

PALM-BASED MAYONNAISE

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Mayonnaise is a whippable emulsion containing vegetable oil as the dispersed phase and an aqueous continuous phase, and is made of egg yolk, vinegar, salt, sugar and spices. It is served with sausages, burger patties, chips and salads as food flavouring and to stimulate the appetite for a starter meal. The oil content in mayonnaise is more than 60% [Malaysian Food Act and Regulation, 1983 (2010)] and this contributes to lubricity and the creamy texture of the product.

Soft oils are commonly used as salad oil in mayonnaise production. Soyabean oil (SBO) is the traditional salad oil for mayonnaise. Other soft oils such as sunflower (SFO), olive, cottonseed, safflower, canola and corn oil are also used. These vegetable oils are imported and their prices are expensive compared with that of palm olein.

Palm olein (POo), the liquid fraction of palm oil (PO), can be fractionated into oils with different iodine values (IV). The normal POo (IV 56-58) is used for frying and is not suitable for mayonnaise or salad dressing as the end product hardens during storage at refrigeration temperature. Higher IV (60-67) palm oleins are suitable both as a salad oil and for making salad dressing (Nor Aini, 1995b). They remain clear and have better resistance to cloudiness than POo of lower IV (56-58) (Nor Aini *et al.*, 2007).

In a previous study, Nor Aini (1995a) successfully developed salad dressings using POo (IV 60-67) blended with SFO, which remain pourable at refrigeration temperature (5°C). Nor Hayati *et al.* (2007) reported that a blend of SBO with palm kernel olein (PKOo) in mayonnaise-like emulsions produced the desired stability at 25°C.

The Malaysian Palm Oil Board (MPOB) conducted a research project on mayonnaise using POo of IV (58-70) and its blends with SFO to improve their crystallisation properties at lower temperatures (5°C and 10°C). Palm-based mayonnaises were



Figure 1. Palm-based mayonnaise.

successfully produced and the products had good characteristics in terms of pH (pH 4 - 4.5), particle size (4 - 4.45 microns) and stability at refrigeration temperatures (5°C and 10°C). A palm-based mayonnaise formulated using egg yolk powder (F2) received a high score and was comparable to the control sample.

MATERIALS

POo (IV 58-70) and SFO, and their blends of POo:SFO at different ratios, namely, Blend A, Blend B and Blend C, were used for mayonnaise production.

PRODUCT CHARACTERISTICS

The recommended pH for mayonnaise is in the range of 3.0 - 4.5 with acetic acid as the predominant acid to prevent the growth of



pathogens such as *Salmonella* and *Staphylococcus* bacteria. Figure 2 shows the pH values of experimental mayonnaise using SFO and POo: SFO blends (Blends A, B and C). The pH values of the mayonnaise samples at 5°C and 10°C were not significantly different from one another and fell within the recommended values.

The particle sizes of the mayonnaise samples were 3.06 - 3.30 µm at 5°C, and 4.27 - 4.39 µm at 10°C (Figure 3). Particle size below 4.5 µm is acceptable as giving a better texture.

Temperature stability of the mayonnaise samples are shown in Figure 4. Blend A had better stability at 5°C and 10°C compared with Blends B and C. The stability of Blend A was also comparable to those of the commercial mayonnaises at 10°C (Figure 5).

For sensory evaluation, three palm-based mayonnaises were formulated using Blend A. They were formulations F1, F2 and F3. Formulation F1 was formulated using fresh egg

yolk, F2 using yolk powder and F3 using isolated soya protein (ISP). The commercial soya-based mayonnaise was used as the Control. Overall sensory attributes, namely, appearance, colour, texture and odour, were evaluated, and the scores are shown in Figure 6. Fifteen MPOB panellists participated in the product tasting. Based on Hedonic scales, mayonnaise F2 received the highest scores for appearance, colour and texture. In terms of odour, mayonnaise F1 received a higher score than F2 and the Control. This means that mayonnaise formulated using fresh egg yolk gave a higher intensity of odour compared with using egg yolk in powder form. Overall acceptability showed that mayonnaises F1 and F2 were comparable to the Control. All sensory attributes of the formulated mayonnaises were not significantly different from that of the Control.

NOVELTY

- A palm-based mayonnaise with soft and smooth texture at 5°C.

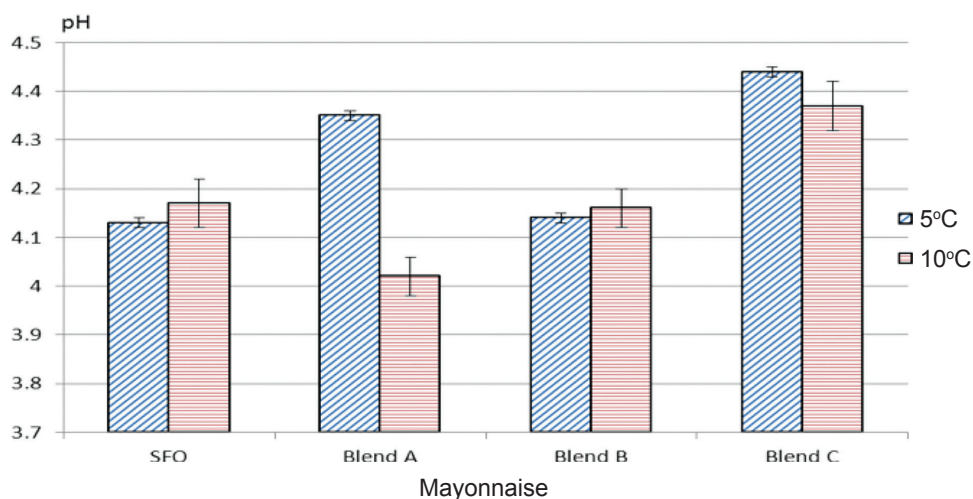


Figure 2. The pH values of mayonnaises using sunflower oil and blends of palm olein: sunflower oil blends (Blend A, Blend B and Blend C).

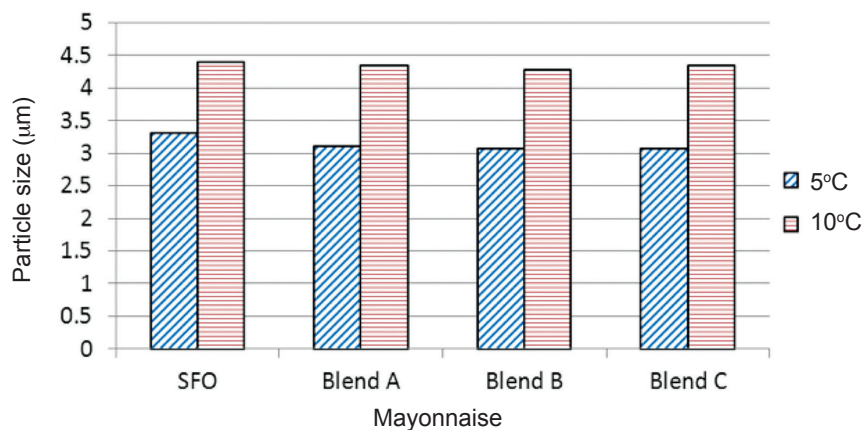


Figure 3. Particle sizes of mayonnaises using sunflower oil and blends of palm olein: sunflower oil blends (Blend A, Blend B and Blend C).

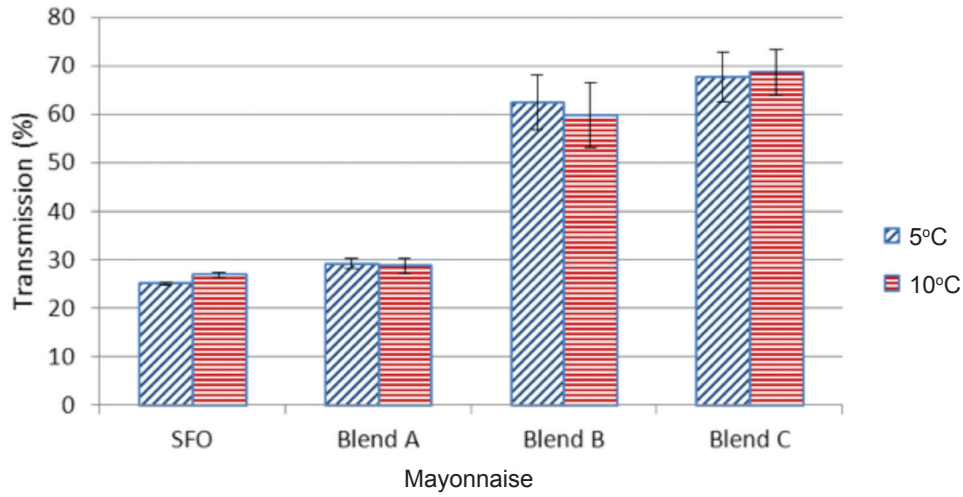
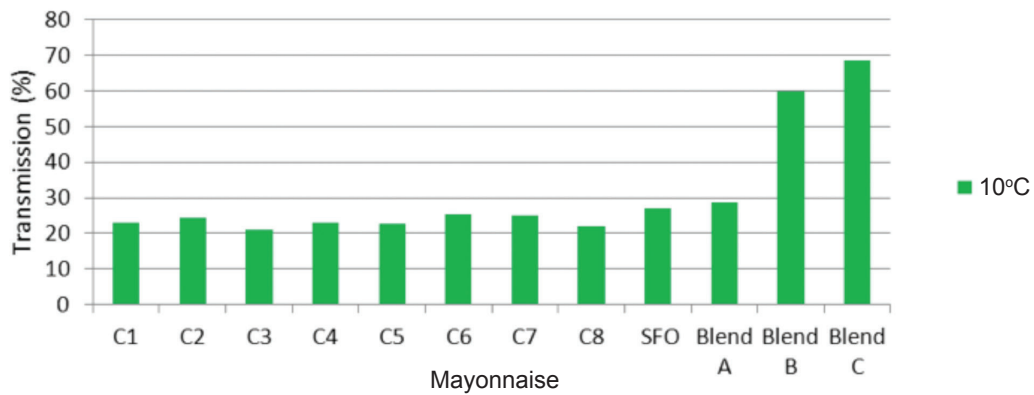
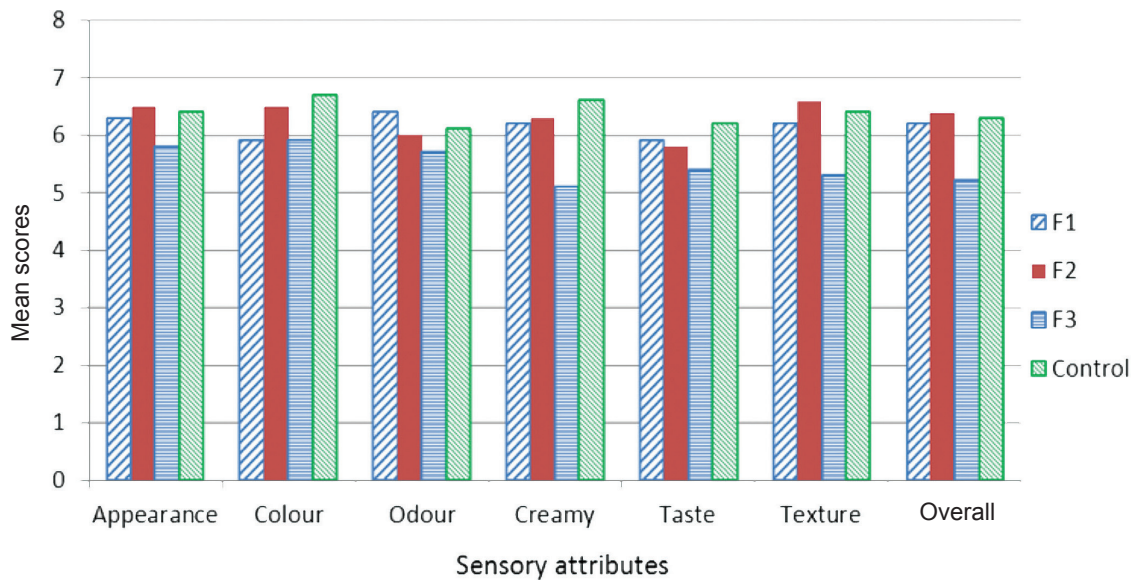


Figure 4. Temperature stability of mayonnaises of sunflower oil and blends of palm olein:sunflower oil blends (Blend A, Blend B and Blend C).



Note: C1-C8 = commercial mayonnaise; SFO = sunflower oil; palm olein: sunflower oil blends (Blend A, Blend B, Blend C)

Figure 5. Stability of commercial and experimental mayonnaises at 10°C.



Note: F1= palm-based mayonnaise; F2= palm-based mayonnaise + yolk powder; F3= palm-based mayonnaise + isolated soya protein; Control = soya-based mayonnaise. n = 15; Hedonic scales: 1 to 9; 1 denotes strongly unacceptable and 9 denotes strongly acceptable.

Figure 6. Sensory evaluation of palm-based mayonnaises.

TABLE 1. ESTIMATED EXPENDITURE AND ECONOMIC VALUES

Item	Value
Capital expenditure	RM 508 000
Materials cost (kg ¹)	RM 7.80
Benefit to cost ratio	1:1.07
Payback period	2 years
Internal rate of return (IRR)	35%
Net present value (NPV)	RM 197 553.90
Return on investment (ROI)	57.43%

ADVANTAGES OF PALM-BASED MAYONNAISE

- Soft and smooth texture.
- Economical.
- Uses *trans*-free fat.

MARKET POTENTIAL

Palm-based mayonnaise has the potential markets in hotels, fast food restaurants, retailers and catering services. The product has good potential for both the domestic and global markets.

ECONOMIC EVALUATION

The estimated expenditure and other economic parameters for producing palm-based mayonnaise are shown in *Table 1*. The estimated total investment cost is RM 508 000. At a production level of 300 000 kg per annum and at a long-term price of RM 12.50 per kg, it will generate an income of RM 189 400 per year. The prospects in palm-based mayonnaise are attractive with a payback period of two years.

CONCLUSION

Mayonnaise produced using Blend A is stable at refrigeration temperatures (5°C-10°C). It is comparable to mayonnaise made with SFO at the same storage temperatures (5°C-10°C) and commercial samples at 10°C.

REFERENCES

- MALAYSIAN FOOD ACT AND REGULATION 1983 (2010). ISBN: 978-967-89-2075-9.
- NOR AINI, I (1995a). Use of palm olein in salad dressings. *PORIM Information Series No. 26:1-2*.
- NOR AINI, I (1995b). Application of palm oil products in salad dressing. *Palm Oil Developments No. 23:1-3*.
- NOR AINI, I; NOOR LIDA, H M D; AZMAN, I and HANIRAH, H (2007). Palm blends for temperate climates. *MPOB Information Series No. 369:1-4*.
- NOR HAYATI, I; CHE MAN, Y; TAN, C P and NOR AINI, I (2007). Stability and rheology of concentrated O/W emulsions based on soyabean oil/palm kernel olein blends. *Food Research International, 40:1051-1061*.

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