

Extraction, radical scavenging activities and physicochemical fingerprints of black pepper (*Piper nigrum*) extract

Olusegun Abayomi Olalere¹  · Nour Hamid Abdurahman¹ · Oluwaseun Ruth Alara¹

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Abstract Black pepper (*Piper nigrum*) is an essential tropical crop which doubled as spice in food industries and medicine in the treatment of free radical related disorders. For this study, microwave reflux method was employed in the extraction of bioactive oleoresin from black peppercorns. Extraction parameters such as irradiation time, microwave power, feed particle size and molar ratio were optimized. The effects of these parameters on the oleoresin yield and antiradical activities were investigated using a multi-level Taguchi methodology. The results obtained placed the optimum extraction condition at 120 min irradiation time, 350 W microwave power, 0.105 mm feed particle size and 12 g/ml molar ratio. Under this optimal condition, the oleoresin yield was obtained as 5.64% (w/w). However, the optimum percentage inhibitions of the extracted spice oleoresins on the stable DPPH and hydrogen peroxide radicals were estimated to be 88.75 and 90.31%, respectively. Moreover, the Fourier transform infrared (FTIR) analysis confirmed the presence of unsaturated amide groups, which validated the antioxidant potential of the black pepper extract. The scanning electronic microscopy (SEM) further elucidated the structural transformation of black pepper from the pulsed microwave heating effect.

Keywords Antioxidants · Black pepper · Characterization · Free radicals · Microwave extraction · Taguchi optimization

✉ Olusegun Abayomi Olalere
olabayor@gmail.com

¹ Faculty of Chemical Engineering & Natural Resources,
Universiti Malaysia Pahang, Lebuhraya Tun Razak, Kuantan,
26300 Gambang, Pahang Darul Makmur, Malaysia