**Formulation of Spice Oleoresin Emulsions using Natural Emulsifiers and Stabilizing Agents**

**Selvakumar Murugesan**, Gowtham Palanisamy, N Sai Prasanna, Trivikram Nallamilli, KSMS Raghavarao

Department of Chemical Engineering, Indian Institute of Technology Tirupati, Tirupati - 517619, Andhra Pradesh, India.

Emulsion technology has been widely applied in pharmaceutical and food industries to create a diverse range of products. An Oil-in-Water is a stable emulsion system, in which an oily phase is dispersed into an aqueous phase. This Oil-in-Water emulsion is mainly useful for delivering hydrophobic bioactive compounds, especially in food and pharmaceutical applications. Black pepper, “King of Spices” or “Black Gold”, is one of the most vital and widely consumed spices in the world. Black Pepper Oleoresin (BPO) is a combination of essential oils and resin, which are responsible for the flavour profile and pungency of black pepper, respectively. Due to the presence of hydrophobic components and viscous resin, PO is not easily dispersible in food matrices. The study aims to formulate a stable Oil-Water emulsion with BPO using a natural emulsifier (lecithin) and stabilizing agents such as Gum Arabic, Chitosan, Pectin, and Fructooligosaccharide (FOS) by ultrasonication method. The BPO-Lecithin emulsions (BPO-LEs) were developed with lecithin (8% w/w) at ultrasonication conditions of 40% amplitude and 5 min time. The formulated BPO-LE has an average droplet diameter of 257.33 ± 6.6 nm and a zeta potential of -65.35 ± 1.48 mV. Among four natural stabilizing agents, FOS resulted in stable BPO-LEs with a droplet diameter of around 230 to 450 nm and zeta-potential of around -40 to -60 mV when the FOS content is varied in the range of 10-50% w/w. The best results are observed for emulsion with FOS content of 50% w/w with droplet size (440.4 ± 17.08 nm) and zeta potential (-57.2 ± 3.68 mV), and stability of over one month at ambient conditions (25ºC ± 2). The viscosity, density, FTIR, and microstructure of the BPO-LEs were assessed in order to understand their stability. The encapsulation efficiency of 50% w/w FOS-incorporated BPO-LE was 80 ± 0.74 %. The antioxidant activity of BPO, BPO-LEs, and FOS-stabilized BPO-LEs was also evaluated. The present investigation suggests that FOS-stabilized BPO-LEs can potentially be used in food and nutraceutical applications.

**Reference**

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