

## Ultrasound-Assisted Extraction of Bioactive Compounds from Cocoa Shell and Their Encapsulation in Gum Arabic and Maltodextrin: A Technology to Produce Functional Food Ingredients

**Authors :** Saeid Jafari, Khursheed Ahmad Sheikh, Randy W. Worobo, Kitipong Assatarakul

**Abstract :** In this study, the extraction of cocoa shell powder (CSP) was optimized, and the optimized extracts were spray-dried for encapsulation purposes. Temperature (45-65 °C), extraction time (30-60 min), and ethanol concentration (60-100%) were the extraction parameters. The response surface methodology analysis revealed that the model was significant ( $p \leq 0.05$ ) in interactions between all variables (total phenolic compound, total flavonoid content, and antioxidant activity as measured by 2,2-Diphenyl-1-picrylhydrazyl (DPPH) and ferric reducing antioxidant power (FRAP assays), with a lack of fit test for the model being insignificant ( $p > 0.05$ ). Temperature (55 °C), time (45 min), and ethanol concentration (60%) were found to be the optimal extraction conditions. For spray-drying encapsulation, some quality metrics (e.g., water solubility, water activity) were insignificant ( $p > 0.05$ ). The microcapsules were found to be spherical in shape using a scanning electron microscope. Thermogravimetric and differential thermogravimetric measurements of the microcapsules revealed nearly identical results. The gum arabic + maltodextrin microcapsule (GMM) showed potential antibacterial (zone of inhibition: 11.50 mm; lower minimum inhibitory concentration: 1.50 mg/mL) and antioxidant (DPPH: 1063 mM trolox/100g dry wt.) activities ( $p \leq 0.05$ ). In conclusion, the microcapsules in this study, particularly GMM, are promising antioxidant and antibacterial agents to be fortified as functional food ingredients for the production of nutraceutical foods with health-promoting properties.

**Keywords :** functional foods, coco shell powder, antioxidant activity, encapsulation, extraction

**Conference Title :** ICFFSHGFT 2024 : International Conference on Functional Food, Safety and Health Guidelines in Food Technology

**Conference Location :** New York, United States

**Conference Dates :** April 22-23, 2024