

Title: Impact of Palm-Based Milk on the Functional Properties of Kaya Spread

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Abstract:

Kaya is a traditional Southeast Asian spread, widely consumed in Malaysia, Singapore, and Indonesia. It is typically made from coconut milk, sugar, eggs, and occasionally thickened with starch. However, the heavy reliance on coconut milk presents sustainability concerns due to the environmental impact of coconut farming, which includes limited land productivity and labour-intensive harvesting. In contrast, palm-based milk derived from oil palm plantations, offers a more sustainable alternative due to the higher yield and resource efficiency of oil palm cultivation. This study explores the development of a sustainable kaya spread by substituting coconut milk with palm-based milk, aiming to promote the latter as an environmentally friendly alternative in traditional food applications. Three formulations were evaluated: 100% coconut milk (control), 100% palm-based milk, and a 50:50 combination of both. A comprehensive physicochemical assessment was conducted, including measurements of pH, rheology, particle size distribution, colour (L^* , a^* , b^*), and texture. The pH values did not differ significantly among the samples ($p > 0.05$), indicating comparable acidity levels. Rheological analysis revealed that all formulations exhibited shear-thinning behaviour, where viscosity decreased with increasing shear rate, a desirable trait for spreads, as it allows easier flow during application. Notably, the 100% palm-based milk formulation recorded the lowest shear stress, suggesting a more flowable and adaptable gel structure. Particle size analysis showed that the 100% palm-based milk sample had the smallest volume-weighted mean diameter ($D[4,3] = 235.924 \mu\text{m}$), indicating a smoother and more uniform dispersion. In terms of colour, this formulation also exhibited superior brightness retention, supported by higher L^* values. Texture profiling demonstrated that both the 100% palm-based and combination samples had

higher stickiness, implying a more elastic and flexible gel network compared to the firmer structure observed in the control sample. These findings indicate that palm-based milk, either in full or partial substitution, can be effectively incorporated into kaya spread formulations without compromising quality. Moreover, its use enhances certain functional properties, supporting its application as a sustainable alternative to coconut milk in traditional spread products.

Biography:

Norhidayah Suleiman is a Senior Lecturer in the Department of Food Technology, Faculty of Food Science and Technology at Universiti Putra Malaysia (UPM), Selangor, Malaysia. Her expertise in food process engineering, she has actively contributed to advancing green technologies in food systems, particularly through the extraction of functional ingredients using supercritical carbon dioxide (scCO₂) and other advanced extraction technology. Her research emphasizes the integration of sustainable techniques in food processing and the development of value-added food products. Her primary research interests include green extraction technologies, food processing innovation, and the optimization of processes to improve both functional and nutritional quality of food.

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Notes or Comments: