

Application of response surface methodology to optimize maceration extraction of antioxidants from *Cosmos caudatus*

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Cosmos caudatus has been proclaimed as a high source of bioactive compounds such as chlorogenic acid, quercetin and ascorbic acid. Reported evidence indicated that *C. caudatus* exhibits high antioxidant activities. This study is undertaken to study the effect of extraction time and ethanol concentration on yield and DPPH scavenging activity and to optimize the maceration extraction conditions for *C. caudatus*. Response surface methodology (RSM) based on central composite design (CCD) was applied to obtain significant variables and the optimum conditions. The independent variables were extraction time (h) and ethanol concentration (% v/v). The range of the extraction time was between 6 to 24 h and ethanol concentration was 30 to 100% (v/v). The dependent variables were yield (%) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging activity (%). Results show that extraction yields ranged between 11% and 25% and DPPH scavenging activity ranged between 29% and 99%. Yield was only influenced by ethanol concentration. However, both extraction time and ethanol concentration significantly affected towards DPPH scavenging activity. Maximum yield and DPPH scavenging activity are the optimal extract qualities. Thus, the optimal conditions were 24 h extraction time and 84% (v/v) ethanol concentration. The experimental values agreed with those expected by RSM models, showing the eligibility of the method used and RSM's performance in optimizing the conditions of extraction.

Keywords: *Cosmos caudatus*, Antioxidant activity, DPPH, Yield, Ethanol concentration, Extraction time