the response surface method, we examined the effects of process-independent variables on the dependent variables (the content of total phenolic compounds (TPC), the content of total flavonoids (TFC), and the antioxidant activity (AA). In HAE, the optimal conditions for measuring TPC, TFC, and antioxidant activity (FRAP, DPPH, and ATBS) in a single experiment were extraction temperature (37°C), extraction time (100 minutes), and sample-to-solvent ratio (7.3%). In MAE, the optimal conditions were the microwave power (480 W), the extraction time (120 seconds), and the sample-to-solvent ratio (8%). Among the UAE results, the optimal conditions of the extraction process were ethanol concentration (14.6 %), extraction time (11.8 minutes), and sample-to-solvent ratio (8 %). Additionally, MAE showed better results concerning the extraction yield of phenolic compounds and high antioxidant activity TPC and TFC (49.9+3.26 mg GAE/g and 20.86 + 1.62 mg QUE/g of DW, respectively) and AA by FRAP method (11.22 mg AAE/g DW), DPPH method (17.14%), and ATBS method (4.25%). Accordingly, the efficiency of the extraction method from anise seed was in order MAE > UAE > HAE.