PALM-BASED VEGAN MAYONNAISE

SAW MEI HUEY; NUR HAQIM ISMAIL; NORAZURA AILA MOHD HASSIM
and SIVARUBY KANAGARATNAM

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Mayonnaise and mayonnaise-type dressings are among the oldest emulsions, first commercially manufactured in the early 20th century (Moustafa, 1995). Traditional mayonnaise is a shear-thinning, viscoelastic, and highly viscous oil-in-water emulsion (Štern *et al.*, 2001). The Food and Drug Administration (FDA) defines mayonnaise as an emulsified semi-solid food prepared from at least 65.0% vegetable oil, acidifying agents (vinegar, lemon, or lime juice at a minimum of 2.5% by weight as citric or acetic acid), egg yolks, and other permitted ingredients such as salt, carbohydrate sweeteners, spices, flavourings, monosodium glutamate, sequestrants, and crystallisation inhibitors (Widerström *et al.*, 2017).

In recent years, vegan food has become a growing trend due to health and environmental concerns. The global vegan food market was valued at USD22.3 billion in 2023 and is projected to reach USD57.6 billion by 2032, growing at a compound annual growth rate (CAGR) of 11.2% during the forecast period (Straits Research, 2024). Within this sector, vegan mayonnaise has gained significant popularity, with market demand expected to grow as more consumers shift towards plant-based diets (New Scientist, 2020).

Stable vegan mayonnaise made from palm-based oil has now been successfully developed, thus offering an acceptable texture, aroma, and colour comparable to conventional mayonnaise. This palm-based vegan mayonnaise formulation utilises plant-based emulsifiers and stabilisers to achieve a stable emulsion with a smooth and creamy texture, catering to the increasing demand for vegan, cholesterol-free, and allergen-free food products.

THE TECHNOLOGY

The technology offered involves the formulation and processing method for palm-based vegan mayonnaise, providing a viable alternative to conventional mayonnaise. The process utilises superolein and plant-based ingredients to create a stable mayonnaise emulsion with a smooth and creamy texture. This method is simple and does not require heat or vacuum processing, making it more efficient (*Figure 1*).

Figure 1. The production of palm-based vegan mayonnaise using a 3 kg mixing machine.

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Head of Innovation Commercialisation Center, Malaysian Palm Oil Board. 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia.
Tel: 03-8769 4574 Fax: 03-8926 1337 E-mail: tot@mpob.gov.my Website: www.mpob.gov.my

This vegan mayonnaise incorporates palm fraction, which offers superior oxidative stability compared to other soft oils. As a result, it does not require refrigeration and able to maintain product quality over time. Additionally, the egg-free formulation eliminates allergens and animal-derived ingredients, making it suitable for a wider consumer base, including vegans, vegetarians, and individuals with similar dietary restrictions. Moreover, the raw materials used in this formulation are easily sourced, ensuring cost-effectiveness and feasibility for large-scale production.

The developed palm-based vegan mayonnaise remained stable after six months of storage at 25°C, as shown in *Figure* 2. To predict long-term stability, the sample was subjected to an accelerated stability test using LumiFuge at 4,000 rpm for 7.5 hr, simulating the effects of 24.2 months of real-time storage. The results indicate that the formulated mayonnaise emulsion exhibits high stability, with an instability index of 0.002, corresponding to a projected shelf life of more than 24.2 months under normal storage conditions.

The sensory properties of the developed palm-based vegan mayonnaise were evaluated against commercial vegan and egg-based mayonnaises, as shown in *Figure 3*. The developed palm-based vegan mayonnaise delivers a remarkable sensory experience, closely matching the taste and texture of traditional egg-based mayonnaise while outperforming commercial vegan alternatives. With its rich, creamy texture, balanced flavour, and appealing appearance, this innovative product has received high consumer acceptability ratings, demonstrating its competitiveness with established products.

NOVELTY

The formulated palm-based vegan mayonnaise maintains a creamy texture and excellent emulsification properties while providing a fully plant-based, stable alternative. Unlike conventional mayonnaise, which is typically produced using soft oils such as soybean or sunflower oil, this product is formulated using palm fraction, providing unique advantages. Palm fraction is naturally stable, offering higher resistance to oxidation than traditional soft oils, which helping to extend shelf life.

BENEFITS AND ADVANTAGES

- Fully plant-based alternative.
- Simple processing method.
- Excellent taste and texture.
- Balanced fatty acid composition.
- Flavour can be tailor-made according to preferences *e.g.*, garlic, wasabi, lemon and others flavour.

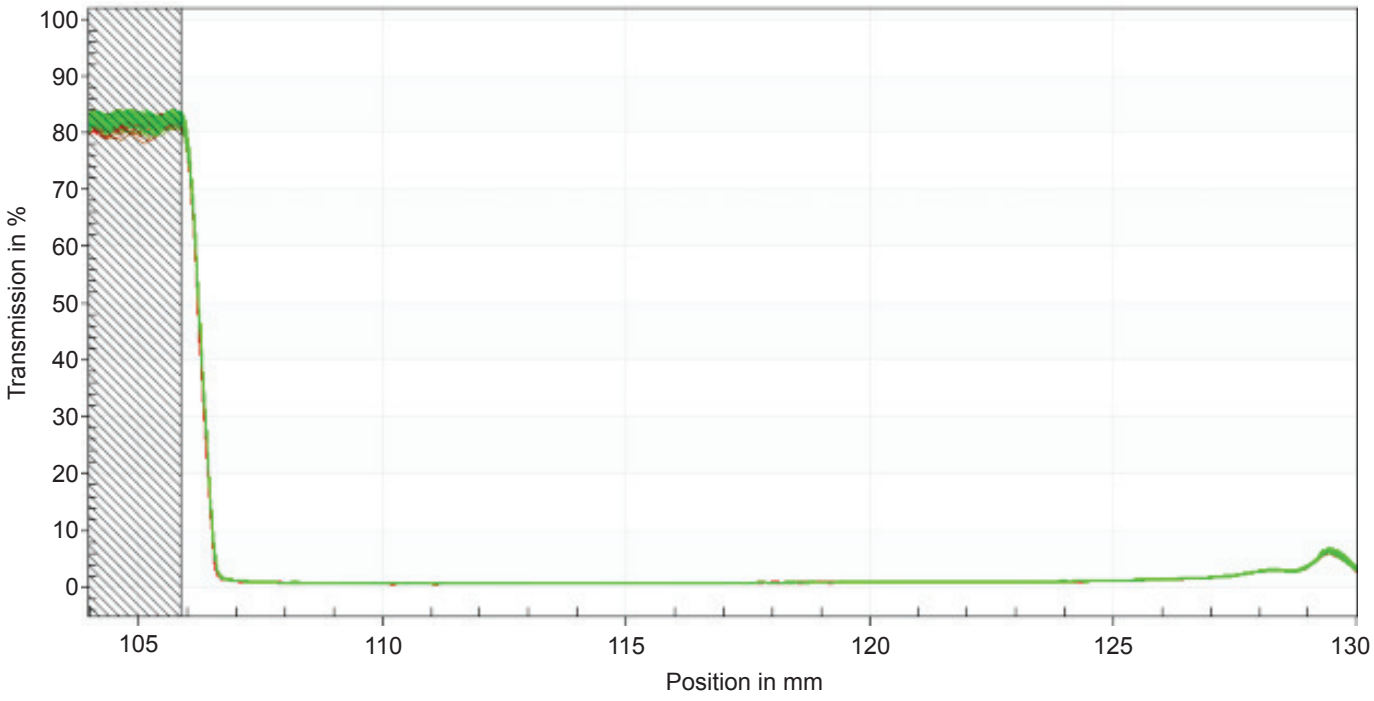

Figure 2. Transmission profile of the developed palm-based vegan mayonnaise sample after six months of storage at 25°C.

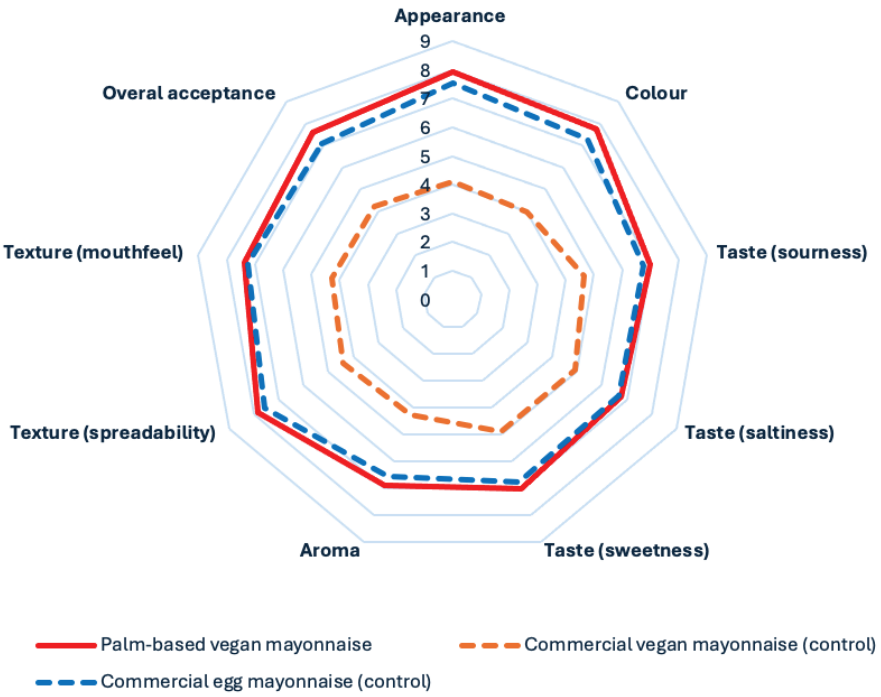

Figure 3. Sensory scores of the developed palm-based vegan mayonnaise compared to commercial vegan and commercial egg mayonnaise.

ECONOMIC ANALYSIS AND COMMERCIAL BENEFITS

The ingredient cost of one 400 g bottle of palm-based vegan mayonnaise is RM2.17. Commercial vegan mayonnaise is sold between RM32.90 and RM59.90 per 390 to 450 g bottle, while commercial egg-based mayonnaise ranges from RM14.00 to RM31.80 per 390 to 450 g bottle.

CONCLUSION

Palm-based vegan mayonnaise offers a promising alternative to conventional mayonnaise with good stability and health benefits of palm-based oils. Its longer shelf-life, resistance to oxidation, and ability to be stored without refrigeration make it a cost-effective and sustainable choice.

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For more information, kindly contact:

Head of Innovation Commercialisation Center, MPOB
6, Persiaran Institusi, Bandar Baru Bangi,
43000 Kajang, Selangor, Malaysia
Tel: 03-8769 4574
Fax: 03-8926 1337
E-mail: tot@mpob.gov.my
www.mpob.gov.my