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Optimisation of phenolic compounds and antioxidant capacity of Trigona honey and propolis using response surface methodology from fermented food products

(2021) *International Food Research Journal*, 28 (6), pp. 1233-1244.

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Abstract

Honey and propolis are honeybee products that are becoming increasingly common as a result of their ability to improve human health. The optimal combination of honey and propolis fortotal phenolic content (TPC), total flavonoid content (TFC), and antioxidant capacity wereanalysed for Trigona honey and propolis aqueous extracts using response surfacemethodology and a central composite design. The effect of honey (X1: 15 - 16.5 g) andpropolis (X2: 13.5 - 15 g) on the total phenolic content (TPC, Y1), total flavonoid content(TFC, Y2), antioxidant capacity (DPPH, Y3; ABTS, Y4), and FRAP (Y5) were tested. Theexperimental outcomes were adequately fitted into a second-order polynomial modelregarding TPC (R2 = 0.9539, p = 0.0002), TFC (R2 = 0.9209, p = 0.0010), antioxidant activity(DPPH, R2 = 0.9529, p = 0.0002; ABTS, R2 = 0.9817, p < 0.0001), and FRAP (R2 = 0.9363, p= 0.0005). The optimal percentage compositions of honey and propolis were 15.26 g (50.43%)and 15 g (49.57%), respectively. The predicted results for TPC, TFC, DPPH (IC50), ABTS,and FRAP were 162.46 mg GAE/100 g, 2.29 mgQE/g, 14.52 mg/mL, 564.27 µMTE/g, and3.56 mMTE/g, respectively. The experimental outcomes were close to the predicted results:152.06 ± 0.55 mg GAE/100 g, 2.21 ± 0.05 mg QE/g, 13.85 ± 0.34 mg/mL, 555.22 ± 36.84µMTE/g, and 3.71 ± 0.02 mMTE/g, respectively. It was observed that the optimalcombination of honey and propolis provided the highest antioxidant yield and can be used asfunctional foods, cosmetics, and medical and pharmacological ingredients

Author Keywords

Antioxidant; Flavonoid content; Phenolic content; Response surface methodology; Trigona honey; Trigona propolis

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Publisher: Universiti Putra Malaysia

ISSN: 19854668
Language of Original Document: English
Abbreviated Source Title: Int. Food Res. J.
2-s2.0-85126363451
Document Type: Article
Publication Stage: Final
Source: Scopus