

EVALUATION OF THERMAL STABILITY OF NATURAL ANTIOXIDANTS EXTRACTED FROM *EMBLICA OFFICINALIS* SEED AND *ANNONA MURICATA* L. FRUIT PEEL AND SEED ON SENSORY PROPERTIES OF SPONGE CAKE

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Food by-products are rich in natural antioxidants that address health issues effectively. The present study aimed to determine the effect of phenolic antioxidants extracted from *Embllica officinalis* seed (ESE), *Annona muricata* seed (ASE), and *A. muricata* fruit peel (APE) on the sensory properties of sponge cakes. The phenolic antioxidants were extracted using ethanol: water (70:30) solvent system. The total phenolic content (TPC) was determined using Folin-Ciocalteu's method and expressed as grams of gallic acid equivalents (GAE) per kilogram of sample. The antioxidant activity and thermal stability of extracts were evaluated using ferric reducing antioxidant power (FRAP) assay and compared with synthetic antioxidants: butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA), and tert-butyl hydroquinone (TBHQ) at different concentrations (50, 100, 150, 200 and 250 µg/mL). The effect of antioxidants was determined in sponge cake using a standard recipe with 200 mg/kg of antioxidants. Sensory evaluation was conducted to assess the sensory attributes (i.e. appearance, colour, taste, odour, texture, overall acceptability) of prepared sponge cakes using an 11-point hedonic scale and compared with control without added antioxidants. Results showed that the TPC (g GAE/kg) of ESE (374.22±5.09) was significantly higher ($p<0.05$) than APE (316.44±1.92) and ASE (6.92±0.55). ASE showed the highest antioxidant activity with a reducing power of 188.05±1.42% than BHT (121.23±2.68%) and BHA (135.57±1.12%) at 200 µg/mL. However, the antioxidant activity of TBHQ was higher in all concentrations. More than 80% of the antioxidant activity of ESE, ASE, and APE was retained after heating at 180 °C. The ranking order of thermal stability showed as ESE>TBHQ>APE>ASE>BHT>BHA. Sensory scores for all attributes of sponge cakes were not significantly different ($p>0.05$) from the control except for texture and overall acceptability in ESE-added sponge cakes that showed significantly higher scores ($p<0.05$). This research has proven that natural antioxidants are promising alternatives for synthetic antioxidants, considering their thermal stability and effect on sensory characteristics.

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Keywords: Antioxidant activity, Phenolic antioxidants, Sensory evaluation, Thermal stability, Total phenolic content