

TRANS-FREE PALM-BASED SHELF-STABLE MARGARINE FORMULATION

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Trans-free palm-based shelf-stable margarine was formulated from palm oil derivatives without hydrogenation. The margarine, processed in a scraped-surface heat exchanger (was filled in containers of 10 and 20 kg and could be marketed for baking and shallow frying) (Figure 1). The formulation has a melting point of 36°C - 37°C, and is thus suitable for tropical and hot regions.

The current requirement in many countries for food products to be free of *trans*-fatty acids has led food formulators, especially those of margarines and shortenings, to switch to non-hydrogenated fats as raw materials, and interesterified fats are one of the alternatives commonly used. Basically, this is to obtain a stock similar to hydrogenated oils, while liquid oils can be used to the maximum in the formulation. Palm oil and its derivatives, with various physical properties, are now known to many as one of the best solutions for *trans*-free formulations. Similar to other margarines, a shelf-stable margarine would contain a minimum 80% fat phase and maximum 16% water phase plus other ingredients (Faur, 1996). The solid fat content (SFC) profile is important in providing the required melting properties in the mouth and 'fresh' feeling on the tongue when consuming



Figure 1. Palm-based shelf-stable margarine.

bread with the margarine applied on it but a shelf-stable margarine should also be able to be well worked with dough (Charteris and Keogh, 1991). The dough should not stiffen nor collapse during tempering. As the slip melting point (SMP) of shelf-stable margarine is higher than that of table margarine, filling can be done at a higher temperature and the plant operated at maximum capacity without affecting the product quality (Miskandar *et al.*, 2002). Tempering is only done at 2°C higher than the filling temperature (Teah *et al.*, 1983). Thus, practically a normal warehouse is sufficient.

A current margarine formulation developed by MPOB meets the general requirements for a good shelf-stable margarine without using any *trans*-fatty acids.

PRODUCT SELLING POINT

Fully palm oil derivatives, *trans*-free and low cost of production.

PRODUCT CHARACTERISTICS

Although the formulation was designed to use cheaper raw materials, it nevertheless, has a close SFC profile to two popular industrial margarines (Figure 2). At 20°C, the SFC of the formulation is 25% which meets the basic requirement for efficient dough working (Stauffer, 1996). It has 10% SFC at 30°C, which ensures no oil separation at high temperatures, and 2%-4% SFC at 37°C to confer good melting in the mouth.

Storing the product for 25 days at 20°C and 30°C showed it to be reasonably stable with no significant ($P > 0.05$) hardening (Figure 3). The consistency was also very similar to three commercial margarines (Figure 4). According to Teah *et al.* (1983), the yield of the product falls between the desirable range for good and spreadable margarines, which also indicates good dough working consistency.

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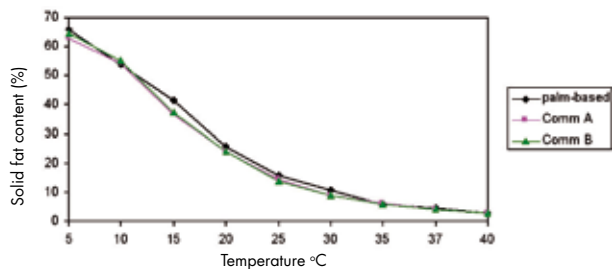


Figure 2. Solid fat content profiles of palm-based and commercial African margarines.

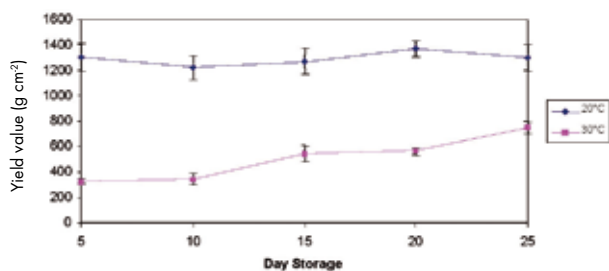


Figure 3. Penetration yield at 20°C and 30°C for 25 days.

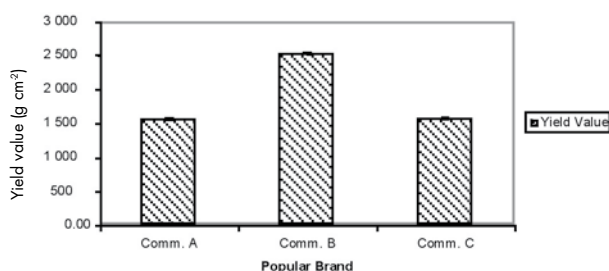


Figure 4. Penetration yield value of three commercial samples.

Microscopic evaluation showed the crystals to be homogeneously distributed with not much clumping, indicating that the margarine will remain stable and smooth during storage (Figure 5). The result indicates that the product can be

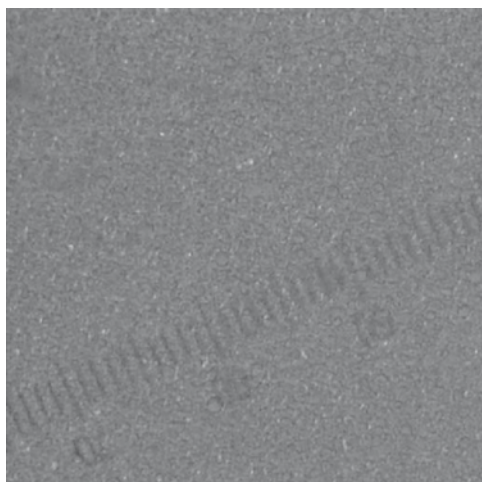


Figure 5. Crystal development after 25 days' storage at 30°C (mag. 10x10).

used from 20°C to slightly over 30°C without oil separation and 'sandiness' from crystal migration.

INVESTMENT OPPORTUNITY

No additional capital investment is needed by an existing margarine producer. The product can be added to the existing product array.

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