

Development of ultrasound assisted solid liquid extraction method for the recovery of bioactive compounds from cocoa shell by-product as natural source of functional ingredient.

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Abstract:

Cocoa beans (*Theobroma cacao* L.) are one of the largest cultivated crops all over the world, producing large amount of by-products. The huge by-product production causes an enormous economic loss and also several environmental problems. Today cocoa shell by-product is not used and scattered among the cocoa plantation until its rots. However, because of its content in bioactive compounds, such as methylxanthines (theobromine, caffeine), it could be interesting valorise this by-product as valuable source of bioactive compounds for production of nutraceutical products. In fact, methylxanthines have important properties, for example neurostimulant and anti-inflammatory properties or relaxing effect for smooth muscles, such as bronchial muscles. The aim of the present study was to develop and optimize an extraction process for recovery of bioactive compounds from cocoa shell by-product. The extraction of cocoa shell was carried out by ultrasound assisted solid liquid extraction (USAE) and all parameters affected on extraction efficiency were optimized by using a chemometric approach. The chemical composition of USAE extract was characterized by UHPLC-HRMS and the main compounds theobromine and caffeine were quantified by UHPLC-UV (283 nm), moreover the antioxidant capacity was evaluated by in vitro assays (DPPH). The selective recovery of theobromine and caffeine from cocoa shell by-products can be consider a promising way to obtain bioactive ingredients to use in food, pharmaceutical and cosmetic industries.