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Modelling the Physicochemical Properties of Papaya Based-Cookies Using Response Surface Methodology

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Abstract : The development of healthy cookies for health-conscious consumers cannot be overemphasized in the present global health crisis. This study was aimed to evaluate and model the influence of ripeness levels of papaya puree (unripe, ripe and overripe), oven temperature (130°C, 150°C and 170°C) and oven rack speed (stationary, 10 and 20 rpm) on physicochemical properties of papaya-based cookies using Response Surface Methodology (RSM). The physicochemical properties (baking time, cookies mass, cookies thickness, spread ratio, proximate composition, Calcium, Vitamin C and Total Phenolic Content) were determined using standard procedures. The data obtained were statistically analysed at $p \leq 0.05$ using ANOVA. The polynomial regression model of response surface methodology was used to model the physicochemical properties. The adequacy of the models was determined using the coefficient of determination (R^2) and the response optimizer of RSM was used to determine the optimum physicochemical properties for the papaya-based cookies. Cookies produced from overripe papaya puree were observed to have the shortest baking time; ripe papaya puree favors cookies spread ratio, while the unripe papaya puree gives cookies with the highest mass and thickness. The highest crude protein content, fiber content, calcium content, Vitamin C and Total Phenolic Content (TPC) were observed in papaya based-cookies produced from overripe puree. The models for baking time, cookies mass, cookies thickness, spread ratio, moisture content, crude protein and TPC were significant, with R2 ranging from 0.73 – 0.95. The optimum condition for producing papaya based-cookies with desirable physicochemical properties was obtained at 149°C oven temperature, 17 rpm oven rack speed and with the use of overripe papaya puree. The Information on the use of puree from unripe, ripe and overripe papaya can help to increase the use of underutilized unripe or overripe papaya and also serve as a strategic means of obtaining a fat substitute to produce new products with lower production cost and health benefit.

Keywords : papaya based-cookies, modeling, response surface methodology, physicochemical properties
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